

Chapter 3. Affected Environment and Environmental Consequences

In this chapter, the physical, biological, social, and economic characteristics of the environment at and near the Old Columbine and Turkey Flat recreation residence tracts are described in as much detail as possible to define the baseline condition of the area of potential effect (APE). Areas of potential effect may vary by resource. The legal coordinates of the tracts were given in chapter 1, and the layout of residences is shown in figures 7 and 8.

The baseline description of the environment is followed by an evaluation of the potential for each alternative to impact specific resources. Sources of potential impacts are identified, followed by an assessment of direct, indirect, and cumulative effects.

Each impacts assessment includes a description of the approach used to evaluate proposed activities; references scientific or other sources of data and information; discusses credible opposing views, if any; and discloses incomplete or unavailable information, scientific uncertainty, and risk (40 CFR, 1502.9 (b), 1502.22, 1502.24). Further, the analysis of impacts to each resource is based on current, best available scientific and commercial information to ensure the scientific integrity of the discussions (36 CFR 219.36 (a)).

Not all resource impacts are measurable or quantifiable. Where this is the case, a qualitative judgment is made regarding the degree of effect on the resource. Guidelines related to significance generally fit into two main categories:

- Emissions based, comprising standards for air and water quality, noise, etc., and
- Environmental quality based, comprising significance criteria for valued ecosystem components or similar attributes, such as biodiversity.

A determination that an impact is significant is based upon an actions effect on thresholds established for each resource. That is, for each resource, there is a threshold above which a potential impact is considered significant. For example, an impact to air quality may be considered significant if it increases the ambient concentration of a specific chemical element or compound above the concentration established by a resource management agency, such as the U.S. Environmental Protection Agency (EPA), for the protection of human health and safety. Thresholds also provide a tool to predict whether it is likely that the impacts identified as potentially significant can be avoided, reduced, or mitigated to a less than significant level.

The CEQ regulations for implementing NEPA define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7).” The combined, incremental effects of human activity, referred to as cumulative effects, may pose a serious threat to the environment. Although an impact may be insignificant by itself, it may contribute to cumulative effects that accumulate over time, from one or more sources, and result in the degradation of important resources.

Because the spatial (geographic) and temporal (time) characteristics of an APE differ for each resource, each cumulative effects analysis that follows includes a definition of the APE. The Pinaleno Mountains, in general, are the broad area of consideration for the cumulative effects analysis reported in this EIS. Past, present and reasonably foreseeable future activities within this area are listed in table 2, with corresponding locations shown on figure 3.

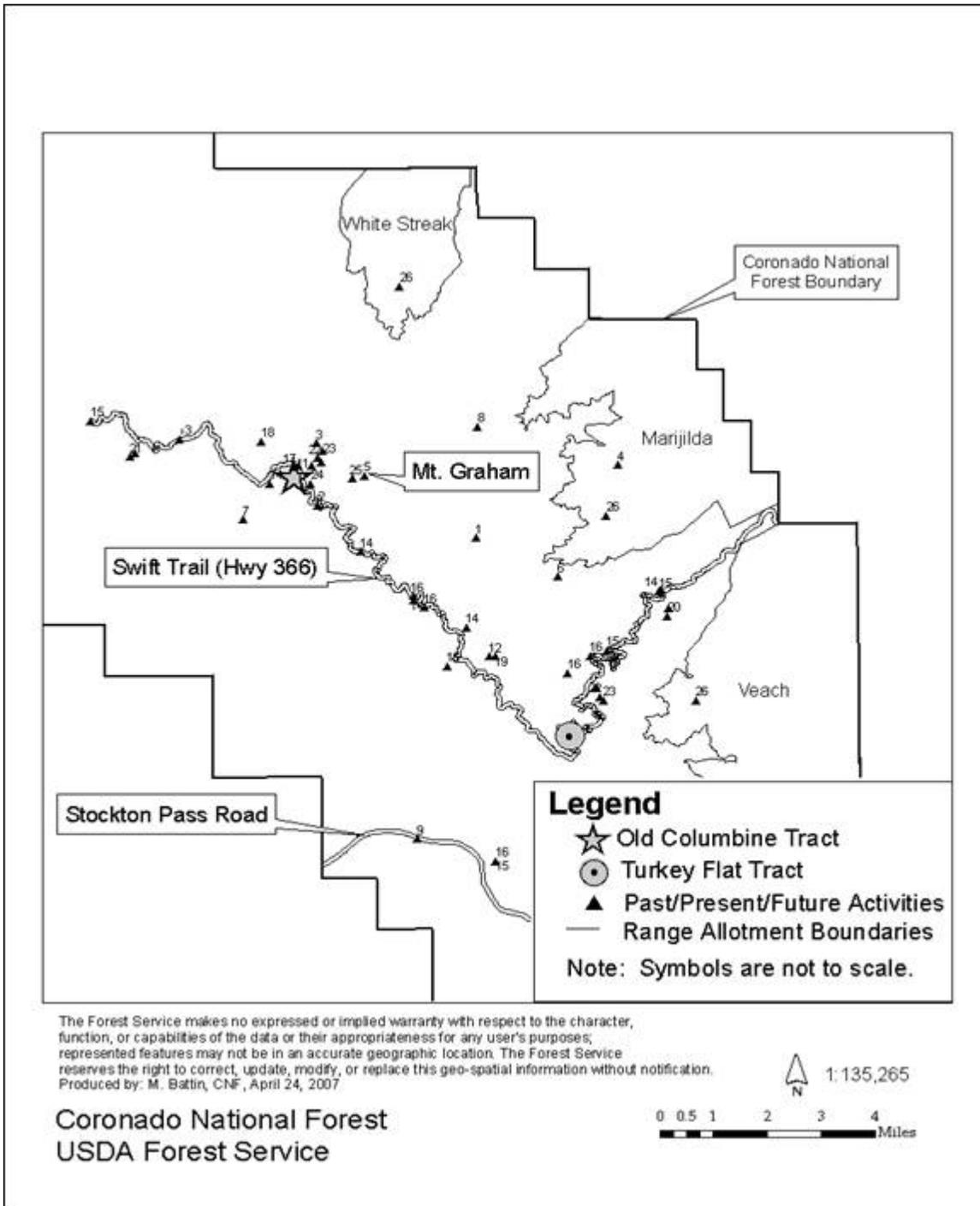


Figure 3. Relative locations of reasonably foreseeable actions near the Safford recreation residence tracts (Note: Numbers in figure 3 correspond to those activities listed in table 2)

Table 2. Past, present, and reasonably foreseeable actions considered in the cumulative effects analysis reported in this EIS

Number on Map (Figure 3)	Activity	Approximate Date	Area Affected
1 (not shown)	Introduction of Abert's squirrel (<i>Sciurus aberti</i>)	1940s	all
2	Timber sales ¹	1943 to 1973	7,924 acres
3	Arizona Bible Camp (special-use permit)	1966 to present	20 acres
4	Marijilda Fire	1989	363 acres
5	Mt. Graham International Observatory (MGIO) (special-use permit)	1988	24 acres
6	Graham Complex Fire	1993	544 acres
7	Clark Peak Fire	1996	4,948 acres
8	Nuttall Complex Fire	2004	29,698 acres
9	Paved roads: Swift Trail (Hwy. 366) and Stockton Pass Highway	1960 to 1980s	37 miles
10	Pinaleño Ecosystem Management (PEM) project (fuel reduction: mechanical)	2001 to present	1,100 acres
11	Pinaleño Ecosystem Restoration project (PERP) (fuel reduction, habitat improvement)	2008 to 2018	5,800 acres
12	Reconstruction of Heliograph Lookout	2006 to 2007	< 1 acres
13	Trails (41)	Ongoing	155 miles
14	Developed campgrounds (Noon Creek, Shannon, Hospital Flat, Cunningham, Columbine Corrals, Soldier Creek and Riggs)	Ongoing	25.5 acres
15	Picnic sites and trailheads (Stockton Pass, Old Noon Creek, Round-the-Mountain, Wet Canyon, Clark Peak)	Ongoing	3.5 acres
16	Group use areas (Stockton Pass, Upper Arcadia, Upper Hospital Flat, Snow Flat, Treasure Park, and Twilight)	Ongoing	26.75 acres
17	Columbine Visitor Information Station	Ongoing	1 acre
18	Administrative facilities (Noon Creek, Heliograph, Webb Peak, West Peak, and Columbine)	Ongoing	7 acres

Number on Map (Figure 3)	Activity	Approximate Date	Area Affected
19	Electronic sites (Heliograph and Ladybug) (special-use permits)	Ongoing	7 acres
20	Angle Orchard (special-use permit)	Ongoing	2 acres
21	Dam/reservoir (special-use permit)	Ongoing	13 acres
22	Water systems associated with Old Columbine and Turkey Flat recreation residence tracts	Ongoing	2.1 miles
23	Waterlines (six special-use permits)	Ongoing	Unknown ²
24	Fuel Reduction at five special-use sites	2007	250 acres
25	Microwave dish installation	2007	On MGIO site
26	Grazing allotments (active) in Ash Creek and Jacobson Canyon subwatersheds <ul style="list-style-type: none"> • White Streak • Veach • Marijilda 	Ongoing	1,668 acres 487 acres 1,046 acres

¹ Logging was carried out in the mixed conifer and spruce-fir stands from 1946 to 1973.

² Forest Watershed and Program Manager Bob Lefevre reports that this information is unavailable (4/24/08).

Air Quality

The forest plan establishes the following standard and guideline for air resources; it is applicable to all areas of the Coronado NF.

“All management practices would be planned so that air quality would meet local, State, and Federal standards (USDA-FS, 1986, p. 45-1).”

Affected Environment

To conserve and protect the ambient air quality of the United States, provisions of the Clean Air Act (CAA) directed the EPA to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that affect human health and welfare. The CAA also directed EPA to establish criteria to protect and maintain clean air in natural areas, such as designated wilderness areas, national parks and national forests.

Subsequently, EPA established NAAQS for primary air pollutants that are known to adversely affect human health; these are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), and particulate matter (PM). Threshold concentrations of these pollutants were established and continue to be updated. Networks of ambient air pollutant monitoring stations record data on air quality across the U.S., and enforcement actions are taken by EPA and states to remediate violations of NAAQS.

Further, the CAA established air quality standards for various classes of airshed: Class I airsheds are the most restrictive and generally include national parks and wilderness areas; Class II generally comprises rural areas.

The air quality analysis reported in this DEIS is focused on impacts to the Upper Gila River airshed, designated as Class II (see figure 4). Atmospheric pollutants in this airshed typically result from wildland fires, prescribed fires, and dust from traffic and other activities on unpaved roads. Gasoline engine exhaust emissions and propane combustion are additional sources of pollutants in the airshed.

Ambient air quality in the airshed and at the recreation residence tracts is very good because of its relative isolation from urban centers, major highways, limited access, extensive vegetation ground cover, and the large scale of the analysis area. As of December 5, 2006, the area was in attainment of NAAQS (US-EPA, 2006).

Environmental Consequences

Direct and Indirect Effects

Direct impacts to air quality are those that result from emissions of pollutants from various sources to the atmosphere. Point sources of pollutant emissions include chimneys, smokestacks, and other structures that provide a discrete release point. Nonpoint sources result from soil-disturbing activities, such as vehicle travel on a dirt road or ground disturbance by a bulldozer, and smoke from a fire that indiscriminately releases pollutants over a broad area rather than a single release point.

The measure of significance of atmospheric releases is based on a comparison of the predicted concentration of each pollutant at or beyond a site boundary or within the boundary on public roads, to an established standard, such as a NAAQS, and consideration of the potential for the expected concentration to adversely affect a sensitive receptor, human and otherwise.

Many of the Safford recreation residences have wood-burning fireplaces or stoves, propane stoves and heaters, gasoline generators, and unpaved driveways and access roads. The quantity of pollutant emissions from these sources is extremely minimal and intermittent, related to the season of use of the recreation residences, which is approximately May 1 to mid-October, and the duration of occupancy. Occupancy is most often on a few weekends per season and an occasional stay of a week or more.

If no action is taken (alternative 1), emissions from recreation residences would cease after the 10-year closeout permit expires. However, during removal of the residences, local ambient air quality may be temporarily affected by smoke from localized burning of combustible materials and by dust from increased vehicle travel to and from the tracts. If this occurs, local concentrations of particulate matter (PM-10) may increase sporadically for up to a week, depending on the quantity and type of material burned and the duration of burning. Changes in ambient PM-10 concentrations would be discountable. These emissions would in no way adversely affect the attainment of NAAQS in the airshed.

Implementation of alternative 2 (proposed action) would not change the ambient air quality at the recreation residence tracts or the quality of the airshed. Attainment of NAAQS would not be affected.

The effects of implementing alternative 3 would be the same as either alternative 1 or alternative 2, depending on which residences are removed or retained.

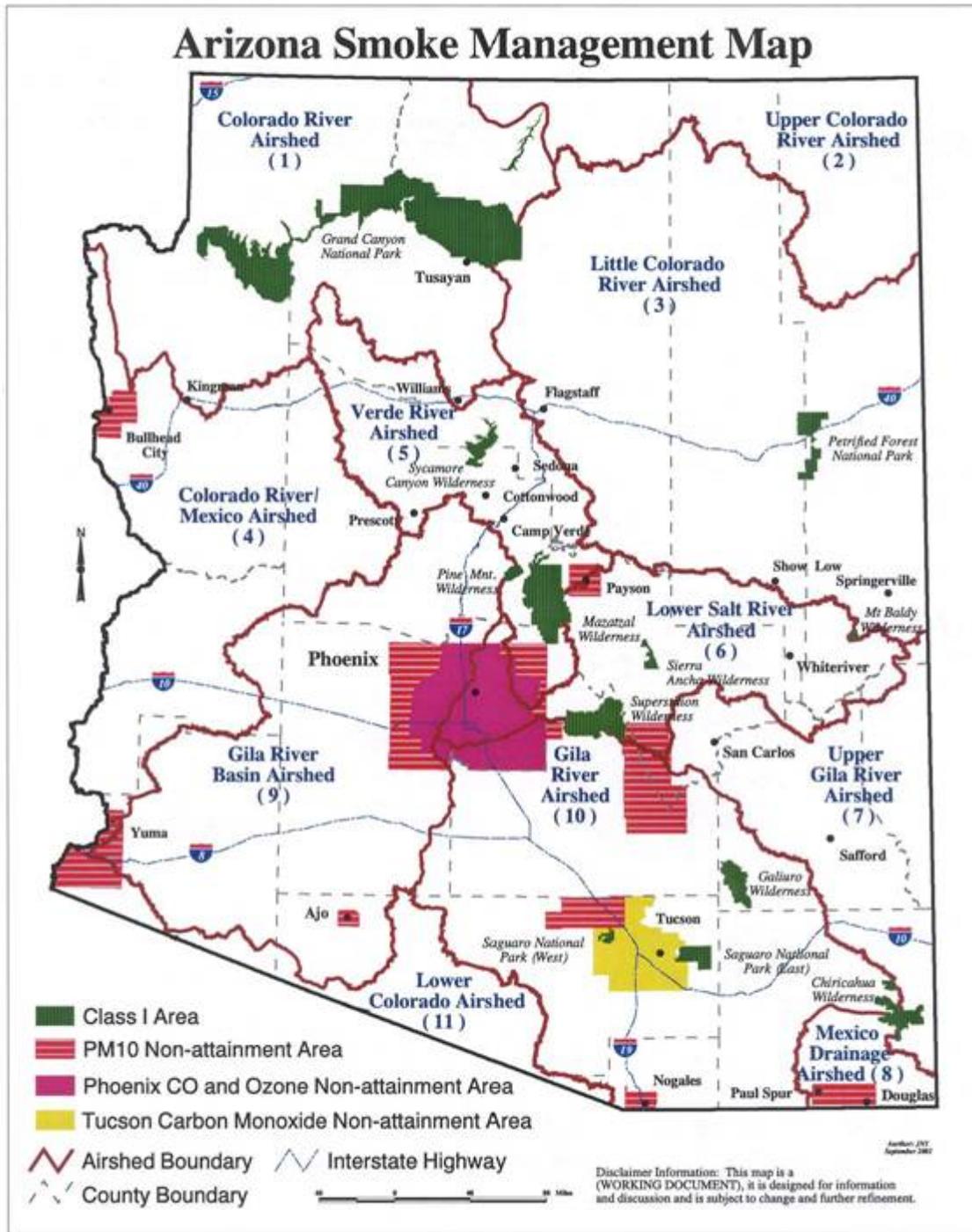


Figure 4. Location of the Class II Upper Gila River airshed (7) in Arizona

Cumulative Effects: Air Quality

The Upper Gila River airshed (see figure 4) was the focus of this cumulative effects analysis.

Future prescribed fires and wildland fires would be the primary source of air pollutants to be considered incrementally in a cumulative effects analysis, on or off the Coronado NF. Prescribed fires would affect ambient air quality to various degrees during the time of burning, depending on the duration of the burn. To minimize potential adverse impacts on ambient air quality, the Forest Service plans and implements prescribed fires in accordance with the Arizona Department of Environmental Quality (ADEQ) State Implementation Plan, which establishes parameters for minimizing smoke emissions and dispersal, such as limitations on burning based on air temperature, humidity, wind speed, etc. (ADEQ, 2002, 2006).

Exhaust emissions and dust generated by vehicle travel to and from administrative and special-use facilities in the APE have a negligible impact on ambient air quality in the airshed. Past logging operations and past, present, and future grazing generate negligible emissions of atmospheric pollutants, including those areas that have been historically overgrazed or logged, where wind erosion of soils may occasionally temporarily increase ambient PM emissions.

If no action is taken and improvements are removed, short-term increases of dust and smoke from localized burning on the tracts could minimally increase ambient PM concentrations. Planning of prescribed fires would ensure that these activities would not be undertaken at the same time.

Cumulative effects of implementing alternatives 2, 3, and 4 would also be negligible because of the short season of use for the residences at both tracts and the planning of prescribed fires so that they do not overlap with removal activities. Significant cumulative effects would not be expected.

Soils

The forestwide standard and guideline applicable to the tracts is as follows:

“Through management services, provide information to minimize disturbance and improve already disturbed areas. Best Management Practices (BMP) would be used to minimize the time of recovery to a satisfactory erosion level, minimize soil productivity loss, improve water quality, and minimize channel damage (USDA-FS, 1986, p. 38).”

Affected Environment

For this analysis, potential impacts to soils in two subwatersheds were evaluated (see figure 5: Ash Creek and Jacobson Canyon subwatersheds). The Old Columbine tract is in the Ash Creek subwatershed, which is about 5,094 acres in size, and the Turkey Flat tract is within the Jacobson Canyon subwatershed, which covers about 8,920 acres. The residence tracts are a very small percentage of the total watershed sizes (25 and 52 acres respectively); therefore, the potential for soils impacts is very low.

A general ecosystem survey (GES) completed for the entire Safford Ranger District (USDA-FS, 1991) reports that soils at both tracts are within the Low Sun Cold (LSC) climatic class. In this area, most annual precipitation occurs between September 30 and April 1. The average annual precipitation in the project area is between 30 and 36 inches (Western Regional Climate Center, 2006). Table 3 provides descriptive information for each GES unit in the tracts.

The Old Columbine tract is located on gneiss. Soils are deep, very cobbly to extremely cobbly, sandy loams with numerous rock outcrops. The elevation of this tract is 9,400 feet above mean

sea level (amsl). Turkey Flat is located on intrusive granitic rock. Soils are shallow to deep, very cobbly to extremely cobbly, sandy loams. The elevation of this tract is 7,200 feet amsl.

Table 3. Descriptive information about general ecosystem survey units in the Old Columbine and Turkey Flat recreation residence tracts

Recreation Residence Tract	GES Unit	Average Gradient Percent	Surface Texture/ Modifier	Soil Depth	Parent Material	Climate Class (see text for description)	Erosion Hazard
Old Columbine	466	0 to 15	Cobbly / Sandy Loam	Deep	Gneiss	LSC	Slight
Turkey Flat	476	40 to 80	Extremely Cobbly / Sandy Loam	Deep	Granite	LSC	Moderate

To determine the existing condition of surface soils, pits were excavated on the recreation residence tracts⁵, using the Forest Service Southwestern Region protocol prescribed in FSH 2509.18. Determinations were made in areas adjacent to recreation residences, in the common areas between the residences, in parking areas, in informal paths, and in general forest areas outside the tracts.

The surveys indicated that soil texture and depth have not been modified at any of the areas examined. However, natural soil bulk density¹ was compacted, and soil structure² was altered (crushed). This damage was found in the areas adjacent to recreation residences, parking areas, and informal paths, primarily as a result of foot and vehicle traffic. The other areas—common areas and general forest areas—did not show damage to soil bulk density or structure.

Changes in soil density and structure likely resulted from the excavation of foundations and footings and from pedestrian and vehicle traffic from residence to residence and to nearby forest areas and landscaping. At residences located on a slope, erosion is presently mitigated by landscape vegetation, rock and concrete barriers, terraces, and logs or boards. Maintenance of access roads and driveways also minimizes erosion on the tracts.

Soil productivity (the capacity of a soil, in its normal environment, to support plant growth) in the tracts is typical for the class of soils present. There is no prime or unique farmland present on either tract.

⁵ June 14, 2006; Bob Lefevre, forester/watershed and forestry program manager, Coronado NF

¹ Soil bulk density is defined as the ratio of the mass of dry solids to the bulk volume of the soil occupied by those dry solids. It varies with structural condition of the soil, particularly that related to packing.

² The arrangement of soil particles into larger particles or clumps. This arrangement modifies the bulk density and porosity of the soil.

Environmental Consequences

Direct and Indirect Effects

In general, impacts to soils are the result of ground-disturbing activities that alter their physical, biological, and chemical properties. Activities conducted by recreation residence permit holders for the next 20 years of occupancy would continue to affect erosion patterns and potential, which, in turn, may locally affect the condition of the subwatersheds in which the tracts are located.

The threshold of significance for impacts of soils is related to the degree of changes in soil density and structure as well as the degree of erosion and runoff that may occur as a result of the proposed action. A quantitative measure for these properties was not defined. In lieu of this, the significance of impacts is correlated with the potential for a high degree of runoff that will result in such degradation of the watershed as to impact the water quality of streams and their use.

Old Columbine Tract

If no action is taken, the natural slope of the area would gradually return after structures are removed. Grasses and shrubs would likely reappear on the tract within the first 5 years. Based on post-removal observations at other locations on the Coronado NF (Madera Canyon on the Nogales Ranger District and Upper Sabino Canyon on the Santa Catalina Ranger District³), compaction and altered soil structure (crushed) would likely persist at least 20 years.

Until vegetation is established sufficiently to stabilize disturbed soils, best management practices (BMPs) would be applied by the forest (FSH 2509.22) to minimize resource damage (USDA-FS, 1990). Overall, the additional increment of erosion in the short term following residence removal would not affect long-term soil productivity.

If new permits are issued, no short-term changes in soils would occur. Over the next 20 years, natural soil bulk density and structure would continue to be compacted and altered by foot and vehicle traffic. Landscaping and the use of BMPs would continue to minimize soil erosion. No change in long-term soil productivity would be expected.

Issuing new permits for Turkey Flat only would have the same effects as those reported for no action. Issuing new permits for Old Columbine only would have the same effects as reported for the proposed action.

Turkey Flat Tract

The direct and indirect effects of no action and proposed action at Turkey Flat would be the same as those described for Old Columbine. Issuing new permits for Turkey Flat only would result in the same effects as the proposed action. Issuing new permits for Old Columbine only would have the same effects as no action.

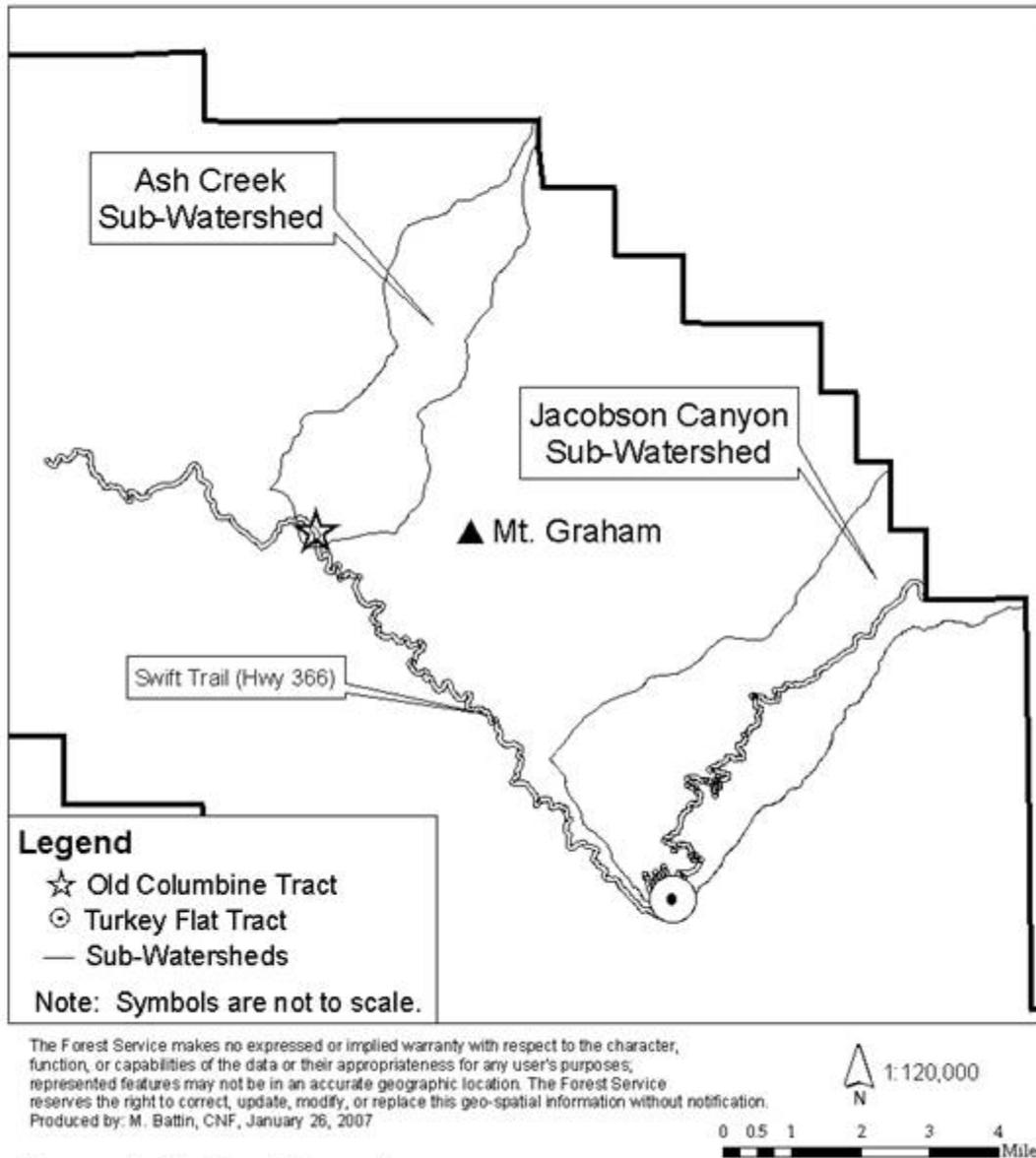
Cumulative Effects: Soils

Cumulative effects on soils were evaluated based on their interrelationship with the condition of the two subwatersheds in which they are located. Watershed condition is established by examination of physical and biological characteristics and processes affecting hydrologic and soil functions. In 2000, the condition of each subwatershed was determined by evaluating data and

³ Observations by Bob Lefevre, Coronado National Forest, watershed and forestry program manager, June 2006.

information about soil condition, riparian area condition, and water quality (FSM 2521.05 (USDA-FS, 2004)). Using direction in FSM 2521.1, both subwatersheds were determined to be in Class I Condition, or “satisfactory.”⁴

Recreation Residences Located Within Sub-Watersheds



Coronado National Forest
USDA Forest Service

Figure 5. Relative location of Ash Creek and Jacobson Canyon subwatersheds and the Old Columbine and Turkey Flat recreation residence tracts.

⁴ Observations by Bob Lefevre, Coronado National Forest, watershed and forestry program manager, June 2006.

Past, present and foreseeable future projects or actions that have affected or may, in the future, affect the soils and other resources in Ash Creek and Jacobson Canyon subwatersheds are listed in table 2. A detailed characterization of how these projects have impacted soils in the subwatersheds is on file in the soils specialist report in the EIS project record (item 190). A brief summary of the nature and effects of past projects follows.

Logging

From 1880 until 1973, logging was an important activity in the subwatersheds. Logging in the mixed conifer and spruce-fir stands, including clearcuts and selection cuts, began in 1946; from 1973 until 1986, it continued on a limited basis. Approximately 800 acres were logged in Ash Creek subwatershed and 300 acres in Jacobson Canyon subwatershed. On June 14, 2006, test pits were excavated in selected areas that had been logged to determine soil conditions. Compaction and soil structure alteration were detected in historic skid roads. Based on visual observations and soil testing, an estimated 30 percent of the logged area has evidence of compaction and altered soil structure (see table 4).

Table 4. Effects of historic logging in the subwatersheds of Old Columbine and Turkey Flat recreation residence tracts

Recreation Residence Tract	Analysis Area (Subwatershed)	Percent of Sub-watershed Occupied by Recreation Residence Tract	Acres Logged	Acres with Soil Compaction and Altered Soil Structure	Percent of Sub-watershed with Cumulative Effects from Historic Logging
Old Columbine (25 acres)	Ash Creek (5,094 acres)	less than 0.01	800	240	5
Turkey Flat (52 acres)	Jacobson Canyon (8,920 acres)	0.01	300	100	1

Grazing

Past heavy livestock grazing in these two subwatersheds has decreased the abundance of native grasses, increased shrubs in the uplands, and altered soil structure and bulk density. Further, nonnative plant species, predominantly Lehmann lovegrass (*Eragrostis lehmanniana*), that were introduced in the lower elevation uplands 50 to 60 years ago, displaced native grasses in most areas already disturbed by grazing. In some areas, removal of vegetation by grazing resulted in soil loss, which was followed by the invasion of exotic grasses. Table 5 reports the impacts in the subwatersheds to date from grazing.

Livestock grazing in the highest elevations of the subwatersheds was discontinued in the 1950s, and BMPs (FSH 2509.22) were implemented on the Coronado NF to mitigate grazing effects. A general improvement in soil conditions has been observed.

Table 5. Historic impacts of grazing on soils in the Ash Creek and Jacobson sub-watersheds.

Recreation Residence Tract	Analysis Area (Sub-watershed)	Subwatershed Occupied by Recreation Residence Tracts	Portion of Grazing Allotment within Sub-watershed	Percent of Analysis Area with Grazing Impacts
Old Columbine (25 acres)	Ash Creek (5,094 acres)	less than 0.01	1,842 acres	36
Turkey Flat (52 acres)	Jacobson Canyon (8,920 acres)	0.01	1,534 acres	17

Fire, Fuel Treatments, and Other Uses

Past prescribed and natural fires as well as wildland fire suppression have changed the vegetation composition of the subwatersheds, which, in turn, has increased erosion. About 50 percent of the area (4,705 acres) affected by the 2004 Nuttall Complex Fire is still experiencing accelerated erosion.

Mechanical fuel reduction and forest restoration projects can have both negative and positive effects on soils. Unmitigated ground disturbance by vehicles and heavy equipment increases erosion, while the creation of sustainable native plant communities promotes natural soil formation and erosion rates.

The Pinaleno Ecosystem Management (PEM) project (item 10) is underway on 110 acres within the subwatersheds. To date, no measurable effects on soils have been observed based on field observations⁵. Other proposed projects (items 11 and 24) would treat approximately 848 acres within the subwatersheds using both prescribed fire and mechanical treatment. Best management practices will be required during both projects to minimize adverse effects.

The use of recreational sites, administrative facilities that include crew quarters, communication equipment, privately owned communications facilities, organizational camps, astrophysical sites, and the roads and trails that access them, affect soils on approximately 40 acres in the subwatersheds. Foot and vehicle traffic cause soil compaction and alter soil structure in these use areas, and erosion is increased in disturbed areas.

Cumulative Effects: Soils

If no action is taken, both short-term (0 to 5 years) and long-term (30 or more years) impacts to soils would continue on about 10,154 acres (see table 6) where past activities have increased erosion, decreased soil bulk density, and altered soil structure. Over time, soil conditions would be expected to gradually improve in areas where ground disturbance has discontinued and vegetation is growing.

⁵ As reported by Bob Lefevre, forester; watershed and forestry program manager, Coronado National Forest; April 10, 2006; June 21, 2006; October 2, 3, 4, 5, and 6, 2006; and November 30, 2006.

Most past, present, and reasonably foreseeable projects would continue to affect 72 percent (10,154 acres) of the two subwatersheds over time, ranging from about 20 years of continuing effects because of wildland fires, to an indeterminate period of time because of continued grazing at lower elevations. The soils resource should benefit across the entire analysis area over time because of the continued use of BMPs and natural soil formation processes. Watershed condition would continue to remain as is (satisfactory), despite the continued impacts from past activities.

If the proposed action is implemented, effects would be the same as reported for no action, plus the additional minimal effects of continued occupancy of the 77 acres of residence tracts (0.01 percent of the two subwatersheds) (see chapter 3, “Soils, Affected Environment” section). Watershed conditions would not be expected to change significantly.

Table 6. Acreage of soils impacted by past, present, and future activities in the Ash Creek and Jacobson Canyon subwatersheds

Project or Action	Impacted Acres of Soils Within Subwatersheds
Graham Complex Fire	250
Clark Peak Fire	484
Nuttall Complex Fire	4,705
PEM Project	110
PERP	848
Heliograph Lookout Repair	1
Historic Logging	340
Grazing	3,376
Administrative Facilities	15
Recreation Facilities	25
Total	10,154 acres

The cumulative effects of issuing new permits to Turkey Flat only would be the same as those described for no action, except that human activities on 52 acres that comprise the Turkey Flat tract would continue to contribute effects on the soil resource within 0.01 percent of the Jacobson Canyon subwatershed. The condition of both subwatersheds would continue to remain satisfactory.

The cumulative effects of issuing new permits for Old Columbine only would be the same as those described for no action, except that human activities on 25 acres that comprise the Old Columbine tract would continue to contribute effects on the soil resource within the Ash Creek

subwatershed (less than 0.01 percent). The condition of both subwatersheds would continue to remain satisfactory.

Water Resources and Riparian Areas

Forest plan standards and guidelines applicable to water resource management, including riparian areas, are as follows:

- “Through management services, provide information to minimize disturbance and improve already disturbed areas. Best management practices would be used to minimize the time of recovery to a satisfactory erosion level, minimize soil productivity loss, improve water quality and minimize channel damage (p. 38-5);”
- “Monitor designated projects according to an approved water quality monitoring plan (p. 39-6);”
- “Manage all programs to eliminate or minimize onsite and downstream water pollution (p. 73-2);”
- “Manage riparian areas in accordance with legal requirements regarding floodplains, wetlands, wild and scenic rivers, and cultural and other resources. Recognize the importance and distinct values of riparian areas in forest plans (p. 39-8);” and
- “Manage riparian areas to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect and, where applicable, improve dependent resources (FSM 2526). Emphasize protection of soil, water, vegetation, and wildlife and fish resources prior to implementing projects (FSM 2526) (p. 39-9).”

Affected Environment

Water resources that may be affected by activities in the recreation residence tracts are located within the Ash Creek (Old Columbine) and Jacobson Canyon (Turkey Flat) subwatersheds (see figure 5). Potentially affected elements of water resources include water quantity, water quality, and riparian resources.

Water Quantity

Water quantity is measured in terms of the peak flow of surface waters and the total annual water yield per area. The peak flow of surface waters depends on hydrologic function, which is the ability of soil to capture, hold, and release water. There is one surface waterflow gauging station in the vicinity of the project area, at Frye Creek near Thatcher, Arizona (USGS 09460150). Frye Creek watershed is similar to Ash Creek in many ways, and is used here as a surrogate to describe the flow characteristics and water yield of the Ash Creek subwatershed. Data from this gauge indicate that snowmelt runoff comprises most of Frye Creek’s flow, because the highest monthly mean flows are recorded in April and May. Average water yield is 0.51 acre-feet per acre annually (USDI-GS, 2007).

Total surface water yield is controlled by annual precipitation in areas receiving less than 20 inches of precipitation per year, and by vegetation type and density in areas where there is more than 20 inches of precipitation per year. The average annual precipitation for the Ash Creek and

Jacobson Canyon subwatersheds is less than 20 inches. The average annual precipitation in the two tracts is between 30 and 36 inches (NOAA, 2007).

The Jacobson Canyon watershed differs from Ash Creek because it has more woodland and grassland vegetation. There are no representative gauging stations in the vicinity. Using a water balance model developed for woodland watersheds (Ffolliott, 2000), it is conservatively estimated that the Jacobson Canyon watershed yields 0.10 acre-feet per acre annually.

The Old Columbine tract is located in the Ash Creek subwatershed. Using the Frye Creek average of 0.51 acre-feet per acre water production as a surrogate, Ash Creek is capable of producing about 2,624 acre-feet of water annually on the Coronado NF.

The Turkey Flat recreation residences are located in the Jacobson Canyon subwatershed. Using the calculated yield of 0.1 acre-feet per acre water production as a guide, Jacobson Canyon is capable of producing about 890 acre-feet annually.

Total water consumption in the subwatersheds is 2,061 acre-feet per year or about 59 percent of the water produced, based on known water rights applications and existing water rights. Fish habitat in Ash Creek and the Arizona Game and Fish Department (AGFD) facility at Cluff Ranch use 97 percent of this water yield (i.e., 2,000 acre-feet⁶). The 88 recreation residences use 22.15 acre-feet per year or 0.06 percent. Old Columbine recreation residences use about 2.85 acre-feet (0.11 percent of the available water) per year in their water system (Arizona Department of Water Resources (ADWR, 1985)). Turkey Flat recreation residences use 19.296 acre-feet (2.16 percent of available water) per year in their water system (ADWR, 1931 and 1938). Table 7 summarizes water yield by subwatershed and use by recreation residences within the subwatersheds.

Table 7. Annual water yield and use in the subwatersheds of the Safford Ranger District recreation residence tracts

Recreation Residences	Sub-watershed	Sub-Watershed Size (acres)	Estimated Annual Surface Water Yield (acre-feet)	Water Used (acre-feet per year)	Percent of Available Water Used from Sub-watershed
Old Columbine	Ash Creek	5,094	2,624	2.85	0.11
Turkey Flat	Jacobson Canyon	8,920	890	19.30	2.16

Source: ADWR, 1985

Water Quality

The quality of a water resource is based on its chemical, physical and biological characteristics relative to the desired conditions for its use. These characteristics, in turn, are affected by conditions and activities within the watershed, which may include point and nonpoint sources⁷.

⁶ An acre-foot is equivalent to 1 foot of water covering an area of 1 acre.

⁷ A point source is any discernible confined and discrete conveyance including, but not limited to, a pipe, ditch, channel, or conduit from which pollutants are or may be discharged (<http://www.fedcenter.gov/resources/facilitytour/wastewater/pointsource>).

Water quality is often affected by erosion of pollutants from the soil surface. Erosion also increases sediment deposited in surface waters. Turbidity resulting from increased suspended sediments is a common degradation of surface water quality. In Ash Creek and Jacobson Canyon subwatersheds, pollutant sources include, but are not limited to, grazing, recreation, roads, septic systems, atmospheric deposition, and point source discharges.

The quality of a surface water resource is determined by how well it meets pollutant standards established under the authority of the Clean Water Act (33 U.S.C 1251) relative to its desired or designated use (e.g., body contact, fish habitat). Based on monitoring of specific pollutants, the Arizona Department of Environmental Quality (ADEQ) assigns water quality status as one of the following “attaining all uses, attaining some uses, inconclusive, not attaining, or impaired.”

There are no perennial streams within either of the tracts or surrounding area that are identified on the “State of Arizona December 2004 303 (d) List and Other Impaired Waters (ADEQ, 2004).” The status reports for Ash Creek downstream from the residence tracts and for nearby Grant Creek and Frye Creek are provided in table 8 (ADEQ, 2004). Figure 6 (water quality assessment) illustrates the location of these streams relative to the recreation residences. No link has been established between the presence and occupancy of the recreation residences as the source of any pollutants to any of these waters.

Table 8. Surface water quality status in three streams in the vicinity of the Safford Ranger District recreation residence tracts

Surface Water	2004 Assessment Status	Standards Exceeded
Ash Creek	Category 2 – Attaining Some Uses	None; results of the analysis of cadmium, copper, and zinc were missing.
Frye Creek	Category 2 – Attaining Some Uses	None; results of analysis of mercury, arsenic, chromium, lead, cadmium, copper, and zinc were missing. All parameters sampled are attaining all uses.
Grant Creek	Category 3 – Inconclusive	None exceeded; only two samples were analyzed.

Source: ADEQ, 2004

Riparian Resources

Data and information that define riparian vegetation⁸ and stream channels in the vicinity of the recreation residence tracts (see table 9) were derived from on-the-ground observations⁹, Coronado NF Geographic Information System (GIS) database layers, and the forest plan.

Potential direct and indirect effects on riparian resources were evaluated for a specific area around the recreation residence tracts (see figures 7 and 8: riparian resources, Old Columbine and Turkey Flat tracts). The area for which cumulative effects were assessed includes the two subwatersheds: Ash Creek and Jacobson Canyon.

⁸ The kinds and amounts of vegetation in the riparian areas are different than terrestrial vegetation. These differences reflect the influence of free or unbound water from the adjacent watercourse or water body.

⁹ Observations made by Bob Lefevre, Coronado NF forester/watershed and forestry program manager, June 14, 2006.

Table 9. Characteristics of riparian resources at or near Safford Ranger District recreation residence tracts

Recreation Residences	Named Drainage	General Direction of Flow	Proximity of Recreation Residence Tract to Channel
Old Columbine	Ash Creek	Northeast	Within the tract
Turkey Flat	Twilight Creek	Northeast	More than 500 feet away from the tract

Ash Creek has year-round surface waterflow (perennial) and is located within the Old Columbine tract. All other surface water channels in the subwatershed are either outside the APE or have intermittent or ephemeral flows (see figure 9, stream channels). The recreation residence tracts do not include any mapped wetlands or flood plains (National Wetlands Inventory, 1977).

Old Columbine Tract

Vegetation in the Old Columbine tract includes Engelmann spruce (*Picea engelmanni*), corkbark fir (*Abies lasiocarpa* var. *arizonica*), Douglas-fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*) and alder (*Alnus* spp.). Several wetland species of shrubs and forbs are found along the creek banks. This area is not mapped as a true riparian type, but the alder, sedges (*Carex* spp.) and hemlock-parsley (*Conioselinum* spp.) are generally considered as obligate (i.e., almost exclusively) riparian plants in this area. Although bare ground is common because of human disturbance (foot and vehicle traffic), the channel banks themselves are heavily vegetated. Only at road crossings are the banks lacking vegetation. There are a number of log grade control structures in the area and one 4.5-foot-high earthen and rock dam with an overflow pipe in it. These structures appear to have no effect on the riparian nature of the area, other than storing a small amount of water onsite. No fish have been observed during several field visits to the riparian area on the Old Columbine tract¹⁰.

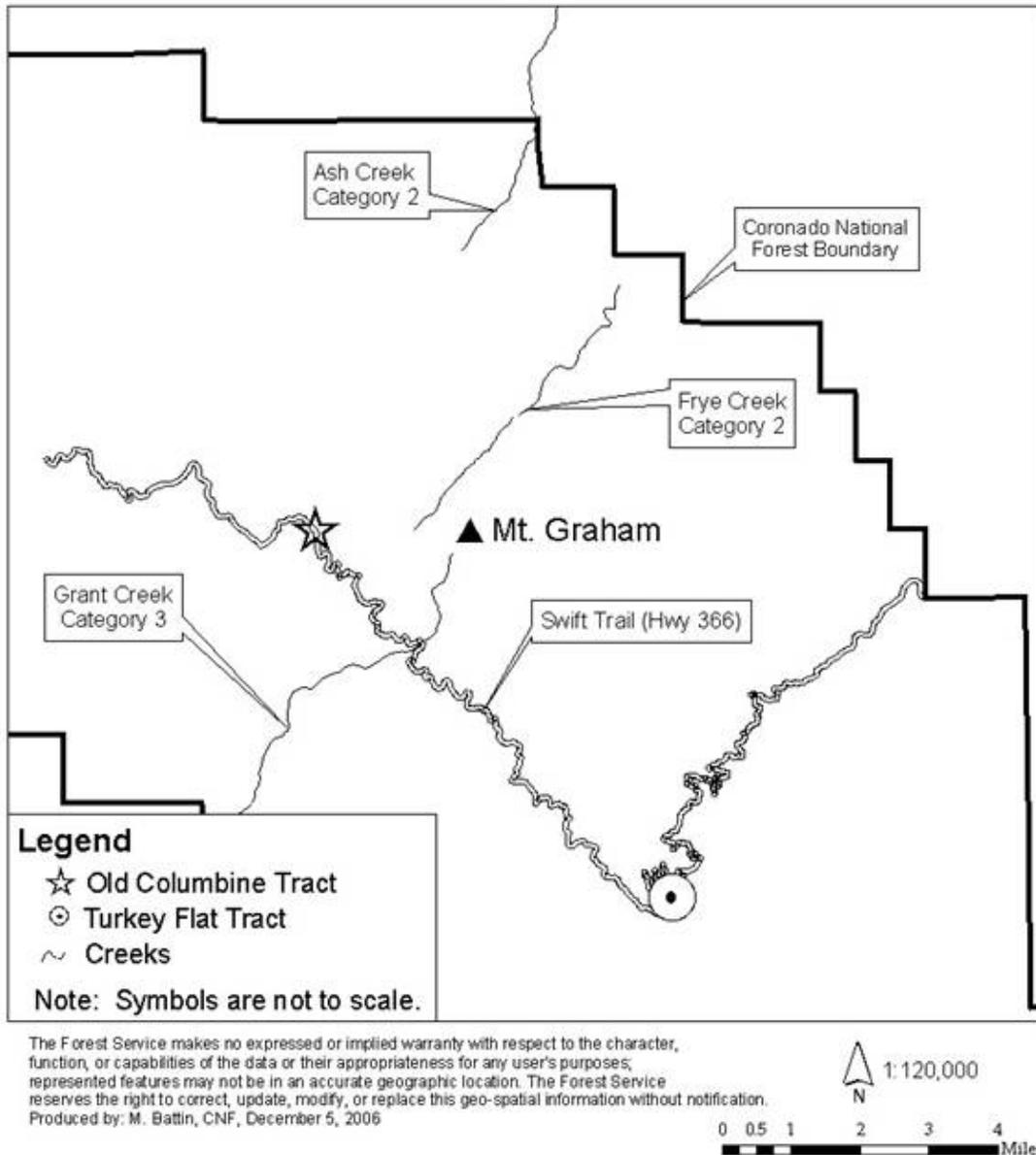
Turkey Flat Tract

There are no true riparian species in the Turkey Flat tract.

Vegetation in the Turkey Flat tract includes white fir (*Abies concolor*), Gambel oak (*Quercus gambelii*), Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), southwestern white pine (*Pinus strobiformis*), and New Mexico locust (*Robina neomexicana*).

¹⁰ Reported by Bob Lefevre over a period of several years through 2006.

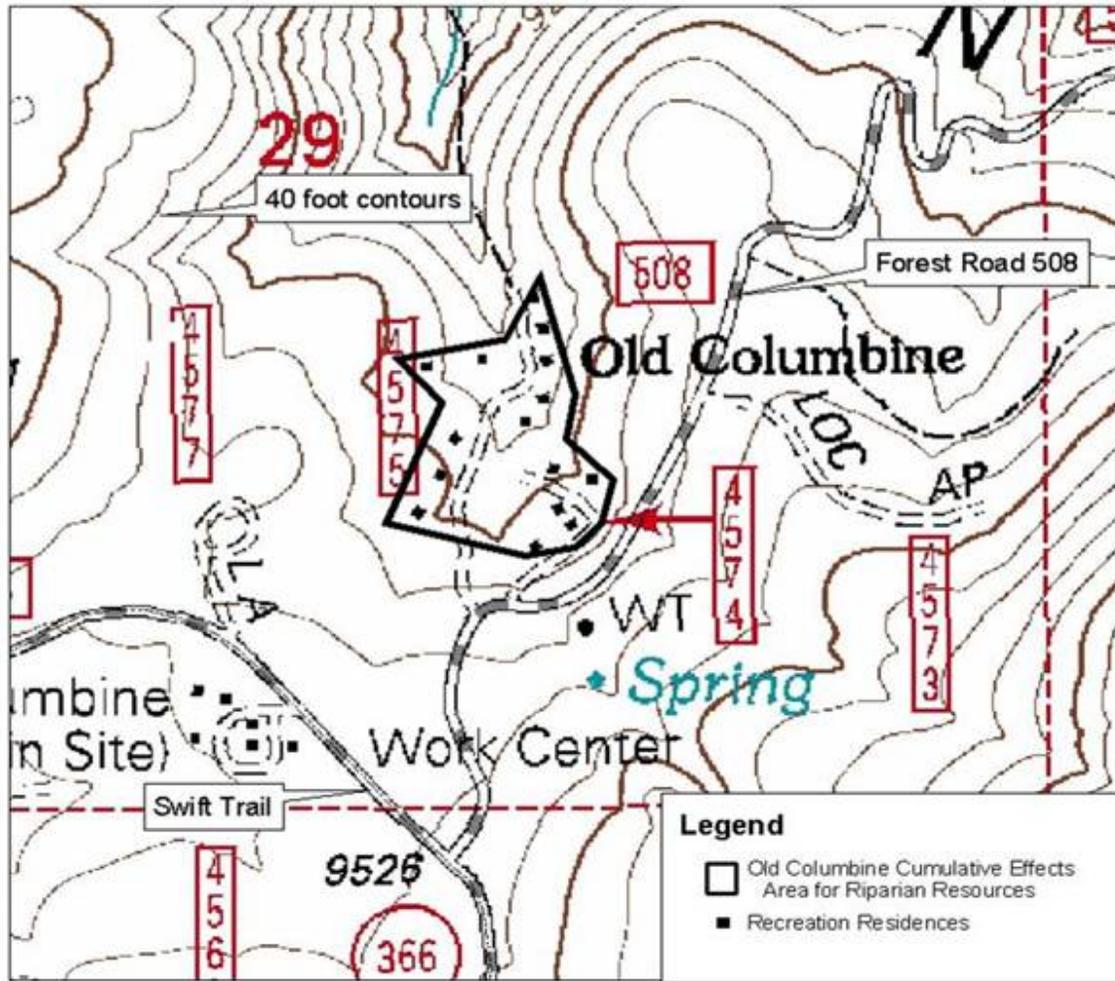
Recreation Residences Water Quality Assessment



Coronado National Forest
USDA Forest Service

Figure 6. Location and water quality category of three streams in the vicinity of the Safford Ranger District recreation residence tracts

Old Columbine Cumulative Effects Analysis Area for Riparian Resources



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Coronado National Forest
USDA Forest Service

Figure 7. Area of analysis: riparian resources on the Old Columbine recreation residence tract on the Safford Ranger District

Turkey Flat Cumulative Effects Analysis Area for Riparian Resources

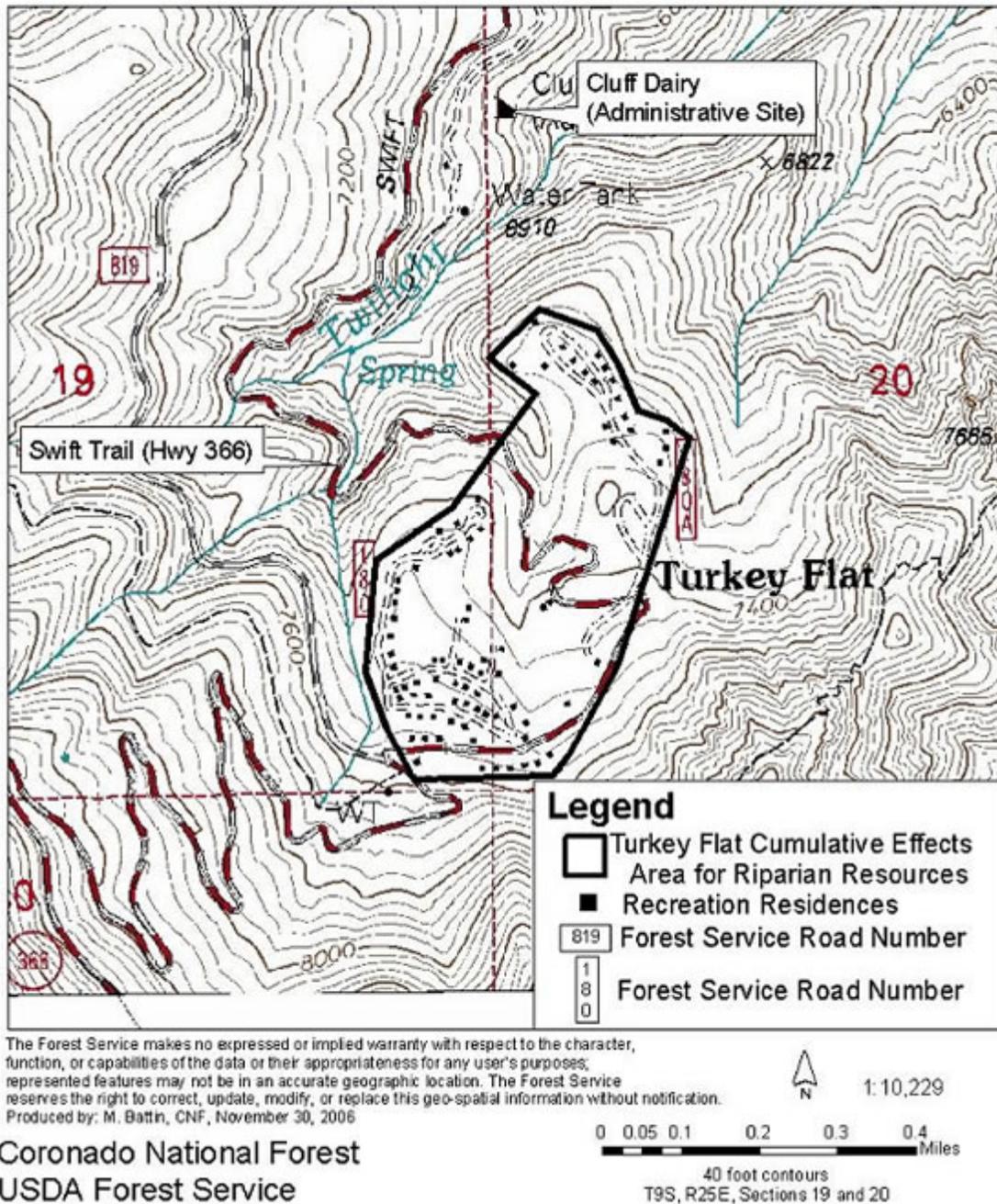
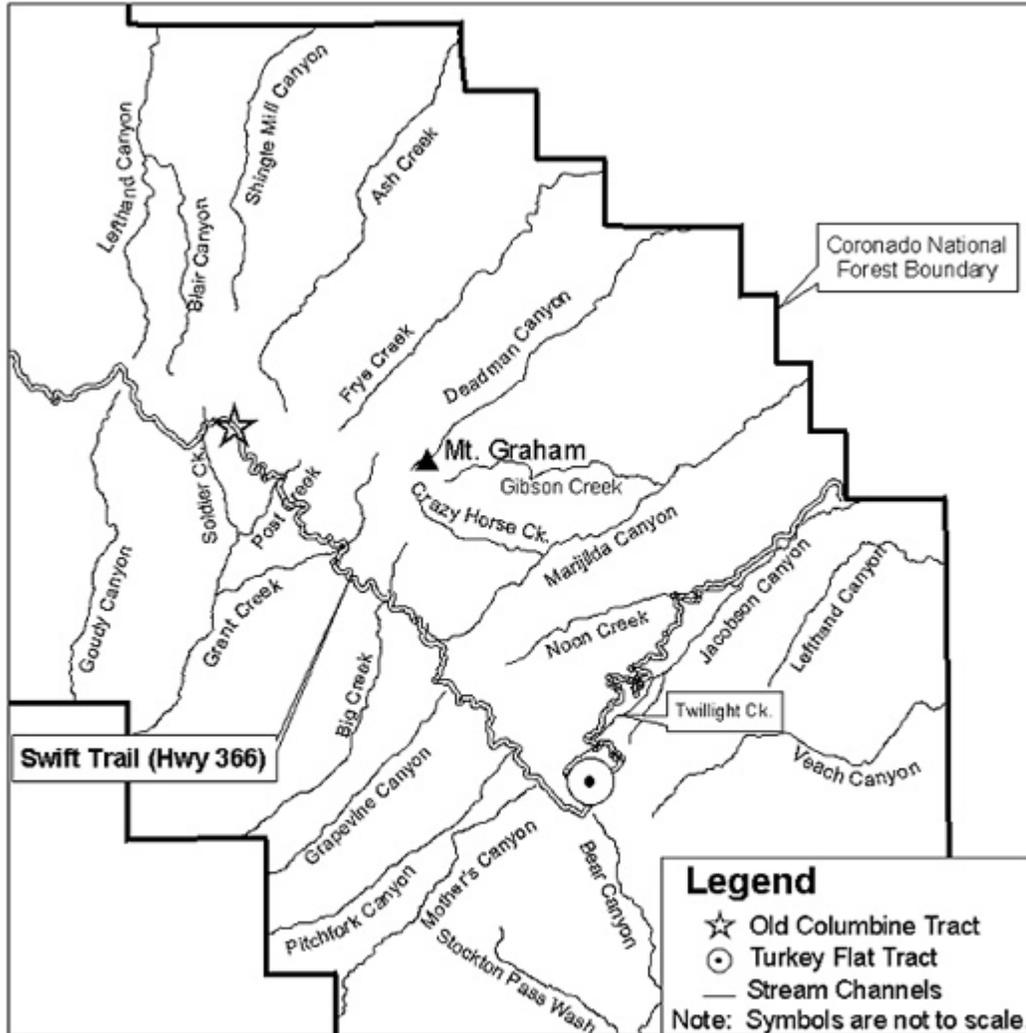


Figure 8. Area of analysis: riparian resources on the Turkey Flat recreation residence tract on the Safford Ranger District

Recreation Residences Stream Channels



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Produced by: M. Battin, CNF, December 13, 2006

Coronado National Forest
USDA Forest Service

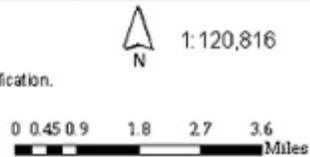


Figure 9. Stream channels within the Ash Creek and Jacobson subwatersheds on the Safford Ranger District

Environmental Consequences

Direct and Indirect Effects

Direct effects to water resources may result from consumptive use of a source of supply as well as by introduction of pollutants and subsequent degradation of water quality. Contamination of water resources can occur by direct discharge of pollutants as point source effluents or by more diffuse (nonpoint) sources, such as erosion and runoff. Impacts are measured by the extent to which a water resource is affected relative to its use, including potable and recreational uses or riparian and aquatic habitat. Depletion of a source of supply or alteration of water quality may adversely impact habitat and populations of both terrestrial and aquatic biota.

Where applicable, the significance of impacts on recreational use and habitat may be determined by the degree to which changes in water quality will affect the status of use designated by, or exceed standards established by, a regulatory agency, or the potential for changes in populations of special status species (i.e., threatened and endangered) or their habitat.

Water Resources, Old Columbine and Turkey Flat

No Action. Removal of the residences would return the tracts to natural slopes, and grasses and forbs would be expected to return within 5 years. Until vegetation is established sufficiently to stabilize disturbed soils, best management practices (BMPs; FSH 2509.22) would be applied by the forest to minimize resource damage (USDA-FS, 1990). The return of vegetation ground cover would gradually improve hydrologic function in the area, resulting in less peak runoff. Water would no longer be consumed by occupants on the tracts, resulting in a very minimal increase in downstream yield.

Runoff is unlikely to introduce sufficient quantities of contaminants to the watershed because there are relatively few sources of such in the residence tracts. Increased vegetation ground cover and decreased foot and vehicle traffic would decrease soil compaction, and correspondingly result in improved infiltration of precipitation and improved, though not measurable, water quality in the Ash Creek subwatershed.

Proposed Action. If the proposed action is implemented, water yield and consumption would remain the same (see table 7). There would be no change in peak flow or total annual water yield.

Issue Turkey Flat Only. If this alternative is implemented, the effects on water resources at Old Columbine would be the same as those described for no action. The effects at Turkey Flat would be the same as those described for the proposed action.

Issue Old Columbine Only. If this alternative is implemented, the effects on water resources at Old Columbine would be the same as those described for the proposed action. The effects at Turkey Flat would be the same as those described for the no action.

Riparian Resources, Old Columbine and Turkey Flat

No action would allow the natural channel of Ash Creek to return on the Old Columbine tract, including the terraces associated with it. Roads, trails and other disturbed areas would be populated with native grasses and forbs.

The proposed action would have no effect on existing riparian resources at Old Columbine. If only Turkey Flat permits are issued, the effects of no action would result at Old Columbine. If only Old Columbine permits are issued, there would be no change in existing riparian resources.

Because there are no riparian resources on the Turkey Flat tract, there would be no impacts from any of the alternatives.

Past, Present, and Foreseeable Actions in the Watershed

Past, present, and foreseeable future projects or actions that have affected or, in the future, may affect the Ash Creek or Jacobson Canyon subwatersheds and the recreation residence tracts include the following activities (see table 2): historic timber and other forest product harvests; historic heavy grazing; prescribed and naturally occurring fires, including Pinaleño Ecosystem Management project pile burning; wildland fire suppression including the Clark Peak Fire and the Nuttall Complex Fire; forest restoration including the Pinaleño Ecosystem Restoration project (PERP), fuel reduction treatments, including the Pinaleño Ecosystem Management project and fuel reduction at special-use permit sites; activities at administrative facilities, including the reconstruction of Heliograph Lookout; recreation; Cluff Ranch (Arizona Game and Fish Department); and livestock and irrigation uses.

Logging

Historic harvesting of timber and other forest products in the subwatersheds were conducted prior to the development and application of today's BMPs (FSH 2509.22). Without mitigation, they contributed to the growth of dense tree stands within and near the recreation residence tracts by inadvertently preparing seedbeds and allowing light to reach the forest floor. This, in turn, has probably decreased the overall water yield from the watersheds (Ffolliott and Thorud, 1975), and increased soil loss from erosion and sediment delivery to surface waters.

The effects of past logging on water quality are no longer present or have been masked by other forest activities. On both the Turkey Flat and Old Columbine tracts, there is no documentation of logging effects on water and riparian resources. Water and riparian resource effects from future forest product harvests during or following fuel reduction treatments, wildlife habitat projects, and forest restoration projects would be minimized by BMPs.

Grazing

Historic heavy livestock grazing throughout the watersheds around the turn of the 19th century and through most of the 20th century decreased vegetation cover in the subwatersheds and altered water yield quantity and timing. This resulted in increased soil erosion and sediment delivery to surface water. In addition, heavy concentrations of livestock in the area contributed to high concentrations of nitrogen and bacteria (*E. coli*) in surface waters.

Best management practices to mitigate grazing effects have since been implemented on Federal lands, with a general improvement in subwatershed conditions. Livestock grazing is documented as currently affecting water quantity only in direct consumption, and continued use of BMPs in grazing would maintain those conditions. In addition, livestock grazing in the vicinity of the recreation residence tracts was eliminated in the 1950s.

Fire and Fuel Treatments

Prescribed and natural fires and wildland fire suppression have affected water and riparian resources in the APE since establishment of the Coronado NF around 1902. Fires have resulted in periodic, short-term effects on water quantity and quality. Studies indicate that the effects of fires

on water resources' quantity and quality decline dramatically after 10 years (Debano et al., 1998). The Graham Complex Fire (1989) no longer affects water quantity or water quality. Effects on water quantity from the Clark Peak (1996) and Nuttall Complex Fires (2004) may continue to the present time, however, no documentation of this has been undertaken. The Clark Peak wildland fire occurred over 10 years ago and its effects on water quality are not considered in this analysis.

Prescribed burning and low-intensity natural fires help restore natural vegetation communities in the subwatersheds, which, in turn, help maintain healthy water quantity and quality conditions. Unfortunately, wildland fire suppression has resulted in increased growth of shrubs and shade-tolerant tree species and decreased grasses in the lower elevations and shade-intolerant tree species at higher elevations of the forest. This, in turn, has increased the frequency and consequences of large, severe fires. There are no reports on the effect of fire on riparian resources at Old Columbine.

Fuel treatments and forest restoration have temporarily affected water and riparian resources by disturbing the surface, altering timing of flows and allowing for accelerated erosion. The long-term positive effect they have had is the establishment of sustainable plant communities that improve natural processes, including natural water yield, water quality, and riparian development. Ongoing fuel treatment and forest restoration projects would be accomplished using BMPs, thereby minimizing negative effects and promoting positive effects on water quantity, water quality, and riparian resources.

Recreation and Special Uses

Forest Service administrative facilities in the subwatersheds include lookout towers, crew quarters, communications equipment and facilities, and the roads or trails to access them. Non-Forest Service administrative facilities include privately owned communications facilities, organization camps, astrophysical observatories, and the roads and trails that access them, all of which exist and operate under SUPs. The effects of these facilities on water consumption are limited to minor alterations in flow timing and water consumption by facility users. Water rights are held by permitted users for 25.452 acre-feet per year (ADWR Water Rights Database).

The Heliograph Lookout project replaced a burned facility; it will not contribute to cumulative effects. The proposed facility at Columbine Work Center would be located outside the cumulative effects area if it is placed at the existing Columbine Work Center. Regardless, the use of BMPs in construction and maintenance of such facilities would minimize adverse effects on water and riparian resources. Administrative facilities have no effect on the riparian resources within the Old Columbine tract.

Recreation facilities in the subwatershed, in addition to the recreation residence tracts, comprise developed areas, such as campgrounds; undeveloped (dispersed) camping areas; and off-road vehicle use. The most common effects of recreation on water quantity are minor alterations of flow timing and consumption by visitors (estimated 0.64 acre-feet per year). In addition, off-road vehicle use has resulted in the creations of surface channels, which change runoff patterns and timing, and causes accelerated erosion on increasingly larger areas. As this activity increases, effects on surface water flows and water quality may be seen.

The most common effects of recreation that affect water quality are increased soil erosion and inappropriate disposal of wastes. There is no documentation of either causing significant adverse impacts to water quality in the cumulative effects area. Effects on riparian areas may include the

displacement or removal of riparian vegetation and channel alteration. Riparian resources in the area have evolved despite the presence of these recreation activities.

Farming does not occur in the upper portion of the subwatersheds. However, Angle Orchard in the Jacobson Canyon subwatershed uses water for irrigation. There are no other farming projects known to be proposed in the subwatersheds.

Cumulative Effects: Water and Riparian Resources

No action would return the tracts to more natural conditions; therefore, there would be no incremental contribution to adverse cumulative effects on water or riparian resources in the subwatersheds.

With the proposed action, existing water and riparian resource conditions would remain the same. Therefore, no cumulative effects with other activities would result.

If permits are issued at Turkey Flat only, water and riparian resources at Old Columbine would improve, therefore, there would be no cumulative impacts. Existing resource conditions at Turkey Flat would remain the same.

If permits are issued at Old Columbine only, impacts at Turkey Flat would improve; therefore, there would be no cumulative impacts. Existing resource conditions at Old Columbine would remain the same.

Recreation

Affected Environment

The Pinaleño Mountains, especially Mt. Graham, provide a wide variety of year-round recreation opportunities in ecosystems that range from desert grasslands to spruce forests. Historic records of the use of Mt. Graham and the Pinaleño Mountains indicate that they served as a summer retreat for Mormon pioneers and other settlers of the communities near the mountain, such as Safford. Many of the existing trails and roads were constructed by these pioneers and, during the Great Depression, by the U.S. Civilian Conservation Corps.

Arizona Route 366 (Swift Trail), the main road into the mountains, provides access to both the Old Columbine and Turkey Flat tracts. Along this 36-mile road, there are 9 developed campgrounds with a total of 127 campsites, 2 developed picnic areas, numerous hiking trails and trailheads, a lake, a visitor center, and multiple dispersed recreation sites, some of which are popular group use areas (including Treasure Park, Upper Arcadia, Twilight, Snow Flat, and Upper Hospital Flat).

The Mt. Graham area is considered a destination recreation area. Outdoor recreation activities include hiking, camping, experiencing solitude, climbing, scenic driving, hunting, fishing, horseback riding, wildlife viewing, visiting high mountain cienegas, and playing in winter snows. There is also one organizational camp for children (Arizona Bible Camp) near the Old Columbine area. Most recreation areas and the higher elevation trails and dispersed sites are used mainly from May through September. Use is typically much higher on weekends and holidays than during the week.

Riggs Flat Campground is full almost every weekend and holiday between Memorial Day and the end of September (Culbert, 2006). Most of the other high elevation developed campgrounds

receive heavy use (i.e., are over half full) on weekends during this season. The exceptions are Clark Peak corrals (a 3-unit campground with horse corrals beyond the end of Swift Trail, which is rarely at capacity) and Round-the-Mountain Campground (a low elevation campground, which is about half full on weekends and holidays year-round). Most developed sites are lightly used on weekdays.

Like most developed sites in the Pinalenos, dispersed sites are primarily used only during the summer season (Memorial Day through September) and are lightly used on weekdays. Dispersed group sites are typically full five to seven weekends per year, and smaller dispersed sites are always full during the three summer holiday weekends. Occasionally there are no dispersed sites of any type available on weekends.

Field personnel estimate that 65 to 75 percent of visitors stay one or more nights in the mountains (Culbert, 2006). Most stay for the weekend, but many stay up to 2 weeks. Riggs Lake gets a moderate amount of day use (picnicking and fishing). Winter use in the Pinalenos is relatively light, but there is picnicking at the lower elevation sites and snow play in a few areas at higher elevations, especially on weekends.

In 2005, the Coronado NF collected a total of \$31,700 at seven developed campgrounds and five group use sites in the Pinalenos (Warren, 2006). Assuming an average of 3.5 people per campsite and 50 people per group site, the estimated number of visitors at these sites during 2005 was approximately 13,650 people, mostly from May through September.

Recreation Opportunity Spectrum Settings

The Recreation Opportunity Spectrum (ROS) system (USDA-FS, 1986a) is a framework that the Forest Service uses to describe recreation settings which range in character from easy access—highly developed to remote and natural. The majority of the Swift Trail corridor is mapped as Roded Natural, with nodes of Urban (Heliograph Electronic Site and Mt. Graham Astrophysical Complex) and Rural (campgrounds) and areas of Semiprimitive Nonmotorized and Primitive along the edges (a wilderness study area). Definitions of the different settings can be found in the ROS Book (USDA-FS, 1986a) and the Recreation Opportunity Spectrum on the Coronado National Forest (USDA-FS, 2000).

The Old Columbine and Turkey Flat tracts are designated as Rural recreational settings.

Recreational Use Trends

Recreational use is steadily increasing in the Pinaleno Mountains. Field personnel report increased use each year, and camping fees collected by the Forest Service reflect this trend. In fiscal year (FY) 1993, \$17,295 was collected for this area of the Coronado NF. In FY 2003 (10 years later) collected fees increased to \$26,906. And, in 2005 (just 2 years later), \$31,700 was collected (Hennings, 2006).

Trail use continues to be relatively light, but field personnel report that 5 years ago, trailheads typically had one car parked at them on most weekends; more recently, there are three to four cars parked at each.

The Swift Trail is maintained by the Arizona Department of Transportation (ADOT). ADOT records vehicle travel at specific points along the 27.4-mile route between the State prison located at the base of the mountain and the Columbine area at a higher elevation. Average daily traffic counts from years 2003, 2004, and 2005 show 60, 90, and 100 vehicles per day respectively,

indicating a steady increase in traffic. A high proportion of these vehicles are assumed to be transporting recreational visitors.

The Pinaleño Mountains have traditionally provided recreation opportunities for local area residents. However, the number of visitors from the metropolitan areas of Tucson (130 miles) and Phoenix (245 miles) has increased with the growth of these areas, and increases in visitors from Albuquerque have been noted. As these urban areas continue to grow, more visitors to the Pinaleños are expected.

The population of Safford has been stable, however, upon the recent opening of a new, large copper mine in the area, about 700 new jobs were created. A minimal influx of new residents was expected. These new residents are potential recreational users of the Pinaleños.

Recreation Residence Tracts

The history of the Old Columbine tract is not well documented, but Forest Service files indicate that permits for the current buildings were first issued between 1923 and 1955; most of the structures were modified during the last half of the 20th century. There are currently 14 recreation residences located in the Columbine tract that are occupied under the terms and conditions of SUPs. Along with the residences, the permits allow for storage sheds, outdoor toilets, and miscellaneous other minor structures. The residence tract sits on 25 acres of NFS land, and all lots in the tract are currently in use.

The first recreation residences at the Turkey Flat tract were permitted in 1929. The Turkey Flat tract has 74 permitted recreation residences, and their permits allow for storage sheds, outdoor toilets, and miscellaneous other minor structures. This tract sits on 52 acres of NFS land.

Occupancy of the residences varies widely, with some families occupying the residences most of the summer and occasional weekends at other times of the year. Many residences are visited only on key weekends during the year. Forest Service special uses managers estimate recreation residences in the Old Columbine tract are used 50 to 60 days per year, and recreation residences in the Turkey Flat tract are used about 30 to 40 days per year.

Environmental Consequences

Direct and Indirect Effects

No Action

If no action is taken, upon the expiration of a 10-year closeout permit, all recreation residences at Turkey Flat and Old Columbine would be subject to removal at the expense of the permit holders. With the removal of improvements, the category of recreation would change from developed recreation to dispersed recreation.

As dispersed recreation sites, these areas would be available to visitors who prefer a non-developed experience or who cannot access developed sites because of overcrowding, which occurs on several weekends each summer. Access to the tracts would change from motorized to nonmotorized because the access roads to the tracts would be gated after residences are removed. From the perspective of the Western Apache, dispersed, nonmotorized recreation is preferred to maintain and preserve the Western Apache TCP.

Those who formerly held SUPs for the residences would be expected to continue to visit the area for recreation. Their presence may slightly increase visitor use at developed and dispersed sites, if they do not return to either of these tracts to picnic or camp.

During the period when facilities are being removed, there would be increased noise and general disturbance caused by removal of structural improvements and heavy hauling. This would temporarily detract from the quality of the nearby recreation experience for visitors for approximately 1 to 3 months. There would be no long-term effects on recreation caused by the activities of facility removal.

The ROS setting for both tracts would change from Rural to Roded Natural.

Proposed Action

There would be no effects on recreational use of either tract if the proposed action is implemented.

Issue Turkey Flat Only

If this alternative is implemented, new SUPs for recreation residences in Turkey Flat would be issued, and their occupancy and use would be allowed to continue. There would be no effects on recreational use of this tract.

Impacts at Old Columbine would be the same as those reported in chapter 3, “Recreation, Environmental Consequences” section, for no action. Upon removal of the residences, the ROS setting for Old Columbine would change from Rural to Roded Natural.

Issue Old Columbine Only

If this alternative is implemented, new SUPs for recreation residences in Old Columbine would be issued, and their occupancy and use would be allowed to continue. There would be no effects on recreational use of this tract.

Impacts at Turkey Flat would be the same as those reported in chapter 3, “Recreation, Environmental Consequences” section, for no action. Upon removal of the residences, the ROS setting for Turkey Flat would change from Rural to Roded Natural.

Cumulative Effects: Recreation

Past, present, and reasonably foreseeable future actions that affect recreational use and ROS settings in the Pinaleno Mountains include construction of roads, trails, developed recreation sites, and administrative sites; wildland fires; fuel treatment projects, including the current PEM and upcoming PERP; special-use permitted activities, including recreation residences and the Arizona Bible Camp, as well as operation of the Mt. Graham astrophysical complex.

Many of these actions have a positive effect on recreation by providing desirable access routes and recreational facilities. Wildland fire and fuels treatments often change the recreation setting, but they generally improve forest health and benefit recreational use in the long term. The Mt. Graham astrophysical complex has had an indirect negative effect on recreational use of the area, because approval of its special-use permit was contingent upon the establishment of the Mt. Graham Red Squirrel Refugium, an area where recreation use is severely restricted.

Removal of the recreation residences would change the nature of use from developed to dispersed recreation. When added to the effects of past, present, and foreseeable future actions, the loss of two developed recreation tracts would have a very minimal impact on the overall recreation program in the Pinaleno Mountains. Both developed and dispersed recreation opportunities would be available at other developed campgrounds, day use areas, multiple dispersed sites, and the organization camp; however, occasionally overcrowding may be experienced.

Because the proposed action would not change the status quo of the recreational use of the area, no cumulative effects would result.

Visual and Aesthetic Resources

Direction on how to analyze the potential impacts of a proposed action on the visual resources of a national forest is given in its forest plan and other Forest Service policy. The forest plan standard for visual resource management is based on visual quality objective (VQO) maps created under the 1974 Visual Resource Management System (VRMS). Since the mid-1990s, national forests have been directed to use the Scenery Management System (SMS) (Memoranda from Forest Service Washington Office, Code 2380: Reynolds, August 22, 1994; McDougle, March 10, 1997; and Furnish, June 11, 2001). SMS mapping of scenic classes, which show the relative importance of scenic resources on the Coronado NF, was completed in 2001.

Although on-the-ground maps for the two systems are quite different, the components of both systems are similar, and analysis (affected environment, environmental consequences, and cumulative effects) for the proposed project yields largely the same results. To be consistent with the forest plan, the analysis that follows evaluates impacts using VQOs.

Current direction in the forest plan for visual resource management (USDA-FS, 1986, p. 28) includes:

- “Maintain and protect the visual integrity of the landscape,” and
- “Rehabilitate or enhance the existing visual quality in the process of accomplishing other resource management practices.”

Both recreation residence tracts lie in MAs 3A and 3B, for which the forest plan guidelines direct that visual quality objectives will be met (USDA-FS, 1986, p. 59). Both recreation residence tracts are in areas with the VQO of Retention¹¹.

Visual quality objectives are based on two components:

- **Variety Class:** A measure of the visual variety or diversity of landscape character. The three variety classes are A (distinctive), B (common), and C (minimal).
- **Sensitivity Levels and Distance Zones:** Sensitivity levels are a measure of the viewer interest in scenic qualities of a landscape. The three levels are 1 (highest), 2 (average), and 3 (lowest). Distance zones include foreground (up to 1/2 mile), middle ground (1/2 mile to 5 miles), and background (over 5 miles).

There are no maps of sensitivity levels for the Coronado NF. However, a review of the VQO maps indicates that the Swift Trail and the Bible Camp Road (FR 508) were identified as

¹¹ Retention: A VQO which requires that human activities are not evident to the casual forest visitor.

Sensitivity Level 1 areas. A project level review of sensitivity levels confirms that these designations are appropriate.

Affected Environment

Visual resources are the natural and human-created features that give a particular landscape its character and aesthetic quality. Landscape character is determined by the visual elements of form, line, color, and texture. All four elements are present in every landscape; however, they exert varying degrees of influence. The region of influence for visual resources includes the geographic area from which the recreation residences may be seen.

Area of Potential Effect

Although the project areas are quite well defined, the boundaries for visual resources are often difficult to draw. As people travel through a landscape, they experience a sequence of viewsheds. To capture the potential impacts to visual quality of the broader area surrounding the tracts, the following analysis considers elements of visual quality in the landscapes beyond each of the recreation residence tracts, including the Swift Trail Highway (AZ 366) corridor and the high elevation conifer forests of the Pinalaño Mountains, where most public use occurs and scenery is highly valued.

Within the Pinalaño Mountains are a number of developed recreation sites, including public campgrounds and picnic areas, an organization camp, trailheads and trails, and the Columbine Administrative Area (which includes a visitor center). Additionally, there are many dispersed recreation areas with no facilities other than roads, small dirt parking areas, and stone fire rings. At present, the greatest detractors to visual quality are the Heliograph electronic site and structures that comprise the Mt. Graham astrophysical complex, one of which is a 167-foot tall boxy white structure that is highly visible from some areas.

Old Columbine Tract

The landscape character in the Old Columbine area is that of a mixed-conifer forest with pockets of rocky mountainside topography, grassy meadows, and occasional stands of aspen trees. The area is accessed by the Swift Trail (AZ 366), which has been designated a scenic byway by the State of Arizona because of its outstanding scenery.

Visual quality in the Old Columbine area is generally good, despite the presence of many dead and diseased trees from insect infestation, several thickets of dense vegetation, and some nearby burned areas. Most of the recreation residences in the Old Columbine area are generally well screened from roads and scenic viewpoints, and other structures (public recreation areas, Columbine, etc.) are in character with the setting.

The Old Columbine area is designated as variety class A, distinctive, based on the distinctive conifer forest and landform of the areas. The existing VQO for this area is retention.

Turkey Flat Tract

The landscape character in the Turkey Flat area is that of a ponderosa pine forest with pockets of rocky mountainside topography and occasional stands of aspen trees. The area is also accessed by the Swift Trail Highway (AZ 366).

Visual quality in the Turkey Flat area is generally good, despite the presence of many dead and diseased trees from insect infestation, several thickets of dense vegetation, and nearby burned areas. About 20 recreation residences in the Turkey Flat area can be seen from the Swift Trail; the others are well screened from roads and scenic viewpoints, and other developments (public recreation areas, Columbine, etc.) are in character with the setting.

The Turkey Flat area is variety class A, distinctive, because of the distinctive conifer forests and landform of the area. The existing visual quality objective for the Turkey Flat area is retention.

Environmental Consequences

Direct and Indirect Effects

No Action

During the 10 years of continued use until removal, there would be no new direct or indirect impacts from the recreation residences.

Temporary impacts on visual quality would result from removal of structural improvements, including disturbance of soils, piling of debris, and operation of heavy equipment, which has the potential to damage vegetation. Visual quality impacts from removal of structural improvements would be observable for at least a few months, and effects following removal of improvements would likely be evident for 1 to 2 years. Eventually, the landscape would return to a natural forest (with the exception of roads and dispersed recreational use), and the tract would continue to meet the VQO of retention.

All Action Alternatives

Visitors come to the Coronado NF for its natural appearing landscapes. To protect visual quality, it is important that, whenever possible, human-made structures on the Coronado NF (including recreation residences) harmonize with the line, form, colors, and textures of the surrounding landscape.

The following excerpt reflects guidance for management of the recreation residence tracts during the early 1980s, when VQOs for the Coronado were mapped (USDA-FS, 2006):

“On the Coronado National Forest, as with all other national forests in the region, the visual inventory and objective setting came after the summer home residences had been in place for many years. Since the summer homes are a recognized part of the Forest Service recreation program, it was assumed they would be there for some time.

In the summer home tracts, it was assumed that each owner would first meet the requirements of their permit (no additions to the buildings, no accessory buildings, no trash in the immediate area, etc.). It was also assumed that it would be the responsibility of each district ranger to manage the area with the Visual Quality Objective (VQO) in mind. This means using the principles of the VRMS to mitigate visual impacts of any non-conforming structures, seeking to meet the VQO over time (usually retention or partial retention). The VQO of retention means that the structure cannot be visually evident. It must borrow from the forest visual elements that surround it – in its form, line, color, and texture. In general, this means that in forested areas the roof and exterior wall materials

must be natural appearing and painted in dark muted forest colors with no shiny materials or highly reflective surfaces, and the area around the home is the natural forest. Many existing homes at the time could meet this objective. The idea was to have the summer homes that did not conform to the objective and were visually evident to reduce their impact over time. This means that when doing routine maintenance such as painting and roofing, owners would choose muted forest colors and dull textures, therefore becoming less evident.”¹²

Because the proposed action would simply be a continuation of an existing use, no new direct or indirect impacts would result from its implementation. Likewise, if permits are issued for one tract and not the other (alternatives 3 and 4), impacts would be negligible, while the impacts of removal at either tract would be the same as those identified for the no action alternative.

If the proposed action is implemented, some recreation residences and associated structures may need changes over time to make them better blend with the surrounding landscape, and in some locations, there are areas with bare ground from vehicle and pedestrian use that needs to be corrected. These maintenance items would be addressed by the Coronado NF in individual SUP operation and maintenance plans.

Cumulative Effects: Visual and Aesthetic Resources

Cumulative effects are considered for the entire Pinaleño Ecosystem Management Area, since the entire mountain range is visible from many locations.

Past, present, and reasonably foreseeable future actions considered in the analysis of cumulative effects on visual quality include the following (see table 2): road maintenance; historic timber sales and livestock grazing; presence and operation of the Mt. Graham astrophysical complex and Heliograph electronic site; developed recreation site use; administrative site use (Columbine, Heliograph lookout, etc.), dispersed recreation use; fuel reduction treatments around special-use permitted facilities; PEM (a forest thinning and fuel reduction project); new permit for the Arizona Bible Camp; microwave tower installation at the Mt. Graham International Observatory; and PERP (a project that includes tree removal and prescribed burning to reduce fire hazards).

No Action

The effects of many of the projects identified as contributing to cumulative visual quality on the Coronado NF would continue through the 10-year closeout period applicable to the recreation residence tracts. Some of these projects have negatively impacted visual quality for many years, most notably, the astrophysical complex telescopes that contrast sharply with the landscape. Others (such as PEM and PERP) will provide long-term benefits to visual quality by reducing the risk of catastrophic wildland fire.

The Arizona Bible Camp is not visible from public viewing locations, and like the recreation residences, existed prior to establishment of VQOs. No new impacts are expected from a new permit being issued to the camp. Visual impacts from developed recreation and administrative sites, dispersed uses, past timber cutting and livestock grazing, fuel treatments around special-use permitted facilities, and from the microwave dish, are and would continue to be, minimal. Roads serve as viewing platforms and provide public access into the forest and are generally considered visually neutral elements.

¹² Source: Memorandum to File, Sarah Davis, forest landscape architect, Coronado National Forest, May 2006.

The visual quality impacts of no action reported in chapter 3, “Visual and Aesthetic, Environmental Consequences” section, would be negligible. Therefore, when considered incrementally with the effects of past, present, and future actions in the area, cumulative effects would be discountable in the short term, and positive in the long term, as the site restores to natural forest conditions. The VQO of retention would not change.

All Action Alternatives

Because there would be no new direct or indirect effects from continuation of existing recreation residence permits, there would be no cumulative effects on the visual resources.

Wild and Scenic Rivers

The eligibility of a river for the National Wild and Scenic Rivers System (National System) is determined by applying the criteria in sections 1(b) and 2(b) of the Wild and Scenic Rivers Act of October 2, 1968 (P.L. 90-542, as amended (95-625 1978); 16 U.S.C. 1271-1287, et seq.). Eligibility is further described in the United States Department of Agriculture and United States Department of the Interior Guidelines for Eligibility, Classification and Management of River Areas, dated September 7, 1982 (USDA-USDI Guidelines), and found in FSH 1909.12, chapter 90. To be eligible for inclusion, a river must be free flowing and, with its adjacent land area, possess one or more “outstandingly remarkable” values. The determination of eligibility is an assessment that does not require a decision or approval document, although the results of this inventory need to be documented as a part of the plan document or plan set of documents.

To the extent the Forest Service is authorized by statute, a responsible official may authorize site-specific projects and activities on NFS lands within river corridors eligible or suitable for National Wild and Scenic River designation only where the project and activities are consistent with all of the following (FSH 1909.12 Ch 80; Section 82.5):

- The free-flowing character of the identified river is not modified by the construction or development of stream impoundments, diversions, or other water resources projects.
- Outstandingly remarkable values (ORVs) of the identified river area are protected.
- For all legislatively mandated study rivers, management and development of the identified river and its corridor is not modified to the degree that eligibility would be compromised or the classification changed to a less restrictive class (such as from wild to scenic or scenic to recreational).
- For all Forest Service identified study rivers, however, they may be managed at the recommended rather than inventoried classification when the suitability study and recommendation is completed.

Affected Environment

Old Columbine Tract

A 6.2-mile segment of Ash Creek from its headwaters to the diversion for Cluff Ranch was determined to be eligible for the National Wild and Scenic Rivers (WSR) System (USDA-FS, 1993). Ash Creek has historically been a perennial creek with intermittent reaches. The Ash Creek drainage has a diversity of vegetation, dropping in elevation from the spruce-fir type to desert scrub. The creek descends through small meadows, Engelmann spruce and Douglas-fir,

alder, oak, sycamore, box-elder, and Arizona walnut. Steep slopes, deep canyons, and waterfalls provide outstanding scenic qualities. Expansive views of the Gila Valley may be seen from the middle to upper elevations of the creek. Historic features such as remnants of an old sawmill and flume operation from the early 1900s are evidence of early Anglo-American occupancy of the mountain. This segment of Ash Creek has a potential classification as recreational (FSH 1909.12, Chap. 80, Sec. 82.3) and reflects outstandingly remarkable values (ORVs) of scenic, historic, and ecological (FSH 1909.12, Chap. 80, Section 82.14).

Several of the recreation residences in the Old Columbine tract are within 1/4 mile of the headwaters of Ash Creek. However, all residences in Old Columbine were built at their present sites several decades prior to the 1993 determination of eligibility.

Turkey Flat Tract

The Turkey Flat recreation residences are miles away from any of the potential streams and rivers on the Coronado NF eligible for National Wild and Scenic River designation. Therefore, Turkey Flat will not be discussed further with regard to potential impacts on wild and scenic rivers.

Environmental Consequences

Direct and Indirect Effects

None of the alternatives would affect the eligibility of Ash Creek for inclusion into the National Wild and Scenic Rivers System because its free-flowing condition, ORVs, and classification would not be adversely impacted. The discussion below explains the reasons for this determination.

Free-Flowing Condition

With implementation of alternative 1, the removal of recreation residences would not involve impoundment, diversion, straightening, rip-rapping, or other modification of the waterway within the eligible portion of the river and, thus, would have no effect on the free-flowing condition of Ash Creek.

For alternative 2, the recreation residences would remain in place; therefore, there would be no effect on the free-flowing condition of Ash Creek.

Removal of the recreation residences at Old Columbine in alternative 3 would have the same effect as alternative 1.

Under alternative 4, the recreation residences at Old Columbine would remain in place; therefore, this alternative would not affect the free-flowing condition of Ash Creek.

Outstandingly Remarkable Values (Scenic, Historic, and Ecological)

With implementation of alternative 1, at the end of a 10-year closeout permit period, removal of the Old Columbine recreation residences would have a minor and temporary effect on the scenic ORV at the upper end of the 6.2-mile segment during the period when structures are being dismantled and scrap materials are staged onsite.

The historic ORV for Ash Creek was assigned because of the presence of the Mt. Graham sawmill and an associated flume for transporting logging products to the Gila Valley—vestiges of

early 1900s Anglo-American use of the mountain. Removal of the Old Columbine recreation residences would have no effect on the Mt. Graham sawmill and flume. Recreation residences were not mentioned in the 1993 eligibility determination as contributing to the historic ORV, even though some of them were built as early as the 1920s. Likewise, the Western Apache *Dzil Nchaa Si'an* TCP was not identified as contributing to the historic ORV, even though it encompasses the entire watershed within the forest boundary. The TCP was determined to be eligible for the National Register of Historic Places in 2001 (Spoerl 2001) and could be identified as contributing to the historic ORV of Ash Creek in a future revision of the forest plan. Recreation residences were not mentioned in the 1993 eligibility determination as contributing to the historic ORV, even though some of them were built as early as the 1920s. Removal of the Old Columbine recreation residences would have no effect on these historic resources.

If heavy equipment were used in the removal of the recreation residences, there would be soil disturbance and the potential for short-term increased soil erosion and sedimentation of Ash Creek. However, most of the erosion would be minimized by the requirement that BMPs be implemented during removal (FSH 2509.22). There would be no changes in long-term productivity or irreversible or irretrievable commitments of resources. While there are no water quality criteria prescribed by the National Wild and Scenic Rivers Act, there could be a temporary, minor, indirect effect on aquatic species in Ash Creek (ecological ORV) because of slightly increased turbidity levels.

Implementing alternative 2 would not affect the ORVs of Ash Creek because the Old Columbine recreation residences were in place at the time of the 1993 determination of eligibility and because this alternative does not change anything on the ground.

Alternative 3, removal of the Old Columbine recreation residences, would have the same effects as alternative 1. If alternative 4 is implemented, the recreation residences at Old Columbine would remain in place; therefore, the effects would be the same as alternative 2.

Stream Classification

With implementation of alternative 1, removal of the recreation residences would have no adverse effect on classification (recreational) of the 6.2-mile segment of Ash Creek eligible for National Wild and Scenic River designation. If the residences and roads were removed and the area returned to a natural appearance, the future classification of this segment may qualify as either scenic or wild.

With alternative 2, there would be no on-the-ground changes; therefore, the recreational classification would not be affected.

Alternative 3 would have the same effects as alternative 1.

Alternative 4 would have the same effects as alternative 2.

Cumulative Effects: Wild and Scenic Rivers

There would be no cumulative effects on the section of Ash Creek eligible for National Wild and Scenic River designation because there are no direct or indirect effects from any of the alternatives.

Heritage Resources

Regulatory Framework

Historic properties are those that are eligible for or already listed on the National Register of Historic Places. Section 106 of National Historic Preservation Act (NHPA) outlines the process that Federal agencies follow to assess potential effects on historic properties when an undertaking is proposed. The process is codified in 36 CFR Section 800. Specific direction applicable to Forest Service, Southwestern Region, compliance with 36 CFR 800 is contained in the “First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities Among New Mexico Historic Preservation Officer and Arizona State Historic Preservation Officer and Texas State Historic Preservation Officer and Oklahoma State Historic Preservation Officer and the Advisory Council On Historic Preservation and United States Department Of Agriculture Forest Service, Southwestern Region” (USDA-FS, 2003).

Other laws, regulations, and Forest Service policies also apply to the inventory, protection, restoration, and interpretation of heritage resources. These include the National Environmental Policy Act, National Forest Management Act, and the Archeological Resources Protection Act. Native Indian Nations’ concerns are considered in this section, because the protection of American Indian historic properties is linked to the preservation of their heritage. The Federal Government’s responsibilities to consult on a government-to-government basis with American Indian tribes and nations is established in the U.S. Constitution, and further mandates clarifying the Forest Service responsibilities are contained in the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, the Religious Freedom Restoration Act, and Executive Orders 13007 and 13175.

Affected Environment

The history of human occupation of the Pinaleño Mountains began long before European entry into the region. Settlements at the base of the mountains and shrines on the peaks date back at least a thousand years, and the mountains are important in the history and traditions of the Four Southern Tribes (Tohono O’odham Nation, Ak-Chin Indian Community, Gila River Indian Community, and Salt River Pima Maricopa Indian Community), the Hopi Tribe, and the Pueblo of Zuni.

The Pinaleño Mountains are also the ancestral and contemporary homeland of the Western Apache, who refer to Mt. Graham as *Dzil Nchaa Si’an*. The Apaches resisted Euro-American encroachment, subjugation and colonization efforts until the second half of the 19th century. The Treaty of Guadalupe-Hidalgo was signed in 1848, ending the U.S. war with Mexico and bringing California, New Mexico and Arizona north of the Gila River under U.S. control. In the succeeding decades, the Western Apache were forced from their homelands because of Federal Indian policy and governmental actions. However, Apache people still claim powerful ties to the Pinaleño Mountain range and surrounding areas, and *Dzil Nchaa Si’an* has outstanding significance in Western Apache spiritual beliefs and practices (Laluk 2008). The mountain is associated with Western Apache oral history and plays a role in stories, songs and myths that reflect ties to it, both in historic and contemporary traditional cultural activities (Spoerl 2001, 2002a, 2002b).

In 2002, in consultation with the Western Apache tribes, the Arizona State Historic Preservation Officer, and the Keeper of the National Register, the Forest Service determined that the entire area of the Pinaleño Mountains (Mt. Graham/*Dzil Nchaa Si’an*) within Forest Service boundaries

(over 198,000 acres) is eligible for listing on the National Register of Historic Places as a Western Apache Traditional Cultural Property (TCP) (Spoerl 2002a, 2002b). *Dzil Nchaa Si'an* was determined to have sufficient integrity to be eligible for listing despite the existence of the recreation residences and other developments on the mountain. However, to the Western Apache, modern developments, especially the Mount Graham International Observatory, have had severe detrimental effects to their religion and culture.

The name "Mt. Graham" was first applied to the Pinaleños in 1846 when the Army of the West under General Stephen Watts Kearny followed the Gila Valley on its way west to California. The first documented Euro-American visit to the top of the Pinaleños occurred in 1871, when a survey party under George M. Wheeler left a stone monument on the summit (Gillespie 2000). Commercial logging of the range began in the last quarter of the 19th century, with the establishment of settlements in the Gila Valley. Sawmills were constructed in accessible canyons on the north side of the range, and the Army cut timber in the Fort Grant vicinity following its establishment in 1873. A military hospital was built at Hospital Flat and used during the summer months. In 1889 through 1890, the Army established a heliograph signaling station on Heliograph Peak. However, military use of the range was in decline after 1880, and ceased when Fort Grant was abandoned in 1895 (Spoerl 2001).

Residents of Pima, Thatcher, and Safford have spent summers on Mt. Graham since the late 1880s (Spoerl 1988). Riggs Flat became the headquarters for summer cattle grazing in the early 1900s, while Chesley Flat was used for growing potatoes. In 1902, the increasing use of the mountains was regulated through establishment of the Mt. Graham Forest Reserve, with the objective of protecting the water supply and timber reserves. By that time, cabins were already present at Old Columbine (King 1915). The land became part of the Crook National Forest in 1908, and in 1953, it was transferred to the Coronado National Forest (Spoerl 2001).

Both the Old Columbine and Turkey Flat tracts were established in the 1920s, upon the Forest Service's receipt of applications for summer residences (Angle 2006). The current recreation residences at Columbine were built between 1923 and 1956, although most have been modified within the last 50 years. Weech et al. (2003:92) note that Turkey Flat was first developed by William Deal and Joe Bassett, who built a log cabin there as part of a plan to grow potatoes. Most of the recreation residences at Turkey Flat were built after the Swift Trail (Highway 366) improved access to the area. Turkey Flat cabins were first constructed between 1929 and 1966, but as at Columbine, most of them have been remodeled or expanded within the last 50 years.

In 2006, in consultation with the Arizona State Historic Preservation Officer (SHPO), the Forest Service evaluated the recreation residences for eligibility for listing on the National Register of Historic Places (Farrell 2006, 2006a; Farrell et al., 2006). Twenty-one of the residences (5 of the 14 residences at Old Columbine and 16 of the 74 residences at Turkey Flat) are over 50 years old and have been only minimally modified since their original construction. However, none of the 88 recreation residences was determined to meet National Register criteria as an individual property. In addition, because most of the residences on each tract lack sufficient age and integrity to form a National Register "historic district," none of the cabins was determined to be eligible as a contributing element of such a district. Therefore, none of the residences on either tract is considered a historic property that would require additional consideration under the provisions of the National Historic Preservation Act (Farrell 2006a). The Arizona State Historic Preservation Officer concurred with this determination on September 21, 2006 (see appendix B).

In March 2006, the forest supervisor wrote to 12 tribes having traditional ties to the land now administered by the Coronado National Forest (project record, item 74) to advise them of the

proposed residence permitting action and invite comments on the scope of this EIS analysis. One reply was received; it was from the White Mountain Apache Tribe. The tribal chairman at that point in time, Dallas Massey, Sr., stated that the continued existence of the recreation residences in itself was an adverse effect on the *Dzil Nchaa Si'an* TCP (Massey 2006). This effect is discussed below.

Environmental Consequences

Direct and Indirect Effects

No Action

No action would have “No Adverse Effect” on historic properties, per 36 CFR 800.5(b). The continued existence of the recreation residences for a 10-year closeout period, after which the structures would be removed, would not alter the characteristics that make the mountain eligible for the National Register of Historic Places as a TCP for the Western Apache. According to former Chairman Massey (2006), the Western Apache would prefer that the residences be removed from *Dzil Nchaa Si'an*, because modern developments such as these impinge upon the spiritual values of the TCP.

The negative effects of the residences expressed by former Chairman Massey (see chapter 3, “Heritage Resources, Regulatory Framework” section) do not change the qualities of the mountain that make *Dzil Nchaa Si'an* eligible for listing on the National Register of Historic Places. Nevertheless, the Forest Service recognizes the Western Apache concerns and acknowledges them throughout this DEIS.

Action Alternatives

All three of the action alternatives would allow the forest to issue SUPs for some or all of the recreation residences, so that they could remain for at least 20 years. No expansion in the recreation residences, nor any changes in recreation residence use, is proposed.

Massey (2006) expressed the perspective of the White Mountain Apache Tribe that the continued existence of the recreation residences contributes to two effects on *Dzil Nchaa Si'an*. First, residential use by individuals, families, and guests, who may not understand or respect the mountains as sacred sites and historic properties, fosters and facilitates unwarranted damage and desecration to the sacred mountain. Second, the residences are likely to continue to have undue and inappropriate effects on land and fire management, because of the Forest Service’s historic responses to fires (suppression) are based on the protection of private property rather than on the restoration of ecosystem function or the protection and expansion of endangered species habitat.

The negative effects cited by Massey regarding the continued presence of the residences do not change the qualities of the mountain that make *Dzil Nchaa Si'an* eligible for listing on the National Register of Historic Places. The residences were present before the TCP was determined eligible for the National Register in 2002. Consultation with the Arizona State Historic Preservation Officer confirmed that each of the action alternatives (alternatives 2, 3 and 4) would have “No Adverse Effect” per 36 CFR 800.5(b) on the *Dzil Nchaa Si'an* TCP (Farrell 2006, 2006b).

In addition, other laws and executive orders require the Forest Service to consider the effect of the proposed project on the TCP, *Dzil Nchaa Si'an*. The American Indian Religious Freedom Act (Public Law 95-341) recognizes that the religious practices of American Indians are an integral

part of their cultures, tradition and heritage, such practices forming the basis of Indian identity and value systems. The Religious Freedom Restoration Act prohibits the government from imposing a “substantial burden” on the free exercise of religion. Recent court decisions (see footnote for citations¹³) suggest that to constitute a “substantial burden,” a government action must coerce someone to act contrary to their religious beliefs under the threat of sanctions, or condition a governmental benefit upon conduct that would violate their religious beliefs. Under this definition, the existence of the recreation residences would not meet the criteria for substantial burden.

The most relevant direction is Executive Order 13007, Indian Sacred Sites, which directs Federal land management agencies, to the extent permitted by law and not clearly inconsistent with essential agency functions, to accommodate access to and use of Indian sacred sites, and to avoid affecting the physical integrity of such sites wherever possible (FSM 1563.01e5). Sections 3 and 4 of this Executive Order appear to limit its applicability and authority:

Section 3. Nothing in this order shall be construed to require a taking of vested property interests. Nor shall this order be construed to impair enforceable rights to use of Federal lands that have been granted to third parties through final agency action. For purposes of this order, “agency action” has the same meaning as in the Administrative Procedures Act (5 U.S.C. 551[13]).

Section 4. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by any party.

Nevertheless, there are ways in which the Forest Service can reduce the effects of the recreation residences on the Western Apache TCP, within existing law and not inconsistent with essential agency functions. To this end, the Forest Service consulted with the San Carlos Apache Tribe and White Mountain Apache Tribe to develop mitigation measures to minimize the ongoing effects of recreation residences on the traditional cultural, spiritual, and historical values of *Dził Nchaa Si'an* will be included as stipulations in the operating plan that governs each SUP. These measures are identified in chapter 2, “Mitigation” section.

Cumulative Effects: Heritage Resources

In addition to the recreation residences and other special-use sites (e.g., Heliograph, Ladybug) on Mt. Graham, the Western Apache strongly oppose the existence of the Mt. Graham International Observatory because of its effects on their TCP. In his letter of April 28, 2006, Chairman Massey wrote that recreation and institutional permits on sacred mountains cause desecration and damage to the Apache culture. To the Western Apache, recreation residences must be considered part of the cumulative impacts to Native American cultural and ecological integrity of sacred sites, which has most recently been exacerbated by projects such as the Mt. Graham International Observatory on the Coronado National Forest, expansion of the ski area on the Coconino National Forest, and copper mining on the Tonto National Forest.

¹³ *Navajo Nation v. U.S. Forest Service*, 408 F. Supp. 2d 866, 883-84 (D. Ariz. 2006); *Navajo Nation v. U.S. Forest Service*, D.C. No. CV-05-01824-PGR, August 8, 2008, U.S. Court of Appeals for the Ninth Circuit, en banc appeal decision.

Social and Economic Resources

The forest plan, page 9, provides the following mission statement for management of the Coronado NF:

- “Manage the resources of the Coronado National Forest under multiple use and sustained yield principles to provide for balanced contributions to the national welfare and **to the economic and social needs of the people of southeast Arizona and southwest New Mexico. Management programs are to be oriented to maintain cultural values and a viable rural economy** [emphasis added].”

Additionally, the forest plan provided the following standard/guideline:

- “Consider all resource values and social needs in doing land adjustment planning (USDA-FS, 1986, p. 40).”

Affected Environment

The Old Columbine and Turkey Flat recreation residence tracts are located within Graham County, Arizona. Most current permit holders list a permanent residence address within Graham County (USDA-FS, 2006). As discussed in chapter 3, “Heritage Resources” section, the entire mountain range has great social and cultural importance for the Western Apaches, who live mainly in Gila, Navajo, and Apache Counties, as well as Graham County. The economic and social activities resulting from use of these recreation residences are generally concentrated within the county. For this reason, the analysis area for direct, indirect, and cumulative effects of this project on the social and economic environment focuses on Graham County, Arizona. The period of analysis for cumulative effects is 20 years, based on the term of a newly issued recreation residence SUP.

The Graham County Comprehensive Plan emphasizes the importance of protecting both the natural resources and scenic beauty that are “essential to the economic stability and unique character and lifestyles” of the area (University of Arizona, 2006). Graham County is rich in natural resources and has a rural culture and economy supported by copper mining, cotton farming, and cattle ranching. The Gila River is a vital source of water for approximately 52,000 acres of arable land in the county, much of which is dedicated to the production of cotton, a primary component of the county’s agricultural economy. Mining also plays a major role in the economy of Graham County. There are a number of small mines in the area, and the Phelps-Dodge Corporation manages a large open pit mine north of Safford. The Mt. Graham International Observatory, located within Graham County on the Coronado NF, is the home of the Large Binocular Telescope, the world’s most powerful optical telescope.

The permit holders are represented by two recreation residence owner associations. The Columbine Recreation Residence Owners Association represents those in the Old Columbine tract and the Mt. Graham Recreation Residence Association represents those in the Turkey Flat tract. Spring-fed water system permits have been granted to each of the two associations (Angle, 2006c). The associations manage the water systems using volunteers from within their membership, represent recreation residence owners in dealings with the Forest Service, disseminate information, and encourage appropriate area maintenance and resident behavior (Bennett, 2006c).

The primary season of use for the permitted recreation residences is May 1 through October 31. Because of weather conditions, the road to the Old Columbine tract is gated from about

November 15 to April 15 each year. Snow conditions sometimes prevent opening of the gate in the spring until the road can be plowed, generally by Memorial Day. The Turkey Flat tract is accessible year round (Angle, 2006a; Bennett, 2006d).

Permits allow recreation residence owners to reside in the recreation residences up to 180 days per year. Actual use at each recreation residence is generally much less, limited to a few weekends and an occasional stay of a week or more. Very little use has been noted during the winter months. Permits do not allow owners to rent their recreation residences to third parties. All recreation residences are permitted to individuals, generally in middle income ranges. However, a growing number of permit holders are professionals in higher income brackets (Bennett, 2006c). Sixty percent of recreation residence owners reside within Graham County. All but two owners reside within Arizona (USDA-FS, 2006).

As mentioned above, all recreation residences are served by water systems permitted to and administered by owner associations. However, in dry years, the springs have run dry, requiring permit holders to haul in water (Bennett, 2006d). Approximately 70 percent of recreation residences have septic systems, and the remaining 30 percent use pit toilets. Neither tract has telephone or electric service; although some recreation residence owners have generators to provide electricity (Bennett, 2006b). Cell phone coverage is poor. Heat is provided through the use of propane or wood stoves. When in residence, permit holders generally obtain supplies and services in Safford, Arizona (Bennett, 2006d).

Most recreation residences are relatively small, and have an average of two bedrooms, kitchen, family room, and a bathroom or pit toilet. Some recreation residences have a loft, and most have a deck. Most recreation residences are well maintained. Permits require that owners maintain the structural integrity and protective coatings of recreation residences and maintain their lots to remove debris, including branches, needles, etc. Wood piles must be kept a safe distance from structures. Permit holders are required to remove any hazard tree, on or off the lot, which may pose a danger to the house or to residents (Bennett, 2006e).

The permit authorizing the occupancy of the residences specifies that a determination may be made at the end of each 20-year term not to extend the permit, and that if it is not issued, the permit holder must remove all improvements. This is a risk assumed by the initial permit holder in signing the permit and constructing a recreation residence on public lands and is assumed by all succeeding owners. An option available to permit holders to mitigate this loss is to move their recreation residence to a location off the Coronado NF rather than remove it.

Other permitted or Forest Service owned facilities also present in the area include a church camp (Arizona Bible Camp) and numerous developed recreation sites, and the area is also used for dispersed recreation and permitted grazing.

Social Environment

Both the Old Columbine and Turkey Flat tracts were established in the 1920s, when applications for permits were first submitted (Angle, 2006). Many of the recreation residences have been passed down through generations within the same family. Other recreation residences tend to be more frequently bought and sold, in some cases as often as every 2 to 3 years (Bennett, 2006a; Angle, 2006b). For many of the individuals who hold permits, these recreation residences are a well-established element of their lifestyle and standard of living, providing a mountain “getaway” to be enjoyed each summer. For some families, ownership and use of these recreation residences have become a part of family culture and tradition.

For some permittees, the cabins are physical reminders of the past and powerful ties to family, community, and cultural history. For these persons, preservation of these sites is important in order to safeguard the history they represent and maintain a sense of connection to the past that can be communicated and passed on to future generations. Emotional and psychological attachments to these sites can be an important contribution to an individual's or community's sense of place. In a similar but reverse manner, for some Western Apaches the cabins are physical reminders of the economic, social, and spiritual losses their own culture has experienced in the past 120 or so years. For them, human-made developments are intrusions that disrupt the sacred and traditional environment of the mountain.

The White Mountain Apache Tribe and some members of the public have expressed concern that NFS land and fire management decisions are unduly influenced by the permitted recreation residences and that the protection and enhancement of habitat for the endangered Mt. Graham red squirrel is compromised in order to accommodate the needs of permit holders. Additionally, concern was expressed that decisions to suppress wildland fire are too heavily influenced by the need to protect recreation residence tract improvements rather than realize ecosystem benefits. For this reason, it is believed by tribal members and some of the general public that the needs of a few citizens are compromising the greater public benefit. By the same token, permit holders have a capital investment in their improvements as well as sentimental attachments resulting in a strong desire to see that investment protected.

Population

In 2000, the population of Graham County was 33,489, which equates to approximately 7.2 persons per square mile as compared to 45.2 persons per square mile across the State of Arizona as a whole (U.S. Census Bureau, 2000a). The population of the county is expected to grow by approximately 35 percent by the year 2030. This rate of growth is much lower than the population growth projected for the State, which is expected to double over the same time period (Arizona Department of Economic Security, 2006). Table 10 displays the racial and ethnic breakdown of the Graham County population, including poverty rates by race or ethnicity.

In 2000, the total number of housing units in Graham County was 11,430, of which 2.5 percent were identified as seasonal homes. Overall, the number of total housing units grew by 25.4 percent since the 1990 census, compared with a growth rate of nearly 32 percent statewide. The highest rate of growth within the county occurred in the number of seasonal homes, which increased by 35 percent in the same 10-year period. The county rate of growth in the number of seasonal homes still falls short of the State average of 46.8 percent. Housing density remains rather sparse, with only 2.47 houses per square mile (University of Arizona, 2006).

Economy

The most dominant categories of employment in Graham County are displayed in table 11. The relative breakdown is reflective of the State as a whole, but with a somewhat greater proportion of jobs in service occupations and the construction, extraction, and maintenance occupations (University of Arizona, 2006).

The major employers within Graham County (University of Arizona, 2006) include the following: Arizona State Prison, Safford; Bonita Nurseries, Bonita; City of Safford, Safford; Eastern Arizona College, Thatcher; Federal Prison, Safford; Impressive Labels, Safford; Mt. Graham Hospital, Safford; Safford United School District, Safford; and Wal-Mart, Thatcher.

Annual fees charged by the Forest Service for a recreation residence is 5 percent of the bare land appraisal. Lots are appraised every 20 years. Annually, the 5 percent fee is adjusted for inflation. The total 2006 annual use fees paid to the Treasury by recreation residence owners at Old Columbine totaled \$8,232, and owners at Turkey Flat paid \$45,064 for a total of \$53,296.

Table 10. Graham County, Arizona, population by race and ethnicity

Race/Ethnicity	Population	Percentage of Population	Number Below Poverty Level	Percentage of Total Below Poverty Level
White	22,473	67.1	3,202	16
Black or African American	625	1.0	173	54
American Indian and Alaska Native	5,005	14.9	2,276	49
Asian	188	0.6	16	14
Native Hawaiian and Other Pacific Islander	13	0.0	10	33
Other Race	4,470	13.3	1,029	27
Two or More Races	715	2.1	246	30
Hispanic ¹	9,054	27.0	2,218	28
Non-Hispanic	24,435	73.0	2,243	13

Source: U.S. Census Bureau, 2000.

¹ Members of all races may be counted as Hispanic, based on their country of origin or ethnicity.

Table 11. Dominant occupations in Graham County and the State of Arizona

Occupational Category	Graham County	Arizona
Management, professional, and related occupations	25.9%	32.7%
Sales and office occupations	23.5%	28.5%
Service occupations	20.8%	16.2%
Construction, extraction, and maintenance occupations	16.4%	11.0%
Production, transportation, and material moving occupations	11.5%	10.9%

Source: U.S. Census Bureau, 2000

Recreation residences and outbuildings require routine maintenance to remain in compliance with the requirements of the SUPs. Maintenance activities that cannot be accomplished by the owners are usually performed by a hired contractor. Most services are obtained from businesses located

in Safford. Additionally, other supplies and services, such as groceries, gasoline, and auto maintenance, required by recreation residence owners while in residence at the recreation residences, are generally obtained in Safford. No quantifiable data is available on the revenue generated by Safford area businesses as a result of these services.

Revenues to Graham County

Special-use permits issued for recreation residences within the Old Columbine and Turkey Flat tracts allow the use of NFS lands on which the residences sit. The recreation residences themselves are private property and are a source of tax revenue to Graham County. County records indicate annual tax revenues of \$1,002 are collected on the residences within the Old Columbine tract and \$6,300 are collected from Turkey Flat owners (Graham County Treasurer, 2006).

Counties receive Federal funds known as payments in-lieu of taxes (PILT) to replace revenue that is lost because of the tax-exempt nature of public lands administered by Federal agencies (1976 Payments in Lieu of Taxes Act). The amount is based on the amount of acreage administered by certain Federal agencies, population, a schedule of payments, the Consumer Price Index, other Federal payments made in the prior year, and the level of funding allocated by Congress.

In addition to PILT, counties have historically received payments from the Federal 25 Percent Fund, which accrues from fees generated by Coronado NF activities, with the exception of certain mineral programs, and is based on the number of NFS acres within each county. The 25 Percent Fund payments to some counties were affected by the enactment in 2000 of the Secure Rural Schools and Community Self-Determination Act (SRSCS)¹⁴, which is intended to stabilize annual payments to states and counties for 6 years, which began in 2001. The new formula for computing annual payments is based on averaging a state's three highest payments between 1986 through 1999 to arrive at a compensation allotment or "full payment amount." Each county had to decide whether to continue to receive payments under the 25 Percent Fund or to receive its proportionate share of the State's full payment amount under SRSCS. Graham County elected to receive its proportionate share of the State's full payment amount under SRSCS.

Environmental Consequences

Direct and Indirect Effects – No Action

Social Environment

If no action is taken, permit holders would have continued use of their lots and recreation residences for 10 years, after which they would be required to remove all improvements. Many permit holders would consider this a loss of an important element of their lifestyle and an adverse impact to their standard of living. For families who have held a permit over multiple generations, a place that has been a part of family culture and tradition would be lost. While the tradition could potentially be continued in another location, some elements specific to the current recreation residence's location, surroundings, and characteristics would be lost.

Many permit holders would experience a feeling of loss when a physical element important to their sense of place is removed, potentially reducing their enjoyment of the area. Those who

¹⁴ The SRSCS (P.L. 106-393) was enacted to provide transitional assistance to rural counties affected by the decline in revenue from timber harvests on Federal lands. Traditionally, these counties relied on a share of receipts from timber harvests to supplement local funding for school systems and roads.

experience historical structures as a physical tie to the past would likely feel a strong sense of loss. For these individuals, a paper record is likely to be considered a poor substitute. The ability to pass this connection on to future generations would be limited to the communication of verbal and written histories.

On the other hand, if no action is taken, an important element of the Western Apache social and cultural environment would be restored. Removal of the residences would help protect their sacred TCP by returning the tracts to a more natural state and fostering a natural fire regime. Concerns about disrespectful and inappropriate behavior on the mountain would be reduced. Their ability to pass on to future generations the concept of respect for the entire mountain would be enhanced. Because Apache history and wisdom is inextricably tied to a sense of “place” (Basso 1996), an improvement in their ability to hand down traditional values, morality, history, and identity would be realized.

Concerns about the effect that the presence of recreation residences has on NFS land and fire management decisions would continue for the next 10 years. Following removal of the recreation residences, concerns about their perceived effect on habitat for the Mt. Graham red squirrel would be eliminated. However, the dispersed recreation use that is anticipated to occur in these sites may present new concerns with regard to the squirrel and other natural resources.

With regard to fire management, the Forest Service would have greater flexibility to manage wildland fire to enhance ecosystem health and restore the natural fire regime. The presence of other permitted facilities in the area such as the Mt. Graham International Observatory, Arizona Bible Camp, electronic sites, and developed recreation facilities would continue, however, to influence the need for fire suppression.

Population

Use of the existing recreation residences is limited to a maximum of 180 days per year. Actual use of the recreation residences is often limited to a few weekends and an occasional stay of a week or more (Bennett, 2006c). None of the recreation residences are primary residences. Although the ability to own a recreation residence within a relatively short driving distance may make Graham County more attractive to some recreation residence owners as a location for their permanent residence, removal of the recreation residences would not be expected to have any direct or indirect impacts on the local population.

Economy

For the 10-year closeout period, there would be no change in the economic contribution made to the local economy because of the existence and use of the 88 recreation residences in the Old Columbine and Turkey Flat tracts. Recreation residence owners would continue to obtain services and supplies from local businesses.

At the end of 10 years, permit holders would be required to remove all improvements. The required removal of each recreation residence may represent the loss of a capital investment for the permit holder. Approximately 56 percent of the recreation residences were constructed in the late 1920s to the early 1940s. The remaining recreation residences were constructed during the 1950s, with a few in the 1960s (Graham County Assessor, 2006). Most of these facilities have exceeded the original design life and as such would be fully depreciated. However, many have been remodeled or updated over the years, effectively extending the original design life.

Regardless, a residence still in use is of value to its owner and represents a loss if it must be demolished. The limited cash value (replacement cost less depreciation) of the residences in these two tracts ranges from a low of \$1,500 to a high of \$38,000 with an overall average of approximately \$13,500 (Graham County Assessor, 2006).

The cost of removing improvements would be borne by the permit holders. The cost of removal of structural improvements is estimated at approximately \$3,000 per recreation residence. Removal costs would include the deconstruction and removal of all buildings and foundations and reshaping of the site to return it to a natural contour. Sites would then be revegetated using a native seed mix. The cost of revegetation is estimated at approximately \$200 per site and would also be borne by the permit holders. The Forest Service would incur expenses to administer the restoration of the site. Forest Service costs are estimated at approximately \$125 per recreation residence.

Following removal of the recreation residences, services and supplies that had been provided by local businesses to permitted recreation residence owners would no longer be needed. A majority of recreation residence owners (60 percent) (USDA-FS, 2006) are residents of Graham County and it is anticipated that their spending would continue to remain within the county. The business of recreation residence owners with primary residences outside the county would be lost. However, no measurable effects on local employment or income are anticipated. The removal of improvements at the end of 10 years may stimulate a very small amount of short-term employment revolving around removal of structural improvements and rehabilitation activities.

Forest Service and County Revenues

If no action is taken, Graham County would continue to collect annual property tax revenues of approximately \$7,500 from recreation residence owners (Graham County Treasurer, 2006) and the Forest Service would continue to collect special use permit fees of approximately \$53,296 annually through December 31, 2018 (USDA-FS, 2006c). After this date, all improvements would be removed. County property tax revenues would be reduced by approximately \$7,500 (Graham County Treasurer, 2006). Forest Service revenues associated with the Old Columbine and Turkey Flat Recreation Residence tracts would cease.

As explained above, counties in which NFS lands are located receive payments from either the 25 Percent Fund or the SRSCS. Graham County chose to take payment under the SRSCS. Therefore, SRSCS payments to Graham County would not change as a result of implementation of alternative 1. However, the SRSCS legislation and associated payments terminated in 2006. SRSCS was extended and payments funded for 2007, however, Congress has yet to take action to extend it beyond 2007. If SRSCS is not extended, payments may be made under the 25 Percent Fund Act.

If payments under the 25 Percent Fund are resumed, Graham County would receive 25 percent of the receipts collected for the recreation residence SUPs for the next 10 years. This would be approximately \$13,300 annually in 2006 dollars. After 10 years, the special-use permits would expire, and no further funds would be collected, resulting in a reduction in annual 25 Percent Fund revenues to the county of approximately \$13,300.

The total revenue loss to the county would be approximately \$20,600 annually, which represents approximately 0.05 percent of the county's 2006 total budget (Arizona Tax Research Association, 2006). This reduction is not expected to adversely impact county services.

Financial and Economic Present Net Value (PNV)

The measure of financial and economic present net value (PNV) has been determined for the alternatives addressed in this EIS.

Financial PNV examines revenue and cost implications from the perspective of the Forest Service. It could also be said that this is the perspective of the taxpayer. Only those revenues and costs that are recorded in financial records are included in this analysis. When considering quantitative issues, financial PNV analysis offers a consistent measure in dollars that can be used to compare alternatives. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits and costs that are not easily quantifiable. This is not to imply that such values are not significant or important, but to recognize that non-market values are difficult to represent with appropriate dollar figures. The values that are not included in this part of the analysis are often at the center of disagreements and interest people have in forest resource projects. Therefore, financial PNV should not be viewed as a complete answer, but as one tool decisionmakers use to gain information about resources, alternatives, and tradeoffs between costs and benefits.

Economic PNV examines a broader definition of benefits by considering the value of national forest uses that are not captured in the marketplace. In this analysis, costs and benefits to permit holders are the primary additions over a financial analysis. Some outcomes, such as biological diversity, visual amenities, and some social impacts have no monetary values or costs that have been established by USDA or the Forest Service. While some research studies have explored the development of such values, these values are considered in a non-monetary fashion by natural resource impacts analysis.

Net public benefit is an important concept in the current regulations for carrying forest management activities (benefits minus all the associated Forest Service inputs and negative effects (costs), whether they can be quantitatively valued or not). Thus, net public benefits, conceptually are the sum of this economic analysis plus the net value of non-priced outputs and costs. It is not the result of economic analysis alone. Many relevant factors cannot be quantified or expressed in monetary terms. The agency endeavors to maximize net public benefit through public participation in the planning process. By seeking public input and designing alternatives and mitigation measures to achieve the desired future condition while minimizing adverse effects and analyzing effects relative to the issues and concerns, an agency achieves the maximum net public benefit. The economic PNV analysis is but one element that must be considered together with the impacts to other resources that are evaluated in this EIS.

PNV is defined as the value of discounted benefits (or revenues) minus discounted costs. A PNV analysis includes all outputs to which monetary values are assigned. In deriving PNV figures, costs are subtracted from benefits to yield a net value. "Future values" (i.e., benefits received in the future) are discounted using an appropriate discount rate to obtain a "present value." The PNV of a given alternative is the discounted sum of all benefits minus the sum of all costs associated with that alternative. PNV estimates attempt to condense a large amount of information into a single value. This value must be used with caution.

Table 12 displays the financial and economic PNV for the no action alternative. All dollars are in constant dollars with no allowance for inflation. A 7 percent discount rate was used over a period of 20 years, from 2009 through 2028. Revenues are not reduced for payments made to states and counties. No action had the lowest financial and economic PNV of the alternatives evaluated in this EIS.

Table 12. Financial and economic present net value (PNV) for no action (20 year planning horizon)

Value	Present Value (Thousands of Dollars)
Forest Service Revenues	\$400.50
Forest Service Costs	-\$146.30
Public Benefits	\$1,244.10
Public Costs	-\$812.70
Financial PNV	\$254.30
Economic PNV	\$431.40

Environmental Justice

If the residences are removed, the social and cultural benefits would accrue mainly to the Western Apache, because the residences are incompatible with their TCP. Table 10 indicates that almost half of the Native Americans within Graham County live below the poverty level, and it is assumed that most of these Native Americans are Western Apaches who live on the San Carlos Apache Reservation.

Direct and Indirect Effects – Proposed Action

Social Environment

Under this alternative, there would be no change to the existing condition. Existing recreation residence permits would be issued for a 20-year period. Permit holders would have the continued use of their lots and attached recreation residences until December 31, 2028, when the permits would again need to be considered for issue. Permit holder lifestyles and standard of living as related to the access to and use of these residences would be maintained. For those families who have maintained multigenerational traditions tied to a recreation residence, this alternative represents the ability to continue a family tradition and maintain family culture.

Permit holders who attach importance to physical reminders of the past would favor this alternative most strongly. Sense of place for these individuals would be maintained. Existing recreation residences could be preserved for the next generation.

Conversely, issuing 20-year permits for the recreation residences would continue their effects on an important element of the Western Apache social and cultural environment. Desecration of the Western Apache sacred TCP would continue, as would their concerns about disrespectful and inappropriate behavior on the mountain. The Apaches’ ability to pass on to future generations the concept of respect for the entire mountain would be diminished, and their ability to convey to their children traditional values, morality, history, and identity would be reduced.

The presence of recreation residences would continue to be a consideration in the determination of current and future management activities including fire prevention and suppression. Permit holders would continue to seek assurance that their properties would be protected from the effects of catastrophic wildland fire. Restoration of a natural fire regime would be politically difficult. The perception of effects resulting from the presence of these recreation residences to Mt.

Graham red squirrel habitat would continue. Those who favor the removal of residences in favor of habitat concerns would remain unsatisfied.

Population

There would be no change from the existing condition under this alternative; therefore, there would be no effect on the local population.

Economy

There would be no change to the economy if the proposed action is implemented. Existing contributions to the local economy would be maintained as recreation residence owners would continue to obtain services and supplies from local businesses. Permit holders would be required to continue the maintenance of improvements as in the past, incurring a similar level of expense.

Forest Service and County Revenues

No change to Graham County or Forest Service revenues would result from the proposed action. The county would continue to collect annual property tax revenues of approximately \$7,300 from recreation residence owners until 2028 (Graham County Treasurer, 2006). Likewise, the Forest Service would continue to collect annual special-use permit fees of approximately \$53,296 for the same period (USDA-FS, 2006c).

If the SRSCS is extended, there would be no effect on Federal funds allocated to the county. If the SRSCS is not extended, and payment under the 25 Percent Fund Act resume, Graham County would receive annual payments of approximately \$13,300 from associated permit fees in addition to 25 percent of other Forest Service revenues.

Financial and Economic Present Net Value (PNV)

Table 13 displays the financial and economic PNV associated with the issuance of new permits. All dollars are in constant dollars with no allowance for inflation. A 7 percent discount rate was used over a period of 20 years, from 2009 through 2028. Revenues are not reduced for payments made to states and counties. The proposed action would have the highest financial and economic PNV of the alternatives evaluated in this EIS.

Table 13. Financial and economic present net value (PNV) for the proposed action (20 year planning horizon)

Value	Present Value (Thousands of Dollars)
Forest Service Revenues	\$604.10
Forest Service Costs	-\$212.20
Public Benefits	\$4,163.70
Public Costs	-\$988.60
Financial PNV	\$2,398.60
Economic PNV	\$3,175.10

Environmental Justice

The issuance of permits is detrimental to the culture and religion of the Western Apache, because the presence of the residences is contrary to protection of the mountain as a TCP. As table 10 indicates, almost half of the Native Americans within Graham County live below the poverty level, and it is assumed that most of these Native Americans are Western Apaches who live on the San Carlos Apache Reservation.

Direct and Indirect Effects – Issue Turkey Flat Only

Social Environment

Direct and indirect effects related to issuing new term permits for the Turkey Flat recreation residence tract would be the same as described for the proposed action. There would be no change to the existing condition relative to these permits. The 74 permit holders with residences located in the Turkey Flat tract would have the continued use of their lots and associated improvements until December 31, 2028, when new permits would be needed. Turkey Flat permit holder lifestyles and standards of living related to the access to and use of these recreation residences would be maintained.

Fourteen permit holders in the Old Columbine tract would have continued use of their lots for 10 years, after which they would be required to remove all improvements. These permit holders would consider this an adverse effect to their lifestyle and standard of living. Many recreation residences in this tract have been handed down through multiple generations within the same family. Loss of the permit would adversely affect the family culture and tradition. While the tradition could potentially be continued in an alternative location, some elements specific to the current recreation residence's location, surroundings, and characteristics would be lost.

Sense of place for permit holders would be maintained. All recreation residences in the Old Columbine tract would be removed in 10 years. Those who value physical reminders of the past would perceive the removal of these recreation residences as an adverse effect to their sense of place and a loss to future generations.

For the Western Apaches, removal of the Columbine recreation residences would have part of the same beneficial effect as the No Action alternative. Issuing permits for the Turkey Flat tract residences would have part of the same detrimental effect as the proposed alternative.

Concerns about the effect that the presence of recreation residences has on National Forest System land and fire management decisions would be alleviated somewhat under this alternative. Except for no action, this alternative would have the greatest potential to improve to the Mt. Graham red squirrel because of the location of the Old Columbine tract relative to these important habitat areas (see chapter 3, "Wildlife" section).

Removal of the residences in the Old Columbine tract would reduce some citizens' concern about the effects on fire management decisions. However, permit holders in the Turkey Flat tract would continue to favor protection from the effects of catastrophic wildland fire. The residences in the Turkey Flat tract and other improvements in the Old Columbine area, such as the Mt. Graham International Observatory, Arizona Bible Camp, electronic sites, and numerous Forest Service developed recreation facilities, would continue to require consideration when determining fire prevention and suppression tactics or other National Forest System land and fire management decisions.

Population

No effects on the population are anticipated.

Economy

Contributions to the local economy for the 10-year closeout period would remain unchanged from the existing condition. After removal of the 14 recreation residences located in the Old Columbine tract, the demand for services and supplies in support of recreation residence permit holders would be slightly reduced; however, no measurable effect to employment or income is anticipated. Twelve of the Old Columbine permit holders have permanent residences within Graham County. The spending of these families would be expected to remain within the county. Spending by the remaining two permit holders would be lost from the local economy.

At the end of 10 years, permit holders in the Old Columbine tract would be required to remove all improvements. The required removal of each recreation residence may represent the loss of a capital investment for the permit holder. Approximately 29 percent of the recreation residences were constructed in the late 1920s to the early 1940s. The remaining recreation residences were constructed during the 1950s, with a few in the 1960s (Graham County Assessor, 2006). Most of these facilities have exceeded the original design life and as such would be fully depreciated. However, many have been remodeled or updated over the years, effectively extending the original design life. Regardless, a residence still in use is of value to its owner and represents a loss if it must be demolished. The limited cash value (replacement cost less depreciation) of the residences in the Old Columbine tract ranges from a low of \$4,700 to a high of \$22,000 with an overall average of approximately \$12,000 (Graham County Assessor, 2006).

The removal of recreation residences at the Old Columbine tract would be a cost borne by the Old Columbine permit holders. The cost of removal is estimated at \$3,000 per recreation residence. Removal would involve the deconstruction and removal of all buildings and foundations and reshaping of the site to return it to a natural contour. The 14 sites would then be revegetated with a native seed mix at an estimated cost to the permit holders of \$200 per site. Forest Service costs to administer the removal of improvements are estimated at \$125 per site (Bennett, 2006). The removal of improvements at these sites may stimulate a small amount of short-term employment revolving around removal of structural improvements and rehabilitation activities.

Forest Service and County Revenues

For the 10-year closeout period at Old Columbine, Forest Service and county revenues would remain unchanged. At the end of 10 years, Forest Service revenues would decrease to approximately \$45,000 annually (USDA-FS, 2006c). County property tax revenues would only be collected on the recreation residences in the Turkey Flat tract and would be approximately \$6,300 annually (Graham County Treasurer, 2006).

If the SRSCS is extended, there would be no effect on Federal funds allocated to the county. If the SRSCS is not extended, and payment under the 25 Percent Fund Act resume, Graham County would receive payments of approximately \$11,250 from associated permit fees in addition to 25 percent of other Forest Service revenues. Total revenue loss to the county would be approximately \$3,050 annually. No adverse impact to county services would be anticipated.

Financial and Economic Present Net Value (PNV)

Table 14 displays the financial and economic PNV associated with issuing new permits for Turkey Flat only. All dollars are in constant dollars with no allowance for inflation. A 7 percent discount rate was used over a period of 20 years, from 2009 through 2028. Revenues are not reduced for payments made to states and counties. Alternative 3 had the second highest financial and economic PNV of the alternatives evaluated in this DEIS.

Table 14. Financial and economic present net value (PNV) for issuing permits for Turkey Flat only (20 year planning horizon)

Value	Present Value (Thousands of Dollars)
Forest Service Revenues	\$572.70
Forest Service Costs	-\$201.70
Public Benefits	\$3,749.10
Public Costs	-\$962.60
Financial PNV	\$371.00
Economic PNV	\$2,786.40

Environmental Justice

Western Apache concerns would be partly addressed by removal of the recreation residences at the Old Columbine tract after 10 years. The number of residences to be removed represents 16 percent of the residences currently permitted on the mountain. Apache access to the 25 acres of the Old Columbine tract would be less inhibited by the presence of private homes. Members of the tribe would continue to have access to the mountain for cultural, religious, and ceremonial purposes, including the 25 acres located in Old Columbine.

Direct and Indirect Effects – Issue Old Columbine Only

Social Environment

Direct and indirect effects related to issuing 14 new special-use permits in the Old Columbine recreation residence tract would be the same as described for the proposed action. There would be no change to the existing condition relative to these permits. The 14 permit holders with residences located in the Old Columbine tract would have the continued use of their lots and associated improvements until December 31, 2028, when new permits would be necessary. Old Columbine permit holder lifestyles and standards of living related to the access to and use of these residences would be maintained.

Seventy-four permit holders in the Turkey Flat tract would have the continued use of their lots for 10 years, after which they would be required to remove all improvements. These permit holders would consider this an adverse effect to their lifestyle and standard of living. Loss of these permits may adversely affect culture and tradition for some families. While the tradition could potentially be continued in an alternative location, some elements specific to the current recreation residence’s location, surroundings, and characteristics would be lost.

Sense of place for permit holders would be maintained. All recreation residences in the Turkey Flat tract would be removed in 10 years. Those who value the residences as physical reminders of the past would perceive their removal as an adverse effect to their sense of place and a loss to future generations.

For the Western Apaches, removal of the Turkey Flat recreation residences would have part of the same beneficial effect as the no action alternative. Issuing permits for the Columbine tract residences would have part of the same detrimental effect as the proposed alternative.

Concerns about the effect that the presence of recreation residences has on National Forest System land and fire management decisions would be alleviated slightly under this alternative. The removal of 74 residences in the Turkey Flat tract would reduce concerns about effects on fire management decisions to a limited extent. However, the permit holders in the Old Columbine tract would continue to favor protection of their assets from the effects of catastrophic wildland fire. The residences in the Old Columbine tract as well as other facilities authorized under the forest plan, such as the Mt. Graham International Observatory, the Arizona Bible Camp, electronic sites, and numerous Forest Service developed recreation facilities would continue to require consideration by the Forest Service when determining fire suppression tactics and land management decisions.

Population

No effects on the population are anticipated.

Economy

Contributions to the local economy for the 10-year closeout period would remain unchanged from the existing condition. After removal of the 74 recreation residences located in the Turkey Flat tract, the demand for services and supplies in support of recreation residence permit holders would be reduced; however, no measurable effect to employment or income is anticipated. Just over half of the Turkey Flat permit holders have permanent residences within Graham County. The spending of these families would be expected to remain within the county. Spending by the remaining permit holders would be lost from the local economy.

At the end of 10 years, permit holders in the Turkey Flat tract would be required to remove all improvements. The required removal of each recreation residence may represent the loss of a capital investment for the permit holder. Approximately 61 percent of the recreation residences were constructed in the late 1920s to the early 1940s. The remaining recreation residences were constructed during the 1950s, with a few in the 1960s (Graham County Assessor, 2006). Most of these facilities have exceeded the original design life and as such would be fully depreciated. However, many have been remodeled or updated over the years, effectively extending the original design life. Regardless, a residence still in use is of value to its owner and represents a loss if it must be demolished. The limited cash value (replacement cost less depreciation) of the residences in the Turkey Flat tract ranges from a low of \$1,500 to a high of \$38,000 with an overall average of approximately \$13,800 (Graham County Assessor, 2006).

The removal of recreation residences at the Turkey Flat tract would be a cost borne by the Turkey Flat permit holders. The cost of removal is estimated at \$3,000 per recreation residence. Removal would involve the deconstruction and removal of all buildings and foundations and reshaping of the site to return it to a natural contour. These 74 sites would then be revegetated with a native

seed mix at an estimated cost to the permit holders of \$200 per site. Forest Service costs to administer the removal of improvements are estimated at \$125 per site (Bennett, 2006). The removal of improvements at these sites may stimulate a small amount of short-term employment revolving around removal of structural improvements and rehabilitation activities.

Forest Service and County Revenues

Over the 10-year closeout period, Forest Service and county revenues would remain unchanged. At the end of 10 years, Forest Service revenues would decrease to approximately \$8,200 annually (USDA-FS, 2006c). County property tax revenues would only be collected on the recreation residences in the Old Columbine tract and would be approximately \$1,000 annually (Graham County Treasurer, 2006).

If the SRSCS is extended, there would be no effect on the amount of Federal funds paid to the county. If the SRSCS is not extended, and payment under the 25 Percent Fund Act resume, Graham County would receive annual payments of approximately \$2,050 from associated permit fees in addition to 25 percent of other Forest Service revenues. Total revenue loss to the county would be approximately \$17,500 annually, which would represent approximately 0.07 percent of the county 2006 budget (Arizona Tax Research Association, 2006). No adverse impact to county services would be anticipated.

Financial and Economic Present Net Value (PNV)

Table 15 displays the financial and economic PNV for alternative 4. All dollars are in constant dollars with no allowance for inflation. A 7 percent discount rate was used over a period of 20 years (2009 to 2028). Revenues are not reduced for payments made to states and counties. The alternative of issuing permits for Old Columbine only had the third highest financial and economic PNV of the alternatives evaluated in this EIS.

Table 15. Financial and economic present net value (PNV) for issuing permits for Old Columbine only (20 year planning horizon)

Value	Present Value (Thousands of Dollars)
Forest Service Revenues	\$432.00
Forest Service Costs	-\$156.80
Public Benefits	\$1,658.80
Public Costs	-\$838.70
Financial PNV	\$275.20
Economic PNV	\$820.10

Environmental Justice

If new permits are issued for Old Columbine only, 74 recreation residences at the Turkey Flat tract would be removed after 10 years. Western Apache concerns would be partially addressed by removal of the recreation residences at the Turkey Flat tract after 10 years. The number of residences to be removed represents 84 percent of the residences currently permitted on the mountain. Members of the tribe would continue to have access to the mountain for cultural,

religious, and ceremonial purposes. Access to the 52 acres of the Turkey Flat tract would be improved, less inhibited by the presence of private homes.

Cumulative Effects: Social and Economic Resources

No Action

For the first 10 years after a decision is made not to renew the recreation residence permits, there would be no change from the existing condition; therefore, there would be no cumulative effects during this period.

Following removal of the recreation residences, in years 11 through 20, the tracts would return to a more natural state, consistent with preservation of the Western Apache TCP. After cabin removal, resource management decisions, including those related to fire, would no longer be heavily influenced by the presence of recreational residences on NFS lands.

The Forest Service is planning the Pinaleño Ecosystem Restoration project. Consultation is currently underway with the San Carlos Apache Tribe and White Mountain Tribe to develop best management practices and appropriate treatments to begin the restoration of the Coronado NF ecosystem. Implementation of this proposal would contribute to improved habitat conditions for the Mt. Graham red squirrel and ecosystem health.

No measurable cumulative effects are expected relative to the population or the economy.

Proposed Action

With the proposed action, there would be no change from the existing condition; therefore, there would be no cumulative effects over a 20-year permit period.

In addition to the recreation residences in the Old Columbine and Turkey Flat tracts, the forest plan direction allows for the presence of numerous other permitted facilities in the area, such as the Mt. Graham International Observatory, the Arizona Bible Camp, electronic sites, and developed recreation facilities. Some individuals would continue to perceive that these facilities, incrementally with the recreation residences, adversely influence fire suppression and other land management decisions.

The Forest Service is planning the Pinaleño Ecosystem Restoration project. Consultation is currently underway with the San Carlos Apache Tribe and White Mountain Apache Tribe to develop BMPs and appropriate treatments to begin the restoration of the Coronado NF ecosystem. Implementation of this proposal would contribute to improved habitat conditions for the Mt. Graham red squirrel and ecosystem health. This project may also help to mitigate concerns for some individuals who object to current forest plan land allocations and their impact on the ecosystem.

No cumulative effects on the population or the economy are anticipated.

Issue Turkey Flat Only

For the 10-year closeout period at Old Columbine, there would be no change from the existing condition; therefore, there would be no cumulative effects over this period.

Following removal of the recreation residences in the Old Columbine tract, in years 11 through 20, the perception that Forest Service resource management decisions are influenced by the presence of private property on NFS lands would be reduced.

The Forest Service is planning the Pinaleño Ecosystem Restoration project. Consultation is currently underway with the San Carlos Apache Tribe and White Mountain Apache Tribe to develop BMPs and appropriate treatments to begin the restoration of the Coronado NF ecosystem. Implementation of this proposal would contribute to improved habitat conditions for the Mt. Graham red squirrel and ecosystem health. This project may also help to mitigate concerns for some individuals who object to current forest plan land allocations and their impact on the ecosystem.

No measurable cumulative effects are expected relative to the population or the economy.

Issue Old Columbine Only

For the 10-year closeout period, there would be no change from the existing condition at Turkey Flat; therefore, there would be no cumulative effects over this period.

Following removal of the recreation residences in the Turkey Flat tract, in years 11 through 20, the perception that Forest Service resource management decisions are influenced by the presence of private property on NFS lands would be reduced.

The Forest Service is in the process of developing the Pinaleño Ecosystem Restoration project. Consultation is currently underway with the San Carlos Apache Tribe and Western Apache Tribe to develop best management practices and appropriate treatments to begin the restoration of the Coronado NF ecosystem. Implementation of this proposal would contribute to improved habitat conditions for the Mt. Graham red squirrel and ecosystem health. This project may also help to mitigate concerns for some individuals who object to current forest plan land allocations and their impact on the ecosystem.

No measurable cumulative effects are expected relative to the population or the economy.

Wildlife Resources

Criteria that are generally used to evaluate impacts on wildlife and ecosystem sustainability include the potential for a reduction in species populations and diversity; depletion or fragmentation of plant and animal habitat; loss of threatened, endangered or other special status species; and impairment of ecological integrity, resilience or health, by such causes as disruption of food chains and alterations in predator-prey relationships.

Species Evaluated

The following discussion reports the results of an analysis of the potential for impacts to wildlife populations and habitat at and beyond the recreation residence tracts at Old Columbine and Turkey Flat. The analysis focuses on the following species having “special status”:

1. **Federally Listed Species:** those that are listed under the authority of the Endangered Species Act by the U.S. Fish and Wildlife Service (FWS) as threatened and endangered (TES), those proposed for listing as such, and areas that are designated by FWS as critical habitat in the proposed area of effect. FSM 2670.31 directs each forest to evaluate its

- programs and site-specific actions to determine their potential effect on federally listed species, population viability across their ranges, and all occurrences contribute significantly to the conservation of the species. FSM 2670.32 directs that a biological evaluation be prepared to determine potential effects on species designated as “sensitive” by the Regional Forester. United States Department of Agriculture Regulation 9500-4 directs the Forest Service to avoid actions that may cause a sensitive species to become threatened or endangered (FSM 2670.12).
2. **Forest Service Sensitive (FSS) Species:** those that are listed by the Regional Forester as “sensitive” in Region 3 (USDA 1999)¹⁵ “because there is concern for population viability across their range, and all occurrences contribute significantly to the conservation of the species.” FSM 2670.32 directs that a biological evaluation be prepared to determine potential effects on species designated as “sensitive” by the Regional Forester. United States Department of Agriculture Regulation 9500-4 directs the Forest Service to avoid actions that may cause a sensitive species to become threatened or endangered (FSM 2670.12).
 3. **Management Indicator Species (MIS):** Conceptually, MIS comprise a select list of species on individual forests that are representative of many other species. As such, they provide a basis for overall forest management based, in part, on the effects on these species and their habitats. National Forest Management Act (NFMA) implementing regulations (36 CFR 219.19) and Forest Service Manual (FSM) 2600 guidelines require that forest plans identify certain vertebrate and/or invertebrate species as MIS, and that these species be monitored “in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent” (FSM 2620.5).

Approach to Impacts Analysis

The Safford Ranger District biologist evaluated direct, indirect, and cumulative effects of the proposed action on TES, FSS, and MIS and documented its findings in a biological assessment and evaluation (BAE), which is filed in the NEPA project record (item 192). For the analysis, the treatment area was defined as land on which management actions would take place, while the cumulative effects analysis area was defined to include all areas where indirect effects may occur, not merely those areas in which actions would take place. The cumulative effects analysis area, unless otherwise noted, includes state and/or adjacent private land. Each determination of effect reported in the BAE represents the overall expected effect of the proposed management actions on TES species.

The BAE was compiled using, but not limited to, the following information sources:

- a review of the literature related to the ecology of TES;
- a review of the following documents: Mt. Graham Red Squirrel Recovery Plan (U.S. Fish and Wildlife Service 1993); Mexican Spotted Owl Recovery Plan (U.S. Fish and Wildlife Service 1995); Final Designation of Critical Habitat for the Mexican Spotted Owl (U.S. Fish and Wildlife Service 2004); and the forest plan (USDA-FS, 1986, as amended);
- a review of Coronado National Forest TES, FSS, and MIS species records; and

¹⁵ This list was updated in 2007. Regional Forester direction in a memo dated September 7, 2007, was that ongoing impacts analyses for which scoping was completed should continue to use the 1999 list.

- field evaluations of habitat conditions in and adjacent to the residence tracts.

Because of the complexity of issues related to Mt. Graham, in particular, threats to the viability of the Mt. Graham red squirrel, this impacts analysis is presented as follows: (1) the presence or absence of a TES is reported for each area of potential effect; (2) general information is presented for each TES; (3) direct and indirect effects on individual TES are reported separately, followed by a Section 7, ESA, determination of effect for the area; (4) effects on Forest Service Sensitive (FSS) species and Management Indicator Species (MIS) are discussed and evaluated; and (5) cumulative effects and determinations are reported.

Endangered Species Act Consultation

Section 7 of the Endangered Species Act (ESA) of 1973 requires Federal agencies to consult with the FWS on potential impacts to listed species and habitat before a proposed action is implemented. Section 7(a)(2) requires each Federal agency, in consultation with the Secretary, Department of the Interior, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling ESA requirements, each agency must use the best scientific and commercial data available. This section of the act sets out the consultation process, which is further implemented by regulation (50 CFR §402).

“Formal” consultation with FWS is mandated if impacts to a species are not expected to be discountable or insignificant. Because of this, the forest initiated formal consultation with the FWS on January 24, 2007, with the submittal of a BAE for FWS review (Project Record, Items 191 and 192). A biological opinion (BO) regarding effects on the Mt. Graham red squirrel, Mexican spotted owl, and Apache trout was received from the FWS on August 18, 2008. In the BO, the FWS concurred with the determinations made in the BAE, which are discussed in the following sections. A copy of the BO is provided in appendix C to this EIS.

Federally Listed Threatened and Endangered Species

The project encompasses approximately 25 acres of mixed conifer in the Old Columbine area, and about 52 acres in the mixed conifer and pine-oak types in the Turkey Flat area. The mixed conifer areas mainly consist of Douglas-fir (*Pseudotsuga menziesii*), southwestern white pine (*Pinus strobiformis*), and ponderosa pine (*Pinus ponderosa*). In the Old Columbine area, the mixed conifer also includes invasive nonfire-adapted species from higher elevations, such as corkbark fir (*Abies lasiocarpa* var. *arizonica*) and Engelmann spruce (*Picea engelmannii*). The pine-oak types are dominated by ponderosa pine, mixed with Gambel oak (*Quercus gambelii*) and Emory oak (*Quercus emoryi*).

Table 16 summarizes federally listed threatened and endangered species and habitat in the vicinity of both recreation residence tracts. Impacts to the jaguar, Mexican gray wolf, and bald eagle are not evaluated, because the species are not known to occur within or near either tract. Effects on the Apache trout are evaluated for the Old Columbine tract, but not Turkey Flat, because there are no streams in the latter tract.

Table 16. Federally listed threatened and endangered species occurrence and habitat in the area of the Safford Ranger District recreation residence tracts

Species (ESA Designation)	Old Columbine	Turkey Flat
Mt. Graham red squirrel (Endangered)	Occurs near the analysis area; suitable habitat available nearby; potential suitable habitat within the tract.	Occurs near the analysis area; suitable habitat available nearby, but not within the tract.
Mexican spotted owl (Threatened)	Occurs within the analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
Apache trout (Threatened)	Occurs downstream of the analysis area.	Does not occur within the analysis area.
Jaguar (Endangered)	Does not occur within either analysis area.	
Mexican gray wolf (Endangered)	Does not occur within either analysis area.	
Bald Eagle (Threatened)	Does not occur within either analysis area.	

Affected Environment, Mt Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*)

Habitat

The endangered Mt. Graham red squirrel (MGRS) is one of 25 subspecies of red squirrels in North America. Its habitat is conifer forest, especially old-growth spruce-fir, Douglas-fir and mixed conifers, and its only remaining population is found in the upper elevations of the Pinaleños Mountains. The MGRS was thought to have been extinct in the 1950s, but small numbers of squirrels were “rediscovered” in the 1970s. The squirrel was added to the Federal endangered species list in 1987 by the U.S. Fish and Wildlife Service (FWS), after the estimated population in 1986 was observed to be less than 400. Loss of MGRS habitat because of past logging, drought, insect infestations, and catastrophic fires has exacerbated the decline in population.¹⁶

Recreation residences at Old Columbine are located within MGRS habitat, and their continued existence precludes the restoration of natural vegetation that would comprise squirrel habitat on approximately 77 acres of forest land. In addition, the presence of humans at the recreation residences increases the probability that individual squirrels may be accidentally injured or killed.

The MGRS inhabits a narrow selection of habitats, which include high elevation areas with Douglas-fir and Engelmann spruce trees, and the transition zone comprised of Douglas-fir, corkbark fir, Engelmann spruce, southwestern white pine, and ponderosa pine. Current information on red squirrel habitat on Mt. Graham reports that approximately 11,700 acres of

¹⁶ <http://medusa.as.arizona.edu/graham/envir.html>

coniferous forest are occupied (USDI-FWS, 1992, USDI-FWS, 1999). Recent studies by the Arizona Game and Fish Department (AGFD) indicate that approximately 16,680 acres of “potentially suitable” habitat exists above 7,750 feet elevation (Hatten, 2000). Of occupied habitat, approximately 2,700 acres are considered excellent or good quality (USDI-FWS, 1999). Hatten (2000) estimated as much as 27,181 acres might be suitable as red squirrel habitat, but only a portion of this is occupied.

Approximately 1,900 acres of critical habitat was designated for the MGRS in 1990 (USDI-FWS, 1990; see figure 10, MGRS critical habitat). The areas determined to be critical habitat were based upon the fact that, at the time of listing of the species, these areas “contain[ed] major concentrations of the Mt. Graham red squirrel, and the habitat necessary to its survival, including cover, food sources, nest sites, and midden sites (USDI FWS, 1990).” As such, the areas represent the highest elevations (i.e., those above 10,000 feet) in the Pinaleño Mountains, as well as slightly lower elevations on north-facing slopes, which provide the cooler, moister surroundings necessary for successful midden sites. All of the spruce-fir vegetation association is included within the boundaries of critical habitat, along with a small portion of the mixed conifer.

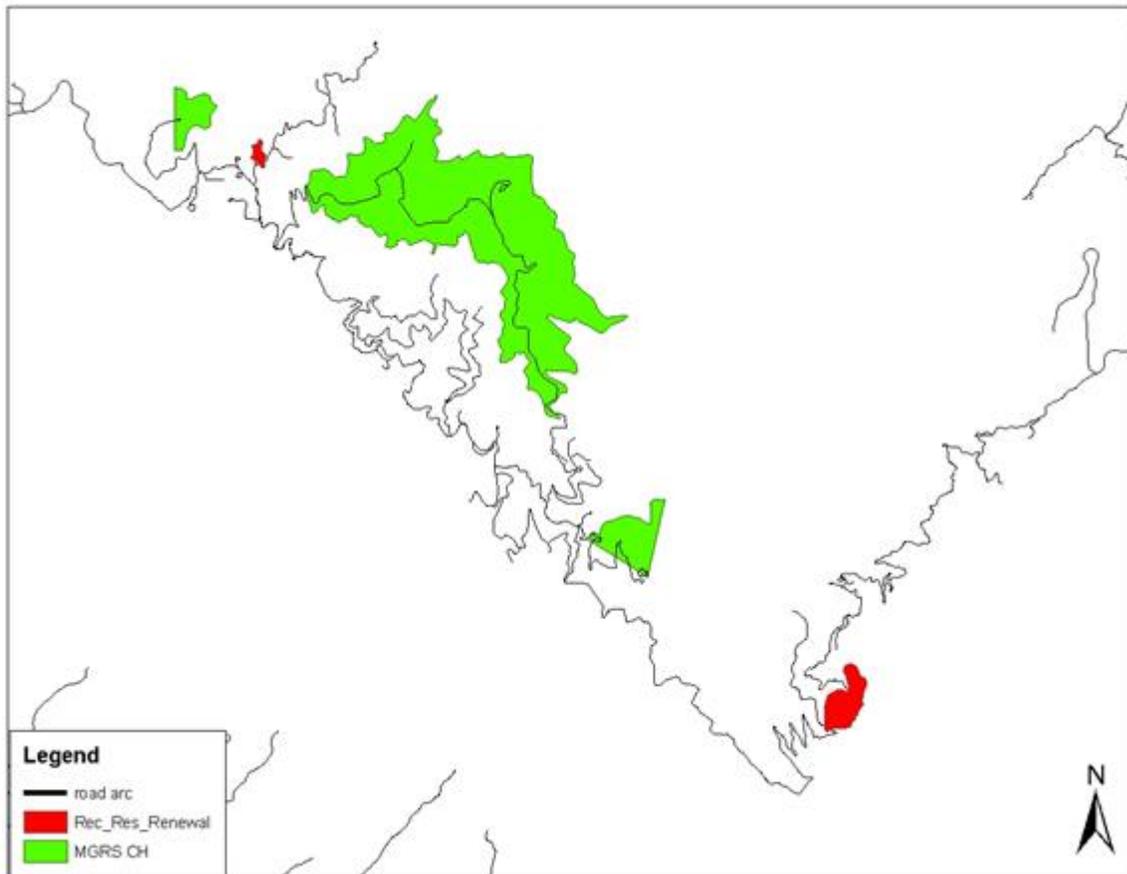
The 25-acre tract at Old Columbine comprises 0.2 percent of the 11,700 acres on Mt. Graham considered to be occupied by the MGRS (USDI-FWS, 1999), or 0.09 percent of the 27,181 acres considered to be suitable as MGRS habitat by Hatten (2000). The 52-acre Turkey Flat tract represents 0.4 percent of the area considered as occupied by the MGRS (USDI-FWS, 1999), or 0.2 percent of the area considered as suitable for occupancy by Hatten (2000). Neither recreation residence tract is located within designated critical habitat for the MGRS.

Middens

Mt. Graham red squirrels create middens, which are areas that consist of piles of cone scales in which squirrels cache additional cones and other items as an over-wintering food source. Middens are typically located in areas with high canopy closure near food sources (e.g., Douglas-fir, corkbark fir, and Engelmann spruce trees). Such placement allows specific moisture levels to be maintained within the midden, thereby creating prime storage conditions for cones and other food items such as mushrooms, acorns, and bones. The squirrel also prefers to establish middens in areas that have large snags or downed logs that provide cover and travel routes (USDI-FWS, 1993).

All known squirrel midden locations in the vicinity of the recreation residence tracts, both historical and present, were considered in this impacts analysis to ensure a conservative analysis, i.e., one favoring protection of the species. An AGFD database of all midden locations found since 1996 served as the basis for the effects analysis, and all active, inactive, and disappeared middens were considered in the analysis.

Old Columbine Tract: Several midden sites have been recorded in the past on the Old Columbine tract. According to the most recent information from AGFD, most of these are considered as having been “removed” from the database (Personal communication, Tim Snow, AGFD, with Anne Casey, Safford Ranger District, April 7, 2006). Classification as “removed” means that these middens have decomposed to the point that they no longer have any of the characteristics of active middens. That is, there is no mound of cone scales that provide an area for storing cones through the winter, no cone scales from recent feeding activities, and no signs the area has been used by a red squirrel for more than three survey periods.



Source: USDI-FWS, 1990

Figure 10. Mt. Graham red squirrel critical habitat, as designated in 1990, in relation to Safford Ranger District recreation residence tracts

Because three historic midden locations in the vicinity of the tract had not been surveyed recently, field surveys¹⁷ were completed on June 7, 2006. Two of the three middens were found to be active, and one had disappeared. Both of the active middens were located outside the residence area, with the closest being approximately 15 feet from an outhouse on the west side of the tract.

Turkey Flat Tract: The Turkey Flat recreation residence tract lies at the edge of the mixed conifer vegetation association and leads downhill to a pine-oak association. The mixed conifer forest is generally suitable for middens mountainwide. However, near this tract, habitat is dry and warm because of its aspect and elevation, which makes it less suitable for middens. The pine-oak association at Turkey Flat is also in a hot, dry area that is not at all suitable for middens.

Prior to 2008, no middens had been found within the 52-acre Turkey Flat tract. The closest midden was located more than 450 feet away from the nearest structure at Turkey Flat (a water tank), more than 700 feet from any of the residences, and about 250 feet higher in elevation than any of the residences. However, in the summer of 2008, during tree marking for another project, the district biologist discovered an active midden on the Upper Turkey Flat recreation residence

¹⁷ Field surveys conducted by Ms. Anne Casey, Safford Ranger District biologist, and Ms. Thetis Gamberg, FWS, Tucson.

tract. The FWS was advised of this find (see appendix C) for its consideration in formal ESA consultation regarding the MGRS.

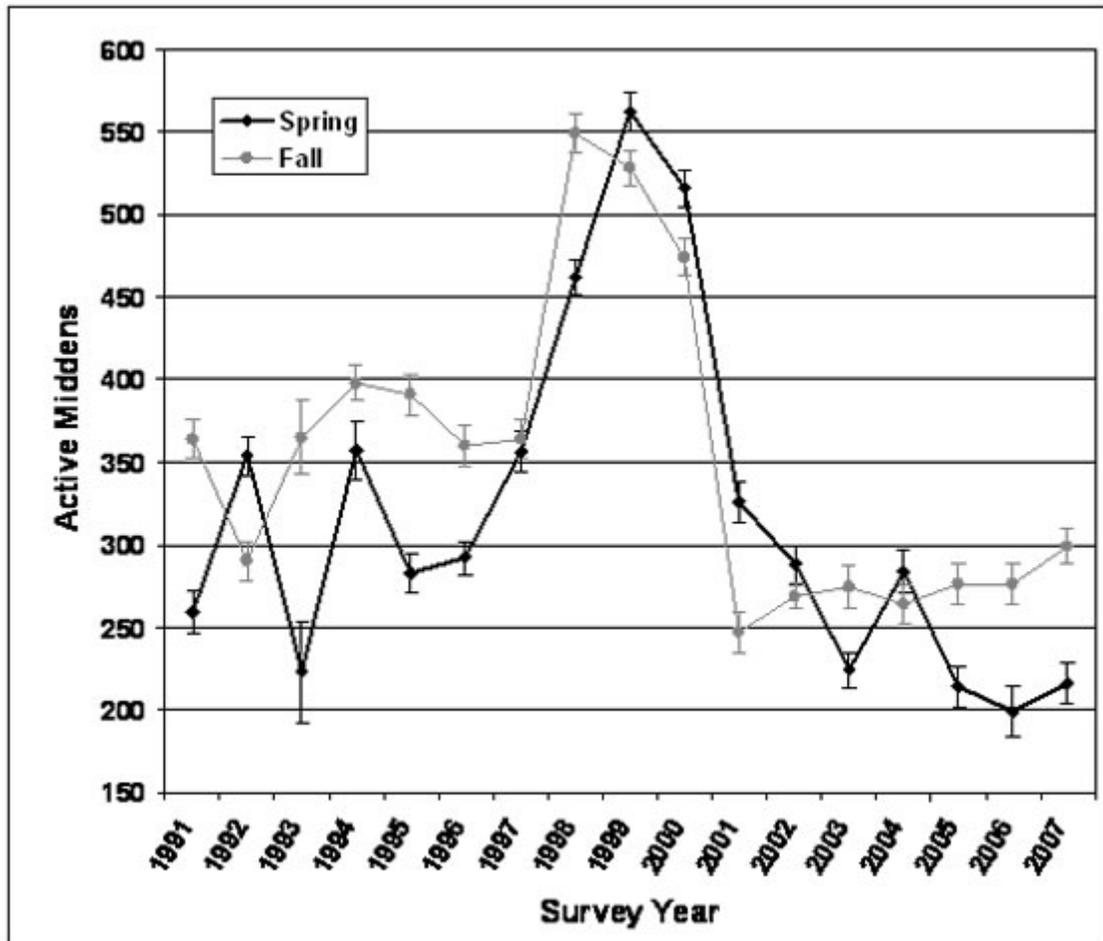


Figure 11. Population estimates for the Mt. Graham red squirrel since 1986

Population

Issues that affect both habitat and population of the MGRS include predation; tree infestation by native and exotic insects (Koprowski et al., 2005); direct mortality; the loss of habitat and middens as a consequence of catastrophic wildland fire (Koprowski et al., 2006); human disturbance; road and trail traffic; use of recreation sites (USDI-FWS, 1992); loss or reduction of food sources because of drought; and potential competition with an introduced squirrel (Abert’s squirrel, *Sciurus aberti*) for food and territory (Edelman et al., 2005).

Arizona Game and Fish Department (AGFD) and the Forest Service have conducted biannual population estimates of MGRS since 1986. The spring 2004 MGRS census estimated a range of 284 (± 13) MGRS occupying the Pinaleno Mountains before the Nuttall Complex wildland fire. The fall 2004 census, conducted approximately 2 months after the Nuttall fire, reported a population estimate of 264 (± 12), showing a small decline attributed to direct mortality from the fire. A more notable decline was shown in the results of the spring 2005 census, which indicated a population size of 214 (± 12). This decline is believed to have resulted from latent indirect

effects of the Nuttall fire, such as loss of cover, loss of food caches when middens were burned, and mortality of orphaned young (Personal communication, J. Koprowski, University of Arizona, with Mt. Graham Red Squirrel Recovery Team, May 8, 2006). A rebound was shown by the fall 2005 census, which estimated 276 squirrels (± 12). However, the spring 2006 census estimated a population of 199 squirrels (± 15), almost a 10 percent decline from the previous spring count. The fall 2006 estimate rebounded to a population of 276 squirrels (± 12). In spring of 2007, the population was estimated to be 216 (± 12) squirrels, and was followed by another increase in the fall of 2007, when the population was estimated to be 299 (± 11) squirrels. The chronology of MGRS estimates of population is depicted in figure 13 (AGFD, unpublished data).

Environmental Consequences, Mt. Graham Red Squirrel

Direct and Indirect Effects, Alternative 1 – No Action

Old Columbine. Residences and improvements, such as water tanks and gas tanks, would be removed from this area in 2018, at the end of the 10-year permit closeout period. Henceforth, the natural vegetation would return in a series of successional stages, including a grassy stage, leading to a shrub stage, followed by the eventual growth of tree species. The mix of new growth would likely resemble the vegetation surrounding the recreation residence area, i.e., mostly mixed conifer.

Tree densities are quite high throughout the Pinaleño Mountains, and there are signs of density induced weaknesses, such as disease and susceptibility to insect infestation (Personal communication, Craig Wilcox, Safford Ranger District, silviculturist, with Anne Casey, Safford Ranger District, biologist, August 8, 2006; see also Gersonde and O'Hara 2005). It has been reported that decreased tree density, such as that which exists in the Old Columbine tract, may actually increase nutrients available for cone production in surrounding trees (Stoll and Schmid 1998). Given this observation, it is possible that the increased density of trees that results from eventual reforestation at Old Columbine may not benefit the MGRS because it may reduce nutrients available to surrounding trees, thereby decreasing cone production and the squirrel's food supply. If residence removal is combined with maintenance of open space on the tract, temporary short-term disturbances may be offset by long-term benefits.

Removal of residences would involve the intermittent use of noisy equipment and vehicles, ground disturbance, and human presence, all of which would temporarily disturb squirrels but would have insignificant or discountable impacts. Because of the proximity of an active midden near the outhouse, there is a possibility that removal activities could cause injury or death to a squirrel and/or any offspring present. If the outhouse is left standing, the midden would remain intact. However, the proximity of access roads and deconstruction of other buildings would continue to pose a danger to any foraging squirrel on the tract.

Turkey Flat. Considering the natural warmth and dryness on this tract, the removal of residences would not likely directly or indirectly affect the MGRS. Further, vegetation similar to that which occurs presently would be expected to re-populate this tract, and it would not be suitable as MGRS habitat.

Cumulative Effects of Alternative 1 on Mt. Graham Red Squirrel

Other developed areas across the mountain include the Arizona Bible Camp, the astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each of these areas is located within a manmade opening in the forest that is maintained by regular

removal of brush and hazard trees. All sites are within potential habitat for the red squirrel except for Ladybug, which is a dry pine-oak vegetation type.

Regular thinning and removal of brush at these additional sites continues to limit cover available for the MGRS. Also, removal of snags may decrease available nesting habitat and cache sites. In addition, occasional human presence at all sites may affect the squirrel foraging and nesting behavior.

Three vegetation thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Depending on the size of the trees thinned by these projects, a small amount of cover for squirrels would be lost. However, trees remaining in each treated stand would receive additional nutrients, which will increase tree growth rates and cone production, both of which benefit the squirrel.

If the recreation residences are removed at the two tracts, vegetation at the sites would replenish through natural succession, and eventually, new habitat for the squirrel would become available. Therefore, the no action alternative would have no adverse cumulative or additive effect with the other uses of the forest that affect squirrel habitat.

Recent wildfires on the Safford Ranger District (e.g., Clark Peak Fire and Nuttall Complex wildfire) reduced the amount of MGRS foraging and nesting habitat in areas that burned at high intensities. While initial impacts were negative, the restoration of natural ecosystem processes will benefit forest health and the MGRS in the long term as cone crops increase in size and the forest becomes better adapted to wildland fire.

Wildfire use, large wildfires, and fire suppression are known to alter the composition of overstory and understory trees that provide cover, nest sites, and food sources, either by fire damage and/or vegetation removal/cutting to create fire lines. On the other hand, fire creates a mosaic of vegetation seral stages, which releases nutrients to surrounding forested areas. Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with no action are impossible to quantify. However, in general, the damage caused by wildland fire on the two tracts, if unsuppressed, would likely be to reduce MGRS habitat by a maximum of 77 acres, or 0.3 percent of suitable habitat on the mountain. The reduction in habitat from creation of fire lines would be discountable relative to the suitable habitat of 27,181 acres estimated by Hatten (2000).

No Action – Effects Determination, MGRS

Although the occupied area within the Old Columbine tract represents an extremely small portion of potential habitat and population of the MGRS, the fact that one squirrel midden and perhaps its occupant(s) may be impacted during residence removal at Old Columbine indicates that no action “*may affect, and is likely to adversely affect*” the MGRS.

Direct and Indirect Effects, Alternative 2 – Proposed Action

Old Columbine. The MGRS using the active midden near the outhouse may be disturbed by human presence at the residences as well as other casual forest users. This midden site is in an area of unusually open canopy, and the midden and squirrel could be adversely affected by human disturbance because it lies on a slight slope and is easily accessible.

Ongoing research of the MGRS indicates that it has a lifespan of about 3 years, which allows it to breed but once (Personal communication, J. Koprowski, University of Arizona, with Mt. Graham Red Squirrel Recovery Team, May 8, 2006). Thus, when continuous use of a midden is observed, it does not always indicate that the resident squirrel is acclimated to human presence. What may happen when the microclimate is of high quality is that, when one resident is lost, another squirrel will use the midden.

Because of human presence near the active midden near the outhouse, the potential exists for accidental injury or death of a squirrel.

Turkey Flat. The MGRS in this area could potentially be disturbed by human presence and noise, but the nearby off-tract midden would not be directly impacted. Indirect effects may result from the need for fire suppression at the tract and, therefore, the inability for Forest Service fire managers to use natural ignition fires (i.e., lightning-caused fires) to burn areas that are historically adapted to fire. Overall, issuing new permits for the Turkey Flat residences is not likely to directly or indirectly affect the Mt. Graham red squirrel.

Cumulative Effects of Alternative 2 on Mt. Graham Red Squirrel

Other developed areas across the mountain include the Arizona Bible Camp, the astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each of these areas is located within a manmade opening in the forest that is maintained by regular removal of brush and hazard trees. All sites are within potential habitat for the red squirrel except for Ladybug, which is a dry pine-oak vegetation type.

Regular thinning and removal of brush at these additional sites continues to limit cover available for the MGRS. Also, removal of snags may decrease available nesting habitat and cache sites. In addition, occasional human presence at all sites may affect the squirrel foraging and nesting behavior.

Three vegetation thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Depending on the size of the trees thinned by these projects, a small amount of cover for squirrels would be lost. However, trees remaining in each treated stand would receive additional nutrients, which will increase tree growth rates and cone production, both of which benefit the squirrel.

If the recreation residence permits are issued, the vegetation cover at each tract would remain the same. Therefore, the proposed action would have no adverse cumulative or additive effect with the other uses of the forest that affect squirrel habitat.

Recent wildfires on the Safford Ranger District (e.g., Clark Peak Fire and Nuttall Complex wildfire) reduced the amount of MGRS foraging, caching, and nesting habitat in areas that burned at high intensities. While initial impacts were negative, the restoration of natural ecosystem processes will benefit forest health and the MGRS in the long term as cone crops increase in response to nutrient release and the forest becomes better adapted to wildland fire.

Wildfire use, large wildfires, and fire suppression are known to alter the composition of overstory and understory trees that provide cover, nest sites, and food sources, either by fire damage and/or vegetation removal/cutting to create fire lines. On the other hand, fire creates a mosaic of vegetation seral stages, which releases nutrients to surrounding forested areas. Because fire is a

randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the proposed action are impossible to quantify. However, in general, the damage caused by wildland fire on the two tracts, if un-suppressed, would likely be to reduce MGRS habitat by a maximum of 77 acres, or 0.3 percent of suitable habitat on the mountain. The reduction in habitat from creation of fire lines would be discountable relative to the suitable habitat of 27,181 acres estimated by Hatten (2000).

Proposed Action – Effects Determination, MGRS

Although the occupied area within the Old Columbine tract represents an extremely small percentage of potential habitat and population of the MGRS, the fact that one squirrel midden and perhaps its occupant(s) may be impacted by human presence at and near recreation residences at Old Columbine supports a finding that the proposed action “*may affect, and is likely to adversely affect*” the MGRS. The FWS concurred with this finding in a BO issued August 18, 2008. The BO assigns a “take” of two squirrels, and reports that, “...*this level of take is not likely to result in jeopardy to the species*” (see appendix C).

Alternative 3 – Renew Turkey Flat Only

Old Columbine. Direct, indirect, and cumulative effects would be the same as reported above under alternative 1.

Turkey Flat. Direct, indirect, and cumulative effects would be the same as those reported above under the text for alternative 2.

Alternative 4 – Renew Old Columbine Only

Old Columbine. Direct, indirect, and cumulative effects would be the same as those reported above under alternative 2.

Turkey Flat. Direct, indirect, and cumulative effects would be the same as those reported above under alternative 1.

Affected Environment, Mexican Spotted Owl (*Strix occidentalis lucida*)

The Mexican spotted owl (MSO) occurs throughout Arizona and New Mexico, parts of Colorado and Utah, and south into Mexico. It is one of three subspecies of spotted owls; the others are the northern (*S. o. caurina*) and the California spotted owl (*S. o. occidentalis*). The Mexican subspecies is geographically isolated from both of the others.

Mexican spotted owls roost during day and hunt at dusk and at night. They breed primarily in dense, old-growth mixed conifer forests, ponderosa pine-Gambel oak forests, and riparian forests located on steep slopes, especially in deep, shady ravines (Fletcher and Hollis, 1994). Breeding sites have high canopy closure, high basal area, many snags, and many downed logs. Owls usually nest in cavities about 80 feet up coniferous trees; however, they also use scrapes on cliff sites or abandoned platform nests. Pairs may not breed yearly. Incubation lasts from 28 to 32 days. Males feed females and young until young are 2 weeks old. Young fledge in 34 to 36 days (Arizona Game and Fish Department, 2001).

Breeding season begins in late February or March, with juveniles fledging between mid-May and mid-June (USDI-FWS, 1995). Formal nighttime callback surveys are performed four times per

year between May 1 and July 31 in each of four protected activity centers (PACs; i.e., 600-acre areas identified around nesting areas) in the Pinaleños. If owl presence is confirmed within a PAC, daytime surveys are performed to locate owl roosting and nesting sites. Owl nest sites are protected within “core areas,” which are composed of 100 acres of the highest quality owl habitat surrounding the nest site.

Multistoried forest with many potential patches is desirable habitat for MSO foraging. Woodrats are the most frequently taken prey and provide most biomass. Birds, lagomorphs (rabbits), and insects are also frequently taken. In Arizona, range size for single owls averages 1,600 acres and combined home ranges occupied by pairs 2,000 acres (Arizona Game and Fish Department, 2001).

Designated Critical Habitat

Critical habitat for the MSO in the Pinaleños was designated by the FWS in August 2004 (see figure 12, MSO critical habitat). Primary habitat constituents for this subspecies include sections of spruce-fir forest, mature mixed conifer forest, pine-oak associations, riparian forests, and canyon habitats. Each of these include uneven-aged stands, snags and downed logs, canopy closure at or above 40 percent, and trees greater than or equal to 12-inch diameter at breast height (DBH), which are preferred characteristics for nesting. Owl recovery also depends upon maintenance of a diverse mosaic of habitats, including meadows and other open areas, for the owls to have foraging grounds and a diverse prey base (USDI-FWS, 2004). Protected activity centers (PACs)¹⁸ and core areas within PACs (100-acre areas around nesting sites) were designated, based on recent protocol survey results (see figure 13, MSO PACs).

¹⁸ PACs are 600-acre areas in which owl nesting and foraging activities are focused

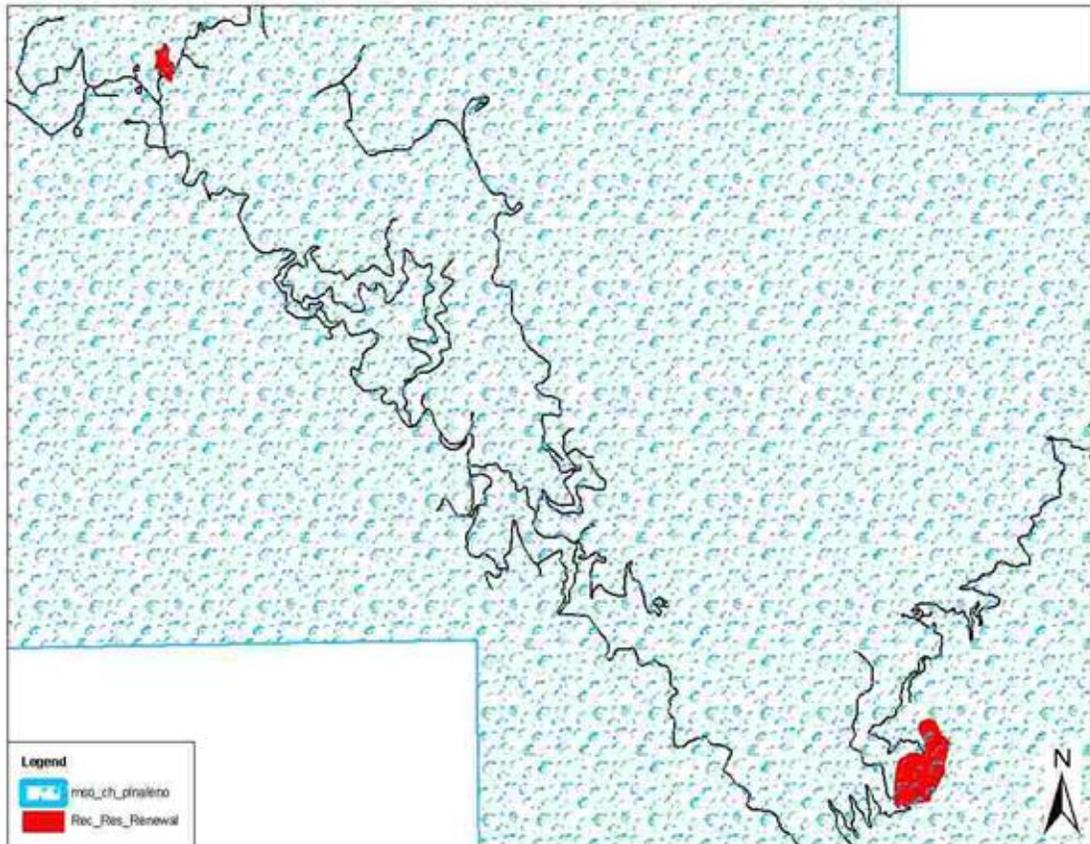


Figure 12. Mexican spotted owl critical habitat on the Safford Ranger District relative to the recreation residence tracts

Old Columbine

The 25-acre Old Columbine tract is not within a PAC and comprises 0.02 percent of the critical habitat available for the MSO in the Pinaleno Mountains. In 2005, ESA consultation addressed the potential impacts of vegetation thinning on 8 acres at the southern portion of the tract (Consultation No. AESO/SE 02-21-05-I-0818). The FWS determined that these 8 acres would be exempted from critical habitat status.

The other 17 acres of the tract, which comprise 0.015 percent of MSO critical habitat, consist of a mix of small meadows interspersed with recreation residences and pockets of mixed conifer vegetation of varying density. Primary constituent elements of critical MSO habitat exist in the northern portion of the tract, including the vegetation association, uneven-aged stand structure, high canopy closure, presence of downed logs, and a large number of trees greater than 12 inches DBH. Vegetation on the eastern and southeastern portions was treated recently by the removal of trees less than 9-inches DBH and pile burning. Logs and snags over 9-inches DBH were retained. Wind-throw and insect infestations have opened the canopy. With regard to primary constituent elements, this area supports a few trees greater than 12-inches DBH, but canopy cover is fairly low, and there is little downed woody material. The western and southern parts of the tract contain a large meadow and several recreation residences that are surrounded by forest, with

many trees greater than 12-inches DBH, and high canopy closure. There is a small amount of downed woody material available in this area.

A water tank at Old Columbine is located approximately 500 feet from the nearest core area in the Grant Vista PAC¹⁹. This core area has been surveyed 8 times in the last 13 years. While surveys confirmed the presence of a single adult owl each time, there has never been confirmation of a pair or offspring. It is possible this area actually represents lower quality habitat used by satellite animals rather than breeding pairs.

The core area of the Mill Site PAC has been surveyed 8 times over the past 13 years, and no nest sites were found. However, the Mill Site PAC was occupied by a pair during seven seasons, and offspring were confirmed twice.

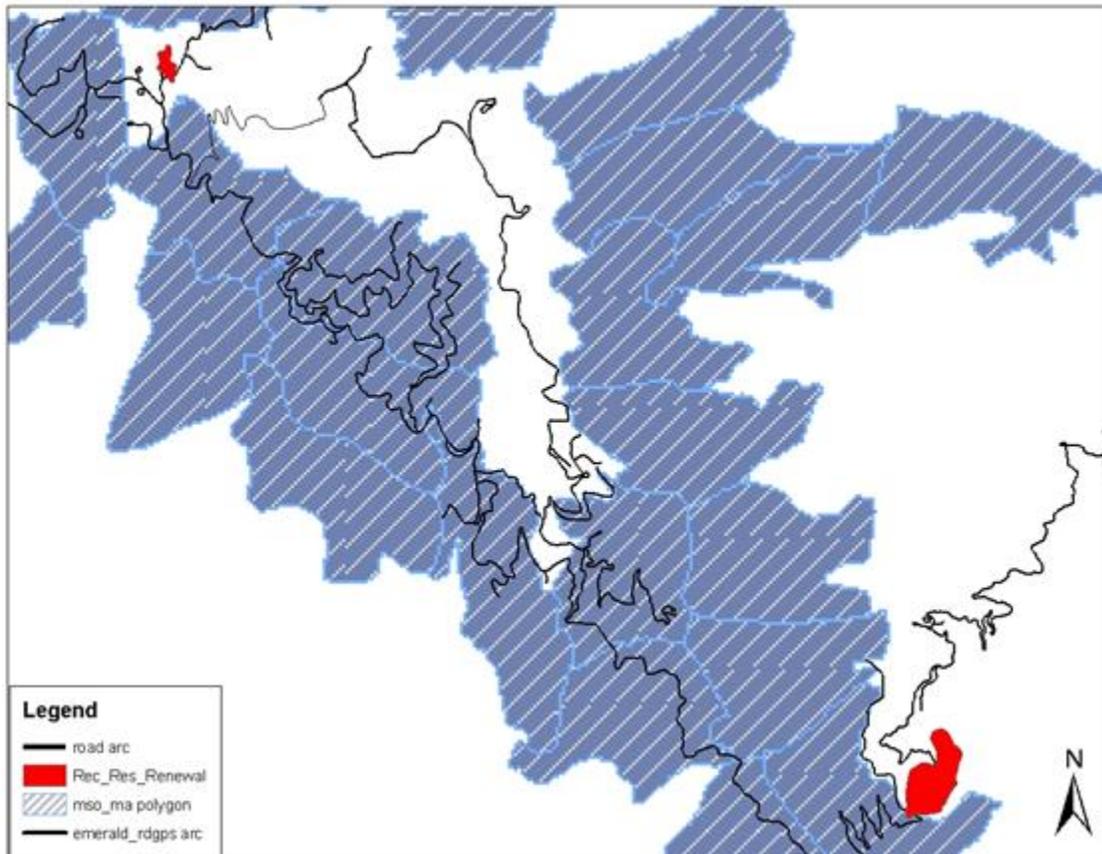


Figure 13. Mexican spotted owl protected activity centers (PACs) on the Safford Ranger District relative to recreation residence tracts

¹⁹ Locations of PACs and core areas are not specifically identified to protect owls and nest sites.

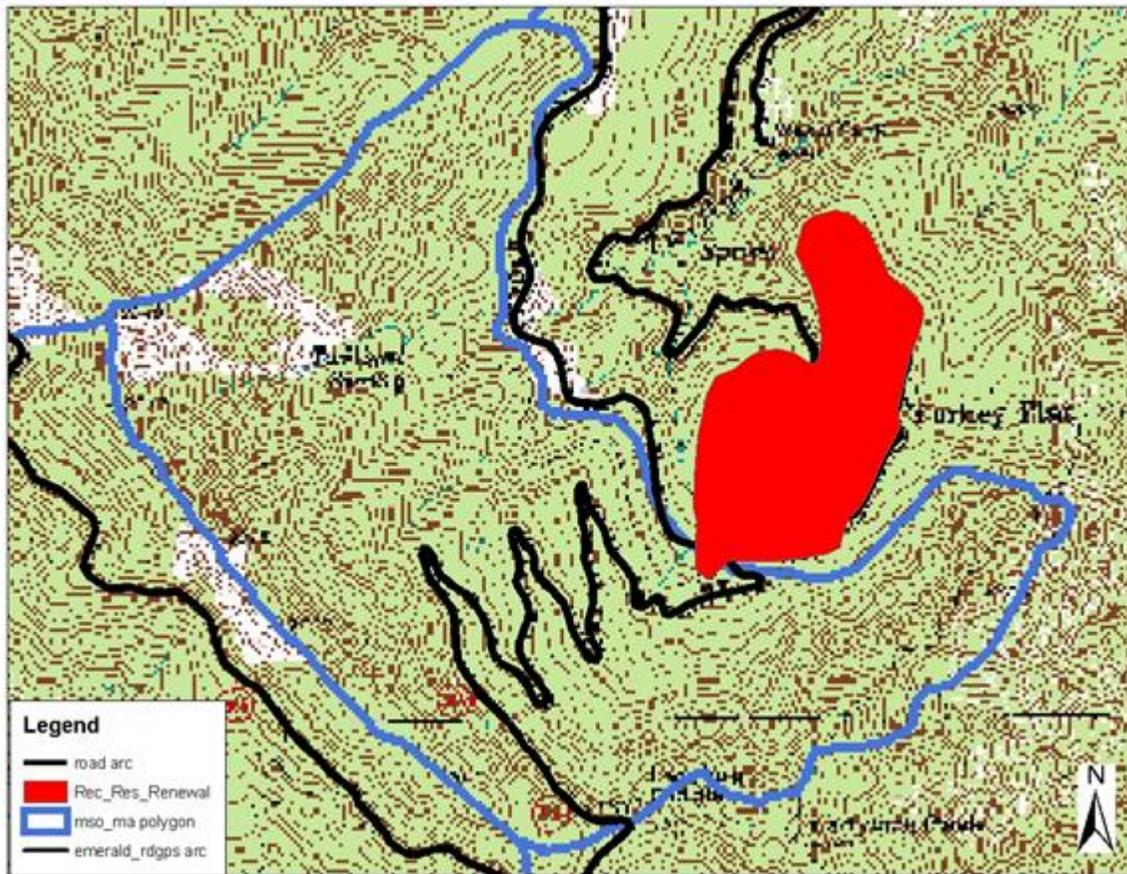


Figure 14. Mexican spotted owl protected activity centers (PACs) relative to the Turkey Flat recreation residence tract on the Safford Ranger District

Turkey Flat

The Turkey Flat tract consists of 52 acres of land which comprise 0.05 percent of the critical habitat available for MSO in the Pinaleno Mountains. In 2005, ESA consultation was completed with the FWS (Consultation No. AESO/SE 02-21-05-I-0818) regarding potential impacts of vegetation thinning on MSO critical habitat on about two-thirds of this area (approximately 35 acres). The FWS determined that the 35-acre treatment area would be considered exempt from critical habitat status. The remaining 17 acres comprise 0.02 percent of critical habitat available to the MSO on the tract.

Two acres of the Turkey Flat tract are designated MSO critical habitat and comprise 0.3 percent of the Turkey Flat PACs (see figure 14, Turkey Flat MSO PACs). They are located around a water tank that supplies the recreation residences and include a small (less than 0.5 acre) open area that leads to the water tank. The area supports some of the primary constituent elements for MSO habitat, including the pine-oak association, uneven-aged stand structure, and canopy cover greater than 40 percent. It could be considered foraging habitat for MSO, although the size of trees in the immediate area (most trees have a DBH less than 10 inches) would likely not provide nesting habitat.

The area around the Turkey Flat residences would likely provide good foraging habitat, however, nests have not been found there. Better nesting habitat is more likely to occur in the mixed conifer areas of the mountain. The Turkey Flat PAC has been surveyed 12 times since 1990 and has been considered occupied all but one time that it was surveyed.

The distance from the Turkey Flat tract to the nearest core area is approximately 1,000 feet, and the distance from the Turkey Flat water tank to the nearest known nest is 2,470 feet. A trail near the Twilight Spring area is more than 600 feet away from the nest.

Environmental Consequences, Mexican Spotted Owl

Alternative 1 – No Action, Direct and Indirect Effects

Old Columbine. During the removal phase, noise from equipment, ground disturbance, and human presence would occur intermittently for several months. Although no breeding birds have been reported in recent surveys, removal activities would be restricted during MSO breeding season.

Following removal of residences and other improvements, such as water tanks and gas tanks, and the closure of access roads, nesting may occur in this area. However, it would take approximately 60 to 80 years for the forest canopy to close sufficiently to become suitable MSO breeding habitat. In the long term, increases in primary constituent elements, such as increased number of large trees, accumulation of downed woody material, and increased canopy cover would be expected as natural succession occurs.

While a future increase in the number of trees on the tract may provide new roosting sites, it may correspondingly decrease the mosaic of small mammal (prey) habitat available. Only a few studies have reported the effects of a decrease in forest openings on populations of small mammals²⁰. The analysis in this EIS assumes that, if the creation of openings and other diversity in wildlife habitat causes an increase in small mammal species diversity and abundance, then the reduction in the diversity of wildlife habitats would cause a reduction in diversity and abundance. After residences are removed, wildland fire may be used for resource enhancement. Fire would help retain a mosaic of small mammal habitat.

Turkey Flat. This site is dry and flat, which may account for its open vegetation structure. Revegetation may provide additional trees for roosting, although alteration of the mosaic of small mammal habitat onsite may adversely affect the prey base of the MSO (Waters and Zabel 1998). Again, it should be noted that there is very little research on the effects on small mammals that are induced by the removal of forest openings.

Following removal of residences and improvements, nesting may occur in this area. However, it would take approximately 60 to 80 years for the forest canopy to close sufficiently to become suitable MSO breeding habitat. In the long term, increases in primary constituent elements, such as increased number of large trees, accumulation of downed woody material, and increased canopy cover would be expected as natural succession occurs. After residences are removed, wildland fire may be used for resource enhancement. Fire would help retain a mosaic of MSO prey habitat on the tract.

²⁰ Ecke et al. 2002, Fisher and Wilkinson 2005, Tews et al. 2004, Waters and Zabel 1998, Wilcove et al. 1986; for a more complete discussion of landscape ecology and community dynamics, see Turner et al. 2001 or Garrett and Peles 1999.

Cumulative Effects

Other developed areas across the mountain include the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each of these areas is located within a manmade opening in the forest that is maintained by regular removal of brush and hazard trees. Regular thinning and removal of brush at these additional sites continues to limit cover available for MSO prey species. However, an increase in the mosaic of available habitat can also stimulate increased diversity of prey species, which can benefit the MSO. Removal of snags may decrease available nesting habitat. Occasional human presence can also affect the MSO foraging and nesting behavior.

Three vegetation thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. NatureServe (2005) has recommended that initial steps for the recovery of the MSO subspecies focus on removal of wildfire threats and avoiding even-aged stand management practices. Depending on the size of the trees thinned by these projects, a small amount of cover for MSO prey species would be lost. However, trees remaining in each stand would receive additional nutrients, which will increase tree growth rates and cover, which should lead to increased availability and increased quality of MSO habitat in the future.

If the recreation residence permits are issued, the vegetation cover at each tract would remain the same. Therefore, the proposed action would have no adverse cumulative or additive effect with the other uses of the forest that affect MSO habitat.

Recent wildfires on the Safford Ranger District (e.g., Clark Peak Fire and Nuttall Complex wildfire) reduced the amount of MSO foraging and nesting habitat in areas that burned at high intensities. While initial impacts were negative, the restoration of natural ecosystem processes will benefit forest health and the MSO in the long term as foraging habitat for its prey increases with a mosaic of vegetation associations and seral stages and the forest becomes better adapted to wildland fire.

Wildfire use, large wildfires, and fire suppression are known to alter the composition of overstory and understory trees that provide cover, nest sites, and food sources, either by fire damage and/or vegetation removal/cutting to create fire lines. On the other hand, fire stimulates grass, forb, and shrub growth and creates a mosaic of vegetation seral stages, which may encourage increased diversity of MSO prey species.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the proposed action are impossible to quantify. However, in general, the damage caused by wildland fire on the two tracts, if unsuppressed, would likely be to reduce MSO habitat by a maximum of 77 acres. Lost habitat from creation of fire lines would be discountable.

If the recreation residences are removed at the two tracts, vegetation at the sites would replenish through natural succession, and eventually, new habitat for the MSO may become available. Therefore, the no action alternative would have no adverse cumulative or additive effect with the other uses of the forest that affect MSO habitat.

No Action – Effects Determination, MSO

Based on the above analysis, it was determined that removal of the recreation residences at both Old Columbine and Turkey Flat “*may affect, but is not likely to adversely affect*” the MSO. It is also likely that the removal of recreation residences would benefit MSO habitat in the long term.

Alternative 2 – Proposed Action, Direct and Indirect Effects

Old Columbine. If permits are issued, human presence and noise may continue to disturb the MSO. However, given its nocturnal foraging behavior, effects are expected to be discountable. Manmade openings (e.g., wood piles, grassy areas, shrubs near the edge of denser forest, and closed canopy areas) would continue to enhance the diversity of MSO prey species by offering a diversity of habitat. Openings also provide a release of nutrients to nearby trees, which may provide additional food sources for prey species.

If permits are issued and the tract continues to be occupied for another 20 years, there would be little change in vegetative cover. Therefore, changes in primary constituent elements of MSO critical habitat would not be expected.

Turkey Flat. If permits are issued, human presence and noise would continue to disturb the MSO. However, given its nocturnal foraging behavior, effects are expected to be discountable. As this tract is fairly open and flat, nest sites are unlikely to be widely available (FWS 1995). Manmade openings (e.g., wood piles, grassy areas, shrubs near the edge of denser forest, and closed canopy areas) would continue to enhance the diversity of MSO prey species by offering a diversity of habitat. Openings also provide a release of nutrients to nearby trees, which may provide additional food sources for prey species.

No changes in vegetation would take place in the Turkey Flat area under this alternative; as a result, no changes in primary constituent elements of critical habitat would be expected.

Occasional increased occupancy of the residences may slightly increase hiking in the general area, but there are several natural features that limit the impacts that hiking may have on the MSO and its habitat. Because of the steep terrain that surrounds the flat area of the Turkey Flat tract, hikers would likely stay on the trail rather than walk in the direction of the documented nest site. In addition, because of the heavy cover in the upper portion of Turkey Flat, it is unlikely that hikers would notice a nest and be so curious as to approach it and investigate.

Cumulative Effects

Hiking. A concern was raised during the scoping of this NEPA review about the potential cumulative effects on nesting MSOs caused by forest users who hike near the residence tracts. These concerns may have arisen from research conducted by Swarthout and Steidl (2003), which concluded that the cumulative effects of high levels of short duration recreation hiking near nests may be detrimental to MSO. In an earlier research paper, it was recommended a 72-foot buffer be established around nests documented along heavily used trails (Swarthout and Steidl 2001).

Because the number of recreation residences would remain the same, there is no expectation that total visitors to the tracts would significantly increase in the future. Use is expected within the Old Columbine tract a total of 50 to 60 days per year, and 30 to 40 days per year in the Turkey Flat tract (See chapter 3, “Recreation” section).

Summer use of the recreation residence areas is generally light; however, residence owners occasionally have family gatherings of approximately 50 people, sometimes as frequently as 10 times between April and November annually. Each gathering typically lasts no more than a day, with occasional higher than normal occupancy for a 3-day weekend. Most users remain within the recreation residence tracts. However, some will hike during these gatherings. More than 90 percent of those who hike will use existing trails (Personal communication, Sharon Wallace, zone recreation specialist, with Anne Casey, Safford Ranger District, July 18, 2007).

A hiking trail from Old Columbine to the Webb Peak area does not lead to a core area. The Ash Creek Trail from the Old Columbine tract parallels the length of the Mill Site PAC, but remains over 250 feet away from the core area, which was determined based on historical sightings and aerial photos of vegetation in the PAC. Because of the steepness of this trail, its use in areas over 1 mile from the residences is generally low (less than 20 people per day during the highest traffic) (Personal communication, Sharon Wallace, zone recreation specialist, with Anne Casey, Safford Ranger District, July 18, 2007). Dense cover in this area makes it unlikely that hikers would spot a nest and approach to investigate.

Other Activities. Other developed areas across the mountain include the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each of these areas is located within a manmade opening in the forest that is maintained by regular removal of brush and hazard trees. Regular thinning and removal of brush at these additional sites continues to limit cover available for MSO prey species. However, an increase in the mosaic of available habitat can also stimulate increased diversity of prey species, which can benefit the MSO. Removal of snags may decrease available nesting habitat. Occasional human presence at all sites may also affect the MSO foraging and nesting behavior.

Three vegetation thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. NatureServe (2005) has recommended that initial steps for the recovery of the MSO subspecies focus on removal of wildfire threats and avoiding even-aged stand management practices. Depending on the size of the trees thinned by these projects, a small amount of cover for MSO prey species would be lost. However, trees remaining in each stand would receive additional nutrients, which will increase tree growth rates and cover, which should lead to increased availability and increased quality of MSO habitat in the future.

If the recreation residence permits are issued, the vegetation cover at each tract would remain the same. Therefore, the proposed action would have no adverse cumulative or additive effect with the other uses of the forest that affect MSO habitat.

Recent wildfires on the Safford Ranger District (e.g., Clark Peak Fire and Nuttall Complex wildfire) reduced the amount of MSO foraging and nesting habitat in areas that burned at high intensities. While initial impacts were negative, the restoration of natural ecosystem processes will benefit forest health and the MSO in the long term as foraging habitat for its prey increases with a mosaic of vegetation associations and seral stages and the forest becomes better adapted to wildland fire.

Wildfire use, large wildfires, and fire suppression are known to alter the composition of overstory and understory trees that provide cover, nest sites, and food sources, either by fire damage and/or vegetation removal/cutting to create fire lines. On the other hand, fire stimulates grass, forb, and

shrub growth and creates a mosaic of vegetation seral stages, which may encourage increased diversity of MSO prey species.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the proposed action are impossible to quantify. However, in general, the damage caused by wildland fire on the two recreation residence tracts, if unsuppressed, would likely be to reduce MSO habitat by a maximum of 77 acres. Lost habitat from creation of fire lines would be discountable.

Proposed Action – Effects Determination, MSO

Based on the above analysis, it was determined that issuing of the residence permits for both Old Columbine and Turkey Flat tracts “*may affect, but is not likely to adversely affect*” the MSO. Renewal of the permits would result in discountable changes in vegetation of the tracts and, therefore, would not result in loss of any existing primary constituent elements of critical habitat. For this reason, permit renewal would have “*no effect*” on MSO critical habitat.

Alternative 3 – Renew Turkey Flat Only

Old Columbine. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 1.

Turkey Flat. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 2.

Alternative 4 – Renew Old Columbine Only

Old Columbine. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 2.

Turkey Flat. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 1.

Affected Environment, Apache trout (*Oncorhynchus apache*)

This fish species is golden-yellow or olive yellow, with a golden belly. Spotting pattern is an even distribution of pronounced, moderate-sized, rounded or oval black spots on the sides of the body and on top of the head. The adipose fin is usually bordered with black. The dorsal, pelvic, and anal fins are tipped with a white to orange color, and an orange to yellow cutthroat mark is present under the jaw. A diploid number of 56 chromosomes and an arm number of 106 in both Apache trout and Gila trout differentiate the species from all other western trout (Minckley, 1973; Behnke, 1992).

Within the Pinaleno Mountains, Apache trout are found in Grant and Ash Creeks. Ash Creek drainage runs through the Old Columbine recreation residence site and proceeds downhill; trout occur approximately 3 miles downstream. There is no habitat for the Apache trout on the Turkey Flat tract.

This trout prefers cool, clear, high elevation streams and rivers. It tends to be restricted to elevations of approximately 5,780 feet and higher. Woody streamside vegetation is dominated by fir and pine species, quaking aspen (*Populus tremuloides*), willow (*Salix* spp.), and Arizona alder

(*Alnus oblongifolia*) (Harper 1978). Some fish found in Grant and Ash Creeks are known hybrids of Apache and rainbow trout. For this reason, the population of these fish within the Pinaleño Mountains is considered nonessential to the recovery of the species. At the time of writing, no population estimates are available (Personal communication, Scott Gurtin, AGFD, with Anne Casey, Safford Ranger District, August 23, 2004).

Spawning occurs from March through mid-June, varying with elevation. Maturity was found to occur in 3 years at a size of approximately 13 centimeters (5.1 inches). Fecundity increases with size of fish. Fry hatch in 30 days and emerge from redds (spawning nests) after another 30 days, then exhibit nocturnal downstream movements (Harper, 1978; Rinne, 1990).

Environmental Consequences, Apache Trout

Adverse impacts to Apache trout can occur when copious amounts of runoff degrade water quality by introducing sediment and pollutants. Significant concentrations of introduced sediment and pollutants may result in direct effects that cause injury or death, and indirect effects on aquatic flora and fauna that comprise food sources for the species.

Alternative 1 – No Action, Direct and Indirect Effects

Old Columbine. Direct and indirect effects on Apache trout are not expected if no action is taken, despite the fact that removal of improvements may include ground-disturbing activities by heavy equipment and vehicles. To minimize erosion and runoff to Ash Creek, the forest would require permit holders to implement best management practices that are specified in FSH 2509.22. A grassy patch in the center of the tract would provide a ready source of seeds to begin replenishment of site cover and minimize future runoff to Ash Creek.

Apache trout in Grant and Ash Creek are known to have hybridized with introduced rainbow trout, and as such, are not suitable for use in reintroduction or for recovery of the species.

Cumulative Effects

Other developed areas across the mountain include the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each of these areas is located within a manmade opening in the forest that is maintained by regular removal of brush and hazard trees. The Heliograph and Ladybug sites are not within watersheds that support Apache trout habitat.

Grasses, shrubs and trees at these sites minimize erosion to the watershed and runoff to streams that support Apache trout. Except for post-fire runoff, there is no evidence that erosion from these areas has adversely affected the Apache trout. Recent wildfires on the Safford Ranger District (e.g., Clark Peak Fire and Nuttall Complex wildfire) reduced the amount of vegetation present and generated large quantities of ash that deposited in watersheds occupied by Apache trout. On the other hand, these fires have created a mosaic of vegetation seral stages, which improve watershed conditions in the long term, by increasing infiltration of water, decreasing overland erosion, and decreasing sheeting.

Three vegetation thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Restoration of frequent, low-intensity fires will reduce the

probability of the occurrence of a high-intensity fire and the consequent erosion and runoff it generates. This will, in turn, improve the quality of waters occupied by Apache trout.

If the recreation residences are removed at the two tracts, vegetation at the sites would replenish through natural succession. Increased ground cover would reduce the degree of erosion from each tract. Best management practices would be followed during the removal phase of the project in order to prevent immediate erosion events. Therefore, the no action alternative would have no adverse cumulative or additive effect with the other uses of the forest that may affect Apache trout.

No Action – Effects Determination, Apache Trout

The removal of recreation residences at the Old Columbine tract “*may affect, but is not likely to adversely affect*” the Apache trout. There is no habitat for Apache trout at Turkey Flat; therefore, there would be “*no effect*” on the species at this location.

Alternative 2 – Proposed Action, Direct and Indirect Effects

Old Columbine. The recreation residences on this tract currently use water originating in Columbine Spring. This use would continue with the issuing of the permits. Currently, there is no evidence that Apache trout is adversely affected in any way by this use. These fish are also known to have hybridized with introduced rainbow trout, and as such, are not suitable for use in reintroduction or for recovery of the species.

No additional runoff or sediment deposit in streams would result from the issuing of new permits, because no ground-disturbing activities would occur. The dirt roads leading into and around the recreation residences would continue to be a source of runoff into Ash Creek during heavy precipitation. However, there is no current evidence that runoff is adversely affecting the Apache trout downstream.

Cumulative Effects

Other developed areas across the mountain include the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each of these areas is located within a manmade opening in the forest that is maintained by regular removal of brush and hazard trees. The Heliograph and Ladybug sites are not within watersheds that support Apache trout habitat.

Grasses, shrubs and trees at these sites minimize erosion to the watershed and runoff to streams that support Apache trout. Except for post-fire runoff, there is no evidence that erosion from these areas has adversely affected the Apache trout. Recent wildfires on the Safford Ranger District (e.g., Clark Peak Fire and Nuttall Complex wildfire) reduced the amount of vegetation present and generated large quantities of ash that deposited in watersheds occupied by Apache trout. On the other hand, these fires have created a mosaic of vegetation seral stages, which improve watershed conditions in the long term, by increasing infiltration of water, decreasing overland erosion, and decreasing sheeting.

Three vegetation thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Restoration of frequent, low-intensity fires will reduce the

probability of the occurrence of a high-intensity fire and the consequent erosion and runoff it generates. This will, in turn, improve the quality of waters occupied by Apache trout.

If the recreation residence permits are issued, the vegetation cover at each tract would remain the same. Therefore, the proposed action would have no adverse cumulative or additive effects of the other uses of the forest that affect Apache trout habitat.

Proposed Action – Effects Determination, Apache Trout

Issuing new permits for residences on the Old Columbine tract “*may affect, but is not likely to adversely affect*” the Apache trout. There is no habitat for Apache trout at Turkey Flat; therefore, issuing the residence permits would have “*no effect*” on the species.

Alternative 3 – Renew Turkey Flat Only

Old Columbine. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 1.

Turkey Flat. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 2.

Alternative 4 – Renew Old Columbine Only

Old Columbine. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 2.

Turkey Flat. Direct, indirect, and cumulative effects would be the same as those reported above for alternative 1.

Forest Service Sensitive Species

Species Evaluated

Populations of each species designated by the Regional Forester as Forest Service sensitive (FSS) must be maintained at viable levels in habitats distributed throughout their geographic range on National Forest System lands (FSM 2670.22). The population viability of FSS species becomes a concern when downward trends in populations or habitat capability are predicted. When the Forest Service undertakes or approves an activity on National Forest System lands, the Agency seeks to avoid or minimize impacts to FSS.

Table 17 lists the status of FSS on the Coronado, based on the FSS species listed by the Southwestern Regional Forester in 1999²¹. White text below indicates species for which impacts are evaluated in this EIS.

²¹ The FSS species list was updated on September 7, 2007. Region 3 issued accompanying guidance that “NEPA analyses for projects that have been through the scoping process and where issues have been identified are not required to utilize the revised list of sensitive species.” Thus, the analysis in this EIS is based on the July 21, 1999, Regional Forester list of FSS species.

Table 17. Habitat and occurrence of Forest Service Sensitive Species at recreation residence tracts on the Safford Ranger District

Species Name	Turkey Flat Recreation Residence Area	Columbine Recreation Residence Area
MAMMALS		
White-bellied long-tailed vole	Occurs within the analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
Pinaleño pocket gopher	Not within the analysis area.	Occurs within the analysis area; suitable habitat available.
BIRDS		
Apache northern goshawk	Foraging habitat available.	Foraging habitat available.
Peregrine falcon	Foraging habitat available.	Foraging habitat available.
Common black-hawk	Not within the analysis area.	Not within the analysis area.
Flammulated owl	Occurs within the analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
Gould's wild turkey	Occurs within the analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
AMPHIBIANS		
Lowland leopard frog	Not within the analysis area.	Not within the analysis area.
INVERTEBRATES		
Pinaleño monkeygrasshopper	Not within the analysis area.	Occurs within the analysis area; suitable habitat available.
A tiger beetle (<i>Amblycheila baroni</i>)	Not within the analysis area.	Not within the analysis area.
Aryxna giant skipper	Not within the analysis area.	Not within the analysis area.
Obsolete viceroy	Not within the analysis area.	Not within the analysis area.
Chiricahua white butterfly	Occurs within analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
A tiger Beetle (<i>Cicindela purpurea cimerrona</i>)	Occurs within the analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
Clark Peak talussnail	Not within the analysis area.	Not within the analysis area.
Mimic talussnail	Occurs within the analysis area; suitable habitat available.	Not within the analysis area.
Pinaleño talussnail	Not within the analysis area.	Not within the analysis area.
Wet Canyon talussnail	Not within the analysis area.	Not within the analysis area.

Species Name	Turkey Flat Recreation Residence Area	Columbine Recreation Residence Area
Pinaleño mountainsnail	Not within the analysis area.	Not within the analysis area.
PLANTS		
Chiricahua dock	Not within the analysis area.	Not within the analysis area.
Coppermine milk vetch	Occurs within the analysis area; suitable habitat available.	Not within the analysis area.
Mock pennyroyal	Occurs within the analysis area; suitable habitat available.	Not within the analysis area.
Arizona alum root	Occurs within the analysis area; suitable habitat available.	Not within the analysis area.
Bigelow thoroughwort	Not within the analysis area.	Occur within the analysis area; suitable habitat available.
Arizona giant sedge	Not within the analysis area.	Not within the analysis area.
Broad leaf ground cherry	Not within the analysis area.	Not within the analysis area.
Chihuahuan sedge	Not within the analysis area.	Not within the analysis area.
Chihuahuan stickseed	Occurs within the analysis area; suitable habitat available.	Not within the analysis area.
Mexican broomspurge	Not within the analysis area.	Not within the analysis area.
Superb beardtongue	Not within the analysis area.	Not within the analysis area.
Pinaleño Jacob's ladder	Not within the analysis area.	Occurs within the analysis area; suitable habitat available.
Rusby hawkweed	Not within the analysis area.	Occurs within the analysis area; suitable habitat available.
White-flowered cinquefoil	Occurs within the analysis area; suitable habitat available.	Occurs within the analysis area; suitable habitat available.
Trans-Pecos Indian paintbrush	Not within the analysis area.	Not within the analysis area.

Environmental Consequences, White-bellied Long-tailed Vole (*Microtus longicaudus leucophaeus*)

The white-bellied long-tailed vole occupies high elevation (6,000 to 10,500 feet), grassy meadows, flats, areas along boggy stream bottoms and roadsides, cienegas²², and openings in coniferous forest. It builds runways through thick grass and steep slopes with bunchgrasses to provide easy access from its burrows to grassy food supplies, extending them under snow in

²² A perennially wet area supported by a spring or other water source, also called “wetland,” “marsh,” or “swamp.”

winter. Nests of grass are built within the burrows, and burrow openings (about 2 inches in diameter) are found near logs, stumps, and clumps of vegetation (AGFD 2003).

This vole is active during the day and throughout the winter. At times, it is semi-aquatic. Grasses and green, succulent vegetation are primary components of its diet. It also eats grass seeds, the bark of willows and alders, roots and fungi. Owls (barn, great-horned, long-eared and short-eared), prairie falcons, weasels and martens are its known predators (AGFD 2003).

This subspecies occurs only in the Pinaleño Mountains; the current population appears to be stable. This vole is considered common in appropriate habitat (AGFD 2003). It occurs on both residence tracts.

No Action

With no action, meadow habitat may be lost as natural succession leads to a thickening of the shrub understory and eventual tree growth, the latter of which would increase canopy closure. Loss of open areas may make the tracts less suitable as vole habitat. However, there are several other meadows in the Pinaleños that provide excellent habitat for this species, including Hospital Flat, Chesley Flat, Peters Flat, and an area south of the Columbine administrative site. In addition to these established meadows, many smaller meadows and forest openings were created by recent wildland fires on the district. Given the availability of other vole habitat in the vicinity, the loss of less than 77 acres of vole habitat due to natural succession would not result in a trend toward Federal listing or loss of viability of the vole.

Proposed Action

If permits are issued for the tracts, onsite vegetation and human presence would remain the same. Habitat and population of the vole would not be changed by the proposed action.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest that is maintained by periodic removal of brush and hazard trees. This maintenance makes additional pockets of habitat available for these voles. In the long term, these pockets serve to improve the survival rate of the subspecies by dispersing its population over a broad area, which, in turn, makes individuals less susceptible to mortality from large wildland fires or other random events.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Thinning in the vicinity of the Turkey Flat tract may create new pockets of habitat for the vole.

Wildland fire and fire suppression can cause localized mortality of voles. On the other hand, although fire damages and destroys trees, this damage opens pockets of vole habitat. Wildland fire use and wildland fires also encourage regeneration of grasses and other plants that serve as a food source for voles.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex wildland fire) decreased vole habitat in areas that burned at high intensity. In moderately burned areas, the reintroduction of fire as a natural process may promote more sustainable forest conditions and improve vole habitat in the long term.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by wildland fire on the two tracts, if unsuppressed, could reduce vole habitat by 77 acres.

If the recreation residences are removed at the two tracts, vegetation at the sites would replenish through natural succession and eventually close existing pockets of vole habitat. Because other reasonably foreseeable actions on the mountain would have no adverse impacts to the vole and may actually improve vole habitat, the additive effects from no action would be offset. There would be no trend toward Federal listing or loss of viability of the species.

If the permits for the recreation residences are issued, the vegetation that comprises vole habitat would remain the same. Therefore, cumulative impacts from the proposed action would be discountable. There would be no trend toward Federal listing or loss of viability of the species.

Environmental Consequences, Pinaleño Pocket Gopher (*Thomomys umbrinus grahamensis*)

This pocket gopher, which inhabits alpine meadows and cienegas within coniferous forests from 6,000 to 10,000 feet in elevation, may occur on the Old Columbine tract. The species is generally associated with understory vegetation composed of perennial grasses (*Festuca*, *Bromus*) and various forbs, such as sneeze-weed (*Helenium hoopesii*). The overstory or adjacent forest includes spruce-fir and mixed conifer forest (Hoffmeister 1956).

No Action

If no action is taken and the Old Columbine residences are removed, the future natural succession of vegetation would likely decrease the availability and quality of gopher habitat, unless action is taken to conserve the meadow. However, the loss of less than 25 acres of gopher habitat is not likely to result in a trend toward Federal listing of the gopher or loss of viability of the species.

Proposed Action

If the proposed action is implemented, no vegetation or ground-disturbing activities would occur, and the Old Columbine meadow would continue to exist and provide habitat for this species.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest that is maintained by regular removal of brush and hazard trees. Regular removal of brush maintains pockets of habitat for the gopher. These pockets may improve the long-term survival of the subspecies by dispersing its population over a broad area, which, in turn, would make individual gophers less susceptible to mortality from large wildland fires or other random events.

Wildland fire and fire suppression can cause localized mortality of gophers; however, fires also damage and destroy trees, which creates new pockets of gopher habitat. Fire also encourages regeneration of grasses and other plants that are food sources for gophers.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) likely decreased gopher habitat in areas that burned at high intensity. In moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improve gopher habitat in the long term.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by wildland fire on the Old Columbine tract, if unsuppressed, could reduce gopher habitat by 25 acres.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Removal of trees in the upper Turkey Flat tract may create pockets of new habitat for the gopher.

If the recreation residences are removed at Old Columbine, vegetation at the site would replenish through natural succession and eventually close existing pockets of gopher habitat. Because other reasonably foreseeable actions on the mountain would have no adverse impacts to the gopher and may actually improve gopher habitat, cumulative impacts with no action would be discountable.

If the permits for the recreation residences are issued, the vegetation that comprises gopher habitat would remain the same. Therefore, cumulative impacts from the proposed action would be discountable.

Environmental Consequences, Apache Northern Goshawk (*Accipiter gentilis apache*)

This species is found throughout Arizona, generally in high elevation, old-growth ponderosa pine and mixed-conifer forests, as well as plateaus. It breeds at elevations above 6,000 feet, choosing Arizona pine and ponderosa pine for nest (eyrie) placement; from one to eight nests are built in March and early April. Short distance foraging flights are taken from the nest to prey upon tree squirrel, rock squirrel, cottontail rabbit, band-tailed pigeon, mourning dove, Stellar's jay, northern flicker, and Montezuma (Mearn's) quail (AGFD 2003). Both tracts may be used for foraging throughout the year.

Goshawk populations are reported to have declined nationwide over the past 50 years. In the project area, populations are expected to decline slightly because of fire suppression, loss of prey habitat, insect and tree disease outbreaks, and loss of nesting habitat resulting from grazing (AGFD 2003).

No Action

No action would also, in the short term, result in noise and increased human presence, both of which may disturb foraging during removal activities. Goshawk foraging habitat may be lost as the tracts naturally revegetate. Natural plant succession would tend toward a thickening of the shrub understory and eventual tree growth, which would increase canopy closure and decrease

habitat for prey species. However, this loss would not likely result in a trend toward Federal listing or loss of viability of the species.

Proposed Action

If permits are issued for the tracts, onsite vegetation would remain the same. There would not be a trend toward Federal listing or loss of viability of the species.

Cumulative Effects

Other reasonably foreseeable actions in the project area include the activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. This clearing of vegetation may create pockets of habitat for small mammals and birds that serve as prey for goshawks (Ecke et al. 2002, Fisher and Wilkinson 2005, Tews et al. 2004).

Wildland fire and fire suppression can cause localized mortality of goshawks, particularly when there are young in the nest. However, fire also damages and destroys trees, which provides new pockets of prey habitat. Wildland fire may also serve to encourage regeneration of grasses and other plants that serve as a food source for prey species.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) likely decreased goshawk prey habitat in areas that burned at high intensity. Although the initial impacts of fire are negative, it ultimately encourages the reestablishment of a mosaic of vegetation associations and seral stages that improve habitat for prey species in the long term.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by wildland fire on the two tracts, if unsuppressed, could reduce goshawk foraging habitat by 77 acres.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Thinning would create additional areas of habitat for goshawk prey species.

If the recreation residences are removed at both tracts, vegetation at the sites would replenish through natural succession and eventually close existing pockets of habitat for goshawk prey species. Because other reasonably foreseeable actions on the mountain would have no adverse impacts to the goshawk and may actually improve habitat for its prey, cumulative impacts from no action would be discountable. There would not be a trend toward Federal listing or loss of viability of the species.

If permits for the recreation residences are issued, the vegetation that comprises goshawk prey habitat would remain the same. Therefore, cumulative impacts from the proposed action would be discountable. There would not be a trend toward Federal listing or loss of viability of the species.

Environmental Consequences, Peregrine Falcon (*Falco peregrinus anatum*)

The peregrine falcon is both a FSS and MIS. Although it was a federally listed endangered species when designated in the forest plan as an MIS, the falcon was delisted in 1999. Populations have increased markedly since organochloride (DDT) pesticide use was banned in the United States (USDA 2005).

This species requires cliffs or cliff-like areas for nesting and feeds mainly on birds, with a lesser diet of mammals, amphibians, and insects (White et al. 2002). Both tracts may be used for foraging throughout the year, by wintering or migrating individuals and by individuals from nearby (off-tract) active eyries (high nests) during the breeding season. The primary threat to the viability of the species is disturbance of nest sites by recreational rock climbers and other users. In addition, ground-disturbing activities and/or other loud noise during the nesting season (March 1 to July 15) may affect reproductive success (USDA 2005).

No Action

Over the long term, removal of residences would change both the diversity and abundance of falcon prey species, because succession would alter species composition and structure on the tracts. No action would also, in the short term, result in noise and increased human presence, which may disturb foraging during removal activities. However, the loss of a small amount of prey habitat and temporary disturbance at the tracts is not likely to result in a trend toward Federal listing or loss of viability of the peregrine falcon.

Proposed Action

If the proposed action is implemented, no vegetation removal or ground-disturbing activities would occur at either tract. Thus, the diversity of prey species habitat would be maintained. No additional disturbance is expected in the vicinity of active eyries, therefore, no impacts on nesting birds are likely to occur. There would not be a trend toward Federal listing or loss of viability of the species.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening that is maintained by periodic removal of brush and hazard trees. This may create pockets of habitat for small mammals and birds that serve as prey for goshawks. Because the falcon uses a wide variety of vegetation types, including those modified by humans (White et al. 2002), the openings and human presence are not likely to deter its use of the tracts.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages within the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The falcon may temporarily avoid using treatment areas because of human presence and noise. Because no activities would be undertaken near eyries, where peregrines are most susceptible to disturbance (White et al. 2002), thinning activities would not likely result in the abandonment of nests.

Wildland fire and fire suppression damage or destroy overstory trees that provide cover. However, fires also stimulate grass, forb, and shrub growth and create a mosaic of vegetation seral stages, which encourage increased diversity of prey species.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire), the Santa Catalina Ranger District (Aspen and Bullock Fires), and the Nogales District (Florida Fire) likely decreased peregrine foraging habitat in areas that burned at high intensity. Although the initial impacts of fire are negative, it ultimately encourages the reestablishment of a mosaic of vegetation associations and seral stages that improve habitat for prey species in the long term.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by wildland fire on the two tracts, if unsuppressed, could reduce foraging habitat by 77 acres.

If the recreation residences are removed at both tracts, vegetation at the sites would replenish through natural succession and eventually close existing pockets of habitat for prey species. Because other reasonably foreseeable actions on the mountain would have no adverse impacts to the falcon and may actually improve habitat for its prey, cumulative impacts from no action would be discountable. There would not be a trend toward Federal listing or loss of viability of the species.

If permits for the recreation residences are issued, foraging habitat would remain the same. Therefore, cumulative impacts from the proposed action would be discountable. There would not be a trend toward Federal listing or loss of viability of the species.

Environmental Consequences, Flammulated Owl (*Otus flammeolus*)

The tiny flammulated owl (its length is 6 inches) is found in arid pine forests, often intermixed with oaks, and almost always with a brushy understory. Other tree species where the owl occurs include piñon pine, white fir, and, most often, Douglas-fir. The owl has been observed at elevations ranging from 5,000 to 8,000 feet in Arizona, is not usually found in low elevation pine-oak or in spruce-fir, and generally inhabits transitional zones and large canyon bottoms (AGFD 2005). Any pine and oak within the residence tracts is considered potential habitat. The owls forage for large insects, moths, and beetles (AGFD 2005).

Population trends for this species are unknown (AGFD 2005). Flammulated owl calls have been noted during previous Mexican spotted owl surveys within the project area (USDA-FS, unpublished data).

Logging is the primary threat to this species, and it is quite sensitive to insecticides. It is a secondary cavity nester, using openings created by primary cavity nesters for breeding (AGFD 2005).

No Action

If residences are removed, tree species composition on the tracts would change because of natural succession. This would likely provide additional owl habitat in the long term. It would not result in a trend toward Federal listing or loss of viability of the species.

Proposed Action

If permits for the recreation residences are issued, owl habitat would remain the same. The proposed action may result in disturbance to owls during periods of extended human presence, but this is not likely to result in a trend toward Federal listing or loss of viability of the species.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. Brush removal may remove some of the cover available to this species. Also, removal of snags could reduce the amount of nesting habitat available. Some human disturbance likely occurs in these areas when residences are being used.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. NatureServe (2005) has recommended that forests be thinned and burned to restore historic habitat conditions for this species. Thus, these activities would enhance owl habitat in the vicinity of the residence tracts.

Wildland fire and fire suppression may damage or destroy overstory and understory trees that provide cover. Although the initial impacts of fire are negative, it ultimately encourages the reestablishment of a mosaic of vegetation associations and seral stages that improve habitat for prey species in the long term. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) likely decreased foraging and nesting habitat in areas that burned at high intensity.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by wildland fire on the two tracts, if un-suppressed, could reduce foraging habitat by 77 acres.

If the recreation residences are removed at both tracts, vegetation at the sites would replenish through natural succession and eventually close existing pockets of habitat for prey species. Because other reasonably foreseeable actions on the mountain would have no adverse impacts to the owl and may actually improve habitat for its prey, cumulative impacts from no action would be discountable and would not result in a trend toward Federal listing or loss of viability of the species.

If permits for the recreation residences are issued, foraging habitat would remain the same. Therefore, cumulative impacts from the proposed action would be discountable and would not result in a trend toward Federal listing or loss of viability of the species.

Environmental Consequences, Gould's Wild Turkey (*Meleagris gallopavo mexicana*)

Gould's turkey is listed as both a FSS and MIS. The Pinaleno population was reintroduced in 2004, followed by an additional release in spring of 2005. The population has improved incrementally with the addition of wild-born poults (Personal communication, Anne Casey, Safford District biologist, with Duane Aubuchon, AGFD, June 15, 2007). AGFD reports recent

observations of the Pinaleño population in the lower elevation Grant and Moonshine Creek areas, and during the Nuttall Fire, they were observed at a higher elevation (507 Road) (AGFD, unpublished data).

This species forages on spring forbs and grasses, insects, and the fruits of juniper, *Vitis* spp. (grapes), and manzanita. It commonly roosts in pine, oak, sycamore, and cottonwood. The species generally occupies pine, pine-oak, and piñon pine-juniper habitat (Eaton 1992). Sustainability of the Pinaleño population is most likely to be influenced by weather/climate changes and nesting success in the project area (USDA 2005).

No Action

If residences are removed, vegetation composition on the tracts would change because of natural succession. This may provide additional turkey habitat in the long term. It would not result in a trend toward Federal listing or loss of viability of the species.

Proposed Action

If permits are issued, vegetation would remain the same on both tracts. This would not have an effect on turkey habitat and would not likely result in a trend toward Federal listing or loss of viability of the species.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. These sites provide openings that, in many areas, encourage the growth of grasses, forbs, and shrubs, including berry bushes and locust trees that are a food source for turkeys. Intermittent human presence also occurs in these areas; however, Gould's turkeys are regularly seen in and around these sites.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The Pinaleño Ecosystem Management (PEM) project (item 10) and special-use area thinning project (item 24) are focused solely on the understory of the forest, i.e., the removal of trees up to 9 inches DBH. Because of this, some cover would be lost. On the other hand, cleared areas would provide better foraging for seeds and insects. Trees that remain in thinned stands would receive additional nutrient release, which increases trees growth rates and mast production. Larger trees that remain in thinned stands would provide excellent turkey roosting sites. A few large diameter trees would be removed in the Turkey Flat area, which may stimulate understory shrub growth and provide foraging habitat.

Wildland fire and fire suppression can damage or destroy overstory trees that provide cover for the turkey. However, fires also stimulate grass, forb, and shrub growth when the canopy is opened, providing additional food sources.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire), the Santa Catalina Ranger District (Aspen and Bullock Fires), and the Nogales District (Florida Fire) probably decreased turkey habitat in areas that burned at high intensity. During

implementation of the Stockton Pass prescribed fire in 2007, turkeys were observed flying in and out of burning areas to forage for insects flushed by the fire. Thus, in moderately burned areas, turkeys may have received immediate foraging benefits from the fire.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by wildland fire on the two tracts, if unsuppressed, could reduce habitat by 77 acres. There would not likely be a trend toward Federal listing or loss of viability of the species.

If the recreation residences are removed at both tracts, vegetation at the sites would replenish through natural succession, ultimately closing areas presently open to foraging. The loss of less than 77 acres of open area would be discountable when considered in combination with the improvements in habitat resulting from other actions in the area. Thus, there would not be a trend toward Federal listing or loss of viability of the species.

If permits for the recreation residences are issued, habitat at Old Columbine would remain the same. Therefore, cumulative impacts from the proposed action would be discountable and would not result in a trend toward Federal listing or loss of viability of the species.

Environmental Consequences, Pinaleño Monkey Grasshopper (*Eumorsea pinaleno*)

Very little is known about this species; only four specimens have been collected on the forest. It is believed to occupy the same habitat as the Mt. Graham red squirrel, including old-growth Douglas-fir stands (AGFD 2001). It may occur in and around Old Columbine habitat. Population trends are unknown (AGFD 2001).

No Action

If the residences are removed, grasshopper habitat would gradually improve as succession returns the vegetation on 25 acres of Old Columbine to a natural state.

Proposed Action

If the proposed action is implemented, vegetation on Old Columbine would remain the same. Human disturbance would not adversely impact the grasshopper, except for maybe a lucky catch by a pet cat. There would not be a trend toward Federal listing or loss of viability of the species.

Cumulative Impacts

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. At present, these openings are not suitable habitat for the grasshopper.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) is focused solely on the understory of the

forest, i.e., removal of trees up to 9 inches DBH. Because of this, cover for grasshoppers would be lost. However, forest structure after treatment would be more resilient to wildland fire, and the long-term result would be a more sustainable habitat. A few larger diameter trees would be removed in the Turkey Flat area, which may create small openings that are unsuitable for these grasshoppers.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) likely decreased grasshopper habitat in areas that burned at high intensity. In moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improve the health of occupied habitat.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by wildland fire at Old Columbine, if unsuppressed, could reduce grasshopper habitat by 25 acres.

If the recreation residences are removed, vegetation at Old Columbine would replenish through natural succession, and suitable grasshopper habitat may return. This would be an additive benefit when considered cumulatively with other nearby activities.

If the permits are issued for Old Columbine, vegetation and habitat would remain the same. There would be no additive impacts that would result in a trend toward Federal listing or loss of viability of the grasshopper.

Environmental Consequences, Chiricahua White Butterfly (*Neophasia terlootii*)

This butterfly occupies the high elevation pine forest, usually above 6,200 feet. Eggs are laid on ponderosa pine and Engelmann spruce, where the larvae eat the leaves. Population trends for this species are unknown, but it may occur on both tracts (AGFD 2001).

No Action

If no action is taken, there is a potential benefit to butterfly habitat in the long term as the tracts become reforested.

Proposed Action

If the proposed action is implemented, vegetation on the tracts would remain the same. Thus, there would be no impact on the butterfly and no trend toward Federal listing or loss of viability of the species.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. These openings do not support suitable habitat for the butterfly; human disturbance at these sites is intermittent.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) is focused solely on the understory of the forest, i.e., removal of trees up to 9 inches DBH. Because of this, cover for butterflies would be lost. However, forest structure after treatment would be more resilient to wildland fire, and the long-term result would be more sustainable habitat. A few larger diameter trees would be removed in the Turkey Flat area, which may create openings that are unsuitable for Chiricahua white butterflies.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) likely decreased butterfly habitat in areas that burned at high intensity. In moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improve the health of occupied habitat. Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by wildland fire at both tracts, if unsuppressed, could reduce potential butterfly habitat by 77 acres.

If the recreation residences are removed, vegetation at both tracts would replenish through natural succession, and new butterfly habitat may return. This would be an additive benefit when considered cumulatively with benefits of other nearby activities.

If the permits are issued for Old Columbine, vegetation and habitat would remain the same. There would be no additive impacts that would result in a trend toward Federal listing or loss of viability of the butterfly.

Environmental Consequences, A Tiger Beetle (*Cicindela purpurea cimerrona*)

Cicindela purpurea cimerrona occupies high elevation meadows and grasslands and areas along trails. It is highly mobile on the ground surface in open areas and doesn't fly unless disturbed by predators or other animals. It preys on smaller insects. Primary predators of adult beetles include insect-eating birds, robberflies, and dragonflies. Some wasps (Tiphidae) and bee-flies (Bombyliidae) also feed on their larvae. However, the beetle's greatest threat is man, from pesticide use and disturbance by off-highway vehicles (AGFD 2001).

Population trends for this species are currently unknown (AGFD 2001). This beetle may occur at both tracts.

No Action

The no action alternative would cause ground disturbance during residence removal, and the long-term result would be a slight decrease in available habitat as natural succession progresses and currently open areas become forested. However, this is not likely to result in a trend toward Federal listing or loss of viability of the tiger beetle.

Proposed Action

Because there are no vegetation or ground-disturbing activities in the proposed action, no adverse impacts would be expected. The proposed action would likely have a net positive effect, as habitat is preserved in the available small openings around the residences.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. These openings represent potential habitat for this species.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Because of the small diameter of trees being removed (less than 9 inches DBH), there would likely be no impacts to this beetle. Some larger diameter trees would be removed in the Turkey Flat area, which may create openings that are suitable for the tiger beetle.

Wildland fire and fire suppression may damage or destroy overstory and understory trees that provide the beetle with cover. Although the initial impacts of fire are negative, it ultimately encourages the reestablishment of a mosaic of vegetation associations and seral stages that improve habitat in the long term.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) likely reduced beetle habitat in areas that burned at high intensity. In moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improve the health of occupied habitat. Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by wildland fire at both tracts, if unsuppressed, could reduce potential beetle habitat by 77 acres.

If the recreation residences are removed, vegetation at both tracts would replenish through natural succession, and new beetle habitat would become available until trees close the canopy. This would be an additive benefit when considered cumulatively with benefits of other foreseeable activities.

If the permits are issued for Old Columbine, vegetation and habitat would remain the same. There would be no additive impacts that would result in a trend toward Federal listing or loss of viability of the tiger beetle.

Environmental Consequences, Mimic talussnail (*Sonorella imitator*)

This species inhabits rockslides from Clark Peak to Marijilda Canyon within the Pinaleño Mountains. Vegetation associated with talussnail populations includes oak, pine, and locust trees, depending on elevation (AGFD 2003). Habitat for this talussnail may occur at Turkey Flat. This species is becoming more common in areas formerly occupied by Pinaleño talussnails (*Sonorella grahamensis*) (AGFD 2003).

Because the no action alternative would not disturb habitat within talus slopes at Turkey Flat, activities that result from issuing new permits for the tract or residence removal are not likely to adversely impact the snail. Neither the proposed action nor no action would result in a trend toward Federal listing or loss of viability of the species.

None of the potential cumulative effects discussed in previous species descriptions is likely to occur within or cause adverse impacts to talus slopes. With the exception of wildland fires, there are no other cumulative effects to analyze for this species. Wildland fires may ignite duff that has built up on top of talus, and the heat from this burning may kill individuals of this species (AGFD 2003).

Environmental Consequences, Mock pennyroyal (*Hedeoma dentatum*), Coppermine milk vetch (*Astragalus cobrensis* var. *marguieri*), Arizona alum root (*Heuchera glomerulata*)

These three species occupy fairly open areas, trails, and roadsides in oak woodland, oak-pine, and pine forest up to approximately 8,500 feet in elevation. All tend to be found on north-facing slopes. Milk vetch and alum root are found in sandy and rocky soils, while pennyroyal tends to prefer sandy loams (AGFD 1999, 2000, 2004). Mock pennyroyal was once described as common and widespread within its range, but is now considered uncommon. There is no scientific explanation for the decline since the mid-1990s (AGFD 2000). Coppermine milk vetch is also considered to be declining (AGFD 1999). Arizona alum root population trends are undocumented (AGFD 2004). These species occur at the Turkey Flat tract.

No Action

If no action is taken, activities during residence removal may result in a temporary loss of individual plants. However, long-term effects would be positive as the tract returns to a more natural state.

Proposed Action

If permits are issued, there would be a continued intermittent human presence at Turkey Flat, which may result in an occasional loss of a plant as vehicles and people travel through the area. This impact would not likely result in a Federal trend toward listing of the species or loss of its viability on the forest.

Cumulative Effects

Other reasonably foreseeable actions in the project area include ongoing activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. These openings represent potential habitat for this species. Occasionally, individual plants may be trampled by forest users, but it is unlikely that this affects the success of the species as a whole.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Because of the small diameter of trees being removed (less than 9

inches DBH), no impacts to these plants are expected. A few larger diameter trees would be removed at Turkey Flat, which may create small openings that are suitable for all three species. Because project 10 is being done by hand and only small understory trees are to be removed, little disturbance to these species is expected.

Wildland fire and fire suppression may destroy or damage individuals of this species; however, the presence of these plants in fire-adapted ecosystems suggests that this plant is also likely to be resilient or adapted to fires. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) may have destroyed plants and habitat in areas that burned at high intensity. In more moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improved health of occupied habitat.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire at Turkey Flat, if un-suppressed, could reduce potential habitat for these plant species by 52 acres.

If the recreation residences are removed, vegetation at Turkey Flat would replenish through natural succession, and populations of these species may increase. This would be an additive benefit when considered cumulatively with benefits of other foreseeable activities.

If permits are issued for Turkey Flat, habitat and human disturbance would remain the same. There would be no additive impacts that would result in a trend toward Federal listing or loss of viability of these plant species.

Environmental Consequences, Rusby hawkweed (*Hieracium rusbyi*), Bigelow thoroughwort (*Eupatorium bigelovii*)

These two species occupy high elevation oak-juniper, mixed conifer forest, and aspen-conifer areas (8,000 to 9,500 feet) (AGFD 2004, 2004a). Both have the potential to occur on the Old Columbine tract. Bigelow thoroughwort tends to occupy somewhat rockier and wetter areas (AGFD 2004) than hawkweed, which is generally found in shady areas (AGFD 2004a). Thoroughwort prefers northeast- and southwest-facing slopes (AGFD 2004). Hawkweed seems to be fairly uncommon (AGFD 2004a). Thoroughwort has been documented in at least two sites within the Pinaleño Mountains, although population trends are unknown (AGFD 2004).

No Action

If no action is taken, activities during residence removal may result in a temporary loss of individual plants. However, long-term effects would be positive as the Old Columbine tract returns to a more natural state.

Proposed Action

If permits are issued, there would be a continued intermittent human presence at Old Columbine which may result in an occasional loss of a plant as vehicles and people travel through the area. This impact would not likely result in a Federal trend toward listing of the species or loss of its viability on the forest.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. Ladybug electronic site is on a warm, dry, south-facing slope, and as such, is unlikely to support these species. Occasionally, individual plants at the other sites may be trampled by forest users. It is unlikely that this occurs with such frequency as to affect the viability of these species, because human use occurs primarily in meadows and cleared areas within recreation sites, which do not support hawkweed and thoroughwort.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) is underway in a higher elevation than these species are likely to be found, with the exception of a small treatment area near Shannon Campground. Because all work there is being done by hand, and only small understory trees are to be removed, it is likely that there has been or will be little disturbance to these species.

Wildland fire and fire suppression may destroy or damage individuals of these species; however, the presence of these plants in fire-adapted ecosystems suggests that these species are likely to be resilient or adapted to fires. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) may have destroyed plants and habitat in areas that burned at high intensity. In more moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improved health of occupied habitat.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire at Old Columbine, if un-suppressed, could reduce potential habitat for these plant species by 25 acres.

If the recreation residences are removed, vegetation at Old Columbine would replenish through natural succession, and populations of these species may increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued for Old Columbine, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a trend toward Federal listing or loss of viability of these plant species.

Environmental Consequences, White-flowered Cinquefoil (*Potentilla albiflora*)

This species occupies rocky slopes and open coniferous forest, from 7,500 to 9,500 feet in elevation (Kearney and Peebles 1960). This plant may occur on both tracts.

No Action

If no action is taken, activities during residence removal may result in a temporary loss of individual plants. However, long-term effects would be positive, as the tracts return to a more natural state.

Proposed Action

If permits are issued, there would be a continued intermittent human presence on the tracts, which may result in occasional loss of a plant as vehicles and people travel through the area. This impact would not likely result in a Federal trend toward listing of the species or loss of its viability on the forest.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. This species occurs at most of these sites, primarily in the forest edges around developed areas. Occasionally, individual plants may be trampled by forest users. It is unlikely that this occurs with such frequency as to affect the viability of the species, because human use occurs primarily in meadows and cleared areas within recreation sites, which likely do not support cinquefoil in significant numbers.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Because all work for project 10 is being done by hand and only small understory trees are to be removed, it is likely that populations of cinquefoil would be affected, with the exception of occasional trampling of individual plants. A few larger diameter trees would be removed at Turkey Flat, which may create openings that are suitable for cinquefoil.

Wildland fire and fire suppression may lead to damage to individuals of this species; however, the presence of these plants in fire-adapted ecosystems suggests that this plant is also likely to be resilient or adapted to fires. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) may have destroyed plants and habitat in areas that burned at high intensity. In more moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improved health of occupied habitat.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire at both tracts, if unsuppressed, could reduce potential habitat for this plant species by 77 acres.

If the recreation residences are removed, vegetation at the tracts would replenish through natural succession, and populations of these species may increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a trend toward Federal listing or loss of viability of these plant species.

Environmental Consequences, Pinaleño Jacob's Ladder (*Polemonium flavum*)

This plant species inhabits rich, moist soils in coniferous forests between 7,500 and 9,500 feet elevation (Kearney and Peebles 1960) and likely occurs within the Old Columbine tract.

No Action

If no action is taken, activities during residence removal may result in a temporary loss of individual plants. However, long-term effects would be positive as the Old Columbine tract returns to a more natural state.

Proposed Action

If permits are issued, there would be a continued intermittent human presence on the Old Columbine tract, which may result in an occasional loss of a plant as vehicles and people travel through the area. This impact would not likely result in a Federal trend toward listing of the species or loss of its viability on the forest.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. This species likely inhabits most of these sites. Occasionally, individual plants may be trampled by forest users. It is unlikely that this occurs with such frequency as to affect the viability of the species, because human use occurs primarily in meadows and cleared areas within recreation sites, which likely do not support Pinaleño Jacob's ladder in significant numbers.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. Because all work for the PEM project (item 10) is being done by hand, and only small understory trees are to be removed, it is likely that populations of this species would not be adversely affected, with the exception of occasional trampling of individual plants.

Wildland fire and fire suppression may lead to damage to individuals of this species; however, their presence in a fire-adapted ecosystem suggests that this plant is also likely to be resilient or adapted to fires. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) may have destroyed plants and habitat in areas that burned at high intensity. In more moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improved health of occupied habitat.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire at both tracts, if unsuppressed, could reduce potential habitat for this plant species by 25 acres.

If the recreation residences are removed, vegetation at Old Columbine would replenish through natural succession, and populations of these species may increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a trend toward Federal listing or loss of viability of these plant species.

Environmental Consequences, Chihuahuan Stickseed (*Hackelia ursina*)

This plant usually grows in shade on moist, north-facing slopes, in oak-pine woodland forest at elevations from 5,000 to 8,000 feet (AGFD 2000). Its range is limited to Arizona and New Mexico (Kearney and Peebles 1960). No population trends are documented for this species (AGFD 2000). These plants are not common, but could potentially occur within the Turkey Flat tract. At present, the tract provides moist pockets of shade that can be used by this species.

No Action

If no action is taken, activities during residence removal may result in a temporary loss of individual plants. However, long-term effects would be positive as the Turkey Flat tract returns to a more natural state. If the residences are removed, further pockets of shaded areas may form as the area revegetates.

Proposed Action

If permits are issued, there would be a continued intermittent human presence on the Turkey Flat tract, which may result in occasional loss of a plant as vehicles and people travel through the area. This impact would not likely result in a Federal trend toward listing of the species or loss of its viability on the forest.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. Ladybug electronic site is on a warm, dry, south-facing slope, and as such, is unlikely to support plants of this species. Some recreation sites may support individual stickseed plants.

Occasionally, individual plants may be trampled by forest users. It is unlikely that this occurs with such frequency as to affect the viability of the species, because human use occurs primarily in meadows and cleared areas within recreation sites, which likely do not support stickseed populations.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) is ongoing at a higher elevation than this plant is likely to be found, with the exception of a small treatment area near Shannon Campground. Because all work at Shannon was done by hand and only small understory trees were removed, there was little disturbance to stickseed in the area. Some larger diameter trees are to be removed at Turkey Flat, which may create some small openings that are unsuitable for Chihuahuan stickseed.

Wildland fire and fire suppression damage or destroy individuals of this species; however, the presence of these plants in fire-adapted ecosystems suggests that it is likely to be resilient or adapted to fires. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) may have destroyed plants and habitat in areas that burned at high intensity. In

more moderately burned areas, reintroduction of fire as a natural process may promote more sustainable forest conditions and improved health of habitat.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire at Turkey Flat, if unsuppressed, could reduce potential habitat for this plant species by 52 acres.

If the recreation residences are removed, vegetation at Turkey Flat would replenish through natural succession, and populations of the species may increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a trend toward Federal listing or loss of viability of stickseed.

Management Indicator Species

Species Evaluated

The role of management indicator species (MIS) in national forest planning is described in the 1982 implementing regulations for the National Forest Management Act (NFMA) of 1976. These regulations require that certain vertebrate and/or invertebrate species present on a forest be identified as MIS and that they be selected because “their population changes are believed to indicate the effects of management activities” (36 CFR 219.19(a)(1)).

The Forest Service Manual (FSM) defines management indicators as “Plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent.” (FSM 2620.5).

The NFMA regulations identify five categories of species that may be considered, where appropriate, as management indicator species:

- Endangered and threatened plant and animal species identified on State and Federal lists for the area.
- Species with special habitat needs that may be influenced significantly by planned management programs.
- Species commonly hunted, fished or trapped.
- Nongame species of special interest.
- Plant and animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality.

Section 219.19(a)(6) requires that “Population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with State fish and wildlife agencies to the extent practicable.”

Management indicator species and their habitat are monitored to observe trends in resources, evaluate management actions, and provide a timely warning of problems or undesirable

conditions affecting the resource. MIS were selected during the development of the 1986 “Coronado National Forest Land and Resource Management Plan” according to their being either threatened and endangered (TES), requiring special habitat needs, or in high public demand. The analysis of impacts to MIS as part of the NEPA process contributes to the identification of trends, which may necessitate development of mitigation or new alternatives when a proposed action is under consideration.

Table 18 lists the MIS for the Coronado that may occur in the project area and the forest plan indicator group(s) to which it (they) belong(s). The full list of Coronado MIS is available at <http://www.fs.fed.us/r3/projects/2004-cor-misreport.pdf>. An impacts analysis for those species in table 18 follows.

Table 18. Information on management indicator species on the Coronado National Forest, Safford Ranger District

Species	Coronado Forest Plan Indicator Group	Presence Within Recreation Tracts
Cavity Nesters		
Sulphur-bellied flycatcher	Cavity nesters, riparian, needs diversity, special-interest, TES	Occur within analysis area; suitable habitat available.
Primary ¹ and Secondary ² Cavity Nesters	Cavity nesters	Occur within analysis area; suitable habitat available.
Riparian Species		
Sulphur-bellied flycatcher	Cavity nesters, riparian, diversity, special-interest, TES	Occur within analysis area; suitable habitat available.
Black bear	Riparian, diversity, game	Occurs within analysis area; suitable habitat available.
Species Needing Diversity		
White-tailed deer	Diversity, herbaceous cover, game	Occurs within analysis area; suitable habitat available.
Sulphur-bellied flycatcher	Cavity nesters, riparian, diversity, special-interest, TES	Occur within analysis area; suitable habitat available.
Black bear	Riparian, diversity, game	Occurs within analysis area; suitable habitat available.
Species Needing Herbaceous Cover		
White-tailed deer	Diversity, herbaceous cover, game	Occurs within analysis area; suitable habitat available.
Mearn's quail	Herbaceous cover, game, special interest	Occur within analysis area; suitable habitat available.
Species Needing Dense Canopy		None of those listed in the forest plan occur in the analysis area.

Species	Coronado Forest Plan Indicator Group	Presence Within Recreation Tracts
Game Species		
White-tailed deer	Diversity, herbaceous cover, game	Occurs within analysis area; suitable habitat available.
Mearn's quail	Herbaceous cover, game, special interest	Occur within analysis area; suitable habitat available.
Black bear	Riparian, diversity, game	Occurs within analysis area; suitable habitat available.
Special Interest Species		
Mearn's quail	Herbaceous cover, game, special interest	Occur within analysis area; suitable habitat available.
Sulphur-bellied flycatcher	Cavity nesters, riparian, diversity, special-interest, TES	Occur within analysis area; suitable habitat available.
Threatened and Endangered Species		
Peregrine falcon	TES (has since been delisted)	Occur within analysis area; suitable habitat available.
Sulphur-bellied flycatcher	Cavity nesters, riparian, diversity, special-interest, TES	Occur within analysis area; suitable habitat available.
Apache trout	TES	Occurs within analysis area; suitable habitat available
Twin-spotted rattlesnake	TES	Occurs within analysis area; suitable habitat available.
Mt. Graham red squirrel	TES	Occurs within analysis area; suitable habitat available.
Gould's turkey	TES (reintroduced)	Occurs within analysis area; suitable habitat available.

¹ Primary Cavity Nesters: Ladder-backed woodpecker, Arizona woodpecker, northern flicker, Gila woodpecker, acorn woodpecker, hairy woodpecker.

² Secondary Cavity Nesters: American kestrel, elf owl, flammulated owl, whiskered screech owl, western screech owl, Northern pygmy-owl, Mexican spotted owl, elegant trogon, eared trogon, sulphur-bellied flycatcher, brown-crested flycatcher, ash-throated flycatcher, dusky capped flycatcher, Cordilleran flycatcher, violet green swallow, juniper titmouse, bridled titmouse, brown creeper, white-breasted nuthatch, red-breasted nuthatch, pygmy nuthatch, house wren, Bewick's wren, eastern bluebird, European starling, Lucy's warbler.

Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*)

This species occupies mid-elevation riparian areas in Arizona, particularly those with sycamore (*Platanus* spp.), oak (*Quercus* spp.), walnut (*Juglans* spp.), and Arizona cypress (*Cupressus arizonica*) components (Ligon 1971). In these areas, the sulphur-bellied flycatcher forages for

insects, generally catching them in flight or picking them off shrubs and trees. Fruit from vines, mistletoe, and fruiting trees supplement their diet during non-breeding season (Fitzpatrick 1980). Nesting generally occurs at elevations between 3,640 and 7,500 feet (Corman and Wise-Gervais 2005). These flycatchers occupy the forest during breeding season only, which extends from June through September (USDA-FS, 2005).

Forestwide habitat for this species has not been estimated. The global population of sulphur-bellied flycatchers is considered stable, and in Arizona, it is considered common within a restricted range (USDA 2005). It is considered to be a common summer resident in the Pinaleños (Corman and Wise-Gervais 2005).

The Turkey Flat tract occurs within the range of elevations listed for this species, but it does not contain any true riparian zones. Therefore, use of the tract as foraging habitat by the flycatcher is likely to be limited.

The Old Columbine tract lies at the head of the Ash Creek drainage, but it is over 1,500 feet above the elevation range for nesting by this species. Therefore, use of the tract as foraging habitat is likely minimal.

No Action

If no action is taken, the residence tracts would revegetate naturally, as shrubs and grasses replenish areas denuded by structure removal activities. During normal vegetation succession, there would be periods of time that shrubs and vines would be available for the flycatcher. In later stages of natural succession, there would likely be trees, some of which would support mistletoe, which would also provide a food source for this species. During residence removal, foraging flycatchers might experience temporary disturbance and would likely avoid the area. Because of the mobility of this species and the presence of many riparian areas available in the Pinaleño Mountains, use of the residence tracts for foraging would likely be limited. The magnitude of habitat alteration resulting from residence removal would not be expected to change the population trajectory on the forest for this species.

Proposed Action

If permits are issued, the status quo would remain with regard to use of the tracts by this flycatcher, because site use and available habitat would remain the same.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. Because most of these sites have no riparian areas, flycatchers likely make minimal use of them for foraging and/or nesting. The magnitude of habitat alteration and human use of these sites would not be expected to change the population trajectory on the forest for this species.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) and thinning around special-use sites

(item 24) are ongoing in the understory, where trees up to 9 inches DBH are being removed. Because of the small diameter of the trees being removed, it is unlikely that these projects would have a measurable effect on flycatcher foraging habitat in this area. A few larger diameter trees will be removed in the Turkey Flat area, which may decrease habitat for these species by a negligible increment.

Wildland fire and fire suppression may destroy or damage vegetation and habitat; however, fires are known to stimulate insect activity, which may improve flycatcher foraging success. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire) have caused temporary losses of riparian habitat. However, nutrient releases from the fires should stimulate regeneration of trees and other plants that provide habitat and food sources for the flycatcher.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or the proposed action are impossible to quantify. However, in general, damage caused by a wildland fire at Old Columbine if unsuppressed, could reduce potential foraging habitat for this species by 25 acres. This magnitude of habitat alteration would not be expected to change the population trajectory on the forest for this species.

If the recreation residences are removed, vegetation at the tracts would replenish through natural succession, and populations of insect species may increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a change in the population trajectory on the forest for this species.

Primary and Secondary Cavity Nesters

Primary and secondary cavity nesters²³ potentially occur in all plant communities on both tracts. In general, these species require large, older age class trees and snags to provide a suitable substrate for cavities. Most of the Pinaleño Mountains are heavily wooded; thus, available cavities are probably not limited, particularly because of recent fires (Clark Peak Fire, 1996, and Nuttall Complex Fire, 2004) and insect activity (starting in the mid-1990s and ongoing). North American Breeding Bird Survey data for 1980 through 1999 indicate a significant downward trend for the Gila woodpecker and American kestrel. For all other primary or secondary cavity nesters, trends are reported as either not significant, or no data were available (USDI-GS, 2000).

Woody upland vegetation that is widespread on the mountain is expected to continue to mature. Large diameter trees are readily available, and there is a high production of snags, providing potential cavity nest sites as trees grow.

No Action

If no action is taken and residences are removed at either or both tracts, the sites would revegetate naturally, which would eventually provide up to 77 acres of additional wooded habitat. Over 100,000 acres of woody vegetation is currently available for these species. The additional acreage

²³ Primary cavity nesters are those species that excavate and nest in cavities, whereas secondary cavity nesters use cavities excavated by primary cavity nesters.

ultimately available after 50 plus years would be less than 1 percent of existing habitat, a very small but beneficial effect.

Population trends for cavity nesters vary: they show declines for northern flickers and American kestrels, statistically insignificant declines for ash-throated flycatchers and Bewick's wrens, stable trends for elegant trogons and sulphur-bellied flycatchers, and statistically insignificant increases for ladder-backed woodpeckers (USDA-FS, 2005). Given the small size of the project area relative to available habitat forestwide and the continued availability of large numbers of snags in the Pinaleno Mountains, the magnitude of habitat alteration resulting from residence removal would not be expected to change the population trajectory on the forest for this species.

Proposed Action

If permits are issued, the status quo would remain with regard to use of the tracts by primary and secondary cavity nesters, because site use and available habitat would remain the same.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Each is located within a manmade opening in the forest maintained by periodic removal of brush and hazard trees. Removal of hazard trees, which includes some snags that might be used by cavity-nesting species, may have localized impacts on primary cavity nesters. However, because of the widespread availability of snags and forestwide tree mortality and infestations of native and nonnative insects, the small increment of loss would not contribute significantly to cumulative effects.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) and thinning around special use sites (item 24) are ongoing in the understory, where trees up to 9 inches DBH are being removed. Because of the small size of trees being removed, it is unlikely that these projects would have a measurable effect on primary and secondary cavity nester foraging and nesting habitat on the forest. A few larger diameter trees are planned to be removed in the Turkey Flat area, which may decrease habitat for these species by a negligible increment.

Wildland fire and fire suppression may destroy or damage vegetation and habitat; however, fires are known to stimulate insect activity, which may benefit foraging success. Recent fires on the Santa Catalina Ranger District (Aspen and Bullock Fires) and the Nogales District (Florida Fire) have increased the forestwide availability of snags for use by these species.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire on these tracts, if un-suppressed, could reduce potential foraging and nesting habitat for these species by 77 acres. This increment of habitat alteration would not be expected to change the population trajectory on the forest for these species.

If the recreation residences are removed, vegetation at the tracts would replenish through natural succession, and wooded habitat would eventually increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a change in the population trajectory on the forest for these species.

Black Bear (*Ursus americanus*)

The black bear is a wide-ranging habitat generalist that prefers areas of dense cover and high vegetative diversity. Grass is known to be a very important component of the bear’s diet in the spring (April through June). In summer, insects and grubs are added to the diet, and in fall, berries and acorns (Hoffmeister 1956).

Protective cover, such as that which is offered by chaparral and pine-oak woodlands, is also very important to bears, especially that which is in the 6-foot height class (LeCount 1984). Summer habitat use often is centered on riparian areas where water is available. Suitable black bear habitat occurs throughout both tracts, with highest densities expected in steep, brushy canyons at upper elevations. Lower elevation sites in the desert grassland and open woodlands may be used seasonally, but are not considered high quality habitat. There are 641,113 acres of black bear habitat forestwide; the two tracts (77 acres) could reasonably be considered as 0.01 percent of this total.

In general, black bear populations are primarily affected by environmental factors, such as rainfall, and by pressure from human activities, such as hunting and depredation removal (USDA-FS, 2005). Population level trends are difficult, if not impossible to detect. Poor mast crops in the early part of this decade may have led to a decreased carrying capacity for bears on the forest. However, most historically occupied habitat is still utilized by black bears (USDA-FS, 2005).

Hunting in the Pinaleños is managed by AGFD as Management Unit 31; the recent black bear sport harvest has been reported as follows (Personal communication, Duane Aubuchon, AGFD, with Anne Casey, Safford Ranger District, February 12, 2008; and “Coronado National Forest Management Indicator Species Population Status and Trends” (USDA-FS, 2005):

- 1996 7
- 1997 8
- 1998 7
- 1999 27
- 2000 23
- 2001 no data
- 2002 10
- 2003 8
- 2004 5
- 2005 7
- 2006 6

No Action

If no action is taken, the tracts would revegetate naturally, providing additional bear habitat as shrubs and grasses replenish areas denuded by residence removal activities. Grass and shrub

habitat would be available until trees begin to populate the site; they would provide additional acorns (mast) for foraging. During residence removal, bears would experience temporary disturbance and would likely avoid the area. Given the bear's mobility and the wide availability of nearby habitat, these effects would be discountable. In the long term, natural succession would result in an increase in the understory of non-woody species, which may include berry bushes, and eventual growth of oak trees that would increase the mast crop. Overall, these effects would have no measurable impact on the local and forestwide black bear population trajectory.

Proposed Action

If the proposed action is implemented, no change in bear density or abundance is expected. The openings maintained around the recreation residences may have a positive effect in that additional nutrients would be available to surrounding trees, which, in turn, would increase mast crops, particularly in the Turkey Flat area. Intermittent human presence may temporarily disturb bears, who would likely avoid the area. Overall, these effects would have no measurable impact on the local and forestwide black bear population trajectory.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. These sites provide openings that, in many areas, encourage the growth of shrubs, including berry bushes and locust trees that are a food source for black bears. Some human disturbance occurs in these areas; however, black bears continue to be reported near recreation residence tracts and campgrounds. Overall, effects of these sites on black bear habitat and population are negligible.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) and thinning around special use sites (item 24) are ongoing in the understory, where trees up to 9 inches DBH are being removed. Because of the small size of trees being removed and the limited acreage affected, the availability of quail habitat is unlikely to be measurably impacted. Removal of a few larger diameter trees in the Turkey Flat area may stimulate further understory grass, forb, and shrub growth, which would, thus, improve quail foraging habitat, but would not result in a measurable benefit to the local or forestwide population trajectory.

Wildland fire and fire suppression damage and/or destroy overstory trees that provide cover for the black bear. However, fires also stimulate grass and shrub growth by opening the canopy; this provides additional food sources for bear. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Wildland Fire), the Santa Catalina Ranger District (Aspen and Bullock Fires), and the Nogales District (Florida Fire) adversely affected black bear habitat in areas that burned at high intensity. Bears were likely displaced to other habitat on the forest or on adjacent private, state, and BLM lands. Despite this displacement, natural succession after the fires will, in the long term, improve bear habitat as a mosaic of vegetation associations and seral stages progress.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to

quantify. However, in general, damage caused by a wildland fire on these tracts, if unsuppressed, could reduce black bear habitat by 77 acres. This increment of habitat alteration would not be expected to change the population trajectory on the forest for this species.

If the recreation residences are removed, vegetation at the tracts would replenish through natural succession, and bear habitat would eventually increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a change in the population trajectory on the forest for black bear.

White-tailed Deer (*Odocoileus virginianus couesi*)

White-tailed deer use a variety of habitats but prefer areas of thick cover. During the fawning period, these deer rely on hiding cover to maintain fawn survival and recruitment (Ockenfels et al. 1991). Shrubs comprise the majority of a white-tailed deer diet, although forbs are seasonally important.

The white-tailed deer harvest in southern Arizona remained stable from 1990 through 2001, despite a slightly downward statewide trend. Recent fires on the forest were followed by regeneration in shrubs and forbs that benefited this species (USDA-FS, 2005). In addition, 2005 to 2007 represented fairly wet years in terms of monsoon precipitation, and local grasses and forbs grew rapidly in response, providing further food sources for white-tailed deer.

There are 1,430,071 acres of white-tailed deer habitat forestwide; these deer are regularly observed at and near both residence tracts. Thus, the 77 acres of residence tracts could reasonably be considered as white-tailed deer habitat. They comprise less than 0.01 percent of available habitat forestwide. Because of the relatively small size of the project area in relation to the available habitat forestwide, impacts would not contribute significantly to the forestwide population trajectory of white-tailed deer.

Like bear, deer populations are influenced by environmental factors, such as rainfall and its effect on food availability, predation, and pressure from human activities, such as hunting (USDA-FS, 2005). Population changes related to any of the alternatives evaluated in this EIS would be difficult to detect.

No Action

If no action is taken, the tracts would revegetate naturally, providing additional deer habitat as shrubs and grasses replenish areas denuded by residence removal activities. Grass and shrub habitat would be available until trees begin to populate the site and provide additional cover for deer. During residence removal, deer would experience temporary disturbance and would likely avoid the area. Given the deer's mobility and the wide availability of nearby habitat, these effects would be discountable. In the long term, natural succession would increase the understory growth of forbs and shrubs. Overall, these effects would have no measurable impact on the local and forestwide deer population.

Proposed Action

If the proposed action is implemented, no change in deer density or abundance is expected. The openings maintained around the recreation residences could have a positive effect in that they provide additional nutrients that encourage understory growth and higher quality shrub forage. Intermittent human presence may temporarily disturb deer, who would likely avoid the area. Overall, these effects would have no measurable impact on the local and forestwide trajectory of the white-tailed deer population.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. These sites provide openings that, in many areas, encourage the growth of grasses, forbs, and shrubs, including berry bushes and locust trees that are a food source for deer. Some human disturbance occurs in these areas; however, deer continue to be reported near recreation residence tracts and campgrounds. Overall, beneficial and adverse effects on forestwide white-tailed deer habitat and population are negligible.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) and thinning around special use sites (item 24) are ongoing in the understory, where trees up to 9 inches DBH are being removed. Because of the small size of trees being removed and the limited acreage affected, the availability of quail habitat is unlikely to be measurably impacted. Removal of a few larger diameter trees in the Turkey Flat area may stimulate further understory grass, forb, and shrub growth, which would, thus, improve quail foraging habitat, but would not result in a measurable benefit to the local or forestwide population trajectory.

Wildland fire and fire suppression damage and/or destroy overstory trees that provide cover for deer. However, fires also stimulate grass, forb and shrub growth by opening the canopy; this provides additional food sources for the species. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire), the Santa Catalina Ranger District (Aspen and Bullock Fires), and the Nogales District (Florida Fire) adversely affected deer habitat in areas that burned at high intensity. Deer were likely displaced to other habitat on the forest or on adjacent private, state, and BLM lands. Despite this displacement, natural succession after the fires will, in the long term, improve deer habitat as a mosaic of vegetation associations and seral stages progress.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire on these tracts, if un-suppressed, could temporarily reduce deer habitat by 77 acres. This increment of habitat alteration would not be expected to change the population trajectory on the forest for this species.

If the recreation residences are removed, vegetation at the tracts would replenish through natural succession, and deer habitat would eventually increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a change in the population trajectory on the forest for white-tailed deer.

Mearn's Quail (*Cyrtonyx montezumae mearnsi*)

Mearn's quail occupy a wide variety of vegetation associations, including desertscrub, grasslands, chaparral, broadleaf evergreen woodlands, coniferous woodlands, and riparian areas (USDA-FS, 2005). They have also been known to use areas of aspen (*Populus* spp.). Roosting and foraging sites generally have high total cover of grasses (49 to 54 percent). Diet consists mainly of acorns (*Quercus* spp.) and underground tubers (wood sorrel (*Oxalis* spp.), sedges (*Cyperus* spp.)); an insect component becomes important during the summer months (Stromberg 2000).

Forestwide, the population of Mearn's quail shows no clear trend, but AGFD harvest data indicate that harvest levels remain approximately the same as when this species was selected as an MIS in 1986. There are 225,410 acres of Mearn's quail habitat forestwide (USDA 2005). The Pinaleño Mountains are not considered among the highest density areas for Mearn's quail (USDA-FS, 2005). The 77 acres of recreation residence tracts are 0.03 percent of available forestwide habitat. Because of the small size of the project area relative to this, impacts of any alternatives evaluated in this EIS would not measurably affect forestwide populations of Mearn's quail.

No Action

If no action is taken, the tracts would revegetate naturally, providing additional habitat as shrubs, grasses, and forbs replenish areas denuded by residence removal activities. It is likely that this stage of succession would allow for increased insect populations, which would also provide additional food sources for Mearn's quail. Additional grass and shrub habitat would be available until succession progresses to a later stage with the growth of trees, which would provide additional food sources and cover for quail. During residence removal, quail might experience temporary disturbance and would likely avoid the area. Because of the mobility of this species and the amount of habitat available forestwide, negative impacts of no action on the population trajectory of Mearn's quail would be discountable. However, effects would be of benefit in the long term, because of an increase in understory growth of forbs and shrubs.

Proposed Action

If the proposed action is implemented, no change in quail density or abundance is expected. Openings maintained around recreation residences may provide additional nutrients and encourage understory growth in the surrounding area. However, human presence may cause temporary disturbance to quail when residences are occupied. Overall, these effects would have no measurable impact on the local and forestwide Mearn's quail population trajectory.

Cumulative Effects

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. These sites provide openings that, in many areas, encourage the growth of grasses, forbs, and shrubs that are a food source for quail. Intermittent human disturbance on the

tracts may cause quail to avoid the area. Overall, the beneficial and adverse effects of activities in these areas on forestwide quail habitat and population are negligible.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The PEM project (item 10) and thinning around special use sites (item 24) are ongoing in the understory, where trees up to 9 inches DBH are being removed. Because of the small size of trees being removed and the limited acreage affected, the availability of quail habitat is unlikely to be measurably impacted. Removal of a few larger diameter trees in the Turkey Flat area may stimulate further understory grass, forb, and shrub growth, which would, thus, improve quail foraging habitat, but would not result in a measurable benefit to the local or forestwide population trajectory.

Wildland fire and fire suppression damage and/or destroy overstory trees that provide cover for quail. However, fires also stimulate grass, forb and shrub growth by opening the canopy; this provides additional food sources for the species. Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Fire), the Santa Catalina Ranger District (Aspen and Bullock Fires), and the Nogales District (Florida Fire) adversely affected quail habitat in areas that burned at high intensity. Individuals were likely displaced to other habitat on the forest or on adjacent private, state, and BLM lands. Despite this displacement, natural succession after the fires will, in the long term, improve foraging habitat as a mosaic of vegetation associations and seral stages progress.

Because fire is a randomly occurring event of unpredictable intensity and duration, the additive effects that it might have in combination with the no action or proposed action are impossible to quantify. However, in general, damage caused by a wildland fire on these tracts, if un-suppressed, could temporarily reduce quail habitat by 77 acres. This small increment of habitat alteration would not be expected to change the population trajectory on the forest for this species.

If the recreation residences are removed, vegetation at the tracts would replenish through natural succession, and quail habitat would eventually increase. This would be an additive benefit when considered cumulatively with the impacts of other foreseeable activities.

If the permits are issued, habitat and human disturbance would remain the same. There would be no additive impacts with other actions that would result in a change in the population trajectory on the forest for Mearn's quail.

Peregrine Falcon (*Falco peregrinus anatum*)

The peregrine falcon is both a FSS and a MIS. A species and habitat description and an assessment of potential impacts from no action and the proposed action, including cumulative effects, were provided in the discussion of FSS earlier in this EIS. There is no estimate of forestwide habitat available for this species, however, surveys indicate that the forestwide population has been increasing since 1986 (USDA 2005).

Based on the impacts analysis reported in the FSS discussion, neither no action nor the action alternatives would have a measurable effect on the forestwide population trajectory of the peregrine falcon.

Apache trout (*Oncorhynchus apache*)

A species and habitat description and an assessment of potential impacts from no action and the action alternatives, including cumulative effects, were provided in the discussion of TES earlier in this EIS. There are 19.6 miles of Apache trout habitat forestwide. However, this habitat is considered unsuitable for contributing to species recovery efforts because of the potential for genetic contamination with other salmonid species.

The Old Columbine tract lies at the headwaters of Ash Creek, which supports trout more than 3 miles downstream of the tract. There is no available trend data for this species, but based on AGFD survey activities in the late 1980s and the 1990s, all historical habitats are occupied (USDA 2005). There are no trout streams on or downstream of Turkey Flat.

Based on the impacts analysis reported in the TES discussion, no action and all action alternatives would not have individual or cumulative measurable effects on the forestwide population trajectory of Apache trout.

Twin-spotted Rattlesnake (*Crotalus pricei pricei*)

This rattlesnake is locally common on talus slopes in ponderosa pine, aspen, and mixed conifer, generally above 8,000 feet in elevation. It eats lizards and small mammals, and breeding occurs from late June through August. Habitats for this species are relatively secure on the Coronado NF. The greatest threat to the species appears to be illegal collecting (USDA 2005). Recent research efforts have indicated that historic habitat in the Pinaleño Mountains remains occupied.

There are 46,351 acres of twin-spotted rattlesnake habitat forestwide, and this snake is considered fairly common within a restricted range (USDA 2005). The 77 acres comprising the recreation residence tracts are not considered twin-spotted rattlesnake habitat, because no talus slopes fall within their boundaries. Because of this, no impacts are expected from no action or the action alternatives, and there would be no changes in the trajectory of forestwide populations of twin-spotted rattlesnakes.

Other reasonably foreseeable actions in the project area include activities at the Arizona Bible Camp, astrophysical site, Heliograph and Ladybug electronic sites, recreation sites, and administrative sites. Of these sites, only the Heliograph electronic site occurs directly adjacent to an area with a talus slope. This talus slope was at one time under the canopy cover of mixed conifer forest, but high-intensity fire burned the north side of the slope during the Nuttall Complex Fire of 2004, essentially clearing the overstory and leaving many large snags scattered across the area. The area has since become stabilized with some grasses growing among the talus, and some small patches are starting to become populated with aspen saplings. Thus, it is unlikely that there are twin-spotted rattlesnakes at the Heliograph site that could be affected by human presence.

Three thinning projects (see table 2, items 10, 11, and 24) are currently in the planning or implementation stages in the mountain range. These projects have a combined objective of restoring the vegetation component of the forest to a condition wherein fire will play a natural role in ecological processes. The areas of the PEM project (item 10) and special-use project (item 24) do not contain talus slopes, so their activities would not affect twin-spotted rattlesnakes. The PERP project boundary encompasses areas of talus, but because talus slopes are generally steep (more than 40 percent slope), treatments would not be undertaken there. Thus, it is unlikely that

thinning projects would have a measurable impact on the forestwide population trajectory of the twin-spotted rattlesnake.

Recent wildland fires on the Safford Ranger District (Clark Peak Fire and Nuttall Complex Wildland Fire), the Santa Catalina Ranger District (Aspen and Bullock Fires), and the Nogales District (Florida Fire) reduced forestwide habitat for this rattlesnake in areas that burned at high intensity. Ongoing research indicates that historical habitats in the Pinalaños are still occupied by this snake; therefore, it is unlikely that Safford district fires have contributed adversely to a decline in the forestwide population.

There is no habitat for the rattlesnake on the residence tracts. Therefore, wildland fire in the tracts would not change the population trajectory on the forest for this species.

There is no habitat for the rattlesnake on the residence tracts. Therefore, implementation of the no action or the action alternatives in combination with the effects of other reasonably foreseeable actions would not change the population trajectory on the forest for the twin-spotted rattlesnake.

Mount Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*)

A species and habitat description and an assessment of potential impacts from no action and the action alternatives, including cumulative effects, were provided in the discussion of the federally endangered MGRS earlier in this EIS.

Past estimates of red squirrel habitat on Mt. Graham reported that approximately 11,700 acres of coniferous forest were occupied (FWS 1992, FWS 1999). More recent studies by the AGFD indicate that approximately 16,680 acres of “potentially suitable” habitat occurs above 7,750 feet elevation (Hatten 2000). The most recent estimate of total suitable MGRS habitat on Mt. Graham was also provided by Hatten (2000), who reported that as much as 27,181 acres on Mt. Graham may be suitable MGRS habitat and that only a portion of this is presently occupied.

The 25-acre Old Columbine tract is suitable habitat for the MGRS. Recent (2006) surveys²⁴ reported no middens within the tract, and two active middens outside the tract, the closest being 15 feet from an outhouse near one of the residences.

The 52-acre Turkey Flat tract is lower in elevation and drier than Old Columbine because of its southern aspect; it is not considered to be prime MGRS habitat. Nevertheless, during a 2006 survey midden was observed within 500 feet away from a water tank that serves the residences. For this analysis, both tracts were considered to be red squirrel habitat. When considered relative to Hatten’s estimate, the tracts comprise between 0.3 to 0.5 percent of “potentially suitable” habitat that is available forestwide.

No Action

If no action is taken, temporary disturbance by humans and vehicles during removal of improvements may disturb the squirrel, but in the long term, the tracts would experience natural succession that would in 50 to 100 years become red squirrel habitat. As a result, a slight increase in potential squirrel habitat of up to 77 acres (between 0.3 to 0.5 percent of present forestwide habitat) would be realized. This is a very small increment and is not likely to contribute significantly to a change in the forestwide population trajectory of the MGRS.

²⁴ Field visit by Anne Casey, Safford district biologist, and Ms. Thetis Gamberg, FWS.

Proposed Action

The area around the Old Columbine recreation residences has long been occupied by the MGRS despite the presence of residences and humans. While human disturbance would continue with permit renewal, the acreage of habitat available to the species would not change. The recent biological opinion issued by the FWS regarding potential impacts to the endangered MGRS concurred with the Forest Service assessment that the proposed action “may affect, and is likely to adversely affect” the MGRS (USDA 2007). The BO reported that an incidental “take” of two squirrels may occur if the proposed action is implemented. Such a loss would not contribute significantly to the forestwide population trajectory of the squirrel.

Cumulative Effects

Cumulative effects of other reasonably foreseeable actions were reported earlier in this EIS in the TES discussion. Based on the analysis, no action and the action alternatives would not have a measurable effect on the forestwide population trajectory of the MGRS.

Gould’s Turkey (*Meleagris gallopavo mexicana*)

Gould’s turkey is listed as both a FSS and MIS. A description of the species and habitat and an assessment of impacts are provided in the FSS discussion above.

There is no estimate of acres of available habitat forestwide, but this species also occurs in the Huachuca, Peloncillo, and Galiuro Mountains of the Coronado NF (USDA 2005). Since reintroductions in specific locations in the Pinaleños in 2004 and 2005, turkeys have increased in number and spread to all areas of the mountains (Safford Ranger District Sighting Information, unpublished data).

The 77 acres comprising both tracts could reasonably be considered turkey habitat; turkeys are regularly seen in and around the Old Columbine area. Gould’s turkey habitat available within the Pinaleño Mountains is about 198,400 acres, which includes areas of spruce-fir forest, mixed conifer forest, pine-oak woodlands, chaparral areas, and desert grasslands; recent sightings have been reported in all of these vegetation associations (Safford Ranger District Sighting Information, unpublished data). The 77 acres of the two tracts comprises less than 0.04 percent of locally available turkey habitat.

No Action

If no action is taken, the tracts would revegetate naturally, providing additional habitat as shrubs, grasses, and forbs replenish areas denuded by removal activities. It is likely that this stage of succession would allow for increased insect populations, which would also provide additional food sources for Gould’s turkeys. Additional grass and shrub habitat would be available until succession progresses to a later stage, allowing the growth of trees, which could also provide additional food sources and roosting sites for turkeys.

During residence removal, turkeys may be temporarily disturbed by human presence and noise and would likely avoid the area. However, they would benefit in the long term, because of an increase in understory growth of forbs and shrubs. In the short term, habitat alteration on the tracts may disturb the turkey, but in the long term, natural succession would result in an incrementally small net local increase (0.04 percent) in turkey habitat. This change would not alter the Gould’ turkey population trend either locally in the Pinaleños or forestwide.

Proposed Action

If the proposed action is implemented, no change in turkey density or abundance is expected. Openings maintained around recreation residences may provide additional nutrients and encourage understory growth in the surrounding area. However, human presence may cause temporary disturbance to turkeys when residences are occupied.

These changes would have a negligible impact on turkey populations locally and forestwide.

Cumulative Effects

Cumulative effects of other reasonably foreseeable actions on Gould's turkey were reported earlier in this EIS in the FSS discussion. Based on the analysis, no action and the action alternatives would not have a measurable effect on the forestwide population trajectory of the turkey.

Fire Management

Prescribed fire application for the management of fuels, use of wildland fire (natural ignitions) for resource improvement and fuel reduction, fire suppression, and public and firefighter safety are all affected by the presence of the recreation residences and other human-made structures on the district.

Many ecosystems depend on fire for their composition and health. Fire, ranging from low-intensity to high intensity, from frequent intervals to infrequent intervals, is an important natural process in forest, brush, and prairie environments. Some ecosystems, like open ponderosa pine stands, depend on frequent lower intensity fires in cycles of 5 to 25 years (Danter 2008). Other ecosystems, such as chaparral (Manzanita/scrub oak), depend on periodic higher intensity fires with intervals of 15 to 20 years (Danter 2008). In mixed conifer regimes, fire tends to occur less frequently with higher intensity. Yet each fire scenario is important in maintaining those ecosystems. When natural processes or aggressive fire suppression removes periodic fire from fire-dependent environments, rapid changes in species density, composition and structure can occur, leading to overcrowding, decline in species health, and possible insect and disease outbreak. Concurrently, fuels continue to build up contributing to unwanted catastrophic wildfire.

The Forest Service seeks to improve overall forest health and lessen the risk of catastrophic, destructive wildland fires by working to bring the forests closer to historic, ecological conditions. It also realizes that human values and structures usually warrant protection and mitigation from possible devastating effects of a catastrophic wildland fire. Whether through natural ignitions or prescribed fire applications, both low and high intensity fires can be beneficial to help achieve these goals of protecting human resources while restoring a healthier ecological condition. Prior to European settlement, Southwestern ponderosa pine forests had far fewer trees than today and had frequent, low-intensity surface fires. To the Western Apaches, restoration of the fire-adapted ecosystem in the Pinalenos is important in protecting *Dzil Nchaa Si'an*, their sacred mountain and TCP.

Regulatory Framework

The "Coronado National Forest Fire Management Plan" (USDA-FS, 2006a) documents the various strategies used to determine the appropriate management response (AMR) to wildland

fires as well as strategies for managing the burnable vegetation (fuel) in the management areas identified in the forest plan; fire management units (FMUs); fire management analysis zones (FMZs); and ecosystem management areas (EMAs).

The National Fire Plan addresses approaches for accomplishing hazardous fuel reduction and for assisting communities that have been or may be threatened by wildland fire, and Federal Wildland Fire Management Policy states that the protection of human life is the single overriding suppression priority. Fires are suppressed at minimum cost, considering firefighter and public safety, and all values to be protected, consistent with resource objectives.

Fire Management Analysis Zones

The Coronado NF is presently divided into planning units, referred to as fire management analysis zones (FMZs), which are grouped according to common fire management direction and fire behavior characteristics. These include:

- FMZ AA: This zone occurs at high elevations having high resource value. Seventy-five percent of the Pinaleno Mountains EMA lies in this zone. Vegetation in this zone includes mixed conifer, ponderosa pine, and oak woodland communities. The high resource values of this zone are linked to the presence of recreation residence tracts, private land and structures, multiple high use recreation areas, threatened and endangered species, and astrophysical sites.
- FMZ BB: This zone occurs at low elevations having low resource values. Twenty-five percent of the Pinaleno EMA is in this zone.
- FMZ CC: This zone occurs at low elevations having high resource values. There are no FMZ CC zones in the project area.

FMZ AA and BB zones are of great value to the Western Apache Tribe and San Carlos Apache Tribe, as both comprise *Dzil Nchass Si'an*, a TCP and sacred site.

Fire Suppression Considerations

Over an analysis period from 1985 to 1996, FMZ AA has experienced the highest percentage of natural (lightning) and human origin (62 percent). Both tracts were threatened by recent wildland fires in their immediate vicinity, the most recent in 2004 (the Nuttall Fire) and the other within the last decade (Clark Peak Fire, 1996).

Affected Environment

Vegetation in the Old Columbine tract is primarily mixed conifer with a considerable amount of intermixed spruce. Some of these stands have been previously thinned. This tract sits at the top of the drainage, which makes it vulnerable to wildland fire because of the high potential for uphill runs.

In the Turkey Flat area, the lower elevation stand is a pine-oak mix, and the upper elevation is a drier mixed conifer with small amounts of spruce intermixed. This area has a very heavy fuel loading, which could promote extreme fire behavior. This tract sits approximately mid-slope of the drainage, which places the structures in the worst part of the canyon for fire protection.

In both tracts, the potential for extreme fire behavior is high because of ongoing drought conditions, high winds, low humidity, and steep slopes. Inside the tract boundaries, the vegetation (trees and brush) and ground debris (pine needles and sticks) would be intermixed with any burnable material, including structures and contents, vehicles, propane tanks, wood piles, and outdoor furniture.

The fire regime condition class (FRCC)²⁵ for these areas is class 3, which indicates that the fire regime has been substantially altered from its natural (historical) range (Hahn et al., 2003). The natural range or reference condition is a close approximation of what the regime would have been prior to Euro-American settlement in the area. The natural range is preferable for ecosystem restoration and the integrity of the Western Apache TCP and sacred site.

Fire regime condition classes measure the degree of an ecosystem's departure from reference conditions. The three fire regime condition classes are based on no or low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the reference conditions (Hann et al., 2003). This departure is identified by changes in key ecosystem components, such as vegetation characteristics (species composition, structural stage, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances, such as insect and disease mortality, grazing, and drought. Possible causes of this departure include, but are not limited to, fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, and introduced insects and disease (Schmidt et al., 2002). All departures from natural conditions and their causes are considered by the Western Apache to adversely affect the integrity of the *Dzil Ncha Sian* TCP and sacred site.

The Turkey Flat tract is situated in the interior of a canyon, and the fuels in the area can best be described as both fuel model 2 (ponderosa pine with a grass understory as the primary carrier of fire) and fuel model 9 (ponderosa pine with needle cast as the primary carrier) (Anderson, 1982). The Old Columbine tract is located at the top (head) of the canyon as the slope starts to level out. This area is located in an area that transitions from fuel models 2 and 9, into fuel model 10 (mixed conifer with heavy dead and down ground fuels) which burns at a much higher intensity due to the heavier concentration of ground fuels (Anderson, 1982).

Environmental Consequences

Direct and Indirect Effects, Old Columbine

No Action

This area is especially vulnerable to wildland fire because of its location at the top of Ash Creek. Fires in or near Ash Creek have the potential to run up-canyon, creating extreme fire behavior and threatening the recreation residences. In the Old Columbine tract, a considerable amount of fuel thinning was done during the Nuttall Fire of 2004.

²⁵ A fire regime condition class (FRCC) is a classification of the degree of departure from the natural (historic) regime. There are no wildland vegetation and fuel conditions or wildland fire situations that do not fit within one of the three classes (<http://www.nwgc.gov/teams/wfewt/message/FrccDefinitions.pdf>).

If the residences are removed, costly thinning (\$1,000 per acre plus) would not need to be repeated to maintain a defensible space²⁶. Also, future structure protection would not be necessary, and expenditure of funds for such would significantly decline.

Using the latest wildland fire situation analysis (WFSA) to calculate suppression costs, the daily costs for initial attack would average \$60,000 to \$100,000 per day and extended attack would average \$100,000 to \$150,000+ per day depending on time of year and current conditions in the tracts. In the future, cost savings would be realized for possible redirection to additional thinning and suppression in other areas, such as Forest Service facilities, the Arizona Bible Camp, telescopes, and other facilities that remain.

Additionally, with the structures gone, wildland fire use and prescribed fire would be easier to implement as management tools to improve the FRCC, and improving the FRCC would help restore the natural ecosystem, which would benefit the ecosystem of the Western Apache TCP.

Proposed Action

If new permits are issued, the need for Forest Service fuel thinning projects and fire suppression would continue. This would require the dedication of taxpayer funds for firefighting and would continue to present a risk of damage to firefighting equipment and injury or death to firefighting crews. The return of a natural fire cycle of low-intensity fires would be impeded. Restoration of the natural ecosystem of the Western Apache TCP and sacred site would be delayed for another 20+ years.

Issue Turkey Flat Only

See impacts under alternative 1 for Old Columbine and alternative 2 for Turkey Flat.

Issue Old Columbine Only

See impacts under alternative 1 for Turkey Flat and alternative 2 for Old Columbine.

Direct and Indirect Effects, Turkey Flat

No Action

Fuel reduction projects are currently being implemented to aid in the protection of structures and alter fire behavior. If the structures are removed after the expiration of the 10-year closeout permit, these projects would no longer need to be repeated. Savings in human resources and funds could be utilized for other wildland-urban interface projects on the district or forest.

With the structures removed, the opportunity for fire managers to apply a wildland fire use strategy would increase, and the decreased cost of firefighting to protect the structures would approach \$60,000 to \$150,000 per day. Furthermore, the need for complex mitigation measures would be eliminated. During wildland fire events, firefighting resources would be able to retreat to the road to construct a fire break rather than providing expensive structure protection in an area with poor access and egress, which compromises public and firefighter safety. In all cases, the exposure to firefighters would be greatly reduced.

²⁶ Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildland fire toward the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space is an area where flame lengths and fire intensity are reduced enough to allow firefighters to contain the spread of wildland fire.

Additionally, with the structures gone, wildland fire use and prescribed fire would be easier to implement as management tools to improve the FRCC, and improving the FRCC would help restore the natural ecosystem, which would benefit the ecosystem of the Western Apache TCP.

Proposed Action

If new permits are issued, the need for Forest Service fuel thinning projects and fire suppression would continue. Taxpayer revenue would continue to support fire suppression. The risk of damage to firefighting equipment and injury or death to firefighting crews would continue. The return of a natural fire cycle of low-intensity fires and restoration of the natural ecosystem of the Western Apache TCP and sacred site would be delayed for another 20+ years.

Issue Turkey Flat Only

See impacts under alternative 1 for Old Columbine and alternative 2 for Turkey Flat.

Issue Old Columbine Only

See impacts under alternatives 1 for Turkey Flat and alternative 2 for Old Columbine.

Cumulative Effects

No Action

The cumulative effect of removing the recreation residences, in conjunction with adjacent acres burned by recent large fires and the adjacent past and future fuel reduction projects, would be to promote more options for wildland fire management (i.e., wildland fire use and large prescribed burns) across the entire Pinaleño EMA. This, in turn, would expedite the improvement of the FRCC (Hahn et al., 2003) for the analysis area. Allowing naturally ignited fires with low to moderate fire behavior to burn would improve the composition of vegetation communities and encourage the succession of a more fire tolerant landscape. A fire tolerant landscape would burn with less intensity, and there would be little or no damage to old growth trees. Further, the fire-tolerant landscape would be in harmony with the ecosystem restoration regarded by the Western Apaches as essential to protecting their TCP and sacred site.

Proposed Action

Issuing new permits for the old Columbine and Turkey Flat tract would have a cumulative effect of reducing the ability of fire managers to use natural wildland fire and prescribed fire for ecosystem restoration or resource management purposes because of their potential threat to property. Smaller, more expensive fuel reduction projects would continue to be necessary for these tracts as well as all other structures on the mountain. This alternative would limit the options for improving the FRCC and restoring the Western Apache TCP and sacred site. In addition, there would continue to be a risk of fires igniting in recreation residence tracts and spreading into the forest. The Forest Service could exercise its authority to close the forest or limit use of recreation residence tracts during peak fire danger periods. The present use of risk-benefit analysis as part of wildland fire suppression would continue; firefighter safety would continue to be held above all risk to protect property.

Issue Turkey Flat Only

See impacts under alternative 1 for Old Columbine and alternative 2 for Turkey Flat.

Issue Old Columbine Only

See impacts under alternatives 1 for Turkey Flat and alternative 2 for Old Columbine.

Unavoidable Adverse Effects

Unavoidable adverse impacts of the proposed action are those that occur when:

- There are no reasonably practicable mitigation measures to avoid or minimize adverse impacts.
- There are no reasonable alternatives to the proposed action that satisfy the purpose of and need for the action, eliminate the impact(s), and/or in themselves, do not result in other or similar adverse impacts.

In essence, unavoidable adverse impacts on natural and human resources are those that would exist after project implementation, even after mitigation measures have been applied.

The proposed action of reissuing permits for the recreation residences on the Safford Ranger District would not result in any unavoidable adverse impacts to the various resources evaluated in this EIS.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments result in the absolute loss of a resource, such as the extinction of a species or the removal of a mineral or an ore from the earth. Irretrievable commitments are those that are lost for a limited period of time, such as the decrease in timber productivity of forested areas that are cleared for use as a power line right-of-way or road. An irreversible commitment is one that lasts forever; an irretrievable commitment is one that constrains the production or use of a renewable resource for a short to medium period of time (i.e., several or many years).

There will be no irreversible commitments of resources from any of the alternatives or actions analyzed in this EIS. Implementation of the proposed action would continue recreational use of the tracts for a minimum of 20 years, which is an irretrievable commitment that would delay natural succession and the eventual full restoration of the tracts to historic forest conditions.

