CHAPTER 3. ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential effects of the Proposed Action on air quality; biological and cultural resources; recreation; soils, hydrology, and water quality; vegetation, fire and fuels; and visual quality. In addition, the potential changes to those environments that would result from implementation of the alternatives are evaluated.

Air Quality

Description of Existing Conditions

The federal government and the State of California have each established ambient air quality standards for several criteria air pollutants. Ambient air quality data are routinely gathered and reported by the California Air Resources Board. The air quality monitoring stations nearest the Quail project area are Echo Summit, South Lake Tahoe (Sandy Way), and Tahoe City (Lake Forest Road). The project area has good air quality that rarely violates state or federal ambient standards.

Ozone

The Lake Tahoe region of Placer and El Dorado Counties is designated as an unclassified/attainment area for all ozone standards. Since 1995, there have been 2 days that exceeded state ozone standards and 1 day that exceeded the national 8-hour ozone standard at the Sandy Way station. At Echo Summit, there were 2 days that exceeded state ozone standards (California Air Resources Board 2004).

Particulate Matter

The Lake Tahoe region of Placer and El Dorado Counties is designated as an unclassified/attainment area for particulate matter less than 10 microns in diameter (PM10). The only exceedances of the state PM10 standard have occurred at the Sandy Way station, where the standard has been exceeded approximately 37 days since 1995 (California Air Resources Board 2004). No data are currently available for PM2.5 concentrations from monitoring stations in the Lake Tahoe Basin.

Carbon Monoxide

The Lake Tahoe region was a non-attainment area for carbon monoxide (CO) from 1992 until 1997. In 1998 the area was redesignated as an attainment area for CO (California Air Resources Board 2004). As of November 2004, the Environmental Protection Agency has designated the Lake Tahoe Region is designated as an unclassified maintenance area (U.S. Environmental Protection Agency 2004).

Environmental Consequences

No-Action Alternative

The No-Action Alternative would result in no exhaust or smoke emissions being generated during implementation. Smoke production was modeled on the basis of a scenario of a wildfire occurring in 2005 using the Fire and Fuels Extension of the Forest Vegetation Simulator (FFEFVS) (Reinhardt and Crookston 2003) (Table 3-1; see also Table B-4 in Appendix B). On average, wildfires in treatment stands would burn as passive crown fires in 2005 rather than as stand-replacing active crown fires. In 2005, 15 stands would burn as passive crown fires, five would burn as surface fires, and one would burn as a conditional crown fire. However, the probability of a crown fire would increase over time as fuels continue to accumulate. By 2025 the average treatment stand would be expected to experience a conditional crown fire, resulting in greater emissions than current conditions would entail (Table B-4).

Proposed Action

The potential direct, indirect, and cumulative effects on air quality of the Proposed Action are expected to be minor and would be minimized by implementation of county-specific Smoke Management Plans. The Proposed Action would result in a direct effect on air quality in the project vicinity as a result of smoke generated from burning piles and the prescribed burning of slash and other downed woody debris. Exhaust and fugitive dust emissions generated by equipment and power tools used in vegetation treatments could also result in direct effects.

Smoke Effects

Potential smoke-related emissions from wildfires under both the Proposed Action and the No-Action Alternative with wildfire in 2005 are summarized in Table 3-1. Smoke emissions from a passive crown fire (which would remove a greater amount of understory biomass than the Proposed Action) in 2005 would be greater than those predicted as a result of burning thinned materials in 2006. Emissions resulting from prescribed underburning of stands 5 years after thinning operations would be greater in

mechanically thinned stands than in hand-treated stands, because residual chipped material in the mechanically thinned stands would be burned during underburning operations, whereas thinned materials piled during hand treatments would be burned 1 year after thinning operations. Because the probability of crown fire increases over time, and because understory fuels would continue to accrue, the emissions from a wildfire in 2010 if no treatment is undertaken would be expected to exceed the total emissions under the combination of pile burning in 2006 and prescribed underburning in 2010.

The Proposed Action would have minor adverse effects on air quality as a result of prescribed burning; however, the Proposed Action is expected to result in long-term benefits to air quality throughout the Basin because of decreased smoke emissions generated during uncontrolled wildfire events. The expected smoke emissions generated by prescribed burning as described in the Burn Plan are expected to be at least one-third less than those generated by an uncontrolled wildfire event if no fuel reduction actions are taken.

Table 3-1. Predicted Smoke Production from Wildfire and Prescribed Burns following Hand and Mechanical Treatments

Wildfire[1]		Hand Treatment			Mechanical Treatment		
Smoke (Particulate Tons/ac)		Burn Type[2]	Smoke (Particulate Tons/ac)		Burn Type[2]	Smoke (Particulate Tons/ac)	
PM2.5	PM10		PM2.5	PM10		PM2.5	PM10
0.40	0.47	Pile burn[3]	0.26	0.31	Underburn	0.29	0.34
		Underburn	0.20	0.24			

[1] Wildfire in 2005 without treatment (assumes the average stand would experience a passive crown fire)
[2] Burn Type: Pile burning in 2006 and underburning in 2010
[3] Assuming 80% of thinned fuels from 70% of the stand were concentrated into piles covering 10% of the stand area (see Reinhardt and Crookston 2003 for additional details)

Exhaust Emissions

The Proposed Action would affect air quality through the generation of exhaust emissions from equipment and power tools, such as a cut-to-length processor and forwarder, a chipper or masticator mounted on an excavator base, and chainsaws. Estimated exhaust-related emissions are shown in Table 3-2, and are based on the following assumptions.

- In mechanically treated units, one forwarder and two processors would work simultaneously.
- A chipper or masticator would be used over a period of 10 days total.
- In hand treatment units, 10-person crews would use 10 chainsaws concurrently.

- Mechanical and hand treatments would occur concurrently (worst-case scenario).
- Treatments would take place over approximately 60 days each year for 2 years.
- All equipment is assumed to operate for 8 hours/day.

Exhaust emissions from all mechanical equipment and hand tools operating simultaneously are expected to average 42 lbs/day of reactive organic gases (ROG), 31 lbs/day of oxides of nitrogen (NO_x), <2 lbs/day of PM10, and 164 lbs/day of CO. Chainsaws rather than forwarders and processors generate most of the ROG and NO_x emissions due to the engine and fuel types. These levels of daily emissions, and the total exhaust emissions generated over the course of the Proposed Action, are well below the levels of significance established by Placer County APCD. These levels are 80 lbs/day for ROG, NO_x, and PM10 and 550 lbs./day for CO (California Air Resources Board 2001). Air emissions generated during implementation are considered to be individually and cumulatively minor and short term, and would not result in adverse cumulative air quality effects.

Fugitive Dust

Dust on roads and landings would be controlled at all times of the year when dust is present (see measure AIR-8), thereby minimizing effects on air quality. Dust generated by equipment use off roads is not predicted to adversely effect air quality, because the equipment would not be in contact with bare soil and any resulting dust would not remain airborne.

Table 3-2. Estimated Daily and Total Air Exhaust Emissions Generated under the Proposed Action

Pollutant	Significance Threshold (lbs/day)	Proposed Action	
		Daily (lbs)	Total (lbs)
ROG	80	42	5,040
NO_x	80	31	3,720
PM10	80	2	240
CO	550	164	7,374

Biological Resources

Description of Existing Conditions

Habitat in the Project Area

The forest stands in the Quail project area consists entirely of the mixed conifer forest type, although Jeffrey pine (*Pinus jeffreyi*) is a dominant species within this type. Streamside riparian vegetation and the aspen (*Populus tremuloides*)/meadow community type also occur in the project area.

The mixed conifer forest type is characterized by white fir (*Abies concolor*) throughout the overstory. Other overstory components include Jeffrey pine, sugar pine (*Pinus lambertiana*), incense cedar (*Calorcedrus decurrens*), red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta*) and western juniper (*Juniperus occidentalis*). Dominant understory shrubs include tobacco brush (*Ceanothus velutinus*), oak (*Quercus vaccinfolia*), snowberry (*Symphoricarpos* spp.), and squaw carpet (*Ceanothus prostrata*). Herbaceous plants include white-veined wintergreen (*Pyrola picta*), kellogia (*Kelloggia galioides*), white flowered hawkweed (*Hieracium alviflorum*), lousewort (*Pedicularis semibarbata*), Ross' sedge (*Carex rossii*), and fescue (*Festuca* spp.) (Laacke 1990; Fites 1993; Potter 1994).

Streamside riparian vegetation in the Basin is often dominated by lodgepole pine, with black cottonwood (*Populus trichocarpa*), willows (*Salix* spp.), or alder (*Alnus* spp.). White fir and Jeffrey pine also grow in the overstory. A mix of small white fir, shrubs, and herbaceous species typically composes the understory. The aspen/meadow community type includes aspen stands and mountain meadows. Although aspen dominates these stands, willows are common in the understory. Meadows are composed of a mix of various grasses, sedges, forbs, and scattered willows.

The present mixed conifer type developed following Comstock-era logging (1880 to 1920) and in the absence of the most prevalent historic disturbance regime, fire. Prior to the early 1900s, when effective suppression began, fire was essential to keeping stands open and minimizing shrubs and ground fuels. In the absence of fire, shade-tolerant species such as white fir have crowded the understory and become a dominant component of the overstory. Concurrently, overall tree densities have increased, and shrub encroachment has significantly reduced the herbaceous understory. During drought cycles, epidemic bark beetle populations have caused large-scale mortality, primarily in white fir species. The 2004 annual mortality survey indicates that mortality due to bark beetles is increasing.

A portion of the project area was sanitation/salvage logged in the 1960s, with some selection harvest taking place in the Blackwood and McKinney Management Areas. Moderate amounts of mortality occurred during the drought cycle of 1988–1996.

Extensive salvaging was conducted in the floodplain of the Meeks Bay Management Area in the early 1990s.

Existing Forest Structure and California Wildlife Habitat Relationships Types

Stand exam plot data (USDA Forest Service 2002) were collected and summarized for each treatment stand before planning the Proposed Action. Data were collected by LTBMU staff between 1999 and 2003. Based on the stand exam plot data, each treatment stand was typed according to the California Wildlife Habitat Relationships (CWHR) structural stage classification scheme (Mayer and Laudenslayer 1988). For tree-dominated habitats or stands, a CWHR stage is a combination of average tree size (diameter at breast height [dbh]) and canopy closure classes. Table 3.3 shows the CWHR standards for tree size. Table 3-4 shows the standards for canopy closure.

Table 3-3. CWHR Standards for Tree Size

CWHR Size Code	Size Class	DBH (inches)
1	Seedling	<1
2	Sapling	1–6
3	Pole	6–11
4	Small tree	11–24
5	Medium/large tree	>24
6	Multi-layered tree	Size class 5 trees over a distinct layer of size class 4 or 3 trees; total tree canopy closure exceeds 60%

Table 3-4. CWHR Standards for Canopy Closure

CWHR Canopy Closure Code	Closure Class	Canopy Closure (%)
S	Sparse cover	10–24
P	Open cover	25–39
M	Moderate cover	40–59
D	Dense cover	60–100

A CWHR structural stage or type is expressed by combining the CWHR size and canopy codes. For example, the average condition of a forest stand typed as 4M is 11–24 inches dbh and 40–59% canopy closure. Alternatively, a stand with a mean tree diameter of 9 inches and canopy closure of 30 percent would be typed as 3P.

The CWHR system is used to summarize habitat conditions for several species and to quantify effects of the Proposed Action (e.g., habitat modification or change) on those species, because the biological analyses and planning efforts presented in the SNFPA EIS are based primarily on this system. Also, the SNFPA EIS defines habitat suitability for several species, including California spotted owl, northern goshawk, and American marten, in terms of the CWHR system.

Most treatment stands in the project area are two-storied, with shade-tolerant species in the understory and pine and fir in the overstory. Stand ages range from 70 to 100 years. Most of these stands are in the stem-exclusion stage of stand development. In this stage, some trees begin to die while survivors grow larger and express differences in height and diameter; first one species and then another may appear to dominate the stand (Oliver and Larson 2000).

Table 3-5 summarizes the existing (i.e., preproject) average structural conditions of each treatment stand (see Figure 2-1 for the locations of stands); the average condition of all stands combined (i.e., the average condition over the project area); and the CWHR type of each stand.

Special-Status Wildlife, Plant, and Fish Species

Special-status wildlife, plant, and fish species include species listed as endangered or threatened, or proposed for listing, under the federal Endangered Species Act (ESA); designated as sensitive by the Regional Forester; or designated as special-interest species by TRPA. The BE/BA prepared for this project (Jones & Stokes 2004b) analyzed 23 special-status species that could be affected by the Proposed Action. This determination was based primarily on whether a special-status species is known to occur or could occur in the project area. The potential for occurrence of a species was evaluated on the basis of the known regional and local distribution of the species, occurrence records, and the known or potential presence of suitable habitat in the project area.

Sixteen additional species were initially considered for analysis in the BE/BA. However, these species were not evaluated further because no suitable habitat occurs in the project area or the project area is outside the known range of these species. The status of each species and rationale for eliminating it from further evaluation are described in the BE/BA.

The BE/BA describes the habitat associations, occurrence, and regulatory status of each special-status species in the project area. The BE/BA is hereby incorporated by reference and is available for review at the LTBMU Supervisor's Office. The known or potential occurrence in the project area of the 23 species analyzed in the BE/BA is summarized below.

Lahontan Cutthroat Trout

Lahontan cutthroat trout is not known to occur within treatment stands; however, this species has been documented in the project area in the Cascade Creek watershed (see above). Because the Cascade Creek watershed is hydrologically connected to treatment stand 5-5, it is included in the project area.

Several other streams and lakes in the Basin were historically suitable for and/or occupied by this species. However, because exotic fish species currently inhabit most or all of these streams and lakes, and efforts to remove or control exotic fish in most of these areas have not been implemented, most of these habitats are generally considered unsuitable for Lahonton cutthroat trout. Fluvial populations of Lahontan cutthroat trout are considered intolerant of predation and competition by nonnative salmonids, and rarely co-occur with them (DeStaso and Rahel 1994; Schroeter 1998; Dunham et al. 2000). At least nine fish species are known to occur in streams along the west Basin, including several predatory trout such as rainbow trout, brook trout, and brown trout (Lahontan Regional Water Quality Board 2004). It is assumed that these habitat conditions prevail in most of the project area. Because of these assumed habitat conditions, as well as the highly limited distribution of known occurrences, Lahontan cutthroat trout is not expected to occur in the project area beyond the Cascade Creek watershed.

Mountain Yellow-Legged Frog

Despite widespread implementation of amphibian surveys in recent years (e.g., Multispecies Inventory and Monitoring Program), the only known extant population of mountain yellow-legged frog in the Basin occurs at Hell Hole in the south Basin. Historic records of mountain yellow-legged frogs in the Basin include observations at Grouse Lake (1974), Tamarack Lake (1975), Secret Harbor Creek (1994), and 5.5 miles north of Incline Village (1932) (USDA Forest Service 2001c *citing* Schlesinger pers. comm.).

Although streams in the project area provide aquatic habitat, it is assumed that most or all of these streams are not considered suitable breeding habitat for this species due to their relatively high gradient and fast flows and/or the occurrence of nonnative predatory fish. At least nine fish species are known to occur in streams along the west Basin, including several predatory trout such as rainbow trout, brook trout, and brown trout (Lahontan Regional Water Quality Board 2004). Mountain yellow-legged frogs are not expected to occur in the project area due to these habitat conditions, combined with the highly limited distribution of known occurrences. However, prior to implementation of the Proposed Action, a more rigorous assessment of suitable habitat within the project area by LTBMU biologists would be a conducted to determine the presence and distribution of suitable habitat and the likelihood of occurrence for this species.

Table 3-5. Existing Average Structural Conditions of Treatment Stands

Stand	Acres	Basal Area (ft^2/ acre)	Trees (per acre)	QMD (inches)	Canopy Closure (%)	CWHR Type
1-1	13.0	302.9	475.5	10.8	70.3	4D
1-3	86.7	302.9	475.5	10.8	70.3	4D
1-2	80.0	159.0	842.5	5.9	60.1	3D
1-4	186.0	224.8	589.1	8.4	55.9	3M
1-5	129.3	135.6	1,397.1	4.2	51.8	2M
5-1	3.0	323.8	1,477.9	6.3	75.4	3D
5-2	3.4	323.8	1,477.9	6.3	75.4	3D
5-5	51.3	323.8	1,477.9	6.3	75.4	3D
5-4	7.8	213.6	669.2	7.7	63.3	3D
5-6	14.6	213.6	669.2	7.7	63.3	3D
5-7	127.0	229.5	652.2	8.0	63.3	3D
5-8	69.6	308.0	963.0	7.7	71.7	3D
5-13	3.0	308.0	963.0	7.7	71.7	3D
5-9	118.3	373.9	547.5	11.2	68.3	4D
5-10	151.1	192.6	558.8	8.0	54.1	3M
5-11	79.8	237.5	930.0	6.8	61.6	3D
5-12	9.5	228.4	925.0	6.7	57.9	3M
13-1	268.6	200.4	928.7	6.3	59.0	3M
13-2	207.2	177.4	575.5	7.5	57.7	3M
13-3	266.3	209.5	1,245.4	5.6	68.9	2D
13-4	113.2	124.4	1,176.0	4.4	58.3	2M
14-12	183.4	202.6	481.8	8.8	59.7	3D
14-15	200.0	144.6	357.1	8.6	45.2	3M
14-16	309.9	162.4	1,088.9	5.2	51.8	2M
14-17	15.8	288.1	394.8	11.6	54.1	4M
14-18	6.3	252.2	538.8	9.3	60.0	3D
Average		237.1	841.5	7.6	62.5	
Total	2,704.1					

Bald Eagle

Winter season surveys for bald eagles are conducted annually and sponsored by LTBMU; breeding season surveys are conducted annually by TRPA. Breeding bald eagles do not occur in the project area. However, treatment stands 5-4 and 5-6 occur approximately 0.75 mile from the bald eagle nest site at Emerald Bay. Treatment stands 5-4, 5-6, 5-2, and 5-5 are adjacent to TRPA-designated wintering habitat at Emerald Bay. TRPA protects all historic and current nest sites within a 0.5-mile radius delineated around each nest (Tahoe Regional Planning Agency 1987); TRPA also applies a *non-degradation* standard to wintering habitat.

American Peregrine Falcon

The project area does not support suitable nesting habitat for peregrine falcons. There are no TRPA-designated peregrine falcon threshold population sites in the project area. The nearest known cliff sites considered suitable for nesting are located at the Blackwood Canyon Cliffs and Eagle Falls above Emerald Bay, outside the project area. These areas were surveyed by TRPA in 2000; no peregrine falcons were detected.

California Spotted Owl

As of 1999, there were nine pairs of spotted owls and five single birds known to occur on USFS and other lands in the Basin (USDA Forest Service 2001c). Most spotted owl occurrences in the Basin are in the northwestern, western, and southern portions of the Basin. California spotted owls occur and nest in the project area.

Protocol-level surveys for spotted owls have been conducted in portions of the project area most years between 1991 and 2004; surveys would continue in 2005. There is one California spotted owl PAC (Lower Blackwood PAC), encompassing 343.3 acres, in the project area.

CWHR stages considered suitable for California spotted owl in Sierran mixed conifer forest are 4M, 4D, 5M, 5D, and 6. Types 5M, 5D, and 6 are considered suitable for nesting; 6 is considered preferred nesting habitat (USDA Forest Service 2004). Based on this system, 233.8 acres of habitat suitable for spotted owl occur in treatment stands; of this, 183.5 acres are located outside spotted owl PACs (Table 3-6).

Table 3-6. Summary of Suitable Spotted Owl Habitat (based on CWHR classification) in Treatment Stands inside and outside PACs

		Acres		
Stand	CWHR Type	Inside PACs	Outside PACs	Total
1-1	4D		13.0	13.0
1-3	4D	50.3	36.4	86.7
5-9	4D		118.3	118.3
14-17	4M		15.8	15.8
	Total	50.3	183.5	233.8

Northern Goshawk

Northern goshawks are year-round residents in the Lake Tahoe region and are distributed throughout the Basin from approximately lake level to treeline (Keane 1999). Nineteen goshawk territories were active in the Basin in 2003 (USDA Forest Service 2003a); based on the distribution of known territories and habitat, an additional five to six territories likely exist (USDA Forest Service 2003a *citing* Keane unpublished data).

Northern goshawks occur and nest in the project area. Protocol-level surveys for northern goshawks have been conducted in portions of the treatment stands most years between 1991 and 2004; surveys would continue in 2005. There are three northern goshawk PACs and several known nest sites in the project area.

CWHR forest stages considered suitable for northern goshawk in the Lake Tahoe area are 4P, 4M, 4D, 5M, 5D, and 6. According to this system, 233.8 acres of suitable habitat for northern goshawk occur in treatment stands; of this, 155.3 acres are located outside goshawk PACs (Table 3-7).

Table 3-7. Summary of Suitable Northern Goshawk Habitat (based on CWHR classification) in Treatment Stands inside and outside PACs

		Acres		
Stand	CWHR Type	Inside PACs	Outside PACs	Total
1-1	4D	4.0	9.0	13.0
1-3	4D	74.5	12.2	86.7
5-9	4D		118.3	118.3
14-17	4M		15.8	15.8
	Total	78.5	155.3	233.8

Willow Flycatcher

Willow flycatchers are not known to occur in the project area; however, they have been detected 0.5 mile downstream of stands 1-2 and 1-4. Suitable nesting habitat for this species is present in the project area in stands 1-1 through 1-4, 13-1 through 13-4, and 14-12 through 14-18. Riparian vegetation occurs along several streams in the project area. The composition of riparian woody vegetation is dominated primarily by alder and also includes some willow and cottonwood. However, most streams in the project area are high-gradient and/or incised with dry banks and adjacent uplands. The riparian vegetation distributed along these streams is typically sparse, narrow, and patchy.

Osprey

LTBMU and TRPA annually monitor breeding ospreys using walk-in and shoreline boat survey methods. More than 15 osprey nest sites (including historical sites) occur in or near the project area along the shorelines of Cascade Lake, Emerald Bay, and Lake Tahoe between Emerald Bay and Sugar Pine Point. There are no nest sites within treatment stands. This conspicuous species (nesting ospreys are highly vocal and detectable when disturbed) has not been detected incidentally during recent surveys for other species in portions of the treatment stands. However, treatment stand 5-7 is approximately 0.25 mile east of nest sites along Lake Tahoe north of Emerald Bay. The present occupancy and reproductive status of these nest sites are not known. This stand will be surveyed for osprey activity prior to treatment; a wildlife biologist will be consulted and the prescription will implement LOPs. Several other nest sites are near (but more than 0.25 mile from) treatment stands. TRPA protects intact nest sites within a 0.25-mile radius delineated around each nest (Tahoe Regional Planning Agency 2002).

Golden Eagle

The project area does not support suitable nesting habitat for golden eagles. There are no TRPA-designated golden eagle threshold population sites in the project area. The nearest known cliff sites considered suitable for nesting are located at the Blackwood Canyon Cliffs and Eagle Falls above Emerald Bay, outside the project area. TRPA surveyed these areas in 2000; no golden eagles were detected.

Waterfowl

Waterfowl species occur in aquatic habitats throughout the project area. Foraging and resting habitat occurs in open water habitat, slow-moving streams, and adjacent herbaceous uplands. Suitable nesting habitat is limited in the project area because the Proposed Action would occur on drier conifer-dominated sites. There are no TRPA-designated waterfowl threshold sites and no habitat mapped by LTBMU as suitable for waterfowl in the project area. However, there are TRPA-designated waterfowl sites at Lily Lake, McKinney Lake, and Blackwood Creek.

American Marten

Several forest carnivore surveys have been conducted throughout the Basin since 1991 (Lake Tahoe Basin Management Unit file information). LTBMU has conducted carnivore surveys using track plates and/or camera stations in the south Basin at Heavenly Ski Resort and near Angora Lake, Big Meadow, and Glen Alpine Creek; in the east Basin at South Camp Peak and other east shore locations; and in several west Basin watersheds, including the Ward Creek watershed. LTBMU's Multispecies Inventory and Monitoring Program has recently conducted carnivore surveys in several randomly selected locations throughout the Basin; moreover, USFS's Urban Biodiversity Study has been studying carnivore use of USFS urban lots in the Basin.

American martens have been detected at several locations throughout the Basin over the past decade, including several west Basin watersheds (Lake Tahoe Basin Management Unit file information). Mixed conifer forest and riparian habitat in the project area provide suitable habitat for this species. Surveys for American marten and other carnivores have been conducted in 14 of the project stands (1-3, 1-4, 5-6, 5-7, 5-9, 5-10, 5-11, 13-1 through 13-4, and 14-12 through 14-16). American martens have been detected in eight of the stands (1-3, 5-10, 5-11, 13-2, 13-3, 13-4, 14-12, and 14-16) as well as within 100 meters of two additional stands (14-17 and 14-18).

CWHR stages considered moderately to highly important for American marten are 4M, 4D, 5M, 5D, and 6 (USDA Forest Service 2004). Based on this system, 233.8 acres of suitable habitat for American marten occur in treatment stands (Table 3-8).

Table 3-8. Summary of Suitable American Marten Habitat (based on CWHR classification) in Treatment Stands

Stand	CWHR Type	Acres
1-1	4D	13.0
1-3	4D	86.7
5-9	4D	118.3
14-17	4M	15.8
	Total	233.8

Pacific Fisher

Pacific fishers have never been detected during focused carnivore surveys in the Basin. Although fisher historically occurred here, there are no recent reliable reports of this species in the Basin (USDA Forest Service 2003a).

The presence and distribution of Pacific fishers in or near the project area are not known. However, protocol-level surveys have been conducted in the stands surveyed for

American marten to document the presence or absence of carnivores, including Pacific fishers. Mixed conifer forest and riparian habitat in the project area provide biophysical conditions that appear suitable for fishers; however, the species' potential for occurrence in the Basin and the project area is considered extremely low. There are no recent occurrence records of fishers in or near the Basin, and this species is presently thought to be extirpated in the Sierra Nevada from Yosemite National Park northward (Zielinski et al. 1995). This reported gap in Pacific fishers distribution includes the Lake Tahoe Basin.

CWHR stages considered moderately to highly important for Pacific fisher are 4M, 4D, 5M, 5D, and 6 (USDA Forest Service 2004). Based on this system, 233.8 acres of suitable habitat for Pacific fisher occur in treatment stands (Table 3-9).

Table 3-9. Summary of Suitable Pacific Fisher Habitat (based on CWHR classification) in Treatment Stands

Stand	CWHR Type	Acres
1-1	4D	13.0
1-3	4D	86.7
5-9	4D	118.3
14-17	4M	15.8
	Total	233.8

California Wolverine

Wolverines have never been detected during focused carnivore surveys in the Basin. However, observations of wolverines in and near the Basin have been reported over the last 30 years. Most of these reported observations have not been confirmed. Some of these observations are summarized in the BE/BA.

The presence and distribution of wolverines in the project area are not known. The 1990 observation in Desolation Wilderness occurred approximately 1 mile from treatment stands in the project area. The majority of the survey effort for furbearers within the project area had been conducted using covered trackplates. In addition to the stands described above for American marten, stands 5-7, 5-10, 5-11, and 13-3 have been surveyed using camera stations, which are more suited to detecting California wolverine. No wolverines have been detected at any of these stations. Mixed conifer forest and riparian habitat in the project area provide biophysical conditions that appear suitable for wolverines; however, the species' potential for occurrence in the project area is considered very low. There is only one confirmed occurrence record of a wolverine in the Basin. Also, if wolverines presently occur in the Basin, they probably occur in

relatively remote locations at higher elevations than the project area, away from human development and disturbance.

Mule Deer

Mule deer are likely to use mixed conifer forest and riparian habitat in the project area as summer range and to occur there in low numbers. There is no designated critical summer range or critical fawning habitat for either the Loyalton-Truckee or Carson River herds in the project area. Important habitat requirements for mule deer fawning include undisturbed meadow and riparian areas that provide hiding cover and forage. Mule deer also use shrub habitat for forage and fawning. CWHR modeling conducted by TRPA predicted the occurrence of suitable fawning habitat in several of the riparian/meadow areas within west Basin watersheds (Tahoe Regional Planning Agency 2002). However, it is assumed that much of the riparian habitat along streams in the project area does not provide suitable mule deer fawning habitat. The riparian vegetation distributed along many of these montane streams is sparse, narrow, and patchy.

Subalpine Fireweed

Subalpine fireweed is not known to occur in the Basin. Suitable habitat for this species was found in riparian areas and wet pockets during plant surveys conducted by LTBMU in treatment stands in 2002 (August, September, and October) and 2003 (June and October). However, subalpine fireweed was not observed during these surveys.

Starved Daisy

Starved daisy is not known to occur in the Basin. Some suitable habitat for this species may be present within the action area. However, this species was not observed during plant surveys conducted by LTBMU in treatment stands in 2002 (August, September, and October) and 2003 (June and October).

Upswept Moonwort, Scalloped Moonwort, and Western Goblin

Suitable habitat for upswept moonwort, scalloped moonwort, and western goblin was found in riparian areas and wet pockets during plant surveys conducted by LTBMU in treatment stands in 2002 (August, September, and October) and 2003 (June and October). However, these species were not observed in treatment stands. Western goblin has not been documented in the Basin. One occurrence of scalloped moonwort is known from Ward Canyon and another from Blackwood Canyon. The Blackwood Canyon occurrence is approximately 600–700 feet west of treatment stand 1-4 and was observed during the 2002–2003 surveys.

Veined Water Lichen

Veined water lichen is not known to occur in the Basin. Comprehensive surveys have not detected veined water lichen in the project area. Some suitable habitat for this species may be present within SEZs in the project area.

Bolander's Candle Moss, Three-Ranked Hump-Moss, and Broad-Nerved Hump-Moss

Bolander's candle moss and broad-nerved hump-moss are not known to occur in the Basin. However, three-ranked hump moss has been documented in the Basin. Comprehensive surveys have not detected any of the three mosses in the project area. Some suitable habitat for these species may be present in the project stands in wet areas.

Management Indicator Species

Wildlife management indicator species (MIS) identified in the LTBMU LRMP are bald eagle, American peregrine falcon, northern goshawk, California spotted owl, willow flycatcher, blue grouse, mallard, pileated woodpecker, mule deer, and black bear. Fish MIS are Lahontan cutthroat trout, rainbow trout, and brook trout. These species are known to occur or potentially occur in the project area. MIS are addressed in Appendix A of the BE/BA.

Environmental Consequences

No Action

No adverse direct effects are expected to result from implementing the No-Action Alternative. Indirect effects include the increased probability of stand-replacing catastrophic wildfire, which could substantially reduce forest wildlife habitat and result in detrimental effects on watershed and water quality. The likelihood of such an event is higher than under the Proposed Action and would continue to increase over time.

Proposed Action

Direct and Indirect Effects

This section describes the potential direct and indirect effects of the Proposed Action on forest, aquatic, and riparian habitats in general, and on each special-status species addressed in this EA. Direct effects are defined as those that are caused by the Proposed Action and would occur at the time of the action; indirect effects are those that are caused by the Proposed Action and are later in time, but still reasonably certain to occur. In this analysis, direct effects are those that would occur while the Proposed Action is being implemented (e.g., disturbances during construction). Indirect effects are those that

would occur as a result of the Proposed Action, such as alterations of forest succession processes and changes in water quality. To minimize redundancy and unnecessary parallel analyses, the analysis of species-level effects would tier from the more general analysis of habitat effects, as well as analyses and results presented in the SNFPA EIS (USDA Forest Service 2001a), SEIS (USDA Forest Service 2004), and BE (USDA Forest Service 2003b).

The Proposed Action was designed specifically to meet the objectives of and comply with the SNFPA ROD (USDA Forest Service 2004), which amended portions of the LTBMU Land and Resource Management Plan (LRMP). It also directly incorporates the ROD's standards and guidelines. A programmatic-level BE was prepared to analyze regional implementation of the SNFPA on 193 sensitive species (USDA Forest Service 2003b). The BE concluded that the Proposed Action may affect individuals or habitat of some sensitive species, but would not likely contribute to a trend toward federal listing or cause a loss of viability of any sensitive species. This section presents a project-level analysis intended to tier from analyses and conclusions presented in the SNFPA SEIS and BE. This analysis assumes that all applicable standards and guidelines specified in the ROD are directly incorporated in and met by the Proposed Action. Please see the ROD for a description of these standards and guidelines.

Forest Structure and CWHR Types

Simulations of various treatment and non-treatment scenarios were conducted by LTBMU staff with the stand exam data using the Forest Vegetation Simulator (Dixon 2002). Four scenarios were simulated over a 25-year period: 1) no treatment; 2) no treatment with a wildfire in 2005; 3) hand treatment; and 4) mechanical treatment. The simulated prescription for hand treatment generally consisted of thinning trees up to 14 inches in diameter in 2005, piling thinned material and selected ground fuels in 2005, burning the piles in 2006, and underburning in 2010. The simulated prescription for mechanical treatment generally consisted of thinning trees up to 30 inches in diameter in 2005, chipping treated materials and ground fuels in 2005, and underburning in 2010. Table 3-10 presents predicted CWHR types for each stand in the year 2025 under both the No-Action and Proposed Action scenarios. The Proposed Action scenario combines both manual and mechanical treatments. Figures 2-1 and 2-2a–c depict specific locations within stands where mechanical and manual treatments would be implemented. Table 3-11 presents a summary of the total amount and net change of each CWHR type in all treatment stands combined under both the No-Action Alternative and Proposed Action. A full set of modeling results, including values for numerous variables (e.g., stand structure, fuel loads, smoke conditions), is included in Appendix B.

Terrestrial Vegetation and Wildlife

Completion of the Proposed Action, including thinning, biomass removal, pile burning, and prescribed burning, would lead to a reduction in surface fuel loading and fuel ladder conditions in the urban defense and threat zones. This reduction would change the overall structure of wildlife habitat in the project area. Through the removal of

Table 3-10. Predicted CWHR Types for Each Stand Immediately after Treatment and in Year 2025 under the No-Action and Proposed Action Scenarios

Stand	Existing Condition		No Action: Predicted Conditions in Year 2025		Proposed Action: Predicted Conditions Immediately After Treatment, Year 2005				Proposed Action: Predicted Conditions in Year 2025			
	CWHR Type	Acres	CWHR Type	Acres	CWHR Type in Manually Treated Portion of Stand	Acres	CWHR Type in Mechanically Treated Portion of Stand	Acres	CWHR Type in Manually Treated Portion of Stand	Acres	CWHR Type in Mechanically Treated Portion of Stand	Acres
1-1	4D	13.0	4D	13.0	4M	0.1	4M	12.9	4M	0.1	4M	12.9
1-3	4D	86.7	4D	86.7	4M	31.9	4M	54.8	4M	31.9	4M	54.8
1-2	3D	80.0	3D	80.0	3S	26.4	3P	53.6	3P	26.4	3M	53.6
1-4	3M	186.0	3D	186.0	3M	55.3	3M	130.7	3M	55.3	3M	130.7
1-5	2M	129.3	2D	129.3	2P	129.3		0	2M	129.3		0
5-1	3D	39.3	3D	57.7	3M	13.1	3M	44.6	3M	8.9	3M	30.4
5-2	*Data for stand 5-1 represent 5-1, 5-2, and 5-5 combined*											
5-5	*Data for stand 5-1 represent 5-1, 5-2, and 5-5 combined*											
5-4	3D	22.4	3D	22.4	3P	14.8	3P	7.6	3M	14.8	3M	7.6
5-6	*Data for stand 5-4 represent 5-4 and 5-6 combined*											
5-7	3D	127.0	3D	127.0	3P	54.4	3M	72.6	3M	54.4	3M	72.6
5-8	3D	69.6	3D	69.6	4M	69.6		0	4M	69.6		0
5-13	3D	3.0	3D	3.0	4M	3.0		0	4M	3.0		0
5-9	4D	118.3	4D	118.3	4M	118.3		0	4M	118.3		0
5-10	3M	151.1	3D	151.1	3P	151.1		0	3P	151.1		0
5-11	3D	79.8	3D	79.8	3P	79.8		0	3M	79.8		0
5-12	3M	9.5	3D	9.5	3M	9.5		0	3M	9.5		0

Table 3-10. Continued

Stand	Existing Condition		No Action: Predicted Conditions in Year 2025		Proposed Action: Predicted Conditions Immediately After Treatment, Year 2005				Proposed Action: Predicted Conditions in Year 2025			
	CWHR Type	Acres	CWHR Type	Acres	CWHR Type in Manually Treated Portion of Stand	Acres	CWHR Type in Mechanically Treated Portion of Stand	Acres	CWHR Type in Manually Treated Portion of Stand	Acres	CWHR Type in Mechanically Treated Portion of Stand	Acres
13-1	3M	268.6	3D	268.6	3P	186.9	3P	81.7	3M	186.9	3M	81.7
13-2	3M	207.2	3D	207.2	3P	149.0	3P	58.2	3M	149.0	3M	58.2
13-3	2D	266.3	3D	266.3	3P	207.5	3M	58.8	3M	207.5	3M	58.8
13-4	2M	113.2	3D	113.2	2P	113.2		0	3M	113.2		0
14-12	3D	183.4	3D	183.4	4P	150.5	3P	32.9	3M	150.5	3M	32.9
14-15	3M	200.0	3M	200.0	3P	200.0		0	3P	200.0		0
14-16	2M	309.9	3D	309.9	2P	309.9		0	3M	309.9		0
14-17	4M	15.8	4D	15.8	4M	0.2	4P	15.6	4M	0.2	4M	15.6
14-18	3D	6.3	3D	6.3	4M	0	4M	6.3	4M	0	4M	6.3

Table 3-11. Total Amount and Net Change of Each CWHR Type in all Treatment Stands Combined under the No-Action and Proposed Action Scenarios

CWHR Type	Existing Condition (acres)	No Action: Predicted Acres in Year 2025	Proposed Action: Predicted Acres Immediately after Treatment (2005)	Proposed Action: Predicted Acres in Year 2025	Net Change between Existing Condition and Proposed Action Immediately after Treatment (acres)	Net Change between Existing Condition and Proposed Action in Year 2025 (acres)
2P	0	0	552.4	0	+552.4	0
2M	552.4	0	0	129.3	-552.4	-423.1
2D	266.3	129.3	0	0	-266.3	-266.3
3S	0	0	26.4	0	+26.4	0
3P	0	0	1,277.5	377.5	+1,277.5	+377.5
3M	1,022.4	200	366.2	1,866.2	-656.2	+843.8
3D	610.8	2,122.6	0	0	-610.8	-610.8
4P	0	0	166.1	0	+166.1	0
4M	15.8	0	297.1	312.7	+281.3	+296.9
4D	218	233.8	0	0	-218	-218

competing intermediate and suppressed small-diameter trees, the potential for residual trees to develop late successional/old-growth characteristics and fire resiliency would be enhanced.

The direct effects of thinning under the Proposed Action would be improvement of residual tree survival of high-intensity wildfire, reduction of potential for crown fire occurrence, and increased growth rates of residual trees. The treatments are expected to create forest conditions that would support prescribed burning as a forest health and fuel management tool for managing wildlife habitat in the future.

Stand diversity would be maintained by thinning based on canopy position (i.e., intermediate and suppressed trees would be selectively thinned), which would result in uneven spacing of residual trees. To maintain a mosaic of forest conditions within treated stands, SEZs, wildlife clumps, and untreated pockets with limited or no treatment would be retained in most stands except within developed sites or very small stands. Weed and shrub invasion would be minimized by limiting canopy reductions to no more than 30% of existing conditions; retaining some chips and existing mulch as soil cover following treatments; and by planting, if necessary, seedling conifers.

Project activities such as thinning and prescribed burning could disturb the reproductive and foraging activities of wildlife species. Implementing LOPs would reduce the potential adverse short-term effects on some species. LOPs would be in effect where species activity centers are known and mapped. Consequently, short-term disturbance of these species would be minimized by implementing project activities outside LOPs.

Other potential effects of the Proposed Action are habitat removal and modification. Project activities include removal of live trees and snags, downed trees, and understory and midstory structure. Such activities could result in short-term habitat loss or habitat modification for individuals dependent on these habitat elements. However, in compliance with LRMP direction, trees more than 30 inches in diameter would not be thinned, and stand projection modeling of the total canopy cover indicates that cover would not be reduced by more than 30%. Overall, the Proposed Action is predicted to result in a net increase in CWHR structure classes considered suitable for some species associated with mature forests (e.g., California spotted owl, northern goshawk, American marten) (Tables 3-10, 3-11, 3-12, 3-13, and 3-14).

Disturbances to wildlife species could occur in the form of noise disturbance and smoke from prescribed fires. These disturbances would be temporary and not likely to result in a substantial change in behavior or habitat use. A temporary reduction in common prey species (e.g., passerine birds and rodents) could influence foraging activities of some predator species (e.g., California spotted owl, northern goshawk, American marten). However, local and temporary disruptions of prey populations are not expected to affect predators because the impacts would not occur over a significant portion of any individual's foraging range.

Nest or den locations of sensitive wildlife would be protected. Additional measures to protect biological resources are described in *Measures Incorporated into the Proposed Action to Avoid or Minimize Adverse Effects* in Chapter 2.

Creating and burning debris piles could affect wildlife species that would temporarily use them. Burn piles would remain on the forest floor for at least 1 year before being burned. Rodents could use these piles for resting, temporary escape cover, or food caching. The presence of piles and increased availability of escape cover and caching sites could temporarily reduce predation rates on rodents and enhance their populations locally. Rodents that would use these piles for escape cover or food caching, such as deer mouse, Douglas squirrel, and golden-mantled ground squirrel, are not expected to use these piles as breeding or nesting sites. These species nest either underground (e.g., deer mouse, ground squirrel) or in trees (Douglas squirrel) rather than in aboveground piles, and probably would not be sensitive to pile burning during sensitive reproductive periods. Individuals using burn piles as temporary cover could vacate them before or during burning; however, pile burning could eliminate important food stores for individuals using burn piles as cache sites. Ground-nesting birds such as blue grouse could use debris piles as nest sites. However, pile burning is expected to occur in early spring (only in locations outside sensitive wildlife areas) or fall (outside the sensitive nesting period of most ground-nesting birds in the Basin).

The Proposed Action would have a beneficial indirect effect of reduced potential for catastrophic wildfire, which is considered to be one of the primary threats to habitat for forest species. Other anticipated benefits to wildlife include an increase in overall forest health. In addition, thinning from below and removal of suppressed trees could reduce competition in the residual stands and increase the rate of recruitment of large-diameter trees. In the long term, such recruitment could benefit species associated with late successional/old growth forests, such as northern goshawk, California spotted owl, and American marten.

Aquatic and Riparian Habitats

Potential effects of the Proposed Action on soils, water quality, and RCAs are analyzed in the Soils and Hydrology Report (Jones & Stokes 2004a) prepared for this project, which is hereby incorporated by reference.

The Proposed Action would involve the use of low-impact hand and mechanical thinning treatments, slash piling and chipping treatments, and prescribed fire treatments to modify dense vegetation conditions and reduce fuel loads in RCAs. However, limited or no treatment would occur in SEZs. Mechanized thinning treatments, pile burning, and prescribed fire treatments would be excluded from SEZs, but hand removal of standing dead trees and trees actively infested with pests or pathogens would be allowed in SEZs where the removal of such trees has been identified as a need and when it can been accomplished in accordance with TRPA and RWQCB regulations. In general, all vegetation and fuel treatments conducted in RCAs would focus on improving forest

Table 3-12. Total Amount and Net Change of Each CWHR Type Considered Suitable for California Spotted Owl under the No-Action and Proposed Action Scenarios

CWHR Type Considered Suitable	Existing Condition (acres)	No Action: Predicted Acres in Year 2025	Proposed Action: Predicted acres Immediately after Treatment (2005)	Proposed Action: Predicted Acres in Year 2025	Net Change between Existing Condition and Proposed Action Immediately after Treatment (acres)	Net Change between Existing Condition and Proposed Action in Year 2025 (acres)
4M	15.8	0	297.1	312.7	+281.3	+296.9
4D	218	233.8	0	0	-218	-218
5M	0	0	0	0	0	0
5D	0	0	0	0	0	0
6	0	0	0	0	0	0
Total Suitable Habitat	233.8	233.8	297.1	312.7	+63.3	+78.9

Table 3-13. Total Amount and Net Change of Each CWHR Type Considered Suitable for Northern Goshawk under the No-Action and Proposed Action Scenarios

CWHR Type Considered Suitable	Existing Condition (acres)	No Action: Predicted Acres in Year 2025	Proposed Action: Predicted acres Immediately after Treatment (2005)	Proposed Action: Predicted Acres in Year 2025	Net Change between Existing Condition and Proposed Action Immediately after Treatment (acres)	Net Change between Existing Condition and Proposed Action in Year 2025 (acres)
4P	0	0	166.1	0	+166.1	0
4M	15.8	0	297.1	312.7	+281.3	+296.9
4D	218	233.8	0	0	-218	-218
5M	0	0	0	0	0	0
5D	0	0	0	0	0	0
6	0	0	0	0	0	0
Total Suitable Habitat	233.8	233.8	463.1	312.7	+229.4	+78.9

Table 3-14. Total Amount and Net Change of Each CWHR Type Considered Suitable for American Marten and Pacific Fisher under the No-Action and Proposed Action Scenarios

CWHR Type Considered Suitable	Existing Condition (acres)	No Action: Predicted Acres in Year 2025	Proposed Action: Predicted acres Immediately after Treatment (2005)	Proposed Action: Predicted Acres in Year 2025	Net Change between Existing Condition and Proposed Action Immediately after Treatment (acres)	Net Change between Existing Condition and Proposed Action in Year 2025 (acres)
4M	15.8	0	297.1	312.7	+281.3	+296.9
4D	218	233.8	0	0	-218	-218
5M	0	0	0	0	0	0
5D	0	0	0	0	0	0
6	0	0	0	0	0	0
Total Suitable Habitat	233.8	233.8	297.1	312.7	+63.3	+78.9

health, enhancing or maintaining hydrologic and biologic integrity, and maintaining or enhancing the key attributes of riparian habitats. These attributes comprise cool, moist soil conditions; high water quality; retention of large snags and down logs in sufficient quantities to provide habitat and woody debris recruitment in stream channels; and retention of woody material to provide stability to riparian and aquatic habitats, as well as foraging, hiding, and thermal cover for wildlife species. LTBMU watershed specialists would implement a wide range of activity-specific BMPs (Appendix A) designed to minimize detrimental soil disturbance; protect water quality; and maintain the biological integrity, physical stability, and hydrologic connectivity of riparian and aquatic habitats. The Proposed Action is designed to meet the RCOs established in the ROD.

There is little potential for the Proposed Action to adversely affect the geomorphic, hydrologic, or biological characteristics of riparian and aquatic habitats in the subject watersheds because of the low-impact characteristics of the proposed stand treatments, the limitations that would be imposed on operations within RCAs and SEZs, and the use of activity-specific BMPs.

The greatest potential for Proposed Action to affect the hydrologic connectivity of streams and aquatic habitat exists at SEZ crossings. To minimize the potential for project-related effects on hydrologic connectivity in SEZs, existing SEZ crossings would be used whenever possible. In the event that it is necessary to construct a temporary SEZ crossing, the methods used for construction would be selected to avoid or minimize detrimental soil and vegetation disturbance and to maintain hydrologic connectivity between upstream and downstream features. All temporary crossings would be removed following the completion of project-related activities and would be treated as necessary to restore preproject conditions. Implementation of the activity-specific BMPs would further ensure that hydrologic connectivity in streams and special aquatic features is not adversely affected by the Proposed Action.

In many of the proposed treatment stand RCAs, the age class, structural diversity, composition, and cover of riparian vegetation is currently outside the range of natural variability due to the effects of past logging activities and wildfire suppression. In particular, many of the proposed treatment stand RCAs contain an overabundance of white fir, which has suppressed the growth of more desirable conifers and riparian plant species such as aspen. The mechanical and manual thinning treatments that would be applied to RCAs under the Proposed Action would substantially improve this condition. Management actions undertaken specifically to restore aspen stands or other riparian plant communities would be reviewed by a silviculturalist and watershed specialist from LTBMU on a stand-by-stand basis prior to implementation.

The Proposed Action could directly affect fisheries and amphibian resources, primarily as a result of vegetation removal, slash piling, and prescribed fire immediately following treatment; such activities could lead to soil disturbance and its associated effects on aquatic habitats (e.g., accelerated erosion and sedimentation). Any soil displacement,

compaction, or change in ground cover would cause a direct effect on watershed condition and fish habitat. Conservation measures incorporated into the project would be implemented during the maintenance phase to control erosion and sedimentation. The incorporation of BMPs would avoid or minimize potential increases in sediment loads to streams during project implementation such that prescribed fires are not expected to affect aquatic habitats. Over the longer term, potential adverse effects on water and soils from implementing the Proposed Action are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Special-Status Species

Lahontan Cutthroat Trout and Mountain Yellow-Legged Frog

Lahontan cutthroat trout and mountain yellow-legged frog are not expected to occur near treatment stands. If these species occurred there, the Proposed Action could directly affect them, primarily as a result of soil disturbance and its associated effects on aquatic habitats (e.g., accelerated erosion and sedimentation) caused by thinning activities, site preparation, and prescribed fire immediately following treatment. Any soil displacement, compaction, or change in ground cover would cause a direct effect on watershed condition and aquatic habitat. Conservation measures incorporated into the Proposed Action would be implemented during the maintenance phase to control erosion and sedimentation. Permanent BMPs would stabilize poorly aggregated soils at the crossings and direct runoff to infiltration areas outside SEZs, thus reducing effects to a minor level. Also, limited or no project activities would occur within SEZs. Potential adverse short-term effects are expected to be minor or avoided with the conservation measures incorporated into the project design; any such effects would be offset by long-term improvements to fish and amphibian habitat by reducing the risk of catastrophic wildfire occurrence.

The Proposed Action could cause adverse indirect effects. The Proposed Action would involve the use of low-impact hand and mechanical thinning treatments, slash piling and chipping treatments, and prescribed fire treatments to modify dense vegetation conditions and reduce fuel loads in RCAs. However, limited or no treatment would occur in SEZs. Mechanical treatments could cause soil disturbance that may lead to accelerated erosion and sedimentation, possibly degrading aquatic habitat. Hand treatments would not substantially increase erosion and sedimentation beyond existing levels. Implementing the BMPs in all units would minimize or avoid adverse indirect effects on aquatic habitat. In general, all vegetation and fuel treatments conducted in RCAs would focus on improving forest health, enhancing or maintaining hydrologic and biologic integrity, and maintaining or enhancing the key attributes of riparian and aquatic habitats. Over the long term, potential adverse effects on aquatic habitat resulting from implementation of the Proposed Action are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Some beneficial indirect effects of implementing the Proposed Action are likely to occur. Removing excessive small wood and other fuels would reduce the possibility that

wildfires would consume the entire understory and stands of trees protecting streams and meadows. Chipping some material and leaving it on site would help prevent erosion, rearrange the fuels into a less volatile configuration on the forest floor, and provide a source of organic materials for nutrient cycling. Prescribed fire would reduce available fuels, provide heat stratification for fire-dependent seeds, and contribute to nutrient cycling. All these activities serve to restore important ecosystem processes that could ultimately benefit water and soil resources, as well as habitat for sensitive fish and amphibians.

Bald Eagle

Breeding bald eagles do not occur in the project area. However, treatment stands 5-4 and 5-6 occur approximately 0.75 mile from the bald eagle nest site at Emerald Bay. Treatment stands 5-4, 5-6, 5-2, and 5-5 are adjacent to TRPA-designated wintering habitat at Emerald Bay. Because TRPA protects all historic and current nest sites within a 0.5-mile radius delineated around each nest (Tahoe Regional Planning Agency 1987) and applies a *non-degradation* standard to wintering habitat, project activities would occur outside the no-disturbance buffer around the Emerald Bay nest site and outside designated wintering habitat. Accordingly, the Proposed Action is not expected to affect bald eagles.

American Peregrine Falcon

The project area does not support suitable nesting habitat for peregrine falcons. There are no TRPA-designated peregrine falcon threshold population sites in the project area. The nearest known cliff sites considered suitable for nesting are located at the Blackwood Canyon Cliffs and Eagle Falls above Emerald Bay, outside the project area. These areas were surveyed by TRPA in 2000; no peregrine falcons were detected. In addition, suitable foraging areas for peregrine falcons (e.g., meadows, wetlands, and other open habitats) would not be treated. Therefore, the Proposed Action is not expected to affect peregrine falcons.

California Spotted Owl

There is one California spotted owl PAC (Lower Blackwood PAC) in the project area; fuel and vegetation treatments would occur within a portion of this PAC. The extent and type of proposed treatments within this PAC are summarized below. This PAC overlaps with the East Blackwood northern goshawk PAC.

The Lower Blackwood Spotted Owl PAC is 343.3 acres in size and includes portions of treatment stands 1-2, 1-3, and 1-4. The PAC was surveyed in 1991, 1993–94, and 1996–2004; spotted owls were detected in 1993, 1997, 1999, 2001, 2002, and 2004. Male and female spotted owls were detected once each in 2004. Their current status according to USFS Region 5 protocol was recorded as "status unknown—single owl." A total of 220.1 acres (64%) of the PAC would be treated under the Proposed Action. Of these 220.1 acres, 165.2 acres (48% of the PAC) would be mechanically treated in stands 1-4, 1-3, and 1-2; 54.9 acres 16% of the PAC would be manually treated in stands 1-4 and 1-3.

Table 3-15 summarizes the predicted changes in CWHR types for treatment stands inside California spotted owl PACs under both the No-Action and Proposed Action scenarios.

Measures incorporated into the Proposed Action are designed to avoid or minimize potential adverse effects on California spotted owls. In compliance with the ROD standards and guidelines, mechanical treatments would not occur within a 500-foot buffer around a spotted owl activity center within a PAC (measure BIO-6); also, a wildlife biologist would oversee treatment preparations in PACs (BIO-8). Treatments within PACs would be prepared to enhance habitat conditions and maintain multiple story canopy structure throughout the unit, while meeting the purpose and need of the Proposed Action. Furthermore, an LOP from March 1 to August 31 would be in effect within 0.25 mile of any known or suspected nest stands. LOPs would reduce the potential for disturbance to nesting pairs. However, California spotted owls have home ranges that exceed the size of PACs; consequently, the potential remains for temporary disturbance during and after vegetation treatments in foraging areas.

On the basis of simulation results, the Proposed Action is predicted to result in a net increase in CWHR structure classes considered suitable for California spotted owl (Table 3-12) over the long term. The Proposed Action would also move treated stands toward achieving desired conditions for California spotted owl home range core areas (HRCAs) as outlined in the SNFPA (USDA Forest Service 2004) and is expected to reduce the risk of catastrophic wildfire and improve forest health.

Northern Goshawk

There are three northern goshawk PACs and several known nest sites in the project area; fuel and vegetation treatments would occur within portions of these PACs. The extent and type of proposed treatments within these PACs are summarized below.

- The East Blackwood Goshawk PAC overlaps with the Lower Blackwood spotted owl PAC. This PAC is 244.2 acres in size and includes portions of treatment stands 1-4, 1-3, 1-1, and 13-1; 224.6 acres (92%) of the PAC would be treated under the Proposed Action. Of these 224.6 acres, 167.8 acres (69% of the PAC) would be mechanically treated in stands 1-4, 1-3, and 1-1; 56.8 acres (23% of the PAC) would be manually treated in stands 1-4, 1-3, and 1-1. Surveys were conducted in this PAC in 1981, 1988–1995, 1997–99, and 2001–04; northern goshawks were detected in the PAC in 1988–89, 1991–93, and 2002.
- The Upper General Creek Goshawk PAC is 239.6 acres in size and includes portions of treatment stand 13-1; 32.8 acres (14%) of the PAC would be treated under the Proposed Action. Of these 32.8 acres, 18.6 acres (8% of the PAC) would be mechanically treated in stand 13-1; 14.2 acres (6% of the PAC) would be manually treated in stand 13-1. This PAC was surveyed 1998–2004. Northern goshawks were detected in 1998–2002.

Table 3-15. Predicted CWHR Types for Treatment Stands inside California Spotted Owl PACs under the No-Action and Proposed Action Scenarios

		Existing Condition		No Action: Predicted Conditions in Year 2025		Proposed Action: Predicted Conditions Immediately after Treatment, Year 2005				Proposed Action: Predicted Conditions in Year 2025			
California Spotted Owl PAC	Treatment Stand	CWHR Type	Acres in PAC	CWHR type	Acres in PAC	CWHR Type in Manually Treated Portion of Stand	Acres in PAC	CWHR type in Mechanically Treated Portion of Stand	Acres in PAC	CWHR Type in Manually Treated Portion of stand	Acres in PAC	CWHR type in Mechanically Treated Portion of Stand	Acres in PAC
Lower Blackwood	1-4	3M	167.4	3D	167.4	3M	39.4	3M	128.0	3M	39.4	3M	128.0
	1-3	4D	50.3	4D	50.3	4M	15.5	4M	34.8	4M	15.5	4M	34.8
	1-2	3D	2.4	3D	2.44	3S	0	3P	2.4	3P	0	3M	2.4

- The Lower General Creek Goshawk PAC is 203.6 acres in size and includes portions of treatment stand 13-1; 2.5 acres (1%) of the PAC would be manually treated in stand 13-1. This PAC was surveyed 1998–2001, and 2004. Northern goshawks were last detected in the PAC in 1999 or earlier.

Table 3-16 summarizes the predicted changes in CWHR types for treatment stands inside northern goshawk PACs under both the No-Action and Proposed Action scenarios

Measures incorporated into the Proposed Action are designed to avoid or minimize potential adverse effects on northern goshawks. In compliance with the ROD standards and guidelines, mechanical treatments would not occur within a 500-foot buffer around a northern goshawk *activity center* within a PAC (measure BIO-6); also, a wildlife biologist would oversee treatment preparations in PACs (BIO-8). Treatments in PACs would be prepared to enhance habitat conditions and maintain multiple-story canopy structure throughout the unit, while meeting the purpose and need of the Proposed Action. Also, an LOP from February 15 to September 15 would be in effect within 0.5 mile of any known or suspected nest stand (BIO-7). LOPs would reduce the potential for disturbance to nesting pairs. However, northern goshawks have home ranges that exceed the size of PACs; consequently, the potential remains for temporary disturbance during and after vegetation treatments in foraging areas.

On the basis of simulation results, the Proposed Action is predicted to result in a net increase in CWHR structure classes considered suitable for northern goshawks (Table 3-13) in the long term provided that snags and down woody material are available at sufficient levels to provide habitat for prey species. It is also expected to reduce the risk of catastrophic wildfire and improve forest health. Moreover, because the forest understory would be thinned without a substantial reduction in canopy cover, northern goshawk foraging habitat could be improved as a result of the Proposed Action.

Willow Flycatcher

Protocol-level surveys for willow flycatchers may be conducted in suitable riparian/meadow habitat if it occurs within 300 feet of a treatment stand (see measures BIO-3 and BIO-7). If willow flycatchers are detected, an LOP between June 1 and August 31 would be imposed. The location of the LOP would be determined by the USFS wildlife biologist on the basis of site conditions and type of project activity. Therefore, the project would not disrupt breeding activities of willow flycatchers.

Because limited or no project activities would occur within SEZs, and because the BMPs and conservation measures would be implemented, the Proposed Action would not be expected to affect the structure, composition, or hydrologic characteristics of suitable habitat for willow flycatchers.

Osprey

Treatment activities in stand 5-7 could affect osprey breeding attempts if nearby sites are occupied. However, LTBMU biologists would survey these sites for presence/absence

and nesting status before the Proposed Action is implemented. If any of these nest sites are active, an LOP would be implemented within 0.25 mile of the nest site. The timing and duration of the LOP would be at the discretion of the LTBMU forest wildlife biologist.

The Proposed Action is not expected to affect habitat elements important for ospreys. Ospreys require large trees and snags for nesting and roosting. No trees larger than 30 inches dbh would be removed. The Proposed Action is predicted to result in a net increase in CWHR structure classes considered suitable for species associated with mature forests and large trees. This increase, combined with the reduced risk of catastrophic wildfire and overall improvement in forest health, could improve roosting and nesting habitat elements for osprey.

Golden Eagle

The project area does not support suitable nesting habitat for golden eagles. There are no TRPA-designated golden eagle threshold population sites in the project area. The nearest known cliff sites considered suitable for nesting are located at the Blackwood Canyon Cliffs and Eagle Falls above Emerald Bay, outside the project area. TRPA surveyed these areas in 2000; no golden eagles were detected. Moreover, suitable foraging areas for golden eagles (e.g., open habitats) would not be treated. Therefore, the Proposed Action is not expected to affect golden eagle.

Waterfowl

It is unlikely that suitable nesting habitat for waterfowl occurs in proposed treatment areas. Limited or no project activities would occur within SEZs; BMPs and conservation measures that would be implemented would avoid or minimize potential adverse effects on waterfowl populations and habitats in the project area.

American Marten, Pacific Fisher, and California Wolverine

The Proposed Action could affect these species. Of all forest carnivore species addressed in the BE/BA, American marten is the only one known to occur in the project area. Martens are mobile and able to avoid temporary disturbances during project activities. However, habitat would be modified by changing the understory, the distribution and amount of downed woody material on the forest floor, and the canopy structure. Although habitat modifications are anticipated, canopy cover is not expected to be reduced by more than 30%. If a den site were detected in the project area before or during project activities, an LOP encompassing 100 acres surrounding the den site would be implemented from May 1 to July 31.

Creating and burning debris piles are not expected to adversely affect American martens. Marten natal dens typically occur in cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas. Although burn piles would remain on the forest floor for at least 1 year before being burned, martens are not expected to use debris piles created under the Proposed Action except as temporary rest sites or for foraging. Trees

Table 3-16. Predicted CWHR Types for Treatment Stands inside Northern Goshawk PACs under the No-Action and Proposed Action Scenarios

		Existing Condition		No Action: Predicted Conditions in Year 2025		Proposed Action: Predicted Conditions Immediately after Treatment, Year 2005				Proposed Action: Predicted Conditions in Year 2025			
Northern Goshawk PAC	Treatment Stand	CWHR Type	Acres in PAC	CWHR Type	Acres in PAC	CWHR Type in Manually Treated Portion of Stand	Acres in PAC	CWHR type in Mechanically Treated Portion of Stand	Acres in PAC	CWHR Type in Manually Treated Portion of Stand	Acres in PAC	CWHR type in Mechanically Treated Portion of Stand	Acres in PAC
East Blackwood	1-4	3M	146.1	3D	146.1	3M	33.9	3M	112.2	3M	33.9	3M	112.2
	1-3	4D	74.5	4D	74.5	4M	22.6	4M	51.9	4M	22.6	4M	51.9
	1-1	4D	4.0	4D	4.0	4M	0.3	4M	3.7	4M	0.3	4M	3.7
Upper General Creek	13-1	3M	32.8	3D	32.8	3P	14.2	3P	18.6	3M	14.2	3M	18.6
Lower General Creek	13-1	3M	2.5	3D	2.5	3P	2.5	N/A	N/A	3M	2.5	N/A	N/A

and logs that martens use for denning are typically large, whereas most trees and logs piled and burned under the Proposed Action would be smaller.

In the mechanically treated stands, a minimum of three snags per acre and three logs per acre of the largest diameters present would be retained. Based on current stand conditions, the average diameter of snags and down logs in post-treatment stands would exceed 18 inches dbh and 20 inches diameter, respectively. The number and average size of snags and down logs would likely be greater in manually treated stands, because hand thinning crews would not cut snags or buck down logs more than 20 inches in diameter. Reductions in snags and down logs resulting from the Proposed Action would be greatest in the smaller sizes. Because carnivores are more likely use larger diameter snags and logs, this reduction is not expected to adversely affect carnivores. Overall, the Proposed Action is predicted to result in a long-term net increase in CWHR structure classes considered suitable for American marten in the project area (Table 3-14). The Proposed Action is also expected to reduce the risk of catastrophic wildfire and improve forest health.

Mule Deer

The Proposed Action is not likely to adversely affect mule deer. Riparian areas suitable for fawning are not expected to be affected by the Proposed Action. Suitable habitat for deer could improve because of an increase in the quantity and quality of foraging habitat as a result of a more open understory and the effects of prescribed fire.

Subalpine Fireweed, Starved Daisy, Upswept Moonwort, Scalloped Moonwort, Western Goblin, Veined Water Lichen, Bolander's Candle Moss, Three-ranked Hump-moss, and Broad-nerved Hump-moss

Occurrences of western goblin, scalloped moonwort, three-ranked hump-moss, and broad-nerved hump-moss have been documented in the Basin (see *Status of Species in the Action Area*). The remaining five species are not known to occur in the Basin. Preproject surveys for threatened, endangered, sensitive, and special-interest plant species in treatment stands were conducted in 2002 (August, September, and October) and 2003 (June and October). Suitable habitat for all these species is known to occur or could occur within the action area; however, none of these species were observed in treatment stands during surveys. If these species are otherwise observed and reported to the USFS botanist before or during project implementation, their locations will be delineated and avoided during project activities. Accordingly, the Proposed Action is not likely to adversely affect these plant species.

Other Management Indicator Species

Other wildlife and fish species designated as MIS by LTBMU, but that are not special-status species as defined above, are mallard, pileated woodpecker, black bear, blue grouse, rainbow trout, and brook trout. Potential effects of the Proposed Action on these remaining MIS are discussed below

Pileated Woodpecker

Pileated woodpeckers are uncommon permanent residents in the Basin. They prefer dense, mature forests with large numbers of snags, stumps, and logs for cover; they require decayed snags, trees, logs, and stumps for foraging and large snags for nesting (Bull and Jackson 1995). Suitable habitat for pileated woodpeckers occurs in the project area. LRMP guidelines relevant to managing for pileated woodpecker habitat include maintaining two hard snags per acre as well as most soft snags that are at least 20 inches diameter-at-breast-height (dbh) and 12 feet tall, where they are not a hazard to life or property.

Both adverse and beneficial effects on pileated woodpecker habitat could result from the Proposed Action. Removal of woody debris, downed logs, and suppressed trees could result in a decrease in decayed forest elements that provide habitat for bark beetles, ants, and other invertebrates upon which woodpeckers feed. Also, the felling of large snags and green trees could reduce the availability of potential foraging habitat and nest sites in the short term. However, no live trees larger than 30 inches dbh would be felled, and the number of large snags removed would be limited. Alternatively, prescribed fire could increase the rate of snag recruitment and promote faster generation of large-diameter, mature trees. The Proposed Action is expected to reduce the risk of catastrophic wildfire and improve forest health.

Mallard

Mallards are one of the most common waterfowl species in the Basin during spring and summer. In the Basin, wetlands provide nesting, resting, and foraging habitat for mallards; open water and stream habitats provide foraging and resting habitat. Important areas for waterfowl, including mallard, include Pope Marsh, Truckee Marsh, Taylor Creek Marsh, Grass Lake, and Spooner Lake (Tahoe Regional Planning Agency 2001).

Mallards occur in aquatic habitats throughout the project area. Foraging and resting habitat occurs in open water habitat, slow-moving streams, and adjacent herbaceous uplands. Suitable nesting habitat is limited in the project area because the Proposed Action would occur on drier conifer-dominated sites. There are no TRPA-designated waterfowl threshold sites in the project area, and there is no habitat mapped by LTBMU as suitable for waterfowl in the project area. However, there are TRPA-designated waterfowl sites at Lily Lake, McKinney Lake, and Blackwood Creek. It is unlikely that suitable nesting habitat for mallards occurs in proposed treatment areas in the project area. Limited or no project activities would occur within SEZs; BMPs and conservation measures that would be implemented would avoid or minimize potential adverse effects on mallard populations and habitats in the project area.

Black Bear

Black bears are uncommon permanent residents in the Basin. They occur in a variety of habitats, including conifer forests near meadows, riparian areas, and montane shrub communities. In the Basin, black bears are occasionally found in urban areas (e.g.,

residential neighborhoods), particularly in the wildland-urban interface, and forage opportunistically on exposed human refuse.

The Proposed Action should not adversely affect this species. Black bears occur in a variety of habitats throughout the Basin. The species is mobile and able to avoid temporary disturbances, and is not considered sensitive to potential noise and other effects of the Proposed Action.

Blue Grouse

Blue grouse are uncommon, permanent residents in the Basin. They occur in conifer forests interspersed with large openings such as brush patches and wet meadows. This species is generally associated with medium to large conifers and less than 40% canopy closure (USDA Forest Service 2003b). Blue grouse are ground-nesters, nesting near down logs in brushy areas for cover (Zwickel 1992). Mixed conifer forest in the project area provides suitable habitat.

The Proposed Action could affect this species. If suitable nesting habitat for blue grouse occurs in the project area, removal of woody debris and down logs could result in a loss of nest sites and cover. Also, the Proposed Action could disturb individuals locally and temporarily. However, the magnitude and intensity of these potential effects are not expected to affect the regional population.

Cumulative Effects

The cumulative effects of the Proposed Action are based on the direct and indirect effects of the project when considered in combination with the effects of past, present, and planned future actions in the project area and vicinity. Historic logging, livestock grazing, fire suppression, and urban development in the project area and vicinity have changed the landscape substantially. Approximately two-thirds of the Basin's forest was cut between 1860 and 1930. By 1898, the last of the Comstock-era mills had closed because of lack of available lumber. Cattle and sheep also grazed in the Lake Tahoe Basin extensively for the 40 years following the Comstock era (1859 through 1880s). There were 13 dairies that used most of the meadows in the Basin for forage. In the mid-1980s, a drought stressed the forested stands, and the LTBMU estimated that 300 million board feet of timber were standing dead or dying in the Basin.

USFS has not managed forest stands in the project area since the late 1980s and early 1990s. Between 1960 and 1980, the Basin's population grew fivefold, and the number of houses increased from 500 to 19,000. By 1970, 49,000 subdivided lots were created, and hundreds of miles of roads were built. As the Basin became more populated, fire suppression efforts increased. This allowed vegetation biomass accumulation over time, threatening more severe fires if they occurred. By 1990, recreation in the area developed into a $1 billion economy employing more than 20,000 people. More than 200,000 tourists visit the Basin on peak holidays, and visitor days are estimated to exceed 23

million annually (Sierra Nevada Ecosystem Project 1996). Recreation use in the project area is substantial, with peak use during the summer months. This area is popular for mountain biking, hiking, camping, equestrian use, OHV use, snowmobile use, and cross-country and backcountry skiing.

Expected future activities in the project area and vicinity include additional fuel reduction projects (e.g., prescribed burning, vegetation and biomass removal), increased recreation levels (e.g., hiking, biking, cross-country skiing), and watershed restoration projects. These projects could potentially magnify both positive and negative direct and indirect effects on wildlife and vegetation resources.

Portions of the project area have been previously harvested, as have several areas surrounding the project area. Taken together, timber harvest activities in the project area have changed the landscape substantially. However, because the Proposed Action is a thin-from-below prescription that is not expected to dramatically affect overstory forest stand structure, the Proposed Action is not expected to contribute significantly to adverse cumulative effects on wildlife habitats. The total amount of mature forest habitat suitable for California spotted owl, northern goshawk, and American marten in the project area is expected to increase after the Proposed Action is implemented. Consequently, the Proposed Action is not expected to result in significant adverse cumulative effects on these species. Moreover, the expected long-term benefits of reducing the potential for catastrophic losses resulting from wildfire are expected to maintain or improve wildlife and plant habitat regionally over the long term. Therefore, the Proposed Action is not expected to contribute towards adverse cumulative effects on wildlife or vegetation resources.

BMPs would be implemented to minimize or avoid impacts on aquatic habitat. Furthermore, the expected long-term benefits of reducing the potential for catastrophic losses due to wildfire are expected to maintain or improve aquatic habitat regionally over the long term. Therefore, the Proposed Action is not expected to contribute towards adverse cumulative effects on fisheries resources.

Cultural Resources

Description of Existing Conditions

Heritage resource data for the Quail project area are based on available information from heritage resource files held by the LTBMU and information in the *Heritage Resources Inventory Report for the USFS Lake Tahoe Basin Management Unit Quail Vegetation and Fuel Treatment Project, Placer and El Dorado Counties, California* (Jones & Stokes 2004c). These sources contain literature pertaining to prehistory and history and include site records and atlases that show recorded site locations, previously surveyed areas, and other heritage resource data. The entire 2,500-acre project area was surveyed in 2003 and 2004. There are a total of 19 recorded sites within the project area boundaries; however, one previously recorded site was not found during the 2003–2004 survey. Of the

remaining 18 sites, three are prehistoric, 15 are historic, and one has both a prehistoric and a historic component. The prehistoric component is a lithic scatter; the historic component is a refuse deposit. Two of the three prehistoric sites are lithic scatters and one is a milling station. All the prehistoric sites are located in the McKinney Creek area. Of the 13 historic sites, 10 are refuse deposits, one is a structure, one is the remains of a complex of structures that are in ruins, and one is a group of Basque aspen tree carvings. The majority of historic sites are located in the Blackwood and McKinney Creek areas. A total of six isolated artifacts are also located within the project area (two lithic flakes and four pieces of isolated refuse).

The majority of historic sites appear to have been the result of camping activities in the 1940s and 1950s. With a couple of exceptions, the sites are relatively small, and much of the refuse is indicative of recreational camping. This is especially true of the historic sites found in the McKinney and Blackwood Creek areas. One site appears to be refuse from a hotel and restaurant in the Emerald Bay area. Much of the earthenware at the site has matching designs similar to earthenware vessels on display in the Tallac museum. All the prehistoric sites located by the survey are in the McKinney Creek area.

Environmental Consequences

Proposed Action

The Proposed Action would not affect the value of any identified historic properties within the project area. All identified heritage resource sites would be flagged and avoided during implementation of the Proposed Action. Standard resource protection measures incorporated into the project description and described in Chapter 2 would be followed for all heritage resources found during preproject surveys.

No Action

Because no fuel or vegetation treatment activities and no prescribed burning would be undertaken, the No-Action Alternative would have no adverse effects on cultural resources. However, in the event of a wildfire, flammable resources such as wooden structures and Basque carvings would be at risk.

Recreation

Description of Existing Conditions

The project area provides a range of recreation opportunities that take advantage of its remote setting and scenic views. Recreation in the Quail project area is primarily dispersed and nonmotorized, including such activities as hiking, mountain biking, horseback riding, and cross-country skiing. Recreation in certain portions of the area

includes motorized uses, utilizing trails for OHVs, jeeps, motorcycles, and snowmobiles. There are eight developed campgrounds in the project area on state and federal lands, as well as a developed resort operated by a concessionaire.

The southern portion of the project area encompasses the Emerald Bay area of Lake Tahoe, a popular tourist destination. A number of trailheads lead to scenic views, Desolation Wilderness, White Cloud Falls, and numerous alpine lakes. State Route (SR) 89 is a scenic highway corridor offering dramatic views of Emerald Bay and Lake Tahoe.

North of Emerald Bay, the Quail project area encompasses Meeks Bay, a popular destination for swimming, sunbathing, and other beach activities. Because much of this area is not accessible by road, most recreational activities are non-motorized.

The northernmost portion of the project area contains popular OHV routes, including the McKinney–Rubicon Springs Road (Rubicon Trail) and routes to Ellis Peak, Ellis Lake, Buck Lake, and Noonchester Mine.

Pursuant to the LRMP, the recreation emphasis in the Quail project area would continue to be the maintenance of a variety of motorized and nonmotorized outdoor recreation opportunities.

Environmental Consequences

No Action

The No Action Alternative would have no direct effects on recreation in the short term. However, a catastrophic fire, resulting from hazardous fuel buildup, could have substantial effects on recreation opportunities within the Basin.

Proposed Action

The potential direct, indirect, and cumulative effects on recreation are expected to be minor and short term. Existing recreation opportunities would not be permanently affected by fuel reduction activities. The Proposed Action has the potential to adversely affect recreation resources by temporarily closing roads and trails during tree felling activities for public safety concerns. The expected closure times and locations would be posted in public notices. The individual closures are expected to be short (15 to 30 minutes); to be implemented during nonpeak use periods (midweek, after Labor Day, and before Memorial Day); and to affect only small segments of roads and trails. Hikers would not be impeded by closures because they would be able to avoid the project area at a safe distance (at least 200 feet) from activities. Contractors would be required to clear roads and trails as soon as possible after felling activities.

Fuel reduction treatments may indirectly affect recreation by reducing understory brush and small trees, thereby making it easier to travel through the forest. This reduction may have the unintended effect of creating conditions favorable for illegal OHV use. Use of motorized vehicles off system roads and trails in the project area is illegal. Limiting fuel treatments to retain a greater density of understory trees and shrubs within 50 feet of existing roads and trails is expected to minimize potential illegal OHV use following treatments.

Soils, Hydrology, and Water Quality

Description of Existing Conditions

The Proposed Action would physically affect portions of 21 watersheds[1] (subject watersheds) on the western side of the Basin (Figures 2-1 and 2-2a–c). The bulk of the proposed treatment stands are located in the Blackwood Canyon, McKinney Creek, Meeks Creek, Sierra Creek, Quail Creek, and Rubicon Creek watersheds. A relatively small proportion of the proposed treatment stands are located in the other 15 subject watersheds.

Most of the subject watersheds consist largely of National Forest System Lands that are managed by LTBMU primarily for the purposes of habitat restoration and enhancement, water quality protection and enhancement, wildland fire prevention, and recreation. In general, National Forest System Lands within the subject watersheds have not been logged commercially since the late 1960s.

Geology

The subject watersheds are underlain by a variety of geologic units (Lake Tahoe Basin Management Unit 2003). Most of the proposed treatment stands north of the Lonely Gulch/Sierra Creek watershed divide (Figure 2-1) are underlain by unconsolidated glacial moraine and outwash deposits, the latter of which have been partially reworked by modern-day stream systems. Small portions of the proposed treatment stands located near the mouth of Blackwood Canyon and the adjacent intervening area watersheds are underlain by unconsolidated andesitic rocks and lacustrine sediments that were deposited when the level of Lake Tahoe was substantially higher than it is today.

South of the Lonely Gulch/Sierra Creek watershed divide, most of the proposed treatment stands are underlain by granitic rocks. The few small treatment stands located in the intervening area watersheds around Emerald Bay and small portions of the proposed treatment stands located on the northern side of the Sierra Creek watershed are underlain by unconsolidated glacial moraine deposits.

[1] Watershed boundaries delineated by Jorgenson et al. (1978).

Soils

Soils in the subject watersheds were mapped by the U.S. Soil Conservation Service and USFS in the late 1960s during their survey of soils in the Basin (Rogers et al. 1974). Soils in the proposed treatment stands north of the Lonely Gulch/Sierra Creek watershed divide are mapped primarily as soils of the Tallac, Meeks, Waca, and Meiss series. Soils in the treatment stands south of this divide are mapped primarily as soils of the Cagwin and Meeks series. The general characteristics of these five soil series are described below.

- **Tallac Series.** Soils of the Tallac series are deep or very deep, moderately well drained, coarse-textured Inceptisols that formed from weathered glacial deposits. They contain large quantities of coarse fragments (gravels, cobbles, and stones), and are typically underlain by a weakly cemented hardpan at depths of 40–70 inches below the soil surface. Permeability is moderately rapid above the hardpan and slow in the substratum. In the proposed treatment stands, soils of the Tallac series typically occur on slopes with gradients of 0–60%. When disturbed, runoff is slow to rapid, and the hazard of erosion is slight to high.
- **Meeks Series.** Soils of the Meeks series are deep, somewhat excessively drained, coarse-textured Inceptisols that formed from weathered glacial outwash. They typically contain large quantities of coarse fragments (gravels, cobbles, and stones) and are underlain by a weakly cemented hardpan at depths of 41–70 inches below the soil surface. Permeability is rapid above the hardpan and slow in the substratum. In the proposed treatment stands, soils of the Meeks series occur on slopes of 5–60%. When disturbed, runoff is slow to rapid, and the hazard of erosion is slight to high.
- **Waca Series.** Soils of the Waca series are moderately deep, well drained, coarse- to moderately coarse–textured Andisols that formed from andesitic tuff. They typically contain appreciable quantities of gravel and are underlain by weathered andesitic tuff at depths of 20–40 inches below the soil surface. Permeability is moderately rapid. In the proposed treatment stands, soils of the Waca series occur on slopes of 30–50%. When disturbed, runoff is rapid and the hazard of erosion is high.
- **Meiss Series.** Soils of the Meiss series are shallow, moderate-textured Andisols that formed from weathered andesitic rock. They are typically underlain by hard andesitic rock at depths of 10–20 inches below soil surface. Permeability is moderately rapid. In the proposed treatment stands, soils of the Meiss series occur on slopes of 30–50%. When disturbed, runoff is rapid and the hazard of erosion is high.
- **Cagwin Series.** Soils of the Cagwin series are moderately deep, somewhat excessively drained, coarse-textured Entisols that formed from weathered granite. They are underlain by weathered granitic rock at depths of 20–40 inches below the soil surface, and they typically occur in association with rock outcrop. Within the project area, slope gradients typically range from 15 to 50% in areas underlain by soils of the Cagwin series. When disturbed, runoff is rapid and the hazard of erosion is high.

Erosion Hazard Ratings

The erosion hazard ratings are a function of several factors, such as surface soil texture, coarse fragment content, infiltration capacity, and slope gradient, and indicate the likelihood that accelerated soil erosion would occur as a result of vegetation management operations, fires, and overgrazing (Rogers et al. 1974; Soil Survey Division Staff 1993).

Although the soils that occur within the proposed treatment stands vary in texture and coarse fragment content, the erosion hazard ratings are largely a function of slope gradient. The hazard of erosion is high or very high in soil map units where slope gradients exceed 15%. The hazard of erosion is slight to moderate in gently to strongly sloping soil map units where slope gradients are typically less than 15%, as well as in steeply sloping map units where soils occur in complex with rock outcrop. These erosion hazard ratings are based on the assumption that the soil would be devoid of protective ground cover. Erosion control BMPs would be used during implementation of the Proposed Action to mitigate erosion hazard ratings to low or moderate.

Most of the proposed mechanical treatment areas (499.2 acres) are located in soil map units that have a slight or moderate erosion hazard rating. However, approximately 16% (98.6 acres) of the proposed mechanical treatment areas are located in soil map units with a high erosion hazard rating. None of the proposed mechanical treatment areas are located in soil map units with a very high erosion hazard rating.

Climate and Hydrology

Precipitation on the western side of the Basin ranges from 30 to 40 inches per year. It occurs mostly as snow between November and March, but also occurs as rain during rain events, rain-on-snow events, and summer thunderstorms. The median annual precipitation for Tahoe City, located near the mouth of the Blackwood Creek watershed, is 29.7 inches (Rowe et al. 2002).

The 21 subject watersheds that would be affected by the Proposed Action include several large, perennial streams such as Blackwood Creek, General Creek, Meeks Creek, and Cascade Creek; a few large lakes such as Cascade Lake; and numerous other intermittent streams, ephemeral streams, and wetlands that do not have official geographic names. All surface water bodies in the subject watersheds drain directly into Lake Tahoe or are tributaries to other water bodies that drain directly into Lake Tahoe. Data collected by the Lake Tahoe Interagency Monitoring Program (LTIMP) indicate that streamflows on the western side of the Basin are typically greatest during the April through June snowmelt period and taper off significantly in July (Rowe et al. 2002).

Water Quality

The cooperative LTIMP began monitoring streamflows and water quality in streams tributary to Lake Tahoe in 1979 (Rowe et al. 2002). The objective of the LTIMP monitoring network is to acquire and disseminate the streamflow and water-quality information necessary to support science-based environmental planning and decision making in the Basin. Two large perennial streams in the subject watersheds (Blackwood Creek and General Creek) were added to the LTIMP monitoring network in 1993. Relatively recent data for four constituents of concern and the associated water quality standards adopted by the LRWQCB and TRPA are shown for these monitoring stations in Table 3-17.

Median values for total phosphorus and total iron exceeded the LRWQCB/TRPA standards at both monitoring stations during the period of record (1993–1998). The median value for total nitrogen was slightly above the LRWQCB/TRPA standard for Blackwood Creek station, while both stations were well below the LRWQCB/TRPA standard for suspended sediment.

Environmental Consequences

No Action

The No-Action Alternative would have no short-term adverse effects on soils, hydrology, or water quality. A complete discussion of potential effects that would result from uncontrolled wildfire is presented in the Soils and Hydrology Report.

Proposed Action

A CWE analysis was conducted as required by NEPA and the LRWQCB's waste discharge waiver program for USFS projects. The results of this analysis are discussed below (*Cumulative Watershed Effects*). An additional analysis was conducted to ensure compliance with the RCOs set forth in the SNFPA (2001a). The project-level RCO analysis is the primary means for determining whether project activities would contribute to or interfere with attainment of desired landscape-level riparian ecosystem conditions described in the Aquatic Management Strategy of the SNFPA. RCAs that would be affected by the Proposed Action are shown in Table 3-18. The analysis found the Proposed Action to be in compliance with all six RCOs. Additional details can be found it the Soils and Hydrology Report.

Table 3-17. LTIMP Water Quality Data for Blackwood Creek and General Creek between 1993 and 1998

Constituent	Minimum	Maximum	Median	LRWQCB and TRPA Standard*
	mg/L			
Blackwood Creek				
Total Nitrogen	0.042	0.603	0.125	0.19
Total Phosphorus	0.10	1.88	0.037	0.015
Total Iron	0.073†	14.8†	0.448†	0.03‡
Suspended Sediment	1	2,840	21	60
General Creek				
Total Nitrogen	<0.04	1.79	0.16	0.15
Total Phosphorus	0.007	0.351	0.021	0.015
Total Iron	0.032†	7.65†	0.143†	0.03‡
Suspended Sediment	1	1,620	8	60

* Annual average, except for suspended sediment, which is a 90th percentile value

† Median values shown are for biologically reactive iron

‡ Standard shown is for total iron

Source: Rowe et al. 2002

Table 3-18. Riparian Conservation Areas Affected by the Proposed Action (acres)

Watershed	Watershed Area*	Total RCA in Watershed	RCA Treated under Proposed Action	Percentage of Total RCA Treated
Blackwood Creek	7,190	4,302	195	5%
Cascade Creek	2,805	1,829	0	0%
General Creek	4,843	2,752	2	<1%
Intervening area – Eagle Point	731	206	35	17%
Intervening area – Emerald Point	1,527	894	32	4%
Intervening area – Meeks Bay	70	26	1	4%
Intervening area – Paradise Flat North	99	74	1	1%
Intervening area – Paradise Flat South	292	81	11	14%
Intervening area – Rubicon Bay	193	81	0	0%
Intervening area – Sugar Pine Point	927	244	19	8%
Intervening area – Ward Creek	1,095	319	38	12%
Lonely Gulch	688	441	18	4%
Madden Creek	1,301	649	2	<1%
McKinney Creek	2,965	1,784	305	3%
Meeks Creek	5,225	3,306	113	3%
Quail Creek	922	578	60	10%
Rubicon Creek	1,735	1,079	196	18%
Sierra Creek	568	326	60	18%
Unnamed creek at Meeks Bay	174	43	17	40%
Unnamed creek at Paradise Flat	398	270	2	<1%

* Includes surface water bodies such as lakes and ponds.

Direct Effects

Short-Term Effects of Proposed Thinning Treatments and Site Preparation on Soil Quality

Hand thinning and site preparation treatments (chainsaw thinning and slash piling) would be the primary type of treatment applied to high erosion hazard lands and ecologically sensitive RCAs and SEZs located within the proposed treatment stands. Although hand treatments such as these do result in temporary reductions in soil cover, they are typically considered to be low-impact treatments because they do not require the use of heavy mechanical equipment that can cause extensive soil and vegetation disturbance. Soil disturbance (i.e., displacement and compaction) and the disturbance of vegetation not being removed from hand treatment areas is expected to be minimal and would generally be localized on slash skid trails and in the vicinity of constructed slash piles.

Mechanical thinning and slash piling would be implemented primarily in gently to moderately sloping areas (including RCAs) that have a low or moderate erosion hazard rating. Only 16% (98.6 acres) of the proposed mechanical treatment areas would be located on high erosion hazard lands. Although mechanical treatments generally have a greater potential to cause detrimental soil and vegetation disturbance than hand treatments, low ground pressure equipment would be used to minimize soil compaction and displacement in mechanical treatment areas. Soil disturbance in mechanical treatment areas would likely be most substantial in high-traffic areas such as log landings, SEZ crossings, and along the main trails used to move equipment.

In addition to using these relatively low-impact stand treatment methods, LTBMU would (1) design the Proposed Action in accordance with California State Water Resources Control Board (SWRCB) forest management restrictions; TRPA Code requirements; and SEZ restrictions developed by LTBMU, LRWQCB, and TRPA; and (2) work in coordination with the timber sale contractor to implement a variety of soil and water quality BMPs certified by SWRCB and authorized by U.S. Environmental Protection Agency (Tahoe Regional Planning Agency 1988; USDA Forest 2000b), as well as numerous other activity-specific BMPs developed by LTBMU watershed specialists and soil scientists. All BMPs would be monitored for effectiveness throughout implementation of the Proposed Action and would be repaired, reinstalled, or replaced as necessary to achieve desired results. Implementation of these BMPs and compliance with SWRCB forest management restrictions, TRPA Code requirements, and SEZ restrictions would help to minimize or avoid detrimental soil disturbance and ensure compliance with the USFS Pacific Southwest Region soil quality standards for productivity, hydrologic function, and buffering capacity (described in the Soils and Hydrology Report). A complete list of the BMPs that would be used during implementation of the Proposed Action is provided in Appendix A.

Short-Term Effects of Proposed Thinning Treatments and Site Preparation on Hydrologic Processes, Erosion Rates, and Water Quality

The soil disturbance (displacement and compaction), vegetation disturbance, and temporary reduction in ground cover that would result from the proposed thinning

treatments and site preparation could temporarily increase runoff and erosion rates above preproject levels and potentially increase the delivery of sediment and associated nutrients (e.g., nitrogen and phosphorus) to streams that are tributary to Lake Tahoe. The potential for increased runoff and accelerated erosion would be highest on log landings and along forwarder/processor trails where soil and vegetation disturbance is likely to be the most extensive. The greatest increases in sediment delivery potential are likely to occur at temporary SEZ crossings where the distance between project-related soil disturbance and streams would be small.

These potential short-term effects on hydrologic processes, erosion rates, and water quality would be addressed largely through project design and the application of BMPs designed to minimize soil and vegetation disturbance; maintain soil cover; and control runoff, erosion, and sedimentation. Specifically, these concerns would be addressed through (1) the use of low-impact hand treatments on high erosion hazard lands; (2) the use of low ground pressure equipment in mechanical treatment areas; (3) compliance with SWRCB and TRPA forest management restrictions; (4) compliance with SEZ restrictions developed by LTBMU, LRWQCB, and TRPA; and (5) the implementation of state-certified and federally authorized BMPs (Tahoe Regional Planning Agency 1988; USDA Forest Service 2000b) and activity-specific BMPs developed by LTBMU resource specialists. All BMPs would be monitored for effectiveness throughout implementation of the Proposed Action and would be repaired, reinstalled, or replaced as necessary to achieve desired results. Implementation of BMPs and incorporation of the aforementioned forest management and SEZ restrictions into the project design would minimize soil and vegetation disturbance and project-related effects on runoff and erosion and sedimentation rates, and would ensure compliance with the Basin-wide and water body–specific water quality standards adopted by TRPA and LRWQCB. A complete list of the BMPs that would be used during implementation of the Proposed Action is provided in Appendix A.

Effects of Prescribed Fire Treatments on Soils, Hydrologic Processes, and Water Quality

Under the Proposed Action, prescribed fire would be used to treat residual fuel loads in both hand and mechanical treatment areas. Pile burning would be used in hand treatment areas and may be used in some mechanically treated areas to consume slash generated during the hand-thinning treatments and site preparation; low-intensity underburning would be used to consume excess ground fuels in mechanical treatment areas. In accordance with SEZ restrictions developed by LTBMU, LRWQCB, and TRPA, and with TRPA Code requirements for prescribed burns, all pile-burning treatments would be conducted outside designated SEZs or more than 50 feet from riparian indicators, but they may occur near the outer limits of RCAs. The proposed underburning treatments would not be ignited within SEZs and RCAs, but would be allowed to backburn into these areas if conditions permit. In general, both pile-burning and underburning treatments would be conducted when conditions are such that backburning into riparian areas would be unlikely.

Fire can cause chemical changes in soils that can have both positive and negative effects on nutrient availability and plant growth. The potash created by burning organic matter can make the soil more alkaline, which in turn makes calcium, magnesium, and potassium more available to plants. Nitrogen stored in organic matter, however, can be lost through burning. Above 200°C, nitrogen may be lost through volatilization when it is converted to a gas. Nutrients may also be lost through erosion, as ash and surface soil materials are eroded away. Because the maximum ground temperatures resulting from prescribed fires in Sierra Nevada mixed conifer forests rarely exceed 225°C, the net effect of the proposed underburn treatments on nutrient availability would likely be beneficial. Pile burns generate higher ground temperatures and can cause localized reductions in soil nitrogen content. These losses are not likely to be extensive enough to substantially affect nitrogen availability or soil quality in the proposed treatment stands.

Fire can also alter the physical properties of soils through the formation of a hydrophobic layer. At soil temperatures between 100° and 200°C, soil organic matter starts to burn and volatilize. When the soil cools, gas containing the remaining organic matter condenses, and soil particles become coated with a water-repellant substance. This phenomenon is usually patchy and short term, but it can temporarily restrict infiltration and increase runoff rates. Above 500°C, organic matter is entirely consumed and hydrophobic conditions are not created.

Although ground temperatures above 500°C can occur below burning slash piles, ground temperatures this high are uncommon in prescribed fires in Sierra Nevada mixed conifer forests. Accordingly, the proposed underburning treatments, and possibly some of the pile-burning treatments, could create temporary hydrophobic soil conditions in some portions of the proposed treatment stands. Coupled with the temporary reductions in ground cover that typically result from prescribed burns, hydrophobic soil conditions could increase runoff, erosion rates, and the delivery of sediment and associated nutrients to nearby streams. Accelerated erosion rates in areas affected by the prescribed fire treatments could exceed the SNFPA soil quality threshold for soil loss and could cause increases in sediment and nutrient loads that exceed TRPA and LRWQCB standards for runoff and stream water quality (see Chapter 2).

Indirect Effects

Long-Term Effects of Proposed Thinning, Site Preparation, and Prescribed Fire Treatments on Soil Quality, Hydrologic Processes, and Water Quality

The thinning, site preparation, and prescribed fire treatments that would be implemented under the Proposed Action would substantially reduce the risk of catastrophic wildfires with destructively high temperatures (Pritchett 1987; DeBano et al. 1998), improve forest structure and health, and maintain or enhance the physical integrity and key attributes of RCAs and SEZs. By reducing the risk of wildfire, the Proposed Action would substantially reduce the potential for large-scale adverse effects on hydrologic processes (infiltration and runoff rates), soil quality (erosion rates), and water quality (sediment and

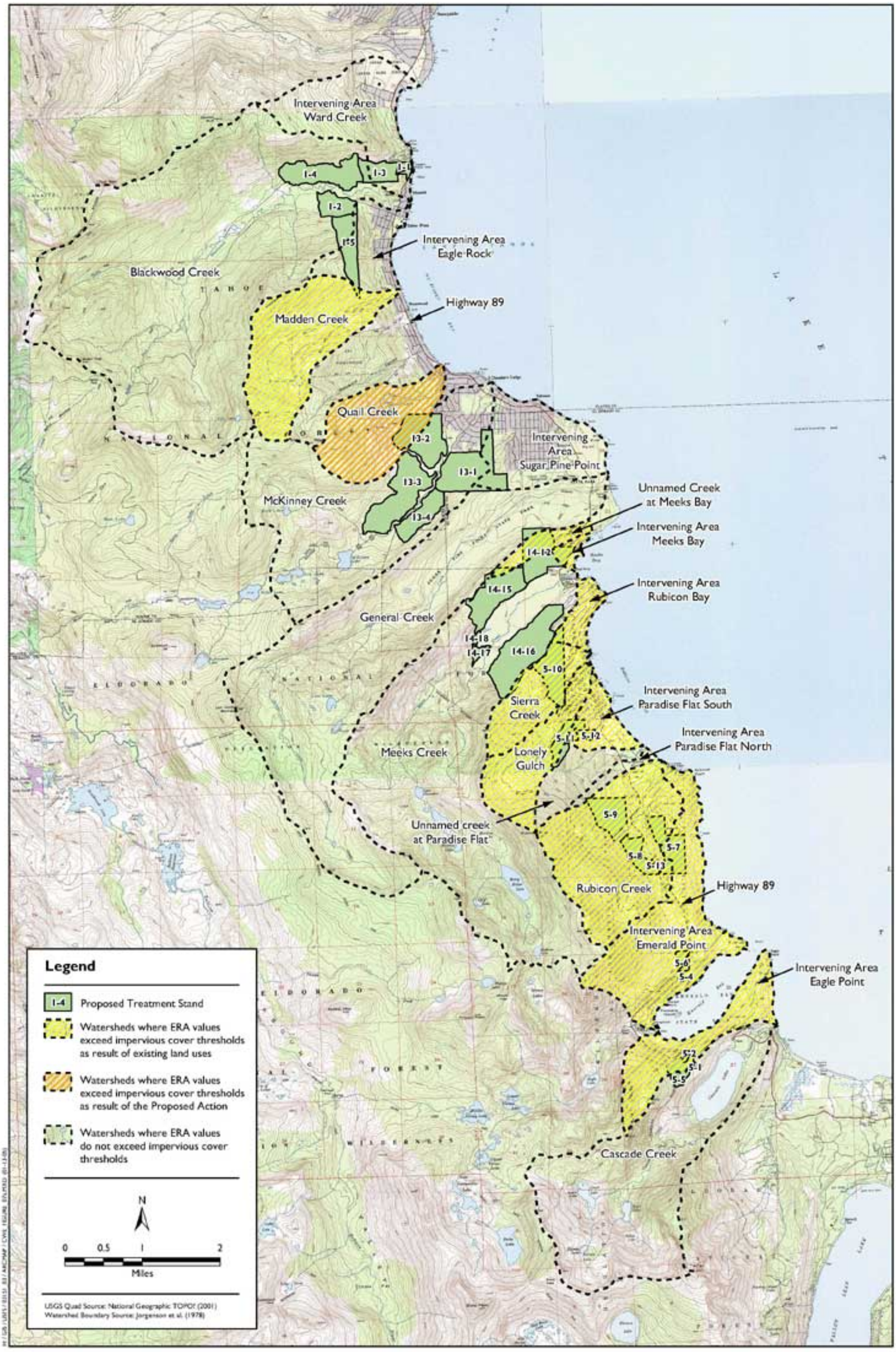
nutrient loading rates) that can result from large-scale wildfire events. Thus, the long-term effects of the Proposed Action on hydrologic processes, soil quality, and water quality would be beneficial and would help to offset some of the short-term adverse effects of the proposed treatments.

Cumulative Watershed Effects

The CWE analysis in the Soils and Hydrology Report results indicated that 11 of the 21 watersheds in the project area are at risk of experiencing adverse cumulative watershed effects such as increased runoff and peak flows, accelerated erosion and sedimentation, and stream channel destabilization over the 10-year postproject evaluation period (Figure 3-1). Ten of these at-risk watersheds have equivalent roaded area (ERA) (an index of impervious ground cover) values that are substantially higher than the impervious cover thresholds for the watersheds as a result of existing land use (residential structures, roads and recreational facilities). In 10 of these 11 subject watersheds, the total ERA values are substantially higher than impervious cover thresholds during the entire 10-year evaluation period as a result of existing land use (residential structures, roads, and recreational facilities such as ski areas). In one of these 11 watersheds (Quail Creek), the total ERA value is slightly greater than the impervious cover threshold in the last 8 years of the 10-year evaluation period as a result of the Proposed Action.

Watersheds Where Total ERA Values Exceed Impervious Cover Thresholds as a Result of Existing Land Use

- *Madden Creek, Rubicon Creek, Intervening Area–Eagle Point, and Intervening Area–Emerald Point Watersheds*. Total ERA values exceed impervious cover thresholds in these four watersheds, largely as a result of existing recreational facilities, such as D.L. Bliss State Park (Rubicon Creek and Intervening Area–Emerald Point watersheds), Emerald Point State Park (Intervening Area–Eagle Point watershed), and the Homewood Ski Area (Madden Creek watershed); the Homewood Ski Area is the subject of an ongoing timber harvest operation. Although these recreational facilities were assigned a relatively low ERA coefficient (0.10) for the purpose of this CWE analysis, they have a large effect on ERA values because they are geographically extensive and occupy a significant proportion of these four watersheds. The Proposed Action has a comparatively small effect on total ERA values for these four watersheds over the 10-year evaluation period.
- *Sierra Creek, Lonely Gulch, Unnamed Creek at Meeks Bay, Intervening Area–Meeks Bay, Intervening Area–Rubicon Bay, and Intervening Area–Paradise Flat South Watersheds*. Total ERA values exceed impervious cover thresholds in these six watersheds largely as a result of existing residential structures and paved/surfaced roads concentrated in communities along the shore of Lake Tahoe. The Proposed Action has a comparatively small effect on ERA values in these six subject watersheds over the 10-year evaluation period.



Jones & Stokes

Figure 3-1
Cumulative Watershed Effects

Watersheds Where ERA Values Exceed Impervious Cover Thresholds as a Result of the Proposed Action

- *Quail Creek Watershed*. The Quail Creek watershed is the only subject watershed where total ERA values exceed the impervious cover threshold during the 10-year evaluation period as a direct result of the Proposed Action. In 2004, ERA values are close to the impervious cover threshold due to the effects of existing residential structures, roads, and recreational facilities (Homewood Ski Area). The Proposed Action causes the total ERA value for the Quail Creek watershed to exceed the impervious cover threshold starting in 2006. Although the effects of the Proposed Action are not permanent and would decrease over time due to watershed recovery, total ERA values remain above the impervious cover threshold for the remainder of the 10-year evaluation period (i.e., through 2013).

Discussion

The results of the CWE analysis indicate that the 11 subject watersheds identified above and in Figure 3-1 are at risk of experiencing adverse cumulative watershed effects such as increased runoff and peak flows, accelerated erosion and sedimentation, and stream channel destabilization. Although the CWE analysis suggests that the Proposed Action could contribute to adverse cumulative effects in these 11 "at risk" watersheds, the individual contribution of the Proposed Action would be relatively small in comparison to the more substantial and often permanent effects of existing land uses and other non-LTBMU vegetation management projects that are employing less environmentally sensitive timber harvesting and fuel treatment techniques. Further, because the Proposed Action would not result in the creation of any permanent impervious ground cover, its effect on watershed conditions and processes would decrease considerably over time as a result of natural watershed recovery. The BMPs that would be implemented by LTBMU (Appendix A) would substantially lessen the initial effects of the Proposed Action and hasten this recovery. Additionally, the Proposed Action would have a number of beneficial, long-term cumulative effects on watershed conditions, such as a reduced risk of catastrophic wildfire, the restoration of healthy forest structure, and a reduction in unnaturally large volumes of woody material in SEZs and RCAs, all of which would help to offset the short-term, adverse cumulative effects of the Proposed Action on watershed conditions.

Vegetation, Fire, and Fuels

Forest Stands

Description of Existing Conditions

The forest stands in the Quail project area consist entirely of the mixed conifer forest type, although Jeffrey pine is a dominant species within this type. The project area elevations below 7,500 feet and covers approximately 2,704 acres within the Blackwood,

McKinney, Meeks and Emerald Bay Management Areas. Site quality ranges from moderate to low (Dunning site classes III and IV). The lower site quality is found on some south-facing slopes and ridgetops. The mixed conifer habitat type is described in detail in *Biological Resources*, above.

Based on stand exam plot data (Forest Inventory and Analysis System 2002) collected between 1999 and 2003, most stands are two-storied with shade-tolerant species in the understory and pine and fir in the overstory. Stand ages range from 70 to 100 years. Most of these stands are in the stem-exclusion stage of stand development. In this stage, some trees begin to die and surviving ones grow larger and express differences in height and diameter; first one species and then another may appear to dominate the stand (Oliver and Larson 2000).

Summary stand data (see Table 3-19 and Table B-1 in Appendix B) indicate an average number of 842 live trees per acre (range of 357–1,478 trees per acre); average basal area of 237 ft^2 per acre (range of 124 to 374 ft^2); average quadratic mean diameter of 8 inches (range of 4–12 inches); and canopy closure average of 63% (range of 45–75%).

Table 3-19. Summary of Existing Live Tree Stand Exam Data

Stand	Acres	Basal Area (Ft^2/acre)	Trees (Per acre)	QMD (Inches)	Canopy Closure (%)
Total/Average	2,704	237.1	841.5	7.6	62.5

Environmental Consequences

No Action

The No-Action Alternative (i.e., no treatment of stands in the project area) would not meet the intent of current management direction for the wildland-urban intermix zone. The No-Action Alternative was simulated in two scenarios: (1) no treatment, without the occurrence of a wildfire throughout the simulation period; and (2) no treatment, with a wildfire occurring in 2005. In the first scenario, the existing overcrowded forest condition is expected to lessen the tree growth by competition and to worsen the threat of mortality from bark beetles. Fuel ladders would connect more acres of ground fuels to the crowns in the overstory, resulting in an increasing potential for stand-replacing fire on a larger spatial scale. In the second scenario, all but a few stands would support active crown fire.

Proposed Action

Treatments of vegetation and fuels that meet the objectives of the Proposed Action involve (1) thinning brush and trees; (2) piling, burning, removing biomass, and chipping

fuels; (3) cutting, chipping, and removing infested, diseased, and dead standing and down trees; and (4) prescribed underburning subsequent to vegetation treatments. These treatments would meet the purpose and need of the LRMP as amended in 2004) in the wildland-urban intermix defense zone.

In compliance with LRMP direction, trees more than 30 inches in diameter would not be thinned, and the total canopy cover would not be reduced by more than 30%. An LOP is given for mechanical treatment within 0.25 mile of California spotted owl and northern goshawk PACs and nest sites.

The potential for residual trees to develop into later stages of stand development (including old growth) would be enhanced by reduced competition for scarce water and by lower risk of stand-replacing fire. The increase in growth rates of residual trees would result in greater resistance to bark beetle attack. Retention of drought- and fire-tolerant Jeffrey pine would withstand prescribed burning following treatment and into the future. Special preference for retention of sugar pine and western white pine would be given in accordance with Region 5 policy to protect these species from white pine blister rust, an exotic pathogen.

Limited or no treatment would occur in SEZs and around nest sites of sensitive species. Thinning would be based on canopy position (i.e., suppressed, intermediate, and a few co-dominant trees would be thinned); this approach would result in uneven spacing of residual trees. To the extent possible, thinning would be designed to restore a mosaic of tree spacing, small openings, and small clumps of pine.

The potential direct, indirect, and cumulative effects of the Proposed Action on forest health are expected to be minor. Noxious weed invasion would be minimized by retaining at least 30% canopy cover; retaining chips, slash, or mulch as soil cover; and use of additional mitigation measures and BMPs.

Simulations of various treatment and non-treatment scenarios were conducted with the stand exam data using the Forest Vegetation Simulator (Dixon 2002). Four scenarios were simulated for a 25-year period: (1) no treatment; (2) no treatment with a wildfire in 2005; (3) hand treatment; and (4) mechanical treatment. Hand treatment would generally entail thinning trees up to 14 inches in diameter in 2005, piling of thinned materials and selected ground fuels in 2005, burning the piles in 2006, and underburning in 2010. Mechanical treatment would entail thinning trees up to 30 inches diameter in 2005, chipping activity and select ground fuels in 2005, and underburning in 2010. Residual basal area and canopy cover resulting from the four scenarios are summarized (see Table 3-20 and Table B-2 in Appendix B) for 2005 (post-treatment), 2015 (to show effects of pile burning and underburning), and 2025 (to show the effects of treatment on residual tree growth).

In the general prescription for hand thinning, trees more than 14 inches in diameter would be retained, and 15 trees per acre smaller than 14 inches in diameter would be retained. In some stands where there is an abundance of small trees, post–hand treatment basal areas would be low. In these stands a mosaic of young open conditions would allow for faster promotion of pine towards old-growth stand development.

In the general prescription for mechanical thinning, a target basal area per acre is used to approximate sufficient reduction in density to allow for a healthier stand condition. Although target basal areas used in the simulation differ between stands, they range from 100 to 140 ft^2/acre. Due to an abundance of large trees in some stands and the 30-inch-diameter limit, some post-treatment basal areas in mechanically treated stands remain higher than the simulated target. Treatment of these stands would be effective for the simulated period, but would need thinning sooner than other stands in which the treatment more closely approximates the simulated target.

Table 3-20. Average Predicted Live Tree Stand Conditions under Four Scenarios

	No Treatment		No Treatment w/Wildfire		Hand Treatment		Mechanical Treatment	
Year	BA	CC (%)	BA	CC (%)	BA	CC (%)	BA	CC (%)
2005	223.4	60.4	32.1	7.1	162.2	39.3	150.2	38.6
2015	255.0	66.0	38.7	19.1	161.2	39.9	165.9	41.9
2025	284.7	69.1	61.0	28.4	185.1	46.3	190.3	48.2

Simulations are accurate to 100-year projects, but begin to lose accuracy beyond that point. Most of the stands in the analysis area are relatively young (80–120 years), and predicting when these stands would approach the old-growth stage would vary depending on whether they are treated. Based on average predicted growth rates for the next 20 years, treated stands would develop into the old-growth stage 31% faster than untreated stands.

Fuels

Description of Existing Conditions

Forest and fuel conditions in the Quail project area prior to the 1850s consisted of forests dominated by widely spaced, large-diameter Jeffrey pine, sugar pine, incense cedar, white and red fir, and lodgepole pine. There were, compared to current conditions, generally fewer trees per acre but larger individual trees. Studies on the west shore of Lake Tahoe in 1999 by Pennsylvania State University professor Alan Taylor et al. (2000) indicated that a 5- to 12-year fire return interval was typical for the area. This regime of

frequent, low-intensity ground fires reduced the amount of understory shrubs, shade-tolerant tree species, and dead fuel accumulations.

Fire suppression over the past 100 years has substantially changed the fuel conditions and fire behavior in the project area. The accumulation of surface and ladder fuels, especially the growth of dense, small-diameter suppressed trees, contributes to increased potential for crown fire potential. Tree mortality, primarily in white fir and lodgepole pine, during the 1988–1996 drought cycle has added to existing standing and down fuel composition. Current down surface fuels range from approximately 31 to 76 tons per acre, with standing dead ranging from 2 to 21 tons per acre (see Table 3-21 and Table B-3 of Appendix B). Average surface fuel loading across the project area is 44 tons per acre; average standing dead fuel loading is 8 tons per acre.

Potential fire behavior on the landscape is analyzed using existing forest stand data including ground fuels and 90th percentile fire weather (with respect to moisture content of fuels, temperature, and wind speed conditions) values in the Fire and Fuels Extension (FFE) (Reinhardt and Crookston 2003) to the Forest Vegetation Simulator. Weather data from the Meyers weather station were the primary source of information for analyzing fire weather. On average, 10 days per year have 90th percentile weather conditions, but the actual number of days is highly variable.

Existing conditions in all the units proposed for treatment fall short of meeting the desired conditions for fuel ladders and fire behavior described in the LRMP as amended. Under an uncontrolled wildfire, most of the stands in the project area are expected to experience active or passive crown fire and tree mortality greater than 90%. An *active crown fire* spreads through the tree canopy; a *passive crown fire* typically ignites individual or small groups of trees but is not propagated through the crown. A *surface fire*, by contrast, is limited to fuels on or near the ground surface such as downed wood, grasses, and shrubs. A *conditional crown fire* is one that can be carried through the crowns with support of a ground fire if the density of trees and overall crown bulk density are combined with sufficient wind and topographical features.

The fire type potential in the FFE is simulated each year and continues to build ground and live fuels until consumed in an active crown fire. Twenty of the 26 stands in the project area would likely experience passive or active crown fire under existing fuel conditions (see Appendix B).

Table 3-21. Average Existing Fuel Loading and Predicted Fire Behavior

Surface Fuels (Tons/A)	Standing Dead (Tons/A)	Canopy Base Height (Feet)	Fire Type Potential	Flame Length (Feet)	Fire Mortality (%)
43.0	9.3	4.3	P	3.5	73.4
A = Active Crown, P = Passive Crown, S = Surface, C = Conditional Crown fire					

Environmental Consequences

No Action

The No-Action Alternative would have no immediate direct effects, because existing fuel conditions and expected fire behavior would not be modified. Over time, however, fuel conditions would worsen, and the probability of catastrophic losses from an uncontrolled wildfire event would increase. The project area would continue to have fuel loadings that are considered hazardous and support fire, such as active or passive crown fire, that is difficult and dangerous to control.

The No-Action Alternative would not improve current conditions, and would consequently fail to meet the intent of current management direction. The existing fuel ladder and overcrowded forest conditions are expected to worsen over time and result in an increased threat of tree mortality, downed fuel loads, and high-intensity wildland fire potential. The No-Action Alternative may contribute to adverse cumulative effects on forest health by increasing the probability of catastrophic wildfire losses, disease and pest invasions, slower tree growth, higher incidence of hazard trees, and lower aesthetic quality resulting from high levels of competition and increased susceptibility to drought.

Proposed Action

The Proposed Action would result in beneficial direct, indirect, and cumulative effects on fuel conditions and fire behavior. Implementation of the Proposed Action would meet the desired conditions for fuel and fire behavior under 90^{th} percentile fire weather conditions for the urban defense zone as identified in the SNFPA ROD (USDA Forest Service 2004). These desired conditions are listed below.

- Stands are fairly open and dominated primarily by larger, fire tolerant trees.
- Surface and ladder fuel conditions are such that crown fire ignition is highly unlikely.
- The openness and discontinuity of crown fuels, both horizontally and vertically, result in very low probability of sustained crown fire.

The Proposed Action, including mechanical and hand treatments, is expected to result in a net benefit to fuel conditions and to meet current management direction for fire behavior. Surface fuels in all stands would be reduced from an average of 44 tons per acre to 15 tons per acre, and potential fire behavior is expected to change from active or passive crown fire to surface fire (see Table B-4 of Appendix B).

The Proposed Action would also result in improved survivability rates of residual stands subjected to wildland fire and to reduce future wildfire suppression costs. Treatments would greatly reduce the potential for crown fire initiation and crown fire sustainability. These benefits would exist for a period of 10–20 years beyond implementation.

In Table 3-22 and Table B-4 in Appendix B, average results from four scenarios are presented. For 2005, the no-treatment scenario reflects the existing condition. The remaining scenarios in 2005 show results of (1) the impact of a wildfire without treatment, (2) the results of hand treatment, and (3) the results of mechanical treatment. The fuel loads in 2005 resulting from hand and mechanical treatments are higher than the no treatment (existing condition) as a result of piling fuels generated by thinning activities as well as existing ground fuels. Because the fuel piles generated in 2005 would be burned in 2006, the fuel load projected for 2015 under hand and mechanical treatments is much less than that projected in the no-treatment scenario.

Visual Quality

Description of Existing Conditions

The forested lands in the project area are generally as attractive now as they have been at any point subsequent to the Comstock mining period (1861–1898). Project area stands are generally two-storied with a dense understory that limits views into the forest. Within the project area the most visible impacts on National Forest System Lands are recreation developments, roads, and utilities. Much of the project area shows little to no evidence of human disturbance to the natural landscape; in particular, the large hand-treatment areas west of SR 89 are located in undeveloped areas of the forest.

All the proposed treatment stands are in areas with Visual Quality Objectives (VQOs) of retention or partial retention[2] with the exception of stand 5-1, which encompasses Inspiration Point, a site identified for visual rehabilitation (USDA Forest Service 1988).

TRPA has designated SR 89 as a Scenic Highway Corridor and a Shoreline Travel Route. Several treatment stands are adjacent to SR 89 (Table 3-23). The adopted scenic threshold policy requires that the 1982 travel route ratings on all roadway and shoreline units be maintained (Tahoe Regional Planning Agency 1989). Scenic thresholds for roadway travel routes are based on composite scores for six indicators: (1) aesthetic qualities of structures and other artificial features such as buildings, landscape scars, or utility lines; (2) physical distractions along the roadway that decrease driving pleasure;

[2] Retention (R) – Only management activities which are not visually evident are allowed. Under Retention, activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount intensity, direction, pattern, etc., should not be evident. Immediate reduction in visual contrast (form, line, color, and texture) should be accomplished either during construction or immediately after.

Partial Retention (PR) – Management activities are to remain visually subordinate to the characteristic landscape when managed according to the partial retention visual quality objective. Activities may repeat form, line, color, or texture common to the characteristic landscape, but changes in their quality of size, amount, intensity, direction, pattern, etc., remain subordinate to the characteristic landscape. Reduction of visual contrast to meet partial retention should be accomplished as soon after project completion as possible, or at a minimum, within the first year.

(3) roadway structure; (4) lake views; (5) landscape views; and (6) variety in elements of the environment. The maximum score for each indicator is five, for a maximum threshold composite score of 30. In roadway units rated below 16, restoration of scenic quality is ongoing (Tahoe Regional Planning Agency 1987, 2004). The project area encompasses roadway units with scenic ratings ranging from 26 at Emerald Bay (one of the most beautiful areas in the Basin with one of highest ratings) to 13 at Meeks Bay (an area identified as needing improvement). Ratings of travel routes intersecting the project area are presented in Table 3-23.

The project also encompasses several stands that may be visible from the Scenic Shoreline Travel Route (Table 3-24). Scenic thresholds for shoreline travel routes are based on composite scores for three indicators: (1) aesthetic qualities of structures and other artificial features such as buildings, landscape scars, or utility lines; (2) panoramic landscape views as seen from boats; and (3) variety in the natural landscape. Route ratings of shoreline travel routes with potential views of project stands are presented in Table 3-24.

Environmental Consequences

No Action

The No-Action Alternative would result in no change from existing conditions with respect to visual quality over the short term. Over the long term, the risk of catastrophic wildfire and associated adverse effects on scenic quality would increase in proposed treatment stands.

Proposed Action

The Proposed Action would result in the open forested landscapes characteristic of fire-dependent mixed-conifer communities. Stands would exhibit characteristics of later stages of stand development as smaller stems are removed and residual trees respond to reduced competition with increased growth. Visitors to the area have expressed a preference for viewing forests in these older stages of stand development.

One of the goals of the Proposed Action is to restore fire-dependent ecosystems and the open, more park-like conditions associated with these ecosystems. Treatments would be designed on a stand-by-stand basis to accommodate screening of the built environment in these more open stands, provided that fire safety would not be compromised. To meet the VQOs for treatment stands, thinning would be designed to restore a mosaic of tree spacing, small openings, and small clumps of pine. Thinning of primarily suppressed and intermediate understory trees would result in uneven spacing of residual trees. In addition, limited or no treatment would occur in SEZs or around nest sites of sensitive

Table 3-22. Average Predicted Fuel Loading and Fire Behavior under 90th Percentile Weather Conditions

	No Treatment			No Treatment with Wildfire (2005)			Hand Treatment			Mechanical Treatment		
Year	Surface Fuels (Tons/ac)	Standing Dead (Tons/ac)	Fire Type Potential	Surface Fuels (Tons/ac)	Standing Dead (Tons/ac)	Fire Type Potential	Surface Fuels (Tons/ac)	Standing Dead (Tons/ac)	Fire Type Potential	Surface Fuels (Tons/ac)	Standing Dead (Tons/ac)	Fire Type Potential
2005	43.7	8.2	P	20.7	70.7	S	60.5	8.2	S	55.3	8.9	S
2015	49.2	8.9	P	44.5	38.5	P	16.3	11.8	S-P	15.3	7.7	P
2025	55.5	10.0	C	55.5	20.9	P	21.9	8.0	P	19.7	5.0	S-P

Fire Types: A = Active Crown, P = Passive Crown, S = Surface, C = Conditional Crown fire

Table 3-23. Travel Route Ratings* for SR 89 Roadway Units adjacent to Treatment Stands

Treatment Stand Number	Roadway Unit	Roadway Travel Route Rating Indicators: Artificial Features	Roadway Distractions	Road Structure	Lake Views	Landscape Views	Variety	Threshold Composite Travel Route Rating*
1-1	Tahoe Pines	2.5	2	4	3	3	3	17.5
Predicted Impact of the Proposed Action on Visual Quality** This stand is located on the western side of SR 89; consequently, lake views would not be enhanced. Visibility of artificial features within the Kaspian Campground may increase but would be unlikely to result in a lower score for this indicator. Lake and landscape views would not be affected. An increase in variety would be expected, but because the treated stand covers a small proportion of the roadway segment there would be no effect on the overall variety score. The general appearance of the forest as viewed from Eagle Rock may be improved.								
5-1, 5-2, 5-4, 5-6	Emerald Bay	5	3.5	3	5	5	5	26.5
Predicted Impact of the Proposed Action on Visual Quality** 5-1 and 5-2: These stands are located between Bayview Campground and Inspiration Point. This is an area of exceptionally high scenic quality. Thinning in these areas would improve lake views across Emerald Bay and would improve variety; these attributes currently have the maximum rating and would remain unchanged. Indicator ratings for artificial features and variety would be unaffected. 5-4 and 5-6: Treatment would improve lake views and variety; however, overall scores for these attributes would remain the same. Views of landscapes would not be affected. Measures would be taken to maintain screening of built structures in Stand 5-4. Because of the small stand size (8 acres), the artificial feature indicator score would not be affected.								
5-8, 5-13	DL Bliss State Park	5	5	3	3	2	3	21
Predicted Impact of the Proposed Action on Visual Quality** Treatment of stands 5-8 and 5-13 would result in improved views into the forest on the east and west sides of the highway. However, the overall variety score would likely remain the same, because the proportion of the total roadway unit treated would be relatively small. Other visual indicators would not be affected.								
5-10, 14-12	Meeks Bay	3	2	3	2	2	2	14
Predicted Impact of the Proposed Action on Visual Quality** 5-10: Treatment has the potential to improve lake views; however, the area of the stand adjacent to the roadway unit is so small that the treatment would not affect any indicator scores. 14-12: This stand is in an area of the Meek's Bay Roadway Unit that is identified as an area of concern with respect to scenic character. The natural forest cover is the principal scenic resource in this area. Because the forest is not very dense in the proposed treatment area, only minimal thinning of small trees would occur. The existing view would not change significantly; accordingly, indicator scores for lake views, landscape views, and variety would remain the same. Treatments would be designed to maximize screening while meeting WUI objectives and would not be expected to affect the artificial features score.								

*Ratings are from Tahoe Regional Planning Agency 2001 Threshold Evaluation

**No treatments would affect roadway distractions or road structures; therefore, only effects on artificial features, lake views, landscape views, and variety are addressed.

Table 3-24. Shoreline Route Ratings* for Units with Potential Views of Treatment Stands

Treatment Stand Number	Shoreline Unit	Shoreline Threshold Travel Route Indicators			Threshold Composite Shoreline Route Rating*	Predicted Impact of the Proposed Action on Visual Quality
		Artificial Features	Background Views	Variety		
1-1	Ward Creek	2	3	4	9	A portion of the treatment stand may be visible from lake; however, visibility of the stand would be limited because it is located on the west side of SR 89 across from the Kaspian Picnic Area. Additional artificial features would not be exposed by treatment nor would background views be affected. Because of limited visibility from the lake, the variety score would not be improved.
5-1, 5-2, 5-4, 5-6	Emerald Bay	2.5	5	5	12.5	Treatment of stand 5-4 may expose additional artificial features. Road scars and residences are currently visible from the lake in the area proposed for treatment. Treatment of this 8-acre stand would not affect the artificial feature score within the unit. Treatment of the remaining stands would potentially improve variety; this rating is already at the maximum value. Treatments would have no impact on background views.
5-7	DL Bliss State Park	5	4	3	12	Portions of the stand may be visible from the lake. Treatment would not expose artificial features or affect background views. Small improvements in variety would not result in an increased variety score for the unit.

*Ratings are from Tahoe Regional Planning Agency 2001 Threshold Evaluation

species. These approaches would result in a natural appearance more characteristic of forests present in the Basin prior to European settlement.

Short-term effects of the Proposed Action would include the addition to the visual landscape of brush piles, stumps, and blackened ground. Cutting stumps flush with ground level in and immediately adjacent to high-use areas and travel routes would minimize visibility of stumps. Brush piles would be present for 1–2 years depending on weather conditions for burning. During this period the VQOs of Retention and Partial Retention would not be met. Blackened areas resulting from underburning would also be present for only 1–2 years until they are naturally revegetated. Fire scars on tree boles naturally occur in fire-dependent ecosystems and are present on trees in stands that have not burned in 100 years or more; such characteristics, accordingly, are not considered to have an adverse effect on visual quality. Figure 3-2 provides photographs of pre- and post-treatment conditions in hand- and mechanically treated stands in the LTBMU.

The Proposed Action and future fuel reduction projects would enhance visual quality over the long term by restoring forest views to a more open condition, maintaining viewing opportunities from vista points, and improving viewing opportunities along scenic corridors. Stand-by-stand assessments of thinning effects on visual quality are presented in Tables 3-23 through 3-25. Overall, the project is consistent with TRPA goals of maintaining or improving the numerical setting assigned to each Scenic Roadway or Shoreline Travel Route and maintaining and enhancing the natural-appearing landscape of lands in the Basin.

Table 3-25. Effects of the Proposed Action on Visual Quality of Individual Stands outside the Scenic SR 89 Corridor

Treatment Stand Number	Predicted Impact of the Proposed Action on Visual Quality
Stands outside the SR 89 Scenic Corridor	
1-2, 1-3, 1-4, 1-5	Treatment of Stand 1-3 may enhance the general appearance of the forest as viewed from Eagle Rock. Treatment of Stand 1-4 would result in enhanced forest views from the road and trail bordering the stand to the south. Treatment of Stands 1-2 and 1-5 would result in improved views into the forest.
5-5	Treatment of Stand 5-5 would result in improved lake views from the trails to White Cloud Falls and Desolation Wilderness that begin at the south end of Bayview Campground.
5-7	Treatment may provide views of the lake along the entrance road to the DL Bliss State Park Campground. Views within the forest will be improved from current heavily forested conditions.
5-9	Treatment would result in improved views into the forest.
13-1,13-2, 13-3,13-4	Treatment would result in improved forest views from trails in the area and from the McKinney–Rubicon Springs Road (Rubicon Trail), a popular OHV route.
14-15, 14-17, 14-18	Treatment would result in improved forest views from USFS Road 14N42, a popular trailhead into Desolation Wilderness.
14-16	Treatment would result in improved forest views from USFS Road 14N44.

BEFORE

AFTER

Hand thinned

Mechanically thinned

03151.03

Jones & Stokes

Figure 3-2
Representative Forest Stands in the Lake Tahoe Basin Management Unit before and after Fuel-Reduction Treatments