CHAPTER 3 RESOURCES

3.1 AESTHETICS

Existing Setting

Aesthetic resources in the vicinity of the Rubicon Trail include alpine lakes, rivers, streams, forested areas, and scenic trails and roadways. Features that contribute to the area's character include the predominance of vast expanses of rock interrupted by sparsely scattered trees and shrubs and a large water body with numerous granite islets. These scenic resources occur within the immediate Rubicon Trail area as well as in adjacent Eldorado National Forest lands, including the federally designated Desolation Wilderness Area.

The landscape and scenic resources of the project area reflect the geology and dramatic topography of the region. Large expanses of exposed granite rock, common in the upper elevations, are the result of the movement of glaciers, which scraped volcanic rock layers away to expose the underlying granite. Former valley glaciers also moved many miles down the west slope of the mountains, carving out the steep-walled river valleys characteristic of the range. The cutting action of streams has continued this process, deepening the canyons of the Rubicon River and the American River.

One of the unique features of the Rubicon Trail is the wide range of elevations over the project area. The canyon wall vertical drop is as much as 1,000 feet in some places and as steep as 100 percent, rendering some river canyons nearly inaccessible. The highest elevation point within the project area is near Spider Lake, which lies at an elevation of approximately 6,700 feet, while the lowest elevation is along Wentworth Springs Road (5,420 feet).

Federal laws stipulate that scenic resources are to be managed and given equal consideration with other resources of the National Forests. Direction for management of visual resources is outlined in the U.S. Forest Service Visual Resources Management System (VMS), which is used to determine the appropriate level of protection for visual resources in any given area and to monitor visual changes in the landscape. Visual resources are inventoried based upon a variety of classes, sensitivity levels, distance zones, and visual quality objectives.

As part of the 1989 Eldorado National Forest Land and Resource Management Plan, the Rubicon Trail area was mapped and classified as primarily Type II. Type II is categorized as

"Retention," which is defined as land on which Forest visitors cannot detect management activities. According to Vicky Jowise, a landscape architect for the U.S. Forest Service, the Rubicon Trail area is generally considered to be "natural appearing."

3.2 AIR QUALITY

Existing Setting

California is divided into 14 air basins whose boundaries are based on geographical and meteorological considerations and follow political boundaries to the extent practicable. The Rubicon Trail is located in Placer and El Dorado Counties[1], most of which lie within the Mountain Counties air basin, as designated by the California Air Resources Board. While a portion of the Placer County segment of the Trail lies within the Lake Tahoe air basin, the El Dorado County portion of the Trail is located in the Mountain Counties air basin.

Both National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) are applicable to the proposed project. The NAAQS were set by the Federal Clean Air Act of 1970, as amended in 1977 and 1990, with states retaining the option to develop different (more stringent) standards. The NAAQS represent the maximum levels of pollution considered safe, with an adequate margin of safety to protect the public health and welfare. The six primary pollutants of concern for which the NAAQS have been established are ozone (O_3), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), and particulate matter with a diameter less than 10 microns (PM_{10}). Because of unique air quality problems in California, the California Air Resources Board (CARB) has developed the CAAQS. Table 3.2-1 lists the currently applicable state and federal standards. The federal standards are not to be exceeded more than once per year. The CARB's policy for determining violations of a State standard is a "not to be exceeded" policy for O_3, CO, SO_2 (one-hour), NO_2, and PM_{10}. The remaining standards are not to be equaled or exceeded.

[1] This report is concerned with the El Dorado County portion of the trail.

TABLE 3.2-1.
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	CAAQS Concentration	NAAQS Primary	NAAQS Secondary
Ozone	1 hour	0.09 ppm (180 µg/m^3)	0.12 ppm (235 µg/m^3)	Same as primary standard
Carbon monoxide	8 hour	9.0 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)	
	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen dioxide	Annual average	--	0.053 ppm (100 µg/m^3)	Same as primary standard
	1 hour	0.25 ppm (470 µg/m^3)	--	
Sulfur dioxide	Annual average	--	0.03 ppm (80 µg/m^3)	
	24 hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	
	3 hour	--	--	0.5 ppm (1300 µg/m^3)
	1 hour	0.25 ppm (655 µg/m^3)	--	--
Suspended particulate matter (PM_{10})	annual geometric mean	30 µg/m^3	--	--
	24 hour	50 µg/m^3	150 µg/m^3	Same as primary standard
	Annual arithmetic mean	--	50 µg/m^3	Same as primary standard
Sulfates	24 hour	25 µg/m^3	--	--
Lead	30-day average	1.5 µg/m^3	--	--
	Calendar quarter	--	1.5 µg/m^3	Same as primary standard
Hydrogen sulfide	1 hour	0.03 ppm (42 µg/m^3)		
Vinyl chloride (chloroethene)	24 hour	0.010 ppm (26 µg/m^3)		
Visibility reducing particles	8 hour (10:00 am to 6:00 pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per millimeter due to particles when the relative humidity is less than 70 percent.		

Source: California Air Resources Board, 1998

The air quality in the project area is fair due to limited emission sources and vigorous wind dispersion. The sources of emission in the project area include vehicle exhaust, road dust, and smoke from pile burning, broadcast burning, and wildfire. Although the area has had a low frequency of wildfires during the last 10 years, wildfire smoke has accumulated within the area during previous

wildfires. Canyons can be a source of accumulated pollutants during inversion days or early mornings.

As part of El Dorado County, the project area is designated as a non-attainment area for State standards for PM_{10} and ozone and is designated in the severe non-attainment category for ozone according to federal standards. Because the County is in the severe non-attainment category for ozone, determinations of conformity with the State Implementation Plan (SIP) for ozone attainment must be made for any federal action that has total direct and indirect emissions equal to or exceeding the *de minimus* (minimum) levels of ozone. In this case, the SIP is the Sacramento Area Regional Ozone Attainment Plan. Conformity determination is also required if the emissions constitute 10 percent or more of those in the non-attainment area (i.e., are regionally significant). In addition to total emission analysis, air quality modeling analysis must be performed. The modeling analysis must show that the action does not cause or contribute to a new violation of any standard or increase the severity or frequency of existing violations. The SIP applies to federal standards only and does not include State standards as a part of attainment requirements for ozone.

The El Dorado County Air Pollution Control District (EDCAPCD) developed the "El Dorado County California Clean Air Act Plan" (EDCAPCD, 1993), which has been adopted by the El Dorado County Air Pollution Control Board. This plan requires implementation of mitigation measures for construction activities and transportation management control options for transportation-related projects. According to the plan, a dust control plan should be submitted to the EDCAPCD for review and approval prior to groundbreaking of such projects. The dust control plan should insure that adequate dust controls are implemented during all phases of project construction and operation.

The "Rules and Regulations" developed by the EDCAPCD are also applicable to the proposed project. In accordance with the requirements of the EDCAPCD, major stationary sources thresholds in Rule 523, New Source Review, are recommended as significance criteria for environmental documents (EDCAPCD, 1998). These thresholds are 50 tons per year (tpy) for NO_x and Reactive Organic Compounds (ROC) and 100 tpy for PM_{10}, CO, and SO_x.

The EDCAPCD Rule 223 addresses the regulation and mitigation measures for fugitive dust emissions, which will apply during the construction process. Project construction would involve road development, which must by conducted in accordance with District Rule 224, Cutback and Emulsified Asphalt Paving

Materials. The proposed project shall also comply with the requirements of District Rule 503, Transportation Conformity and Rule 502, General Conformity. As required by District Rules, burning of vegetative wastes that result from land development clearing must be permitted through the EDCAPCD.

Existing Air Quality

As of 1993, there are no longer operating air monitoring stations in El Dorado County. The Air Pollution Control District previously maintained an air monitoring station in Placerville, which only monitored for PM_{10}. The CARB recorded data at the Placerville Station from 1994 through 1996. Table 3.2-2 presents a summary of the highest pollutant concentrations monitored at the Placerville air quality monitoring station during the three most recent years for which the CARB has reported data.[2] The monitoring station measures O_3, CO, and PM_{10}

As illustrated in Table 3.2-2, the NAAQS and CAAQS for CO were not exceeded from 1994 to 1996 in the subject area. The monitoring data shows that the federal and State standards for O_3 were exceeded from 1994 to 1996, as was the State 24-hour standard for PM_{10} in 1995 and 1996.

TABLE 3.2-2.
AMBIENT AIR QUALITY SUMMARY (EDCAPCD)
PLACERVILLE AIR MONITORING STATION

Pollutant	Averaging Time	CAAQS[1]	NAAQS[1]	Maximum Concentrations[1]			Number of Days Exceeding CAAQS			Number of Days Exceeding NAAQS		
				1994	1995	1996	1994	1995	1996	1994	1995	1996
Ozone	1 hour	0.09	0.12	0.13	0.13	0.13	26	32	31	2	1	1
Carbon monoxide	1 hour	20	35	2	2	1	0	0	0	0	0	0
	8 hour	9.0	9	1.3	1.2	1.0	0	0	0	0	0	0
PM_{10}	24 hours	50	150	34	53	58	0	1	1	0	0	0
	Annual	30	50	16.4	15.3	14.4	0	0	0	0	0	0

Notes:
[1] California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). Maximum concentration units for O_3 and CO are parts per million (ppm). Concentration units for PM_{10} (24-hour or annual) are micrograms per cubic meter ($\mu g/m^3$).

Source: CARB, 1994, 1995, and 1996

[2] Because of the project area's higher elevational differences (i.e., approximately 4,835 to 4,535 feet higher than the Placerville station) and geographic separation (i.e., approximately 30 air miles), this data is presented as regional background information and not as the basis of a project air quality evaluation.

Air Pollutants of Major Concern

O_3—Ozone is a highly reactive form of oxygen. It is the main component of the air pollution mixture known as "smog." O_3 reacts chemically ("oxidizes") with internal body tissues it comes into contact with, such as the lungs. It also reacts with other materials such as rubber compounds, breaking them down. O_3 is not produced directly by any pollution source. Instead, it is formed by a reaction between oxides of nitrogen (NO_x) and reactive organic compounds (ROC) in the presence of sunlight. For this reason, NO_x and ROCs are known as precursors for ozone.

CO—Carbon monoxide is a colorless and odorless gas. CO more readily combines with hemoglobin in the human body than does oxygen and prevents oxygen from entering the bloodstream. Breathing prolonged elevated CO concentrations results in a sensation comparable to suffocation. Unlike ozone, CO is a directly emitted pollutant that concentrates around combustion-related emission sources; consequently, elevated CO levels occur along major roadways, particularly at intersections and during peak traffic conditions.

PM_{10}—Particulate matter consists of small solid particles or liquid droplets from smoke, dust, fly ash, and condensing vapors. PM_{10} refers to particles with a diameter of less than or equal to 10 microns. The larger particles inhaled by humans are mostly deposited in the nasal passages, while the very small particles can penetrate and be deposited in the lung sacs and membranes. Particulate matter comes mostly from unpaved roads, wood smoke, earth moving, mining, construction, and agricultural activities.

Ozone Concentration Patterns

The U.S. Forest Service (USFS) has been participating in "Project Forest," a study of ozone effects on ponderosa pine. There are three plots at Sly Park at an elevation of 3,482 feet, approximately 24 air miles from the project area. Each plot consists of 50 ponderosa pine trees. Van Ooy and Carroll (1995) collected ozone data from 1990 through 1994. The USFS collected the growth data. Though the California standard for ozone is 90 parts per billion (ppb), and the federal standard is 120 ppb, injury to ponderosa pine during the active growth period (June through August) was observed above 60 ppb (Carroll and Dixon 1993). The major cause of the damage is ozone transported by wind from the Sacramento Valley.

Temperature and relative humidity at these sites show strong diurnal (24-hour cycle) patterns. Daytime average temperature maxima decrease with increasing elevation, while average relative

humidity minima increase. The nighttime average temperature minima and relative humidity maxima, however, do not follow these daytime elevation gradients. Correlation between ozone and temperature are generally strongest, but there is a high negative correlation between ozone and relative humidity. High concentrations of ozone are, therefore, likely to occur with high temperatures and low humidity. Correlations between ozone and wind speed are very low. The high ozone concentrations are most likely to occur with westerly and northerly winds.

Ozone concentrations at Sly Park have well-defined wind patterns typical of mountain slope locations, with upslope winds from the west during the day and downslope winds from the east at night. At night, the sinking motion associated with downslope winds, coupled with elevated layers of ozone, may cause the high ozone concentrations on local terrain maxima, such as knolls and ridges, while the air near the valley floor can remain relatively clean. The same pattern is assumed to exist within the project area.

Meteorology/Climate

Weather patterns strongly influence air quality through pollutant dispersion. The primary weather conditions that affect dispersion are atmospheric stability, mixing height, and transport wind speed. Atmospheric stability refers to the tendency for air to mix vertically through the atmosphere. Mixing height is the vertical distance through which air can mix. The transport wind speed is a measure of the ability to carry emissions away from a source horizontally. These three factors determine the ability of the atmosphere to disperse and dilute the released emissions.

The physical shape of the landscape interacts with and controls some weather patterns that influence emission dispersion. On a local or regional basis, the airflow in California is channeled by mountain ranges. The predominant wind direction in a valley is parallel to the valley's longitudinal axis in one direction, and the second most prevalent wind direction is in the opposite direction.

The project site is located in El Dorado County, which is in a transition zone between the climates of the Central Valley and the Sierra Nevada Mountains. At lower elevations, this area tends to reflect the climatic conditions of the Central Valley, characterized by hot, dry summers and cool, damp winters. At higher elevations, the climate is heavily influenced by mountains and mountain ranges, which provide cooler summer temperatures and heavy amounts of rain and snowfall in the winter. According to the EDCAPCD (EDCAPCD, 1993), the coldest month of the year is January, when the area experiences an average minimum temperature of 31 degrees Fahrenheit (ºF) and an average high of

51ºF. The hottest month of the year is typically July with a minimum temperature of 74 ºF and a high of 92 ºF. The area typically experiences 4,087 heating degree days (below 65 ºF). Annual precipitation at Placerville averages 37 inches, 90 percent of which falls between November and April. Within the project area, precipitation averages more than 53 inches annually. Prevailing winds are from the southwest, out of the Sacramento Valley.

3.3 BIOLOGICAL RESOURCES

Existing Setting

Elevations along the Rubicon route in El Dorado County run from approximately 5,400 to more than 7,000 feet. Biological resources and ecosystems within the project area vary with elevation, but generally become less diverse with increasing elevation.

The project area's coniferous forests provide valuable habitat to a diverse array of plant and wildlife species. Large mature conifer trees of more than 4.3 meters (14 foot) circumference (1.4 meters [4.5 feet] diameter at breast height) are especially valuable to wildlife. There are many trees of this size within the biological study area of several species, including incense cedar (*Calocedrus deccurens*), sugar pine (*Pinus lambertiana*), and Jeffrey pine (*Pinus jeffreyi*). Large California black oak (*Quercus kelloggii*) trees are scattered throughout the alignment.

The high mountain lakes and streams in the project area also provide important habitat and sustenance for plants and wildlife. Historically, these lakes and streams were, with a few exceptions, fishless. Amphibians, insects, and small invertebrates such as fresh-water shrimp (*Syncaris pacifica*) dominated these high-elevation aquatic ecosystems. Only within the last few decades have fish been introduced. In addition to aquatic species, large and small terrestrial mammals and avian species depend on these resources for forage, cover, nursery and nesting habitat, and migration corridors.

In the higher elevations, granite outcrops are commonplace, with little to no vegetative cover in some areas. These ecosystems support a less diverse flora and fauna.

Wildlife

Forested lands within the project area support many birds that are dependent on conifer trees for homes. They include cavity nesters such as the pileated woodpecker (*Dryocopus pileatus*), white-headed woodpecker (*Picoides albolarvatus*), hairy woodpecker (*Picoides villosus*), and northern flicker (*Colaptes auratus*). Other bird species

observed within the project area include red-breasted merganser (*Mergus serrator*), mountain quail (*Oreortyx pictus*), Steller's jay (*Cyanocitta stelleri*), mountain bluebird (*Sialia currucoides*), warblers (*Dendroica* spp.), and mountain chickadee (*Parus gambeli*).

Mammal species include striped skunk (*Mephitis mephitis*), chipmunk (*Tamias* spp.), western gray squirrel (*Sciurus griseus*), yellow-bellied marmot (*Marmota flaviventris*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and mule deer (*Odocoileus hemionus*). Black bear (*Ursus americanus*) and other large mammals, including mountain lion (*Felis concolor*), range throughout the project area. Reptile and fish species such as frogs (*Rana* spp.), alligator lizard (*Gerrhonotus multicarrinatus*), garter snake (*Thamnophis sirtalis*), western rattlesnake (*Crotalus viridis*), and trout (*Oncorhynchus* spp.) also occur in the project area.

The Pacific Deer Herd has California Department of Fish & Game (CDFG)-designated critical fawning grounds at the eastern end of the project alignment, mostly south of the Trail.

Vegetative Communities

The dominant vegetation comprises a mix of white fir, Jeffrey pine, and red fir (*Abies magnifica* var. *magnifica*), while Huckleberry oak (*Quercus vaccinifoliai)* forms the dominant understory cover.

Along the western portion of the Rubicon Trail, the natural vegetation consists primarily of ponderosa pine (*Pinus ponderosa*) forest (Sawyer and Keeler-Wolf, 1995). Associated with the dominant pines are black oak, incense cedar, and Douglas fir (*Pseudotsuga menziesii*). A shrubby understory consisting of green leaf manzanita (*Arctostaphylos patula*), deer brush (*Ceanothus integerrimus*), and mountain whitethorn (*Ceanothus cordulatus*) is present in forest openings. Low-growing mountain misery (*Chamaebatia foliolosa*) and mahala mat (*Ceanothus prostrates*) become conspicuous further east along the ridge.

At higher elevations, ponderosa pine forest gives way to a mixed conifer association consisting of ponderosa pine, Douglas fir, white fir (*Abies concolor*), lodgepole pine (*Pinus contorta* ssp. *murrayana*), and sugar pine. Red fir (*Abies magnifica* var. *magnifica*) becomes locally dominant in small mature stands on the north slopes above the South Fork of the Rubicon River. These mixed canopy forests include a shrub understory of huckleberry oak (*Quercus vaccinifolia*), Sierra juniper (*Juniperus occidentalis* var. *australis*), bush chinquapin (*Chrysolepis sempervirens*), and mountain whitethorn. Mountain dogwood trees (*Cornus nuttallii*) and bitter cherry (*Prunus emarginata*) are occasionally conspicuous in the sub-canopy.

Wetlands

The Rubicon Trail alignment is crossed by several seasonal streams. Riparian habitats are limited to the larger seasonal streams. Smaller channels in densely forested stands support only a narrow band of herbaceous vegetation, such as sedges (*Carex* spp.) or self-heal (*Prunella vulgaris*). Larger watercourses are marked by streamside habitats consisting of mountain alder (*Alnus incana*), American dogwood (*Cornus sericea*), western azalea (*Rhododendron occidentalis*), and twinberry (*Lonicera involucrata*). Wetland seeps and springs, including Cold Springs, dot the north-facing slope above the South Fork of the Rubicon River. These wetlands support thickets of mountain alder and water-loving herbs, including twayblade (*Listera convallariodes*), mountain violet (*Viola macloskeyi*), bishop's cap (*Mitella breweri*), and boykinia (*Boykinia major*).

Based on the National Wetland Inventory quad maps dated 1995, the project area includes various types of non-tidal wetlands. The trail runs along riverine (pertaining to a river), lacustrine (pertaining to a lake), and palustrine (pertaining to inland marshes, swamps, bogs, fens, tundra, and floodplains) systems. National Wetland Inventory maps were not provided for Bunker Hill or Robbs Peak quads, so preliminary wetland determination for those two sections of the Trail has not been provided in this report. Bunker Hill involves existing paved roadway and trail alignment that passes through Jacobsen and Gerle Meadows, suggesting palustrine systems are present. The portions of the Trail passing through the Robbs Peak quad are existing paved roads.

Within the Loon Lake quad, a portion of the Trail crosses a riverine system two times: first across an intermittent, seasonally flooded streambed and second across an upper, permanently flooded perennial system.

Within the Wentworth Springs quad, the trail crosses riverine, lacustrine, and palustrine systems. Moving from west to east, the Trail first crosses an upper, permanently flooded perennial riverine system. The trail then crosses Gerle Meadow, Wentworth Springs, and Mineral Springs, where the palustrine systems flood temporarily and encompass approximately 18 acres, nine acres, and one acre, respectively, at the three locations. Before arriving at Wentworth Springs Campground, the Trail crosses a palustrine system that floods seasonally and is approximately 1.5 acres in size.

Once at Wentworth Springs Campground, the wetlands in the vicinity are predominantly palustrine, with one permanently flooded river system at the easternmost extremity of the campground. The remainder of the campground includes

emergent, forested, scrub-shrub, aquatic bed, and unconsolidated bottom subsystems, all of which are seasonally, temporarily, semi-permanently, and permanently flooded. The campground area contains approximately 75 acres of non-tidal wetlands.

Continuing to the east, Loon Lake is the next aquatic feature associated with the Trail. The project study area includes the Loon Lake shore; therefore, lacustrine systems are present. These systems are seasonally and temporarily flooded, and all are diked/impounded along Loon Lake's shore. These wetlands are approximately six acres in size. The palustrine systems present within the Loon Lake area are seasonally and semi-permanently flooded. The project area around Loon Lake contains approximately 30 acres of non-tidal wetlands.

On the way to Little Sluice, the Trail passes scattered palustrine systems categorized in scrub-shrub and forested subsystems. These systems total approximately five acres.

At Little Sluice, the palustrine systems include scrub-shrub, aquatic bed, and emergent subsystems. The water regimes of the three wetlands are temporary, permanent, and seasonal flooding. Each individual, non-tidal wetland is no larger than one acre in size.

Lacustrine and palustrine systems are present along the shore of Spider Lake. In total, approximately three acres of wetlands are present within the project area near Spider Lake. Spider Lake is a lacustrine system that spans approximately 33 acres within the project area.

On the way to Buck Island Lake, the Trail perpendicularly crosses a riverine system with seasonal flooding. At Buck Island Lake, the wetlands along the shore are part of a palustrine system. One wetland within this region (no larger than 0.5 acre) is diked/impounded. Total acreage of the non-tidal wetlands along the shore of Buck Island Lake is approximately 3.5 acres. Buck Island Lake crosses the boundary between the Wentworth Springs and Homewood quad. Between the two quads, Buck Island Lake spans approximately 55 acres within the project study area.

Within the Homewood quad, the Trail crosses palustrine and riverine systems. The palustrine systems are seasonally flooded and total approximately 7.5 acres. The Trail runs along the Rubicon River (a riverine system). Approximately 12 acres of the Rubicon River occur within the project study area.

Species of Concern

Within the project area, two federally listed species may exist, including the American bald eagle (*Haliaeetus leucocephalus*) and Layne's ragwort (*Senecio layneae*). An additional 11 wildlife species designated by the U.S. Fish and Wildlife Service as sensitive species may inhabit the forest in the vicinity of the Rubicon Trail, including the California spotted owl (*Strix occidentalis occidentalis*), great gray owl (*Strix nebulosa*), northern goshawk (*Accipiter gentilis*), willow flycatcher (*Empidonax trailii*), Pacific fisher (*Martes pennanti pacifica*), pine marten (*Martes americana*), Sierra Nevada Mountain Beaver (*Aplodontia rufa californica*), Sierra Nevada red fox (*Vulpes vulpes necator*), California wolverine (*Gulo gulo luteus*), foothill yellow-legged frog (*Rana boylii*), and mountain yellow-legged frog (*Rana mucosa*).

The U.S Forest Service has designated mule deer and trout species as Management Indicator Species. While the osprey has no federal status, it is designated as a Species of Special Concern by the California Department of Fish and Game.

Habitat for the above-listed federally listed Threatened plant species (Layne's ragwort), four federal plant Species of Concern, and one California Native Plant Society List 2 species may occur within the project area: Pleasant Valley mariposa (*Calachortus clavatus* var. *avius*), Stebbins' phacelia (*Phacelia stebbinsii*), Tripod buckwheat (*Eriogonum tripodium*), Nissenan manzanita (*Arctostaphylos nissenana*), and shore sedge (*Carex limosa*).

Sensitive Wildlife Species

Two Wildlife Habitat Protection Programs have been developed for the ENF: one specific to the Rock Creek Recreational Trails area and one for the remainder of the Forest. The Wildlife Habitat Protection Programs have been developed to meet the regulations implemented by the California Off-Highway Vehicle Recreation Division.

Table 3.3-1 illustrates potentially occurring sensitive animal species that may be affected by OHV activities in the project study area.

TABLE 3.3-1.
SPECIAL STATUS ANIMAL SPECIES POTENTIALLY AFFECTED BY OHV ACTIVITIES ALONG THE RUBICON TRAIL

Species Potentially Affected	Status
Bald eagle (*Haliaeetus leucocephalus*)	Federally Threatened, Management Indicator Species (MIS; as categorized by the USFS), State Endangered
California spotted owl (*Strix occidentalis occidentalis*)	Federal Species of Concern, Forest Service Sensitive, MIS, CDFG Species of Concern
Great gray owl (*Strix nebulosa*)	Federal Species of Concern, Forest Service Sensitive, State Endangered
Northern goshawk (*Accipiter gentilis*)	Federal Species of Concern, Forest Service Sensitive, MIS, CDFG Species of Concern
Osprey (*Pandion haliaetus*)	CDFG Species of Concern
Willow flycatcher (*Empidonax trailii*)	Federal Species of Concern, Forest Service Sensitive, MIS, State Endangered
Pacific fisher (*Martes pennanti pacifica*)	Federal Species of Concern, Forest Service Sensitive, CDFG Species of Concern
Pine marten (*Martes americana*)	Federal Species of Concern, Forest Service Sensitive
Sierra Nevada Mountain Beaver (*Aplodontia rufa californica*)	Federal Species of Concern, CDFG Species of Concern
Sierra Nevada red fox (*Vulpes vulpes necator*)	Federal Species of Concern, Forest Service Sensitive, State Threatened
California wolverine (*Gulo gulo luteus*)	Federal Species of Concern, Forest Service Sensitive, State Threatened
Foothill yellow-legged frog (*Rana boylii*)	Federal Species of Concern, Forest Service Sensitive, CDFG Species of Concern
Mountain yellow-legged frog (*Rana muscosa*)	Federal Species of Concern, Forest Service Sensitive, CDFG Species of Concern
Mule deer (*Odocoileus hemionus*)	MIS
Trout (*Oncorhynchus* sp.)	MIS

Bald Eagle. Potential habitat for bald eagles has been identified in a draft Bald Eagle Management Plan of the ENF (Ebert 2000). In general, OHV use on existing trails does not remove habitat for bald eagles. The Rubicon Trail contains "summer habitat," which generally consists of mature timbered areas, usually in close proximity to large water bodies such as lakes and rivers. Summer habitat is used for foraging and overnight roosting. While summer OHV use can displace eagle use, OHV activities typically occur after the egg-laying and incubation stages (January – April) and are unlikely to preclude or affect nest initiation. Disturbance during the early nesting stages (April - May) are most critical to survival. Bald eagle habitat areas potentially affected by OHV use along the Rubicon Trail occur at Road 14N34 within 0.85 miles of known habitat near Gerle Reservoir and at Ellis Creek Trail, within 0.6 miles of habitat on the south side of Loon Lake.

California Spotted Owl. Suitable spotted owl habitat is typically found in mixed conifer, red fir, white fir, and conifer/black oak habitat types. Such habitat exhibits a multi-layered canopy with high canopy closure (usually greater than 50 percent). The suitable canopy habitat typically contains a number of dominant overstory trees (generally larger than 24 inches in diameter). Based on several years of ENF inventory, a population of about 200 spotted owl individuals/pairs is thought to exist in the Forest, with habitat existing in scattered blocks across the forest. Habitat management areas have been delineated on two scales in the Forest as described in the Forest Land and Resource Management Plan. An area potentially affected by OHV use along the Rubicon Trail occurs along a 0.5-mile portion of the Deer Creek Trail. This trail section lies within a designated Protected Activity Center, which is a 300-acre area surrounding a nest or roost area.

Great Gray Owl. Habitat for the great gray owl is described as large meadows or meadow systems associated with mid- to late-seral stands of coniferous forest. The preferred elevation range is considered to be 2,400 to 9,000 feet. One meadow area potentially suitable for great gray owl habitat occurs along the Rubicon Trail within the project study area at Gerle Meadows.

Northern Goshawk. Northern goshawk habitat in the region is typically found on gentle north- to east-facing slopes within mixed conifer and red fir forest, with older-aged trees and canopy closure greater than 60 percent. Pursuant to the Forest Land and Resource Management Plan, where Northern goshawk territories are discovered, 200-acre Protected Activity Centers are established. This species may occur in the vicinity of the project area.

Osprey. Osprey nest in high tree-tops within 15 miles of good fish-producing bays, fresh-water lakes, and larger streams. Osprey habitat consists of mixed conifer forests of yellow pine, cedar, white fir, and lodgepole pine. Ospreys are known to inhabit the area immediately surrounding Loon Lake.

Willow Flycatcher. Habitat for the willow flycatcher is described as meadow and riparian habitats with a six- to 12-foot tall shrubby layer and surface water or saturated soils during the early breeding season. Suitable meadow sizes range from one acre to several hundred acres, with most being greater than 20 acres. One meadow potentially suitable for willow flycatcher habitat within the vicinity of the Rubicon Trail is McKinstry Meadow, which is located outside of the project area in Placer County.

Pacific Fisher. Distribution and abundance of the Pacific fisher in the region is mostly unknown. Pacific fisher sightings are rare in the Sierra Nevada (particularly since the early 1970s). Limited

track plate surveys have occurred sporadically on the ENF since 1992. No fisher were detected in these efforts. Preferred habitat is found between approximately 3,000 and 7,000 feet elevation—in large, relatively unfragmented blocks of older forest, characterized by a 40 to 100 percent canopy closure, multistoried structure, and a high number of large snags and down logs. Preferred resting, foraging, and denning habitats are generally characterized by older, mesic, mixed conifer stands bordering riparian habitat. Suitable fisher habitat areas potentially affected by OHV use in the vicinity of the Rubicon Trail occur along 2.9 miles of Deer Creek Trail and along 0.8 miles of Road 14N34.

Pine Marten. Marten prefer forested habitats with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and an interspersion of riparian areas and meadows. Potentially suitable habitat areas that could be affected by OHV use along and near the Rubicon Trail occur along 0.2 miles of Road 14N34 (on the edge of the road) and along 2.0 miles of Road 13N77.

Sierra Nevada Mountain Beaver. Habitat requirements for Sierra Nevada mountain beaver include dense growth of small deciduous trees (willows, alders, and poplars are preferred) and shrubs, soft, wet soils, and an abundance of grasses and forbs in the Spring. Beaver need dense understory for food and cover and abundant supplies of water. Limited areas of potential habitat may occur for this species in the lowest elevation areas of the project area.

Sierra Nevada Red Fox. Little is known about the habitat requirements for this species. It appears to prefer red fir and lodgepole pine forests in the subalpine and alpine zones. It has been sighted in mixed conifer forest as well. The fox's habitat ranges from approximately 4,000 to 12,000 feet, with most sightings above 7,000 feet. Surveys for mesocarnivores (Pacific fisher, American marten, and red fox) have occurred in the ENF occasionally since 1992; however, no detections have been made. Unverified sightings of red fox have been reported on the Pacific Ranger District just south of the Rubicon/Loon Lake Area. Since these animals are believed to be difficult to survey and more specific habitat requirements are not known, it is assumed that they may be present wherever mixed conifer, red fir, or lodgepole pine habitat occurs in proximity to meadows, riparian areas, and brush fields. Therefore, potential habitat for the Sierra Nevada red fox may occur along the Rubicon Trail.

California Wolverine. As with the Sierra Nevada red fox, little is known of wolverine habitat requirements in the Sierra Nevada Mountains. Wolverines are thought to occur at high elevations where they den in rocky substrates. Wolverines are thought to be extremely sensitive to human disturbance. Recent unconfirmed

sightings have been reported in Desolation Wilderness. Most OHV areas occur below the highest elevation areas likely to contain suitable habitat. However, potential habitat for the California wolverine may occur along higher elevation areas of the Rubicon Trail.

Foothill Yellow-Legged Frog. Habitat for the foothill yellow-legged frog consists primarily of small to moderate size streams with perennial water or perennial pools of water, a cobble substrate component, and open, sunny banks for basking. This species has been found at elevations of up to about 6,000 feet. Specific areas of potential habitat have not been identified for the foothill yellow-legged frog within OHV areas. Limited surveys have occurred across the ENF, but not specifically within the OHV areas or in other areas of the Rubicon Trail. Two known foothill yellow-legged frog locations occur outside the project study area.

Mountain Yellow-Legged Frog. Habitat for the mountain yellow-legged frog consists of high elevation lakes, ponds, tarns, and perennial streams. The species elevation range in the ENF is considered to be higher than 5,000 feet. They appear to prefer lakes and ponds with open shorelines, gentle slopes, and shallow margins; although mountain yellow-legged frogs have been observed in perennial streams with deep ponds. Similar to the foothill yellow-legged frog, this species is expected to confine itself within the riparian habitat corridor along streams and near high-elevation ponds during the dry season. It potentially moves through the width of stream corridors during the wet season. Limited surveys have been conducted across the ENF, but not specifically within the OHV areas or along other areas of the Rubicon. The only known occurrence site for the mountain yellow-legged frog is 0.5 miles from the 4-wheel drive trail near McKinstry Meadow in Placer County.

Mule Deer. Mule deer use a variety of habitats in the Sierra Nevada Mountains. The California Department of Fish and Game (CDFG) developed management plans for the deer herds that occur in the ENF. The CDFG designated habitat areas for each herd, depending on the season and purpose of the use. Habitat areas include summer range, fawning areas, holding areas, migration corridors, and winter range. The Rubicon Trail is located with the summer range of the mule deer. Meadows, riparian areas, and shrub fields are important habitat elements for the deer. Potential mule deer habitat along the Rubicon Trail occurs within one mile of Road 14N34, 0.7 miles of Road 14N15, 0.4 miles and 1.3 miles of Road 12N77A, 1.1 miles of the 4-wheel drive trail near Ellis Creek, and along 0.8 miles of the 4-wheel drive trail near McKinstry (in Placer County, outside the project study area).

Trout. Habitat for trout is perennial streams and lakes. Trout species occur within several OHV areas. Stream crossings with the potential for effects occur at Ellis Creek, Deer Creek, and the Rubicon River.

Plant Species

The Forest maintains an inventory of sensitive plant species found in various locations across the Forest as determined through field surveys conducted during the past 15 years. Habitat for one federally listed Threatened Species, four federal Species of Concern, and one California Native Plant Society List 2 species may occur within the project area; however, no individuals of these species have been found.

Table 3.3-2 illustrates the potentially occurring sensitive plant species that could be affected by OHV activities in the project area.

TABLE 3.3-2.
SENSITIVE PLANT SPECIES POTENTIALLY AFFECTED BY
OHV ACTIVITIES ALONG THE RUBICON TRAIL

Species Potentially Affected	Status
Pleasant Valley mariposa (*Calachortus clavatus* var. *avius*)	Federal Species of Concern, Forest Service Sensitive, CNPS List 1B
Stebbins' phacelia (*Phacelia stebbinsii*)	Federal Species of Concern, Forest Service Sensitive, CNPS List 1B
Layne's ragwort (*Senecio layneae*)	Federal Threatened, CNPS List 1B
Tripod buckwheat (*Eriogonum tripodium*)	Federal Species of Concern, Forest Service Sensitive, CNPS List 4
Nissenan manzanita (*Arctostaphylos nissenana*)	Federal Species of Concern, Forest Service Sensitive, CNPS List 1B
Shore Sedge (*Carex limosa*)	CNPS List 2

Pleasant Valley Mariposa. Suitable habitat for the Pleasant Valley mariposa consists of openings in mixed conifer and ponderosa pone forests and on canyon slopes, spurs, and ridges with southerly aspects at elevations of 2,800 to 5,600 feet. These openings typically have rocky soils with surface rocks and cobbles readily apparent. Common plant associates of the Pleasant Valley mariposa include ponderosa pine, incense cedar, California black oak, canyon live oak (*Quercus chrysolepis*), manzanita (*Arctostaphyos* spp.), and bear clover. No surveys for this species have been conducted along the Rubicon Trail.

Stebbins' Phacelia. The primary habitat for this species is steep canyon walls, often in association with saw-toothed lewisia (*Lewisia serrata*). This plant is also found on open volcanic flows and less commonly on open metamorphic and metasediment substrate.

This plant has not been sighted south of Wentworth Springs Road. No surveys for this species have been conducted along the Rubicon Trail.

Layne's Ragwort. This species is limited to soils derived from ultramafics and gabbros (serpentine soil areas). Currently, there are no other known habitat preferences. Surveys for Layne's ragwort were conducted in the Rock Creek Recreational Trail area. No occurrences of this species were located, although available habitat was identified in a small stretch of the western edge of the area where serpentine soils exist. No surveys for this species have been conducted along the Rubicon Trail.

Tripod Buckwheat. This species is also limited to serpentine soil areas and grows in areas similar to Layne's ragwort. It was not found during surveys conducted in the Rock Creek Recreational Trail area, available habitat was identified in a small stretch of the western edge of the area where serpentine soils exist. No surveys for this species have been conducted along the Rubicon Trail.

Nissenan Manzanita. Nissenan manzanita grows on shallow shale soils often associated with closed-cone conifer forest. Known populations of this species occur just south of the Rock Creek Recreational Trail area, immediately south of Slate Mountain and Road 12N60.2 (dirt road also known as Sand Mountain Boulevard, northwest of the project area). No surveys for this species have been conducted along the Rubicon Trail.

Shore Sedge. Shore sedge occurs in bogs and soggy meadows in association with lower and upper montane coniferous forests, and at the edges of lakes, at elevations ranging from approximately 3900 to 9100 feet. Potential habitat for this species may occur in wet meadow habitats along the Rubicon Trail alignment and at Loon Lake. No surveys for this species have been conducted along the Rubicon Trail.

3.4 CULTURAL RESOURCES

Existing Setting

Prior to European settlement, several Native American groups lived on the east and west sides of the Sierra Nevada Mountains near Lake Tahoe, including the Nisenan (Southern Maidu), Washoe, and the Sierra Miwok. The Eldorado National Forest lies near the intersection of the Nisenan, Washoe, and Northern Sierra Miwok spheres of influence.

The Nisenan territory included the drainages of the American River from the Sierra Crest to the Sacramento River. The southern half of the tribal area was the home of a group of the Maidu called the Nisenan. The Maidu-Nisenan people occupied the American River drainage of the Sierra Foothills. They lived below the 4,000-foot elevation in dome-shaped houses usually located on ridges or larger flat areas near water. The Nisenan territory was crossed with trails, allowing for easy access and trade with other areas and groups. Many of these historic trails are still used today.

The Rubicon Valley was on the dividing line between the Maidu-Nisenan Tribe to the west and the Washoe Tribe of western Nevada. The Washoe people occupied an area south of Lake Tahoe, ranging from the High Sierra to the Great Basin. They followed an annual migration route fishing, hunting, and gathering nuts, berries, and seeds in season, venturing almost as far west as Sacramento on occasion. Archaeological evidence indicates that the Washoe may have occupied most of the project area early, giving way to later incursions by the Nisenan. Both tribes visited the Rubicon Valley on a regular basis, using it as a meeting place for trading with each other and as a summer camp from which they could hunt and fish. The Maidu-Nisenan considered Rubicon Springs its territory.

The U.S. Forest Service (USFS) has conducted archaeological surveys within the project area. According to Krista Deal (the USFS Pacific Ranger District archaeologist), approximately 25 prehistoric and historic sites have been identified within the project area. These sites include the old wagon trail alignment from the Rubicon Springs to the McKinney Hunter's Retreat at Lake Tahoe, the Hunsucker's spring water bottling facility at Rubicon Springs, the Rubicon Springs Resort, and other important resources.

Eldorado National Forest lands within the project study area have been surveyed; however, cultural resources information for the remainder of the study area is lacking. The USFS has no record of surveys conducted on County or privately owned lands. Ms. Deal noted that it is possible that some surveys may have been done on lands outside the ENF under past Timber Harvest Plans.

3.5 GEOLOGY, SOILS, AND SEISMICITY

Existing Setting

El Dorado County elevations increase at a gradual rate, ranging from a low of 200 feet at the Sacramento County border to a high of 10,881 feet atop Freel Peak in the Lake Tahoe Basin. The southwestern foothills, with elevations of less than 1,000 feet, are

composed of rocks of the Mesozoic Era Mariposa formation. The major groups of the Mariposa formation found in these areas are amphibolite, serpentine, and pyroxenite. In the northwestern parts of the County, an abundance of metamorphics of the Calaveras Formation (Paleozoic Era) consisting of chert, slate, quartzite, and mica schist are found. Serpentine formations of limited extent are also found in this area. At the higher peaks, the surface geology in El Dorado County is primarily igneous and metamorphic. Granite has intruded into these great masses and composes the parent material of much of the soils at the higher elevations.

Geology

The Rubicon Trail traverses through a range of geological features. The area around Georgetown is made up of metamorphosed sedimentary rock in the form of meta-sandstone, quartzite, slate, limestone, and schist. Granite formations first become evident just west of Lawyer Cow Camp. While proceeding east along Gerle Creek, visitors pass through Gerle and Neck Meadows, which are the result of glacial activities, where giant glaciers carved out depressions in the rock. Over time, these depressions collected water and sediment, resulting in the present-day meadows.

Another sign of glacial activity is the light-colored granite boulders or "erratics" dotting the sides and bottom of the Rubicon Canyon. A moving glacier transported these boulders (from what is now the Desolation Wilderness) and dropped them as the glacier receded. The brownish-red rocks that underlie the erratics are volcanic in origin.

One of the first signs of volcanic activity along the Rubicon is the basalt rock at the Post Pile, just east of Wentworth Springs Campground. This basalt deposit is the result of the rapid cooling of "liquid" magma by water as it seeped through a crack in the granite.

As the trail moves eastward toward Spider and Buck Island Lakes, huge granite slabs form the landscape. These slabs were "polished" as the heavy glaciers moved slowly through the area.

Soils

The soils found in the project area consist of well-drained sandy and gravelly loams associated with coniferous and hardwood forests. Dominant soils outside the Lake Tahoe Basin are the Auburn-Argonaut and Mariposa-Josephine-Sites Associations. These soils associations account for 25 percent and 30 percent of the Western Slope, respectively.

Most of the project area lands possess slopes exceeding 25 percent. The areas most likely to experience erosion are those with slopes greater than 20 percent, particularly if natural vegetation has been removed or burned away. Off-site impacts resulting from erosion of Trail areas may include increased sedimentation in streams, rivers, and reservoirs and subsequent degradation of water quality, damage to sensitive fisheries, downstream flooding, and mudslides.

A sediment production study, conducted by Coe and MacDonald at sites on Eldorado National Forest and Sierra Pacific Industries land (2002), suggests that native surface roads are the primary anthropogenic source of sediment. The results of the study indicate that sediment production rates are significantly related to slope and are highly variable between the years.

Seismicity

No active or potentially active faults were mapped in El Dorado County; however, branches of the Bear Mountain Fault Zone and the Melones Fault Zone were mapped and described as follows:

> "Well-defined geomorphic evidence of Holocene faulting is lacking, although general features such as broad linear valleys and escarpments are permissive of Quaternary faulting. Trench data reveal minor offsets of later Pleistocene and possible Holocene soils locally, but dip-slip rates for individual faults are very low (.005 to .05 mm/year)" and "zoning not recommended" (DMG, OFR 84-52 Summary Report, 1984).

Near the end of the portion of Rubicon Trail that lies within El Dorado County is a fault zone that resulted in the formation of the Rubicon Valley. Subsequent glacial activity filled the lower spots in the valley, depositing the soil that currently supports the various forms of vegetation found today. Mineral springs are scattered throughout the area, also indicating the presence of faulting.

Impacts of Recreational Trail Use on Soils

Studies have been conducted that examine the differences of impacts on soil resources resulting from various recreational activities, such as foot, horse, mountain bike, and off-highway vehicle (OHV) use of recreational trails. The available literature indicates that where the amount of measured activity use is relatively equal, the soil impacts of recreational use increase (in order) from hikers and mountain bikers to OHVs and horses (Wilson and Seney 1994; Weaver and Dale 1978).

Rainfall intensity and slope gradient are found to be key factors in explaining variation in soil loss on trails (Hinkley et al. 1983), and soil properties such as structure, texture, and moisture content have been shown to determine the resistance to soil erosion (Webb et al. 1978; Wilshire et al. 1978). Various reports indicate that recreational uses on slope gradients in excess of 15 percent cause the most damage and state that management recommendations should be made to prohibit use, specifically downhill use, on terrain exceeding a 15 percent slope (Weaver and Dale 1978; Cerkel 1994; USDA 1990).

Hikers

Impacts on trails such as trail erosion width, depth, and soil bulk density increase from hiker to cycle to horse (Weaver and Dale 1978). The study states that impacts also increase with increasing slope, and that ascents steeper than 15 percent should not be permitted in natural areas. Soil impacts tend to be greatest in the spring when recreational uses typically increase and soils are still moist. Impacts decrease as the season progresses and soils dry.

Mountain Bike Use

Little scientific evidence exists that indicates mountain bike use causes trail damage and other physical impacts; however, some studies suggest that mountain bikes cause about the same amount of damage as hikers but not as much as horses (Grost 1989; Ruff 1990). "The primary cause of erosion or other physical impacts, may be the existence of the trail itself and it is sometimes difficult to determine the causes of physical impacts dues to the combination of uses and the number of users" (Chavez 1993; Jacoby 1990).

Switchbacks, steep slopes, and traditional rock or log water bars are often cited as areas where mountain bikes cause erosion (Chavez 1993; Leccese 1993; McCoy 1992). A U.S. Department of Agriculture publication (1990) reports that bicyclists may increase their speed on descending trail grades of 15 percent or greater, which requires braking and skid action and result in subsequent rock and soil displacement. The publication further states that on steep, uphill grades of 15 percent or greater, most riders dismount and push their bicycles, reducing resource impacts.

OHV Use

Soil and vegetation impacts associated with OHV use are widely discussed in the literature, and obvious to even causal observers. Soil compaction and the shear forces of motorized vehicles create

mud holes and gullies that alter hydrologic patterns and intensify erosion.

Trail erosion and compaction caused by off-road and all-terrain vehicles reduce the quality of recreational trails and require enhanced management action to develop and maintain safe, usable trails. More studies are needed to quantify the amount and extent of soil loss attributable to OHV use on the Rubicon Trail.

A report by the Geological Society of America (1977) states that motorcycles can compact soil across a track approximately five inches wide and that a single motorcycle traveling 20 miles can compact one acre of soil. The compaction from the vehicles themselves, and the accelerated removal of soil and plant cover by wind and water leads to increased runoff and growth of gullies. The Society Report indicates that as much as 90 percent of the soil moisture otherwise available to plants is lost along some Off-Road Vehicle (ORV) trails.

Studies report that soil erosion occurs as a result of OHV trail use (Wilshire and Nakata 1976; Webb et al. 1978). Weaver and Dale (1978) compared motorcycle erosion with horse and foot erosion on trails and found that motorcycles moving uphill established a narrow rut, which increased runoff velocity and sediment transport capacity. The authors state that the channelization of the trail is the direct result of the tire and torque applied by the vehicle. Cyclists moving downhill, when torque is not needed, do not cause trail channelization. Shear stresses are increased and compressional stresses are reduced on steeper slopes, increasing the quantities of loose sediment available for transport (Quinn et al. 1980).

Horse Use

Trail use by horses results in greater increases in soil compaction, trail width, and depth than trail use by hikers and OHVs (Weaver and Dale 1978). The study indicates that horse traffic applies the greatest weight per unit area among hiking, horseback riding, mountain bicycling, and motorcycling. Thurow (1991) found the severity of soil compaction from trampling to be a function of an animal's weight, hoof size, and the amount of trampling.

Management of Recreational Trails along the Rubicon Trail

Various management strategies exist to reduce negative impacts on recreational trails. Although not all the studies found in the literature were done on areas with soils, vegetation, and climate similar to the Rubicon Trail, the studies do provide valuable information that can be used to minimize impacts on water quality

and soil productivity. Some conclusions can be applied to the Rubicon Trail area:

- Many OHV studies conducted in the 1970s showed that most impacts occurred in "open areas" where OHV use was not confined to trails or roads. An effective strategy for OHV use is confining use to trails and old logging roads that can be effectively maintained.

- Soil moisture studies suggest that trail damage can be minimized by limiting trail use during periods when trails are wet (Wilson and Seney 1994).

- To minimize erosional impacts, Weaver and Dale (1978) recommended keeping OHV traffic moving at low speeds (less than 12 miles per hour) on trails with gentle slopes (less than 15 percent).

3.6 HAZARDS AND HAZARDOUS MATERIALS

A Phase I Environmental Site Assessment has not been completed for the Rubicon Trail Master Plan project. It is recommended that a Phase I Environmental Site Assessment be completed by the County for the federal lands within the project study area coming under easement, and at the time that any private lands may come under easement.

3.7 HYDROLOGY AND WATER QUALITY

Existing Setting

The project study area is located in the northern Sierra Nevada Mountains, near the northern boundary of El Dorado County in eastern California. The area enjoys a Mediterranean-like climate, with abundant sunshine in the summer and moderate to heavy precipitation in the winter. Precipitation may occur as either rain or snow. Average annual precipitation in the project vicinity generally ranges between 55 an 60 inches (1,400 and 1,525 millimeters). Vegetation consumes a little over half this precipitation, with the remainder available as runoff and stream flow. High flood peaks can be generated when warm rain falls on the snow pack, such as occurred in January 1997.

The lands surrounding the project corridor are heavily forested with conifers and some hardwoods. Logging is the primary land use. Recreation uses in the project vicinity include camping, hiking, hunting, fishing, horseback riding, and off-highway vehicle

use. Due to restricted access, relatively few roads, and substantial private ownership, most of these activities are concentrated in reservoir areas rather than being dispersed throughout the forest. The Rubicon trail usually is free of snow by late June and remains open until the weather closes it again during October or November.

Water resources in El Dorado County include rivers, streams, lakes, groundwater, and wetlands. Domestic water in the County comes from surface water systems and, to a lesser degree, from fractured-rock groundwater sources. Two distinct drainage basins occur within the County: the Central California Basin, draining to the Pacific Ocean (on the West Slope) and the Tahoe or Lahontan Basin, draining to the saline lake of the Nevada high desert (Great Basin). The project study area lies within the Central California Basin.

El Dorado County has four major watersheds drained by the Middle Fork of the American River (Central Basin Plan Sub-Area 5-A), the South Fork of the American River (Central Basin Plan Sub-Area 5-A), the Consumnes River (Central Basin Plan Sub-Area 5-B), and tributaries to the Lake Tahoe Basin. The project area lies within the Middle Fork of the American River. The Middle Fork watershed includes surface waters of the Rubicon River, Loon Lake, Lake Edson, Gerle Creek and Reservoir, Stumpy Meadows Reservoir, and Rubicon Reservoir.

The Rubicon River is on the U.S. Park Service's Inventory of Wild, Scenic, and Recreational Rivers. The Rubicon River begins in the Desolation Wilderness and ends at its junction with the Middle Fork of the American River at Oxbow Reservoir. Of the total length of 56 miles, only 29 miles, from Hell Hole Dam to the American River confluence, are designated as scenic. The section of the Rubicon River that is designated as Wild, Scenic, and Recreational is located in Placer County, outside the project boundaries.

Water Quality

Water quality data for the project study area is lacking, but anecdotal evidence indicates that erosion and sedimentation from Trail areas and stream crossings may be the source of localized water quality and aquatic habitat impacts. Vehicle fluids may be entering project area watercourses directly from vehicles as they drive through the water at stream crossings or from contaminated sediment washed from the Trail areas.

3.8 LAND USE AND PLANNING

Existing Setting

The project study area is located in north-central El Dorado County, California, and includes lands within the Eldorado National Forest. El Dorado County is located in the Sierra Nevada Mountains of central California, east of Sacramento and west of the border with the State of Nevada (see Figure 1). The County is approximately 1,713 square miles in area and extends from the Sierra Nevada foothills to the Lake Tahoe Basin. Within the County are two incorporated cities, Placerville and the City of South Lake Tahoe. Both cities are located outside the project study area.

El Dorado County currently comprises numerous distinct areas. The most prominent division within the County is the separation between the Western Slope and the Eastern Slope/Tahoe Basin of the Sierra Nevada Mountains, which is the Great Basin-Pacific Watershed Divide. Dramatic changes in elevation and climate and the Eldorado National Forest landholdings between the two sides of the mountain range have had a significant effect on the development pattern of the County. U.S. Highway 50, running east to west, bisects the County and has also had a profound influence on development patterns. The two incorporated cities in the County, Placerville on the Western Slope and South Lake Tahoe in the Tahoe Basin, lie along U.S. Highway 50. Development and population growth is concentrated on the Western Slope along the U.S. Highway 50 corridor, where winters are temperate and topographic changes are less extreme.

Much of El Dorado County's rural character is derived from its existing communities, many of which were founded following the discovery of gold at Sutter's Mill at Coloma in 1848. Throughout the later 1800s, boomtowns appeared throughout California's Mother Lode area. Some of these boomtowns and trail/roadway service developments have disappeared, while others continue to flourish. Many former boomtowns contain historical structures, sites, and development patterns reminiscent of the early frontier days. Perhaps the most significant former land use in the project study area is the Rubicon Resort site at Rubicon Springs. This site was once the home of a well-known hotel and spring water bottling plant that drew tourists from across the United States.

The Rubicon Trail Master Plan project study area is located in the Western Slope area, within the lands of the United States, as administered by the U.S. Forest Service, and private land holdings. Non-federal lands within the project area are designated as Natural Resources land use areas by the El Dorado County General Plan

and as Open Space by the El Dorado County Zoning Ordinance (see Figure 2).

Important natural resources of the County include forested areas, mineral resources, important watershed, lakes and ponds, river corridors, grazing lands, and areas where the encroachment of development would compromise these natural resource values. Lands under both public and private ownership that contain these resources are included in the Natural Resources designation. Compatible uses may include agriculture, rangeland, forestry, wildlife management, recreation, and water resources development. In addition, they may also support single-family dwellings.

Open Space land refers to areas of land generally dedicated to and essential for natural resource preservation; preservation of agricultural production; preservation of recreational enjoyment areas; wildlife and biotic habitat preservation; protection of public health, safety, and welfare (in relation to seismic, geologic, and geographic hazards); and protection of unusual or unique scenic values.

Applicable goals, objectives, policies, and programs of the current El Dorado County General Plan are discussed in greater detail in Chapter 4.

The Rubicon Trail and its variants were used by Native Americans in the pre-historic period and by travelers and settlers to the Wentworth Springs-Rubicon Springs areas as early as the 1840s. On August 3, 1887, the El Dorado County Board of Supervisors declared that the Trail to be a "public highway." County Board of Supervisors Resolution 142-89 reaffirmed the status of the Trail as a public road on May 18, 1989.

The County Departments of Transportation, Airports Parks and Grounds, and Counsel are currently working with the U.S. Forest Service Eldorado National Forest to execute an easement over Trail segments occurring on federal lands between Loon Lake and Ellis Creek. This easement is expected to be completed during the summer of 2003.

3.9 NOISE

Existing Setting

Excessive noise levels can interfere with communication, disrupt sleep, and in extreme cases, cause physiological impacts such as hearing loss. In many situations, the effects are subjective, and noise may be perceived differently from one individual to another.

Land uses such as schools, churches, hospitals, convalescent homes, and single-family neighborhoods are particularly sensitive to noise. Campers and other individuals using the Sierra Nevada Mountains for recreation are generally very sensitive to the occurrence of noise generated by others.

"Ambient" noise is a composite of all noise sources, near and far, that constitute the normal or existing levels of environmental noise at any given location. In general, the more a noise exceeds the ambient noise, the more intrusive and less acceptable the noise is to the community. Noise also becomes more intrusive if it occurs intermittently or if the sound levels undulate. Noise that is constant is usually less irritating, as people become less aware of it over time. Similarly, noise that occurs during periods of quiet, such as in the evening, when most people are resting or engaged in talking, listening to the radio, or watching television, is more intrusive than noise that occurs in the middle of the day.

Sound is measured in decibels (dB), which describe the relative levels of sound intensity. The scale is logarithmic - a sound of 20 dB is actually ten times louder than a sound of 10 dB, and a sound of 30 dB is 100 times louder than a sound of 10 dB. Although sudden or occasional noises are intrusive, the 24-hour average noise level is the most commonly used measure of the ambient noise environment. This average, weighted for increased sensitivity of people to noises during the nighttime hours, is referred to as the Day-Night Average Level (L_{dn}).

A major source of noise in El Dorado County is typically vehicular traffic that, in and about the project area, includes automobiles, trucks, and motorcycles. The level of vehicular traffic noise varies with the volume of traffic, the percent of trucks, the speed of traffic, and the distance from the roadway. Within the County, noise generated by vehicular traffic is greatest along State Route (SR) 49, U.S. Highway 50, and SR 193.

Recreation-related noise complaints identified in our informal interviews are typically raised by occupants of residences located near forestland, users of rivers and lakes, or campers who come to the area expecting solitude. Helicopter noise is a major source of complaints raised by hikers and campers on Forest Service Lands near the Rubicon Trail. Other complaints deal with off-highway vehicles (OHVs), jet skis, and motorboats, as well as amplified music and noise from raucous parties and vehicles that lack proper mufflers

3.10 PUBLIC SERVICES

Existing Setting

Fire Protection

The U.S. Forest Service (USFS) is responsible for providing adequate wildland fire protection to the Eldorado National Forest (ENF). The project study area encompasses private lands both within and outside the ENF Forest boundaries. The USFS, as the primary protection agency and under cooperative agreements, provides protection for the private lands. The California Department of Forestry and Fire Protection (CDF) is responsible for providing wildland protection to private lands outside the National Forest. These private lands consist of both residential development and commercial forestland.

Separate rural fire districts also provide mutual aid. The Interagency Joint Dispatch Center, located in Camino, is responsible for dispatching resources to suppress fires in the project area. In the event of a fire, the practice is to send the closest appropriate resources, depending upon location. The majority of the rural fire districts are primarily staffed by volunteer firefighters. Response times can reach up to 65 minutes in the rugged mountain areas. The rural fire districts are responsible for structural and wildfire protection as well as medical emergencies within their jurisdictions.

Law Enforcement

The unincorporated areas of El Dorado County receive general public safety and law enforcement services from the County Sheriff's Department. Patrols have recently been placed on the Rubicon Trail. Citations have been issued for fire safety and equipment violations; though it has been determined that many of the crimes that occur on the Rubicon are largely unreported. This is a result of lack of law enforcement in the remote area and unavailability of cellular service.

Documentation shows that incidents of violence that occur on the Trail include threats, verbal altercations, and assault and battery. Over the last year, the Sheriff's deputies who patrolled the Rubicon have been made aware of instances of fights occurring on the Trail; however, by the time the deputies arrived at the scene, the offenders had left the area. Common law enforcement issues include:

- Weapons violations involving the reckless discharge of weapons. Typically the information reported in these

instances is very general, for example "someone across Spider Lake was shooting a gun all night, and we could hear the bullets hitting rocks."

- Drunk driving, open container, and alcohol consumption by minors. Driving under the influence is a citable offense anywhere on the Rubicon; however, open container violations are currently only enforceable on public property.
- Vehicle/OHV registration and equipment violations.
- Damage to natural resources caused by the users leaving the designated Trail, entering wetlands, and trespassing onto private property.
- Illegal campfires.
- Numerous search-and-rescue incidents.
- Theft of parts and accessories from vehicles left in the area due to breakdown.
- Unauthorized trail modifications, including "blasting."

The Sheriff's Department currently has 30 OHV Search-and-Rescue volunteers who regularly access the Rubicon. They are equipped with Sheriff's radios and are in place to initiate any search-and-rescue missions that develop. They are trained in wilderness survival, land navigation, CPR/first aid, radio communications, helicopter and aircraft safety, and man tracking. With the radios in hand, these volunteers can communicate with the patrols and can provide essential information regarding where violations or emergencies are occurring.

The Sheriff's Office has coordinated with the California Highway Patrol (CHP) in Placerville regarding DUI enforcement in the area. The CHP Area Commander has agreed to provide assistance with a DUI checkpoint on the road to the Rubicon. CHP will provide a mobile breath machine (for blood alcohol content) and CHP officers. The Sheriff's Office will provide a mobile command post, deputies to drive transportation vans to the jail, and support personnel. Additionally, the CHP helicopter has been available to provide air support to County deputies on the Trail and to transport other law enforcement personnel into the Rubicon.

The USFS has deployed law enforcement personnel with Sheriff's deputies to provide additional enforcement. El Dorado County currently has a Memorandum of Understanding with the USFS

granting USFS law enforcement personnel permission to enforce State laws in El Dorado County.

Emergency Services

Two hospitals in El Dorado County provide medical services: Barton Memorial Hospital in South Lake Tahoe and Marshall Hospital in Placerville. Emergency air transportation is available for those patients requiring specialized care. Air transportation is provided by several facilities: CHP in Auburn, Care Flight from Reno, and Med Flight from Stockton.

Marshall Hospital is the largest medical services provider in the Western Slope of El Dorado County, while Barton Memorial provides medical services to the residents of El Dorado County's Eastern Slope.

Barton Memorial Hospital has a helipad that is used by Life Flight and Cal Star helicopters to bring patients from the scene of accidents or to transfer patients to different hospitals. Barton Memorial does not own any helicopters; however, Life Flight supplies the helicopters arriving at the hospital. Most helicopter flights occur during the day, and approximately 75 flights occur annually.

Solid Waste

No on-site sanitation facilities or refuse collection programs exist to handle the waste generated by the users of the Rubicon Trail. Due to the Trail's remote setting and difficult access, implementation of traditional campsite-type waste collection programs or sanitation facilities is not feasible. With increasing use and no on-site facilities, substantial amounts of solid waste are deposited along the Trail and in adjacent use areas.

The Sacramento Municipal Utilities District's improvements of the Loon Lake Dam and access road have lead to dramatic increases in use of the Ellis Creek Intertie to the Rubicon Trail and increased dispersed recreation along the north shore of Loon Lake. This increase in the number of users in the area has resulted in levels of use of sanitation facilities at the Loon Lake Chalet, the North Shore RV Park, and trail-side campgrounds far above target volumes f or which these facilities were designed.

Human waste has become a particularly unpleasant problem, degrading the Trail experience for all.

Solid wastes must be categorized for collection and separated from inert waste materials and those that are potentially hazardous to the

environment. El Dorado County Environmental Management is currently implementing a survey of portable, disposable sanitation devices for use on the Rubicon as part of a "pack it out" campaign designed to improve sanitary conditions. The County is working with the USFS to develop dumpsters at Rubicon Trail staging areas for disposal of these sanitation devices. Procedures for hazardous waste, such as motor oil, anti-freeze, crank case oil, and gasoline disposal, also must be addressed. The County General Services Department is working with Environmental Management to provide for the proper disposal of hazardous waste.

3.11 RECREATION

Existing Setting

Because of its range of climates, vegetation and topography, El Dorado County offers a wide variety of recreation opportunities for all seasons. The County contains 1,805 square miles of varying terrain, more than half of which is in public ownership in the form of National Forests and various other parks and recreation areas. In addition, there are a variety of privately owned timberlands, parks, campgrounds, and other recreational facilities. The County supports a wide range of recreation activities including but not limited to sightseeing, camping, hiking, bicycling, picnicking, hunting, water sports, fishing, horseback riding, and off-road vehicle travel.

Parts of the Rubicon Trail are located within the Eldorado National Forest. Recreational opportunities within the Forest are divided into two types: developed and dispersed. Developed recreation facilities provide for recreation use at reservoirs, campgrounds, beaches, picnic areas, and interpretive sites. While driving for pleasure attracts the highest number of visitors, family camping, winter sports, and recreation residence use are also popular developed recreation choices (USFS 1988). Dispersed recreation opportunities take place outside of developed recreation areas and are generally less intensive. Hunting, fishing, hiking, cross-country skiing, snow play, recreation vehicle travel, boating, and undeveloped site camping are common forms of dispersed recreation.

Some of the most important recreation resources in the Eldorado National Forest are its trail systems. There are several hundred miles of trail within the Forest, and most of the existing trails in the County pass through public land. A majority of the Rubicon Trail lies within the Eldorado National Forest, and approximately eight miles of the Trail are located within El Dorado County.

In addition to the County residents who visit the various recreation facilities found in El Dorado County, many people living outside the County also visit these facilities. Many of these tourists or visitors are attracted to the County because they wish to experience open space, natural scenery, and recreational activities that directly contrast the usual, everyday spatial surroundings and activities they encounter in an urban environment.

Recreation sites of historical or archaeological interest (such as the Rubicon Trail) hold considerable interest among those visiting. "Uncommon" activities, or those not readily duplicated elsewhere, tend to generate the greatest amount of demand and visitation from regional and national visitors.

The Rubicon Trail is widely recognized as the premiere OHV route in the United States. The Rubicon has been called the "granddaddy" or "crown jewel" of all off-highway trails, and at one time, it was revered as the most difficult, formally defined OHV route, rated 10 on a scale of one to 10. The narrow passages, rocky climbs, and occasional mud hole keep the Trail rated as most difficult. Because of its difficulty, the Trail is recommended for short wheelbase vehicles with all skid plates in place.

The Rubicon Trail attracts both street legal and "green sticker" motor vehicles. Users travel the Trail on all-terrain vehicles, dirt bikes, and all types of 4-wheel drive vehicles, ranging from daily driver SUVs to vehicles built for the sole purpose of running the Trail. Because the Trail lies adjacent to the Desolation Wilderness, it is also used as an access route by hikers, backpackers, and fishermen.

As part of the Sacramento Municipal Utility District (SMUD) Upper American River Project, SMUD conducted surveys of recreational users within the project study area. Visitors offered suggestions they felt must be addressed within the area. The suggestions that apply to the OHV trail were an improved system for litter removal, more trail signs and displays, signage providing historical information about the region, and an improved Internet resource that could provide information regarding wilderness permits, educational information, trail information, and reservoir levels.

The most common suggestions for changes to the motorized trail system included expansion of the trail system (more visitors suggested expansion than reduction), modified enforcement over OHV use (for every three people who suggested to strengthen the regulations, two people said to reduce the enforcement), and improving trailhead markings.

The U.S. Forest Service (USFS), State Department of Parks and Recreation, and larger public purveyors of recreation and associated services keep records of annual use; however, recreational user numbers for the Rubicon Trail have thus far been unobtainable.

3.12 TRANSPORTATION/TRAFFIC

Existing Setting

U.S. Highway 50 is the primary transportation corridor in El Dorado County, spanning centrally the length of the County from east to west. The arterial road system connects most communities in the County to U.S. Highway 50, to each other, and to the few other access points in neighboring counties. On a local level, access to property is either direct to the fronting arterial road or via public or private local roads, many of which are narrow, unpaved and have no outlet. The Rubicon Trail is accessible via U.S. Highway 50. On U.S. Highway 50 or Interstate Highway 80 from Sacramento, visitors access the Rubicon trailhead at Georgetown via State Highways 49 and 193. A frequently used alternate route to the Trail is also accessed from Highway 50. Visitors turn north from the highway onto Ice House Road, follow the signs for Loon Lake, and go past the camping area. Once visitors are across the dam and down onto the granite slab, the Ellis Creek Intertie to the Rubicon Trail begins. The Ellis Creek Interie joins the Rubicon Trail at Ellis Creek, approximately one mile from the start of each course.Recreation and tourism are two of El Dorado County's primary industries and are responsible for a major component of the demand upon the highway system. The Lake Tahoe Basin is a major attraction as well as the Eldorado National Forest, including Desolation Wilderness and several ski areas. Other attractions include the American River, Marshall Gold Discovery State Historic Park, Folsom Lake, Sly Park Reservoir, Apple Hill, El Dorado County wineries, and the Rubicon Trail. Visitors largely come from the Sacramento and San Francisco Bay areas.

The Rubicon Trail

The Rubicon Trail is a non-maintained County road located in El Dorado and Placer Counties. Parts of the trail pass through the Eldorado National Forest and portions of private lands. The U.S. Forest Service, El Dorado County, and the user groups work together to identify and correct issues that must be addressed on the Trail. The Trail ranges in condition from a well-defined dirt road to granitic domes and ledges that appear impassable to all but skilled OHV enthusiasts.

Traffic volumes and peak vehicle use numbers on the Rubicon Trail have been described as ranging from a very few over-snow OHVs in the winter and spring months to 35,000 OHVs during the three summer months. However, accurate traffic for the Trail is currently unavailable.

Aerial Support of Rubicon Trail Events

Helicopters have been used for logistical and supply support for the Jeepers Jamboree and other events for decades. The use of the county right-of-way portions of the Trail for helicopter take-off and landings by the Jeepers Jamboree from June to August of each year was formally authorized by the County Board of Supervisors on July 12, 1994. However, helicopter use occurs primarily on National Forest lands. Other events use helicopter support with and without the approval of the Eldorado National Forest.