2.0 Watershed Resources

This chapter describes the watershed resources of the SFAR. The chapter begins with a discussion of the environmental setting including the larger regional context. These descriptions provide the framework to discuss critical watershed structures specific to the SFAR such as geology, soils, hydrology and water resources.

CHAPTER 2

2.1 Regional Context

The SFAR watershed is situated within an area known as the Mountain Counties region of the Sierra Nevada. The Mountain Counties include Alpine, Amador, Butte, El Dorado, Nevada, Placer, Plumas, Sacramento, Sierra, and Yuba. This is a distinct region in California with unique water infrastructure and watershed issues. Much of the existing water supply infrastructure was developed for mining operations, power generation, and agriculture, and then later adopted for public water supply. As mining, agriculture, and logging operations have decreased over the past decade, recreation, tourism, and residential development have significantly increased, exerting a different type of demand and effect on water resources.

The SFAR is a tributary to the American River - a relatively large watershed situated between the smaller Cosumnes River basin to the south and the Yuba River basin to the north. The American River watershed encompasses over 2,264 square miles with three main forks – North, Middle, and South. The American River is one of a dozen major rivers that drain the western slope of the Sierra Nevada, contributing approximately 12.3% of the total 21.9 million acre-feet of annual runoff from the Sacramento River basin (USGS 2000, USACE 1991). The flow from the SFAR constitutes 38.5% of the total output of the American River and 4.7% of the total Sacramento River output (USGS 2000, USACE 1991, SJCPWD 2003). The American River is considered a relatively high elevation river compared to other nearby watersheds (El Dorado County 1994). This geographic feature of the watershed has strong implications for water management because much of the precipitation falls as snow in the higher elevations which extends run-off later into the spring and early summer months.

2.2 Overview of South Fork American River Watershed Resources

The SFAR watershed is the largest of the American River subwatersheds accounting for 43 percent of the American River Watershed and draining approximately 542,230 acres (about 840 square miles). The river flows about 55 miles in a westward direction beginning in the high elevations (9,900 feet) of the Crystal Range, Caples and Silver Lake areas and terminating at Folsom Reservoir (490 feet).

Major communities in the western portion of the planning area include El Dorado Hills, the Cameron Park area, and Placerville. These communities have grown rapidly in the past decade due to an increase in industry and professional services in the greater Sacramento Region. Camino and Pollock Pines are the primary communities in the central to eastern portion of the watershed. Many unincorporated small towns and communities are sprinkled throughout the watershed.

Land ownership in the region is a mix of private and public, which results in great challenges for land managers today. Public ownership accounts for over 48 percent of the land within the SFAR watershed with public jurisdictions including the ENF, Bureau of Land Management (BLM), State of California, and EID. Private ownership in the western part of the watershed consists mostly of residential and/or agricultural holdings, while in the upper watersheds timber companies own a large percentage of the private lands which they manage for commercial timber production (GDRCD 2003).

Approximately 150 years ago, land uses in the watershed were comprised of extractive industries (mining and logging), grazing, and agriculture. A dramatic shift has occurred over the past few decades from extractive uses to residential, commercial, and industrial development. The urban and rural development is presenting challenges in the region with respect to water supplies, water quality, and loss of wildlife habitat, among others.

Today, primary land uses include high density residential development, commercial and retail services, recreational activities, rural residential development, agriculture, resource production and extraction, utilities, transportation, and open space. The scenic beauty and abundant recreational opportunities in the region also attract many tourists. Popular activities include mountain biking, boating, off-roading, swimming, fishing, and hiking in the summer, and skiing, snow shoeing, and snow mobiling in the winter.

The following chapters provide detailed descriptions of the environmental setting of the watershed including the geologic history, climate and biological resources.

2.2.1 Geology and Soils

The Sierra Nevada range is dominated by granitic rock but also includes many types of igneous, sedimentary and metamorphic rocks. The environmental history consists of hundreds of millions of years of uplift, erosion, volcanism, and glaciation. The climate, topography, surface processes, and biota interact to produce the Sierra Nevada soils.

The Sierra Nevada Mountain Range was formed by block faulting that generally tilted westward hence its crests tilt in a similar orientation. It is one of the largest batholiths (masses of granite rock deep beneath the earth's surface) in the western United States. The uplift and erosion of this mountain range continues today. Glacial erosion has modified the valleys in the upper watersheds, creating steep canyon slopes. These steep, unstable slopes have high to very high erosion hazards. Fluvial erosion (river-caused) and mass wasting in the river canyons are the main geomorphic processes occurring in the region and present a significant risk to lives and property. Much of the side slopes and upper headwater portions of the watersheds are composed of various volcanic and superjacent sedimentary materials. The dominant rock types found are Paleozoic marine deposits (Shoo Fly complex), Pliocene volcanic deposits (Mehrten formation, near Caples and Silver Lakes), and granitic rocks. There are also metamorphosed sedimentary and volcanic rocks of Mesozoic age. The Sierra Nevada was glaciated several times during the Pleistocene. These events modified the topography of the region, as evidenced by the presence of wide, U-shaped valleys.

Glaciation introduced till and moraine material, both of which are present day sediment sources (SNEP 1996).
The SFAR watershed is located in the Western Metamorphic Belt of the Sierra Nevada physiographic province, which consists of steeply dipping metasedimentary and metavolcanic rocks of Paleozoic and Mesozoic age (BLM 2004). Several important geologic formations influence the watershed of the SFAR. In the lower foothills of the SFAR, a band of metasedimentary, ultramafic rocks, formed from ancient seafloors during the Paleozoic Era, contains a variety of rock types with some unusual chemical properties. These rocks include serpentinite, gabbrodiorite, marble, and many others. The chemical properties of serpentinite are toxic to most plant life and, as such, a variety of endemic plants exist nearly exclusively in these soil types. Similarly, the gabbrodiorite derived soils support another assemblage of endemic and rare plants. The serpentinite outcrops can contain the mineral asbestos, which may pose a health risk to those living in close proximity to airborne particles of asbestos. Weathering and erosion along with the physical interaction of the biota, act upon the rocks to create the soils of the Sierra Nevada.

The soil properties in this region are varied and strongly influenced by the underlying bedrock, which has granitic, sedimentary, volcanic, metamorphic, and glacial origins. The soil productivity varies from non-productive to highly productive; generally, where the temperatures are higher and nutrients accumulate in the lower valleys, the soils tend to be more productive. In addition soils of volcanic origin on the slopes and ridges, such as those found near Camino and Placerville can be very fertile.

Soils in this region were formed by the weathering of volcanic, sedimentary, granitic and glacial rock formations (see discussion of geology for more information on underlying bedrock formations). Many soils in the region are rated as having high or very high maximum bare soil erosion hazard ratings. Past management activities in the region have left some areas of residual soil displacement and compaction (e.g., roads, landings, and skid trails). These areas have altered soil productivity and hydrologic function that increases the potential for surface run off and gully erosion. Gully erosion is present within the region and is typically initiated by channelized water runoff from areas of rock outcrops, roads, landings and skid trails.

2.3 Hydrology and Water Resources

2.3.1 Introduction

The SFAR watershed is located along the southern portion of the American River watershed within the Mountain Counties Area hydrologic region. This region has been identified by the California Department of Water Resources (DWR) within the 2005 California Water Plan Update and includes the foothills and mountains of the western slope of the Sierra Nevada and a portion of the Cascade Range.

The watershed sustains a network of over 1,147 miles of perennial and intermittent streams. Major tributaries are Silver Fork American River, Alder Creek, Silver Creek, Slab Creek, Rock Creek and Weber Creek. Major reservoirs and lakes include: Caples Lake, Lake Aloha, Silver Lake, Ice House Reservoir, and Union Valley Reservoir.

Hundreds of lakes and reservoirs within the SFAR watershed provide important water storage and electric generation for California. Major lakes used for water supply (often modified to increase storage capacity) include: Lake Aloha, Silver Lake, Caples Lake, and Echo Lake, which is outside the geologic watershed, but connected through a canal piping the water into the SFAR watershed. Jenkinson (Sly Park) Reservoir is also outside the geologic watershed but is connected to the SFAR via a transfer tunnel from the SFAR main stem to the Reservoir, in the North Fork Cosumnes River watershed. Reservoirs within the SFAR watershed used for power generation include Union Valley, Ice House, Camino, Junction, Brush, Chili Bar, and Slab Creek.

There are three major hydroelectric projects (greater than 5 MW) within the SFAR watershed: 1) The El Dorado Hydroelectric Project (Federal Energy Regulatory Commission (FERC) No. 184) operated by EID; 2) Upper American River Hydroelectric Project (FERC No. 2101) operated by Sacramento Municipal Utility District (SMUD); and, 3) the Chili Bar Project (FERC No. 2155) operated by Pacific Gas and Electric (PG&E). These and other hydroelectric projects are discussed in Chapter 4.

2.3.2 Watershed Condition

Beginning with the Goldrush Era in 1849, the condition of the SFAR watershed has been greatly influenced by historic and ongoing land disturbance and resource management activities. These activities have resulted in changes in the availability of water, quality of surface and ground water, stream-flow amounts, degradation and fragmentation of aquatic and riparian habitat, and soil erosion and sedimentation. The SFAR watershed, the Coloma subwatershed in particular, has been impacted by historic gold mining (hydraulic mining or placer mining) causing metals contamination, most notably mercury. Mining practices have also affected stream geomorphology by contributing vast amounts of sediment and gravel beyond natural amounts. Significant deposits of mining debris still persist in the SFAR watershed today.

Land disturbance activities resulting in the creation of impervious surfaces (i.e., roads), barren land (i.e., fire), and soil particle displacement (i.e., past logging practices – new methods no longer have the large contributions of sediment to streams and rivers) have lead to an increase in surface runoff rates resulting in an increase in erosion and sedimentation. With increased surface runoff, streams often are unable to withstand the water pressure resulting in over-steepened, deep-cutting streams that produce copious amounts of sediment. An increase in stream sedimentation can result in degraded water quality, loss of biotic habitat and diversity, increased flood frequency, decreased water retention capacity, and rapid filling of storage reservoirs.

Other watershed influences are from hydropower facilities that alter water flow and temperature; stormwater runoff from urban areas increasing chemical and bacterial contamination; recreational activities such as Off Highway Vehicle (OHV) use, which contributes to sedimentation and promotes water diversions that affect instream flows; powerful storm events that cause flooding; slope failure; and excessive erosion and droughts which increase water temperature and reduce water availability.

In recent years, with the increase in development (i.e., El Dorado Hills) in the lower portion of the region, the watershed has become more vulnerable to pollution and contamination. Additionally, with development comes the increase for water demand that spans further than the SFAR watershed to the Central Valley and beyond. This demand places pressure on water supply systems and the providers to increase the supply and delivery of water resulting in the further expansion and development of water supply infrastructure. This increase in development includes roads that are often located in previously undeveloped areas further fragmenting the landscape.

2.3.3 Precipitation

The climate in California is characterized by mild, wet winters and hot, dry summers. However, the crest of the Sierra Nevada, which includes the eastern portion of the SFAR watershed, forms a near impenetrable barrier to storm systems moving in an easterly direction from the Pacific Ocean. This barrier forces storm systems to deposit most of their precipitation along the west slope of the Sierra Nevada range.

Annual average precipitation within the project area varies greatly depending on elevation. In the higher elevations, near the headwaters, annual average precipitation generally ranges between 65 to 75 inches at the Sierra Crest (CAL FIRE 1990). In the middle elevation areas of the watershed, near State Highway 49, precipitation ranges between 35 and 45 inches per year while in the lower elevations, near Folsom Reservoir average precipitation drops to about 22.5 to 27.5 inches per year (CAL FIRE 1990).

Average temperatures in the region generally decrease from west to east with elevation; in the summer months, temperatures tend to be warmer in the lower elevations (70°-85°F) and cooler at the higher elevations (60°-70°F). The winter months are mild at the lower elevations (45°-60°F), and cooler at the higher elevations (30°-40°F).

Approximately 40 percent of the watershed is located above 5,000 feet in elevation. Precipitation often falls in the form of snow at these higher elevations. Snow levels often reach 3,500 feet and sometimes reach as low as the valley floor. At 6,000 feet and above, the snow accumulates and persists throughout the winter until warmer weather produces snowmelt, which often occurs from March to June. The average maximum snowpack accumulation occurs around April 1. The snowmelt provides a major source of water to help meet consumption and energy demands during the dry and hot summer months. Much of the precipitation falls as rain in the lower elevations between November and April.

With surface temperatures increasing, the affects of climate change have become a major concern. Studies have shown on average, across the contiguous United States there has been a 1º Fahrenheit increase in surface temperatures since 1901 with the last ten years being the warmest on record (USEPA 2008). With temperature increases, studies have predicted that climate change will affect precipitation events, causing a higher proportion of precipitation to fall as rain (as compared to snow) and an earlier spring snowmelt runoff (CCCC 2006).

2.3.4 Groundwater

A groundwater basin is defined as an area underlain by permeable materials capable of furnishing a significant supply of groundwater to wells or storing a significant amount of water. It is three-dimensional and includes both the surface extent and all of the subsurface fresh water yielding material.

Given the geologic and topographic features of this watershed, groundwater availability is limited. Less than 10 percent of the water supply within the Mountain Counties Hydrologic Area, which includes the SFAR watershed, is from groundwater (DWR 2005). Development of groundwater resources within the watershed has been based primarily on individual private wells. These wells are located in rural areas of the region, where residences are not connected to a municipal water system and therefore wholly dependent upon groundwater for domestic use, which can often be unreliable during drought periods.

In general, groundwater in this area is an inadequate and unreliable water supply for large scale use. The fractured granite formations that constitute much of the Sierra Nevada foothills and western slopes of the mountains are poorly suited to contain large quantities of groundwater. Water cannot penetrate the rocks unless there are fractures as there is no pore space between the grains of the rock. Where rock fractures are present, small amounts of water can be stored and made available to wells that intersect the fractures. Groundwater availability is restricted to these fractured rock areas and small alluvial deposits immediately adjacent to the region's many streams (DWR 2005).

Alluvium deposits, consisting of unconsolidated particles of sand, silt, and clay, only occur within small pockets within the watershed and often are too thin to provide a significant amount of water storage, thereby further limiting groundwater availability (EDCWA 2007). These groundwater supplies are highly variable in terms of water quantity and water quality (heavy metals) (DWR 2003). Because of the variability of groundwater supplies within the watershed, much of the water supply is provided by surface waters. Currently, a groundwater management plan does not exist within El Dorado and Alpine Counties. However, these county entities regulate the installation of wells, to ensure proper installation takes place according to State regulation. In addition, the DWR Resources keeps track of well installations throughout the State, but does not manage the groundwater found within the State.

2.3.5 Subwatersheds

The SFAR watershed consists of seven subwatersheds, or Hydrologic Sub-areas as defined by the California Interagency Watershed Map of 1999 (CalWater V.2.2.1) (CalWater 2008). These subwatersheds, starting from largest to smallest (see Table 2.1), include: Coloma, Kyburz, Silver Fork, Weber Creek, Silver Creek, Union Valley, and Green Valley.

Coloma Subwatershed - The Coloma subwatershed located in the northwestern portion of the SFAR watershed is the largest of the subwatersheds. Due to its size this subwatershed encompasses various vegetation types, from hardwood forests in the western end transitioning to mixed conifer in the eastern end. This subwatershed is home to the Marshall Gold Discovery State Historic Park where James W. Marshall first discovered gold and that led to the mass movement of people into the area. As a result of historic gold mining practices, a 37-mile stretch of the SFAR, located within the Coloma subwatershed has been identified as a 303(d) listed segment for mercury contamination by the State Water Resources Control Board (SWRCB) (see Chapter 4, for further discussion).

This subwatershed contains approximately nine major tributaries connecting to the SFAR and includes the towns of Georgetown, Mosquito, Kelsey, Coloma, portions of Camino, and Cool.

Kyburz Subwatershed - The Kyburz subwatershed, primarily surrounded by the ENF, includes at its eastern edge, a portion of Desolation Wilderness. This subwatershed contains a predominant amount of old growth forest preserves which provides habitat for sensitive species like the California spotted owl. There are approximately twelve major tributaries with many smaller tributaries throughout the subwatershed. The subwatershed includes the towns of Kyburz, Whitehall, portions of Pollock Pines, and Strawberry. The headwaters for the SFAR begin and flow directly through this subwatershed.

Silver Fork Subwatershed - The Silver Fork subwatershed, located in the upper montane region of the western slope of the Sierra Nevada Mountain Range, is primarily surrounded by the ENF The most easterly portion of this subwatershed lies within the administrative boundaries of Alpine County and contains a portion of the Mokelumne Wilderness.

The subwatershed includes the towns of Kirkwood and Pioneer. There are approximately six major tributaries with many smaller tributaries throughout the subwatershed connecting to the Silver Fork of the American River, and includes two major reservoirs which are Caples Lake and Silver Lake. The reservoirs and areas surrounding the reservoirs provide recreationists many opportunities including boating, fishing, hiking, and camping. In addition, Kirkwood Ski Resort is located in this subwatershed, which provides winter recreation opportunities.

Weber Creek Subwatershed - The Weber Creek subwatershed is located in lower reach of the SFAR watershed, and holds a larger portion of urbanized centers than in any of the other subwatersheds. The subwatershed includes the towns of Placerville, Diamond Springs, Shingle Springs, Sly Park, and portions of Camino and Pollock Pines. There are approximately eight major tributaries with many smaller tributaries throughout the subwatershed. The eastern portion of this subwatershed, along South Fork Weber Creek, contains critical habitat for the California red-legged frog (CRLF).

Silver Creek Subwatershed - The Silver Creek subwatershed is located in the upper montane region of the western slope of the Sierra Nevada Mountain Range, and is

primarily surrounded by the ENF. There are approximately five major tributaries with many smaller tributaries throughout the subwatershed connecting to the South Fork of Silver Creek and the primary tributary Silver Creek. This subwatershed includes one major reservoir, which is Ice House Reservoir. The reservoir and areas surrounding the reservoir provide recreationists many opportunities including boating, fishing, hiking, and camping.

Union Valley Subwatershed - The Union Valley subwatershed is located in the upper montane region of the western slope of the Sierra Nevada Mountain Range, and is primarily surrounded by the ENF.

There are two major tributaries with many smaller tributaries throughout the subwatershed connecting to Silver Creek, and includes the largest reservoir, which is the Union Valley Reservoir, within the SFAR watershed. The reservoir and areas surrounding the reservoir provide recreationists many opportunities including boating, fishing, hiking, and camping.

Green Valley Subwatershed - The Green Valley subwatershed, the smallest of the subwatersheds, is located in the southernmost portion of the SFAR watershed. The SFAR terminates at southern end of this subwatershed at the Folsom Lake reservoir. El Dorado Hills is the primary community located within this subwatershed. There are three major creek tributaries with many smaller tributaries throughout the subwatershed connecting to the SFAR.

2.4 Biological Resources

2.4.1 Vegetation Communities

The Sierra Nevada encompasses 88 plant community types as defined by California's Natural Heritage Division. Sierra mixed conifer forest and blue oak woodland are the most extensive types, covering 2,300 and 2,100 square miles, respectively. Sixty-seven plant community types have a mapped distribution greater than ten square miles. Widespread types exhibit considerable floristic variation from the northern to southern ends of the range and are best analyzed on a sub regional basis. Of California's 7,000 vascular plant species, about 50% occur in the Sierra Nevada. Of these, more than 400 species are found only in the Sierra Nevada and 200 are rare (SNEP 1996).

The SFAR watershed supports a wide variety of vegetation communities, as the planning region encompasses a broad spectrum of environmental conditions. The planning area contains a wide range of elevation, slope, aspect, soils, and precipitation. Using the CALVEG classification system developed by the California Department of Forestry and Fire Protection (CDF) and the USFS, 9 major cover types consisting of 53 distinct vegetation/landcover community types were identified in the SFAR region boundaries (see vegetation community map, Figures). The SFAR watershed is within the CALVEG Northern Sierra Ecological Zone, which identifies a total of 93 vegetation/landcover community types.

Historically, fire has played an important role in maintaining a diverse Sierran landscape. Many vegetation communities in the SFAR planning area are adapted to periodic fires, and suppression of fires and other land management practices has led to an accumulation of fuels. This, along with increasing residential development in forested areas, has increased the risk of catastrophic fire in many parts of the region. Changing fire patterns have had a clear, if not fully understood, effect on the ecosystems found in the SFAR region.

The dominant vegetation alliances of the SFAR watershed, in order of abundance are; Ponderosa Pine (17%), Mixed Conifer-Pine (12%), and the Red Fir (12%), and the Mixed Conifer-Fir (10%). These coniferous vegetation types reflect the montane nature of the watershed and account for 52% of the total land cover. These forests supported a vigorous timber industry throughout the late nineteenth and early twentieth century, and still support a much smaller industry. In addition areas of late successional, "old growth", forest provide habitat for wildlife such as the California spotted owl, great gray owl, pacific fishers, and others. Deer and numerous other wildlife including Goshawks, bald eagles, osprey, black bears, and pacific fishers, utilize these conifer forests.

Oak woodlands are another significant vegetation type in the SFAR watershed. The three major low-elevation species alliances; interior live oak, blue oak, and valley oak, combine to cover over 47,000 acres (9%) of the watershed. Total cover by all hardwood vegetation types is 13%. Oak woodlands provide habitat for native wildlife, plants, and insects, some of which have special-status. Oak woodlands contribute to nutrient cycling, soil quality and erosion control, water quality, and watershed health. The oak woodlands in the SFAR are increasingly at risk from development pressure pushing eastward as the Greater Sacramento Region expands. Valley oak woodlands are particulary vulnerable in the region. Partly because there is relatively little acreage within the region and the area where they occur, flat, low-lying locations on alluvial soils, are ideal for development. They are listed as a "sensitive habitat" by El Dorado County.

Oak woodlands provide many values to wildlife including food, cover, and breeding sites. Acorns are an important food source for mule deer, western gray squirrels, acorn woodpeckers, band-tailed pigeons, scrub jays, and many other vertebrate species as well as invertebrate species (Giusti et al. 1996; USFS 2001; Tietje et al. 2005). Mule deer migrations are influenced by acorn production (Garrison 1992). Acorn woodpeckers are dependent not only on acorns as a food source but also on trees where they can store acorns in holes (i.e., granaries). Other animals depend on leaves and roots. Oak trees also are sources of fungi, mistletoe, and insects for rodent and bird species. Oak woodlands also provide food in the form of herbaceous plants in the ecosystem.

Cavity trees (those trees which have either burned out or have rotted from the inside, creating an empty and protected space inside the outer cambium layer) provide shelter and breeding sites for birds. Deciduous oaks, such as blue oak, black oak, and valley oak, are particularly important as cavity trees (Tietje et al. 2005). Evergreen trees are important for secondary cavity nesters. Snags provide perching and basking sites as well as roosts. Downed woody material from limbs to logs provides resting and reproductive cover for reptiles, amphibians, and birds. Oak woodlands with more

complex understories (e.g., tree understory, shrubs, herbaceous vegetation, and downed woody material) provide habitat for a greater variety of species, including ground-nesting birds. A diverse structure provides reproductive sites for diverse wildlife communities.

The gabbro-chapparal and serpentine-associated vegetation are unique vegetation types in the lower foothills that contain several rare and endemic plant species. These areas are under intense developmental pressure. Fortunately, large areas of gabbro-chaparral have been set aside for preservation; however these areas are still at risk from high-intensity wildfires because the lack of regular fires and a build-up of fuel. Late-succession coniferous forest is another sensitive vegetation type found in the region. Data from an inventory of late-successional, old growth (LSOG) forests on national forest lands completed in the Sierra Nevada Ecosystem Project, indicates that there are approximately 26,400 acres of high to very high quality LSOG in the SFAR watershed. These areas are primarily at risk from wildfire today since USFS management has restricted logging in these areas.

A complete list of vegetation communities and their acreages and percent cover in the SFAR watershed are listed in Table 2-2. The vegetation communities include the major oak woodlands and conifer communities discussed above, as well as several different chaparral communities, annual grasses and forbes (6%) and multiple other minor vegetation types. The most common modified landscapes include urban or developed land (2.0%) and agricultural land (1.0%) (Table 2-2). These cover types are in the western part of the region where elevation, soil type, slope and access facilitate anthropogenic disturbance.

Impacts to plant and animal populations have come largely from settlement, grazing, logging and fire suppression. The plant species of special concern, along with habitats and species of concern of other life forms (amphibians, birds, invertebrates, reptiles, and mammals), are presented below. Of the habitat types most frequently documented to contain rare and unique species, the foothill woodland and chaparral communities have been particularly damaged and fragmented by changes in agriculture and settlement on the western slopes of the Sierra. Invasion of exotic plant species has been most pronounced in the foothill areas and is associated with livestock grazing and settlement patterns (SNEP 1996).

2.4.2 Fisheries

The river systems, wetlands, lakes, reservoirs, ponds, and small alpine streams in the watershed provide a variety of aquatic habitat that supports a varied fishery. The SFAR once supported native fish (splittail, chinook salmon, coho salmon, steelhead trout, lamprey, white sturgeon) up through 4,600 feet elevation. Anadromous fish and most historic species are now extinct from the SFAR watershed due to Folsom Dam and other regional legacy uses (SNEP 1996). The watershed currently supports a recreational fishery (rainbow trout, brown trout, mackinaw trout, red bass).

Presently, the only native salmonid in the SFAR is the non-anadromous rainbow trout (*Oncorhynchus mykiss).* In the 1990's, Chinook salmon and steelhead in the Sacramento River and its tributaries were listed under the federal Endangered Species

Act. Winter-run Chinook is listed as endangered and spring-run Chinook and steelhead are listed as threatened.

Dams and impoundments, which block fish access to streams and alter stream flow patterns and temperatures, together with degraded conditions above dams, have led to a huge loss in the historic habitat of anadromous fish (SNEP 1996). On the SFAR, evidence suggests that Chinook salmon and steelhead used to access the river as far east as Eagle Rock (4,600 ft. elev.), approximately 12 miles west of Strawberry before impoundments were construced (Yoshiyama et al. 1995).

Other native fish species found in the watersheds include:

- California roach *(Lavinia symmetricus)*
- Hardhead *(Mylopharodon conocephalus)*
- Sacramento pikeminnow *(Ptychocheilus grandis)*
- Sacramento sucker (*Catostomus occidentalis)*

Additionally, native fish are being pushed out of their habitat by non-natives such as red eye bass, sun fish, and brown trout. The major non-native fish species found in the watersheds include:

- Sunfishes *(Lepomis sp.)*
- Brown trout *(Salmo trutta)*
- *Brook trout (Salvelinus fontinalis)*
- *Lake trout (Salvelinus namaycush)*
- Brown bullhead *(Ameiurus nebulosus)*
- Kokanee salmon *(Oncorhynchus nerka)*
- Carp *(Cyprinus carpio)*
- Black basses *(Micropterus sp.)*

The fisheries of the SFAR watershed are managed by the California Department of Fish and Game (CDFG) and DWR. Particular reservoirs and streams are stocked with game fish for recreational purposes, though as of November 2008 fewer of these will be stocked per a court order requiring an Environmental Impact Report of the stocking process on the native habitat and native species populations. Several of those are part of the SFAR watershed, including the Silver Fork of the American River, Ice House Reservoir, and Wrights Lake(CDFG website).

2.4.3 Special-Status Species and Habitats of Special Concern

About 300 terrestrial vertebrate species (including mammals, birds, reptiles, and amphibians) use the Sierra Nevada as a significant part of their range, although more than 100 others include the Sierra Nevada as a minor part of more extensive ranges elsewhere. In total, about 60% of the State's vertebrate fauna utilize the Sierra Nevada to some extent. The SFAR region supports many of these species and provides important habitat for taxa from all kingdoms (SNEP 1996).

This region contains a number of sensitive, threatened, and endangered species. The California Natural Diversity Database (CNDDB) records documented occurrences of 59 species and one habitat of special concern within the SFAR planning boundary.

According to data from the CNDDB, six species of plants and six species of animals have official Federal or State listing as threatened or endangered. A complete list of these species and habitats, including their common and scientific names (for species only), state and federal status, and the number of documented occurrences within the SFAR region is provided in Table 2-3.

One of the listed species (federally threatened), the CRLF, has United States Fish and Wildlife Service (USFWS)-designated critical habitat within the SFAR watershed. CRLF, once widely distributed in California, now inhabits less than 30 percent of its former range (USFWSa 2002). This frog inhabits quiet pools of streams, marshes, and occasionally ponds. Because of the extreme reduction in range of this species and the continuing threats to its persistence from introduced predators, development, and other land disturbing activities, CRFL was listed as threatened under the federal Endangered Species Act in 1996. A recovery plan was drafted for this species in January 2000. In the recovery plan, portions of the Weber Creek sub-basin habitat were identified as important to the conservation of this species. The El Dorado Critical Habitat unit, on the upper reaches of Weber Creek, is approximately 8,388 acres and contains one known population of the CRLF.

The Pine Hill area, an outcrop of gabbrodiorite stretching from just south of U.S. Highway 50 in Cameron Park to the SFAR, near Salmon Falls supports a unique assemblage of plant species associated with the gabbro soils in this area. Several of the plant species are known only from this area in El Dorado County and are strictly endemic to gabbro soils. This rarity combined with the threats to the persistence of these species and their habitats resulting from development, led to the federal listing of five of the eight rare species known to this area in 1996. A recovery plan was completed for the Pine Hill plants in 2002 that includes the creation of preserves, as well as, other tasks such as additional research, monitoring and active management (USFWSb 2002). The majority of these preserves are in the SFAR Watershed and cover about 4,214 acres in the project area. See Figure 2-6 for locations of the preserves.

Only one habitat type, the sphagnum bog, is listed as a habitat of concern by the CNDDB within the watershed. The important habitats within the SFAR region are not limited to just those listed in the CNDDB. Eighty-five terrestrial vertebrate species in the Sierra Nevada (most of these are found in the SFAR watershed) require west-slope foothill savanna, woodland, chaparral, or riparian habitats to retain population viability; 14% of these are considered at risk. Eighteen species are dependent upon late successional forests; five of these are at risk. Although few Sierra species appear to require closed forest canopies, many more depend upon the presence of large old trees, snags, and downed logs in all Sierra woodland and forest communities for some part of their life cycle (SNEP 1996). The number of species actually declining in the foothill zone of the Sierra Nevada is undoubtedly far greater because so much of the habitat has been converted. Many of these species do not have state or federal listing because their distributions include habitat in other parts of the state (SNEP 1996). The CDFG has designated areas within the SFAR Watershed as critical habitat for deer herds. Figure 2-6 shows these critical summer and winter foraging areas as well as

critical fawning habitat. Some of the other important habitat types at risk are described above.

2.5 Social and Cultural Characteristics

The region's landscape has been shaped by a wide variety of human activities over thousands of years. These watersheds were used by American Indians to hunt and gather; burning in the valleys was also a common practice to clear hunting grounds. American Indian tribes occupying the lower slopes of the western Sierra Nevada at the time of contact with European-based cultures were the Hill Nisenan or Southern Maidu, and the Sierra Miwok. Many were killed or displaced by contact with the Spanish in the 1700's (mostly from disease) and by later Euro-American settlement. Today identified Indian tribes and/or residents in the SFAR region include the Washoe Tribe of Nevada and California and the Shingle Springs Band of Miwok Indians.

Though many of the American Indian artifacts were destroyed by placer mining, there remain important archeological resources in the region. Evidence of prehistoric uses in the area such as prehistoric camps, along with more recent activities such as pioneer trails, bridges, mining features and logging camps can be found throughout the region that testify to the historic uses of the area, and the need to protect these important cultural sites. American Indians continue to use the region for traditional uses, including basket weaving and ceremonial harvests, however, the availability of materials is contingent on the health of the watersheds in which they grow.

The discovery of gold at Sutter's Mill along the American River in 1848 led to the California Gold Rush of 1849 and played an important part in United States history. There are over 1,500 gold rush era historic and American Indian cultural sites in the SFAR canyon, many of which are eligible for inclusion on the National Historic Register (GDRCD 2003).

The growing metropolitan population in the Sacramento area affects growth in this region, fueling demand for water and other natural resources. Population centers are mostly in the foothills of the Sierra Nevada and along the major Sierra highways. One of these highways, Highway 50, runs east through El Dorado County. Main population centers in the SFAR region include: Placerville, Pollock Pines, Shingle Springs, El Dorado Hills and Cameron Park.

The current population figure for the SFAR planning area is estimated at 176,000. El Dorado County projects population growth about about 25% over the next ten years (El Dorado County website). The population in this county is overwhelmingly white (89.7%); the next largest ethnic group is Asians (2.1%), and American Indians (0.5%). The level of high school education in the Sierra region is higher than for California as a whole but lower than the bachelor degree level. Data from the 2000 census indicates that El Dorado County's per capita income is at $32,122 per person.

2.5.1 Disadvantaged Communities

A disadvantaged community is defined as a community with an annual median household income that is less than 80 percent of the statewide annual median household income. The statewide annual median household income in California in 1999 was $47,493 (U.S. Census Bureau 2000). The City of Placerville qualifies as a disadvantaged community with a median household income of $37,944, which is less than 80 percent of the statewide annual income. Please see Table 2-4 for Disadvantaged Communities in the SFAR Region.

The Black Oak Mine School District, located in Georgetown which is a community located in the northeast of the SFAR watershed, receives Title 1 funding for three of the six schools within the school district. Title 1 funding, generated from the Elementary and Secondary Education Act of 1965, is provided to schools when over 40% of students in a school are enrolled in a free or reduced lunch program. When school districts can show the State that particular schools exceed the 40% threshold, then the schools can receive Title 1 funding. Title 1 funding is based on the percentage of student enrollment that qualifies as being low-income. Low-income students are defined by the State as those children who are enrolled in the free or reduced lunch programs; hence approximately half of the students enrolled in the Black Oak Mine School District qualify for Title 1 assistance and are considered low-income.

It is important to consider disadvantaged communities in this watershed process, as they can be disproportionately affected by land and water management planning decisions. Current water management plans, including the mandatory plans, effectively address water resource objectives within their jurisdictional purview. However, because of the limited jurisdictional boundaries, current planning and implementation processes are not responsible for the overall flexibility and vitality of watershed-scale management of water resources.

The cumulative result of incremental planning can be tightened water supplies and increased competition between users for those increasingly unreliable water resources. This can result in inequities in water supplies amongst certain communities.

Water management decision-making often ignores the historic, economic, environmental, and social burdens of disadvantaged communities. These communities reside amidst the economically viable water infrastructure, but rarely directly benefit from the economics of water resource supply and demand. The needs of these disadvantaged communities must be considered by any future planning efforts and/or implementation projects, including the identification of water and natural resource needs. Disadvantaged community members participate as stakeholders in the public forum to influence decisions that will be of economic benefit to them. Such benefits would center on recreation revenue generating plans, or water development projects that can improve local employment.