KICK LEFLORE / Jim Mcbeath

RESOURCE INVENTORY REPORT 3
AUBURN–FOLSOM PROJECT

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Volume One: Natural Resources

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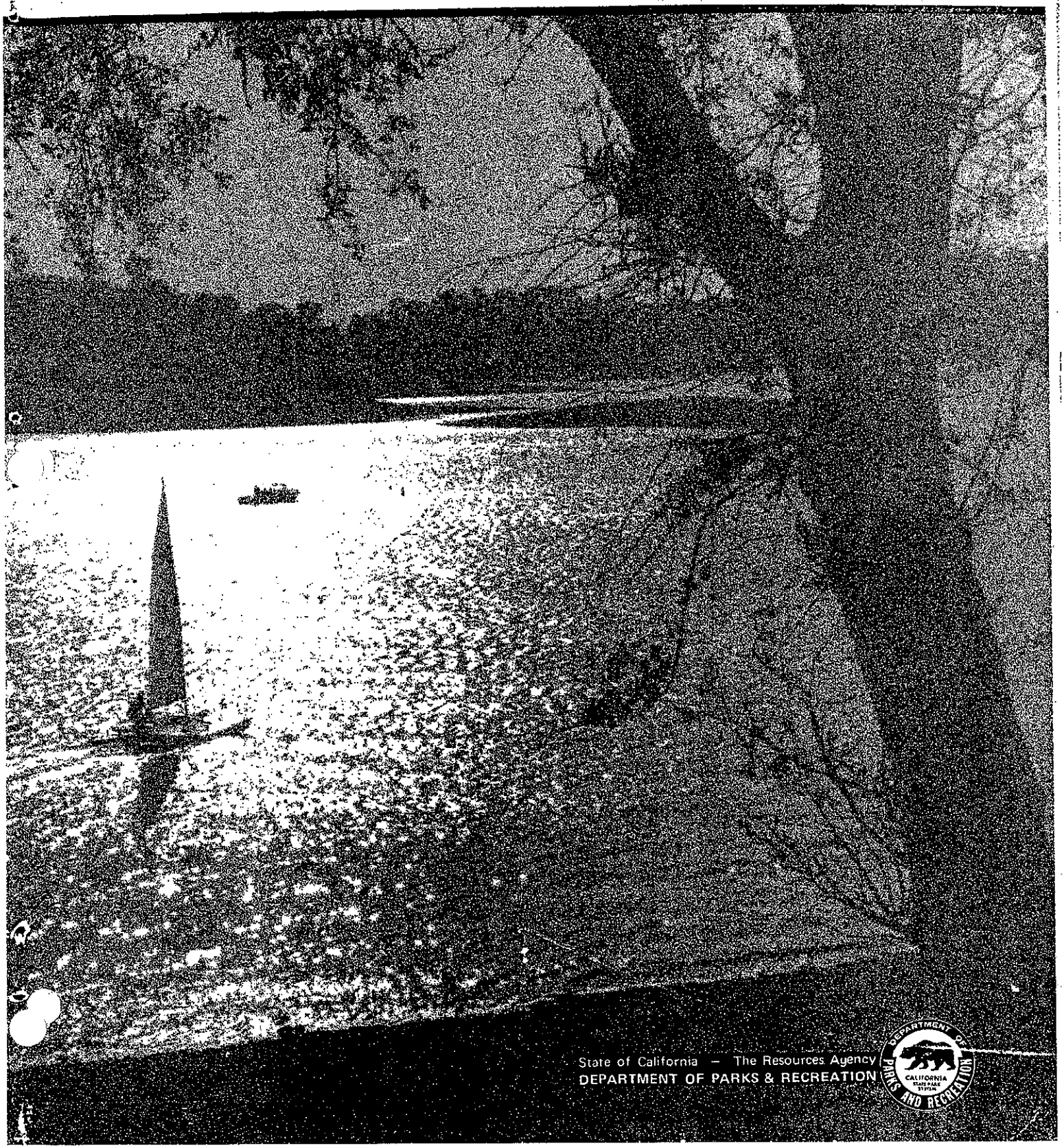

State of California – The Resources Agency
DEPARTMENT OF PARKS & RECREATION

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RESOURCE INVENTORY REPORT

AUBURN-FOLSOM PROJECT

Volume One: Natural Resources

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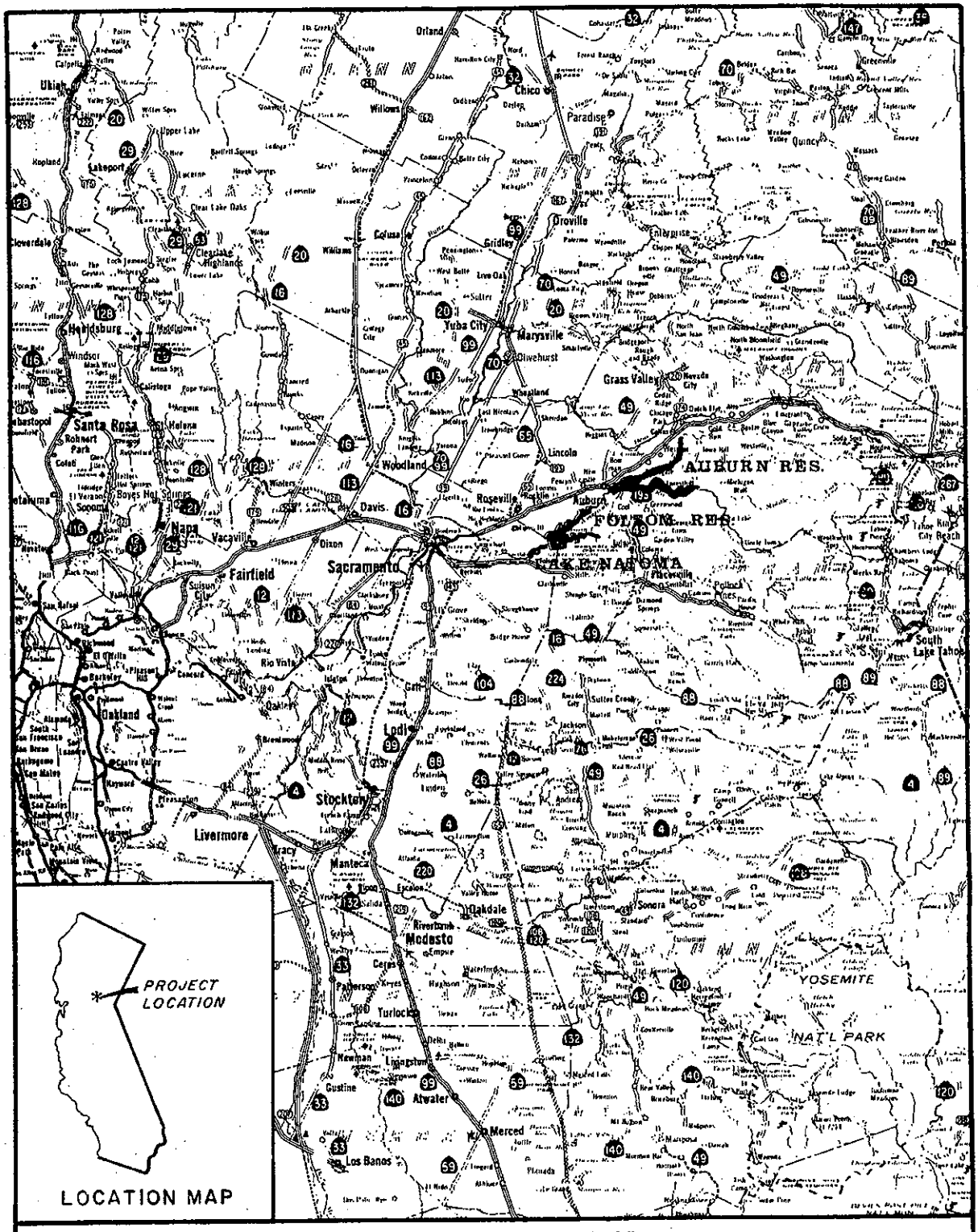


PLATE A – REGIONAL MAP

RESOURCE INVENTORY REPORT

Auburn-Folsom Project

PROJECT DESCRIPTION

The Auburn-Folsom Project is located about 30 miles northeast of Sacramento, between the towns of Folsom, Colfax, and Foresthill, next to the North Fork of the American River. The project encompasses parts of 3 counties, Placer, El Dorado and Sacramento. The regional location can be seen on Plate A. The Folsom Lake Area, a designated state recreation area, totals 7,285 hectares (18,000 acres), and is composed of 2 reservoir units - the Folsom Lake Unit, and downstream, the Lake Natoma Unit. The Auburn Reservoir Project Area, a new unit, totals 16,997 hectares (42,000 acres).

Lake surfaces and shoreline lengths for the project area are:

	Lake Surface Areas		Shoreline Lengths	
	Hectares	Acres	Kilometers	Miles
Folsom Lake	4,856	12,000	137	85
Auburn Reservoir	4,047	10,000	225	140

The Auburn-Folsom Project follows the North and Middle Forks of the American River, from the Sierra Nevada Foothill Landscape Province to their confluence at the Auburn Dam, and the confluence of the North and South Forks of the American River at Folsom Lake SRA, at the eastern edge of the Central Valley Landscape Province.

The project contains elements of both the valley to the west and the mountains to the east. Included in this unit are areas of flat or gently rolling topography around Folsom and Natoma Lakes, as well as steep canyon walls which separate the Auburn Reservoir from the rugged surrounding land. The vegetation is as varied as the terrain, with vegetation types ranging from grasslands and chaparral to oak woodlands and Ponderosa pine forests.

The Auburn-Folsom area is served by a network of local and regional roads. The principal east-west roads are Interstate 80 and U.S. 50. Interstate 80 west of Auburn and Folsom generally parallels the long axis of the project lands. Between Auburn and Colfax, I-80 is a four-lane divided highway. State Route 49, which passes through the city of Auburn, is the main north-south highway in the Sierra Nevada. South of Auburn, it winds down to the bottom of the North Fork American River Canyon, where it crosses the North Fork immediately downstream from its confluence with the Middle Fork. The road then climbs out of the canyon to Cool on the Georgetown Divide, from which it continues southward to Placerville. Highway 49 is a two-lane paved road, with sharp curves and grades exceeding 12 percent.

Placer County's Auburn-Foresthill Road begins near Interstate 80, west of the new bridge across the North Fork. The county road crosses the North Fork immediately upstream from the confluence, and continues eastward along the top of the Foresthill Divide to the town of Foresthill. This road is a two-lane paved highway, with sharp curves and grades exceeding 8.5 percent. It provides the only all-weather access to the Foresthill Divide.

In addition to the Auburn-Foresthill Road and Highway 49, there are three roads which cross the North and Middle Forks of the American River in the upper reaches of the Auburn area. All are unpaved roads with restricted widths, steep grades, and numerous sharp curves. Ponderosa Way extends from Weimar into the North Fork canyon, where it crosses the river on a one-lane truss-type bridge. It climbs onto the Foresthill Divide, and continues down to the Middle Fork at the Greenwood Bridge site. This bridge was destroyed by the flood of 1964, and has not been replaced. The road continues southward along the east side of the Middle Fork, to Spanish Dry Diggings in El Dorado County.

The second of the upper roads is Placer County's Colfax-Foresthill Road. This road extends from old U.S. 40 west of Colfax down Bunch Canyon, to the bottom of the North Fork canyon. It crosses the river near the mouth of Shirttail Canyon on a one-lane suspension bridge, and climbs eastward in Shirttail Canyon and Mexican Gulch to the town of Foresthill.

The last of the upper roads is Placer County's Colfax-Iowa Hill Road. This road originates in Colfax, and crosses the North Fork on a one-lane suspension bridge, at what will be the upper limits of the North Fork arm of Auburn Reservoir. It provides primary access to the community of Iowa Hill.

Indian Hill Road from Interstate 80 at Newcastle to the Auburn-Folsom Road is used as a construction access road.

The Lake Clementine access road provides continuing public access to Lake Clementine Dam in the North Fork canyon. This road originates at the Auburn-Foresthill Road, on the crest of the Foresthill Divide.

U.S. 50, south of Folsom, provides the major southern access to Folsom SRA. The Auburn-Folsom Road, a north-south road, winds from the town of Folsom to the town of Auburn, along the western edge of the Folsom Lake State Recreation Area. From the Auburn-Folsom Road, access to the western shores of the lake can be gained through several roads: Douglas Boulevard, Horseshoe Bar Road, and Rattlesnake Road.

Along the eastern side of Folsom Lake SRA, the major north-south road is the Pilot Hill-Salmon Falls Road. This road branches from Highway 49 in the vicinity of Pilot Hill, and winds south, connecting up with the Green Valley Road to the town of Folsom. Like the Auburn-Folsom Road, the Pilot Hill-Salmon Falls Road also has several smaller access roads to the recreation areas around the eastern parts of Folsom Lake SRA.

A major trail within the project area is the Western States/Pioneer Express Trail, which extends to Lake Tahoe. It follows along the western edges of Lake Natoma and Folsom Lake, then meanders across the Middle Fork of the American River several times, before taking a more northerly direction toward Auburn. Near Auburn, it crosses the American River on an old abandoned railroad bridge below Highway 49, and runs up the canyon toward Foresthill. Many day hiking trails exist within the project area, especially within the Folsom Lake State Recreation Area.

SCENIC AND GENERAL ESTHETIC VALUES

Positive Visual Features

The Auburn-Folsom project lands extend 50 miles along the American River. They create a tilted, water-oriented "trough," that transects the visual diversity of two landscape provinces, the Sierra Nevada Foothill Province and the Central Valley Province. Landscape character varies from the vast horizontal dominance of the Great Valley, through the rolling to moderately steep and broken land forms surrounding Folsom Lake, to the very steep forested canyons of the upper American River.

Considering the diversity of the visual elements and the atmosphere of the entire area, it is best to evaluate visual character in its transitions from the valley to the montane forest. This evaluation will regard variety as a basic criterion in the determination of visual interest, and will regard the elements of form, line, color, and texture as the basic determinants of landscape character.

Beginning at the eastern edge of the Great Valley, Lake Natoma is the lowest and westernmost element of the project lands. Its visual character is unique within the project area; most open views at Natoma are dominated by strong horizontal lines. The horizon against the valley floor, the horizontal profile of the Orangevale Bluffs, and the edge of the narrow, linear lake itself all tend to dominate the major views. The shorter views are generally dominated and enclosed by either dense tree growth or the jumbled maze of stone piles left by gold dredgers. Here, the texture and form of these elements predominate, often creating scenes which lack visual variety, and thus, visual interest.

As viewer position changes to the top of the bluffs, there is a significant increase in landscape variety and interest. From this vantage, neither horizontal lines nor monotonous texture dominate, and the long views up and down the lake are striking. The view from the bluffs toward the Sierra Nevada gives a good example of visual diversity and high visual interest. During the appropriate season and time of day, the snow-covered Crystal Range of the Sierras, framed by a foregound of oak trees and preceded in the middle ground by the smooth and reflective lake surface and the sweeping edges where the lake meets the shore, yields a view with elements of color, form, line, and textural detail. These elements visually terminate at the Rainbow Bridge, a scenic element and focal point.

Because the Lake Natoma area is basically visually self-contained, external views of the lake are restricted primarily to views from the Hazel Avenue Bridge, from the Rainbow Bridge, and from Highway 50 where it crosses Alder Creek.

Among the natural and cultural scenic features at Lake Natoma are: the lake itself, Nimbus Dam, the Orangevale Bluffs, certain areas of dredger tailings that feature visual variety and contrast, the old red brick Folsom Powerhouse, and Rainbow Bridge, an old concrete arch structure.

From within the primary use areas at Lake Natoma, scenic quality is generally high. The area is visually self-contained, and visual intrusion is primarily limited to the area around the dam, the area around the upper end of the lake, and Greenback Lane.

Folsom Lake has a visual character distinct from the lower Lake Natoma. The two lakes are separated by some two miles of free-flowing river - a dynamic visual break between the still lake waters. It is within this zone that the horizontal dominance of the valley gives way to the visually more complex foothill zone. Land forms are the dominant elements which give the area its visual character. The rising and falling of rolling foothills in both near and distant views, the patterns created by the openings in the foothill woodland vegetation, and the lake itself give strong and varied forms to the landscape. The seasonal changes in vegetation define major color elements - gold grasses against dark tree masses in the summer, and green grasses against gray or light green trees in the winter and spring. Lake reflections give strong color patterns, that contrast with this backdrop. Spotty tree cover and diversity of tree species contribute to the variety of visual texture. The lake shore itself is a focal edge in this landscape, creating undulating variety in a strong line element. Boats and people contribute motion and scale to the ever-changing lake surface. Because of this considerable variety in the landscape at Folsom Lake, the area has a great deal of visual interest.

Unlike much of Lake Natoma, project lands at Folsom Lake are not quite so visually self-contained. On the south shoreline, most of the landscape character is defined by open rolling lands, that are above the lake and outside the project. Since these are private lands and home development is expanding into them, it can be expected that the visual character of Folsom Lake on this shore will change dramatically.

Views to the lake from public roads are limited. The broad, open panorama of Folsom Lake can be seen from the road across the dam itself, and from the observation area nearby. The lake is partially visible from the Salmon Falls Road near Sweetwater Creek, and from the Salmon Falls Bridge. There is also a glimpse of New York Creek Cove from Salmon Falls Road. In addition, the lake is visible from Highway 50 at White Rock Hill. Except for these instances, the lake can be viewed publicly only from within the recreation area itself.

Among the scenic features at Folsom Lake are: the lake itself, Folsom Dam, the densely wooded peninsula area between the North and South Forks, several islands along the North Fork, and the upper enclosed portion of the lake in the North Fork Canyon above Rattlesnake Bar.

The visual quality of the primary use areas at Folsom Lake is generally high. Granite Bay, Beals Point, and Dike 8 are all visually self-contained areas that encompass long views across the lake. Brown's Ravine is both self-contained and enclosed, and features few long views across the lake. The general view from the lake is now of a high quality, but as noted, future residential development will intrude into this view.

The visual transition from Folsom Lake to the proposed Auburn Reservoir is again made along a stretch of open river. In this instance, as visitors proceed up the North Fork of the American River from the upper end of Folsom Lake, they travel through a deep and narrowing canyon. As with the transition between Lake Natoma and Folsom Lake, the topography becomes steeper, the canyon deepens, and the vegetation changes.

Auburn Reservoir will be characterized by several important visual considerations. Because of extremely steep side slopes, access to the lake shore will be minimal. The visual implications of this are significant - viewer positions will generally be either considerably above the lake, looking far down into the canyon, or from the lake surface itself. This will tend to emphasize long, panoramic views.

The Auburn landscape lacks the visual variety of Folsom Lake. Form and texture dominate the landscape character. The uniformly dense vegetation and uniformly steep canyon walls make up the characteristic landscape. This "sameness" is broken in the fall, when fall foliage color gives variety to the landscape.

The exceptions to this situation offer significant visual interest. With the addition of the lake, views through the canyon in areas of dissected and uneven form will have considerable variety. These views will break the sameness that can be created by a linear horizon and straight lake-edge lines running parallel to the horizon. Reaching up the deep and narrow canyons, the lake will assume the visual characteristics of a wide, slow-moving river. Boat travellers in motion will observe an ever-changing landscape background, molded and bent by the enclosing canyon walls. Movement along this narrow corridor will reveal a sequence of varied, dynamic views, with changing light-dark, distant-near, and open-enclosed views.

In general, the lake will increase the visual variety and the visual interest of the area. The reflections, new edge lines, forms, colors, and the contrast of textures with the surrounding landscape will all tend to increase visual interest in the deep canyons.

There are two significant areas within the Auburn project lands which are visually distinct from the steep canyon landscape: the Knickerbocker Area, and the ridge along the Foresthill Divide. The broad Knickerbocker area, east of the lake and the damsite, is the more significant of the two. Visually distinct from the lake and the dam, this area occupies a wide rolling topland with a character similar to the Oak Woodland-Savanna which surround Folsom Lake.

The Knickerbocker area, because of its size, its self-containment, and its visual diversity, has perhaps the greatest visual interest of any land area in the Auburn-Folsom project. The area features a variety of landscape elements and distinct landscape characters. Form, line, texture, and color blend in many complementary combinations. Spatial structure is alternately formed by rolling topography and open savanna, narrow riparian woodland along creek canyons, oak woodland on rolling to moderately steep topography, pine and oak-studded ridgetops featuring long views into the river canyon, and small stream courses and ponds. These areas are visually dissected into many smaller units. The Knickerbocker has many areas of high visual quality.

Several high points in the Knickerbocker area command near-360-degree panoramic views. One particular point commands views to 3 of California's 9 landscape provinces. The view includes the coast range, the Great Valley, the foothill region, and the crest of the Sierra Nevada range. Among the landmarks visible from this single point are Mt. Diablo, Sutter Buttes, Folsom Lake, Pilot Hill, and the peaks of the Crystal Range in the Sierra.

The second distinct area occupies the ridgetop along the Foresthill Divide, between the North and Middle Forks of the American River. This area, bounded on 3 sides by the future lake, and dissected along its spine by the Auburn-Foresthill Road, is a visual travel corridor, perched high above the lake. The landscape character of the divide is largely determined by form and texture. The moderately steep and broken hills dissect the views from road, and break the divide into a string of small enclosures which straddle the road. This topography determines the major enclosing forms, and the dominance of chaparral and oak thickets give the divide a strong and often uniform texture. Grassy clearings punctuate this sameness, and give a human spatial feeling to some of the topographic enclosures along the road.

Several major views from the Auburn-Foresthill Road look through "windows" in the hilly divide. There will be long views towards the lake near Ruck-A-Chucky on this same route, and there will be views up both forks of the lake, as well as downstream toward the dam.

Views to the lake, other than from project lands, can be seen from several roads. Highway 49 across the dam will offer a view, as will the road across the Iowa Hill-Colfax Bridge. The Mosquito Ridge Road and the proposed Georgetown-Colfax Road and bridges, which will connect Interstate 80 and Highway 193 and will cross the lake twice, will also offer views to the lake.

The primary scenic features on the Auburn project are the lake itself, the dam, the vertical and massive Lime Rock, the cavernous and steep quarry site, the Oxbow, Long Point, Big Bend, the Foresthill Divide, the Ruck-A-Chucky and North Fork Bridges, the Knickerbocker area, and the steep canyons themselves.

Negative Visual Features

Negative visual features can be generally defined as introduced forms, lines, colors, or textures which are in conflict with the dominant visual characteristics of a given landscape. Negative features within the Lake Natoma are: the corporation yard south of the dam (an inappropriate visual intrusion on the lake shore immediately within the major view towards the dam from the Nimbus Flat boat launch area); the operating gravel plant at Mississippi Bar; the Highway 50 freeway crossing over the lake at Alder Creek (a visual as well as a physical intrusion on the lake itself); and the visual intrusion of private residences next to the trail, on top of the Orangevale Bluffs.

Within the Folsom Lake area, the most significant negative visual feature is the network of volunteer dirt roads and parking areas. Because of the erosive nature of the soil, once the cover is stripped, the topsoil is lost, thus making revegetation extremely difficult. These rutted, barren scars do not mar the long vistas of the lake and surrounding area, but can dominate the smaller areas and views. Some of the major problem areas are Rattlesnake Bar, Dotons Point, and Horseshoe Bar. Other negative features within the area are road scars and grading scars, erosion on the backside of Nimbus Overlook, and powerlines.

The project lands at Auburn are generally visually self-contained. The "environmental takeline" was established to maintain the integrity of the native visual landscape, and visual intrusion should be minimal. Exceptions to this situation can be found on the Middle Fork, where subdivisions are visible from project lands, and across from the City of Auburn, where residential areas of the city will be visible.

The most significant negative feature will be the "bathtub ring" caused by the extreme drawdown in the reservoir. This scar will be extreme, and will be accentuated by the steep side slopes. It will dominate most lake level views, and will create strong disruptive elements of line, color, and texture which will conflict with the characteristic landscape of the forested canyons. Other negative features are powerlines, road scars in the steep canyons, other grading scars, and damage from dam construction which cannot be mitigated.

A potential negative intrusion is the Georgetown-Colfax road, to be constructed across project lands. Grading scars from this road will create a strong line element in the steep canyon landscape. Similarly, relocation of Highway 49 across the dam and through some part of the Knickerbocker area will cause some visual intrusion into this very scenic landscape.

Environmental Noise

Existing noise sources in the vicinity of Auburn-Folsom are primarily from transportation systems operating in the area. Interstate 80 and Highway 50, which carry large volumes of traffic, are sources of almost continuous noise during the day. At night the volume of traffic, and consequently the noise level, is reduced, but these roads can still be considered sources of continuous noise. State Route 49, though not as heavily traveled as Interstate 80 or Highway 50, is another major traffic artery during the daytime, but drops off sharply in its traffic flow during the night.

Another source of transportation noise is the Southern Pacific Railroad, which is divided at Auburn, with the upgrade track passing along the west side of town, and the downgrade track passing through the east side of Auburn. The trains produce more noise than the flow of freeway traffic, but this is offset somewhat by the sporatic nature of the railway activity.

Another significant source of noise in the area comes from the logging and quarry operations located to the east of Auburn. The transportation route for the heavy trucks carrying logs and stone brings them through the town, before they proceed on to their ultimate destinations.

The Auburn Municipal Airport and numerous smaller facilities close to most of the communities surrounding the project are further sources of noise. Aircraft are mostly of the smaller types, but flight activity is considerable. These planes are not particularly objectionable after they have gained altitude and are dispersed in various directions, but they do create a noise environment of considerable magnitude around the airport.

Finally, there is the noise environment of the towns themselves. Most noise there is caused by local traffic. Some commercial or industrial noises have local significance, but these are limited in their impact. Outside of Auburn, logging and quarrying are the major noise sources.

Air Quality

Overall air quality in the Auburn-Folsom Project area is excellent. There are emissions from vehicles on Interstate 80, Highway 50, Highway 49, and the other roads and streets of the area, from the railroad, and from some commercial and industrial establishments. Both Placer and El Dorado Counties have active air pollution control programs. For detailed information, see Appendix I.

NATURAL VALUES

Geologic Features

The Auburn-Folsom unit lies in the American River drainage system, extending from steep-walled canyons in the western foothills of the Sierra Nevada Geomorphic Province, down to its emergence into the Great Valley Province. The highest land elevation is more than 885 meters (2900 feet) near Colfax, and the lowest is less than 45 meters (150 feet) at Natoma. The relief of the area is rugged, with steep canyon walls and mountainous terrain around Auburn on the upper reaches of both North, Middle, and South Forks grading down to rolling hills in the Folsom Dam area. Downstream from Folsom Dam, the American River plunges through an inner canyon, then empties into Lake Natoma. At two areas on Lake Natoma, the northwest bank is nearly vertical, and reaches 15 to 30 meters (50 to 100 feet) in height. (For more detailed information refer to the U.S.G.S. topographic maps.)

The project area is an area of complex structure, form, and history. (See Table 1 for Stratigraphic Nomenclature). The West slope of the Sierra Nevada is one of the most outstanding examples of a tilt block mountain. The range was formed through the processes of volcanic and sedimentary deposition and intrusion of granitic batholiths, accompanied and followed by faulting and massive uplift and erosion. Although the overall features of the range reflect the processes of fault-block mountain building, many local terrain features are products of the agents of erosion, primarily running water in the lower elevations (below 1724 meters or 5000 feet) and ice in the higher elevations. The Auburn project area is dominated by the effects of erosion, that have shaped the deeply incised canyons of the North and Middle Forks of the American River. The higher elevations to the east of the project in the headwaters of the American River have been greatly scarred and polished, as a result of glaciation.

TABLE 1
STRATIGRAPHIC NOMENCLATURE

AGE	STATE MAP SYMBOL	STATE MAP UNIT State Map Units listed here are not necessarily in stratigraphic sequence; the sequence used has been standardized for all sheets of the Geologic Map of California	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formally named formations grouped within an individual State Map Unit are listed in stratigraphic sequence from youngest to oldest.)
CENOZOIC – QUATERNARY – Recent	Qal	RECENT ALLUVIUM	Poorly sorted stream deposits of clay to boulder size, some colluvium and glacial outwash gravels.
CENOZOIC – QUATERNARY – Pleistocene	QP	PLIOCENE-PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS	Arroyo Seco Gravel – brick-red soil that encloses gravel composed of well-rounded clasts of quartz and quartzite; Laguna Formation – compacted, nonandesitic sediments of silt, clay, sand, and gravel size. "Gravel deposits of uncertain age" of Piper and Gale including surficial deposits of well-rounded cobbles and boulders set in a matrix of deep red to reddish-brown soil (some may be Early Tertiary and other Quaternary). Old alluvium in the vicinity of Folsom Dam.
CENOZOIC – TERTIARY – Pliocene	Pmlc	MIDDLE AND/OR LOWER PLIOCENE NONMARINE SEDIMENTARY ROCKS	Mehrten Formation – coarse alluvial and mudflow deposits, chiefly of hornblende andesite fragments, includes gravel, sandstone, and tuffaceous beds (generally considered upper Miocene in part; contains some locally derived rhyodacite clasts near Golden Gate Hill). Unnamed rhyolite tuff, rhyolitic and diatomaceous sand and silt (in the Indian Diggings area, Omo Ranch quadrangle; contains diatoms considered to be "Pliocene, probably lower" according to G.D. Hanna, written communication from Q. Aune 9/29/64). North of 38° 31' N. Lat. along the eastern edge of the Great Valley, the Pmlc unit contains some Valley Springs Fm. which was not differentiated from the more abundant Mehrten Fm. Sandy clay shales containing cross-bedded, pebbly sandstone and conglomerate, and thin layers of tuff (southwest of Pittsburg; unit has been called Orinda Fm., "Los Medanos Fm.", and "Wolfskill Fm.").
CENOZOIC – TERTIARY – Pliocene	Pvp	PYROCLASTIC	Lawlor Tuff – lapilli tuff consisting of angular broken fragments of pumice set in a matrix of pumicite. Volcanic rocks of the Sierra Nevada commonly referred to the Mehrten Formation – thick andesitic mudflows, breccia, tuff, gravel, and some massive andesitic lava in the Silver Lake quadrangle (possibly includes strata not correlative with Mehrten Fm. in the Foothills area). Rhyolite tuff near Columbia believed to be younger than the Mehrten Fm., Q. Aune, written communication 6/30/64. Light-brown to pale-red, pumiceous, dacitic tuff beds of probable fluviatile origin, near base of the Tehama Fm. on west side of Great Valley.
CENOZOIC – TERTIARY – Miocene	Mvp	MIOCENE VOLCANIC ROCKS: PYROCLASTIC	Volcanic rocks of the Sierra Nevada commonly referred to the Valley Springs Formation – white to buff-colored, massively bedded rhyolite tuff, some thin lenses of pebble conglomerate, sandstone, and rhyolite (may not be entirely correlative with Valley Springs Fm. of the Foothills area).
CENOZOIC – TERTIARY – Eocene	Ec	EOCENE NONMARINE SEDIMENTARY ROCKS	Ione Formation – massive, white quartzose sandstone, lenses of white or light-colored anauxitic clay and white sandstone, gray or bluish shale and clay, lignite, and other carbonaceous beds. (In minor part marine. Includes some Valley Springs Fm. in the Buffalo Creek quadrangle.)
CENOZOIC – TERTIARY – Undivided	Tc	TERITIARY NONMARINE SEDIMENTARY ROCKS	Volcanic sedimentary rocks near Vacaville – massive pale-pink to white ashy claystone, mudstone, or siltstone, lenses of crossbedded coarse- to very coarse-grained, blue, friable sandstone, and lenses of andesitic pebble and cobble conglomerate. (May be marine in part, and part of the San Pablo Group). Auriferous (and nonauriferous) gravel deposits of uncertain age in the Sierra Nevada.
MESOZOIC – CRETACEOUS	Ku	UPPER CRETACEOUS MARINE SEDIMENTARY ROCKS	Chico Formation – fine-grained sandstone, shale, siltstone, and conglomerate (east side of Great Valley). Gray, silty clay shale, greenish-gray calcareous and ferruginous sandstone(near Vacaville).
MESOZOIC	gt	MESOZOIC GRANITIC ROCKS: TONALITE (QUARTZ DIORITE) AND DIORITE	Mottled, gray, medium- to coarse-grained tonalite; dark-green, medium- to coarse-grained diorite; trondhjemite; and dioritic rocks in the San Andreas quadrangle.
MESOZOIC	bi	MESOZOIC BASIC INTRUSIVE ROCKS	Medium- to coarse-grained hornblende gabbro, pyroxenite, noritic anorthosite and related rocks, some diorite, some mafic porphyritic hypabyssal intrusive rocks and metagabbro (may be Late Paleozoic in part).
MESOZOIC	ub	MESOZOIC ULTRABASIC INTRUSIVE ROCKS	Serpentine (some silicified), peridotite, dunite, olivine pyroxenite, some ankerite and talc schist, lherzolite, and amphibolite derived from pyroxenite.
MESOZOIC – JURASSIC	Ju	UPPER JURASSIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS	Mariposa Formation – dark-gray to black, clay slate, tuff, graywacke, and conglomerate. Salt Spring Slate – dark-gray slate derived from siltstone, tuff, graywacke, and conglomerate. Cosumnes Formation of the Amador Group – dark-gray clay slate, sheared graywacke, thin-bedded tuff, some basic lava, red and green chert, and a basal conglomerate (may be Middle Jurassic in part).
MESOZOIC – JURASSIC	JRv	JURASSIC AND/OR TRIASSIC METAVOLCANIC ROCKS	Copper Hill Volcanics – mafic, intermediate, and sparse felsic volcanic rocks, tuff, volcanic breccia, and amygdaloidal mafic lava. Brower Creek Volcanic Member of the Mariposa Fm. – dark-green mafic volcanic breccia, some tuff, and rare pillow lava. Gopher Ridge Volcanics – bedded mafic or intermediate tuff and volcanic breccia. Logtown Ridge Formation – coarse mafic volcanic breccia, in part porphyritic, subordinate tuff, lapilli tuff, and minor pillow lava. Volcanic rocks of uncertain stratigraphic position, chiefly mafic volcanic breccia and tuff. Amphibolite schists, quartz porphyry "feeders" for dacitic volcanics; Upper Jurassic basic sills and dikes (Mother Lode belt). Early or Middle Jurassic recrystallized tuff-breccia, tuffaceous sandstone and tuff of andesitic and basaltic composition, andesite and basalt flows in the Fallen Leaf Lake quadrangle.
PALEOZOIC	m	PRE-CRETACEOUS METAMORPHIC ROCKS, UNDIFFERENTIATED	Paleozoic and Mesozoic mafic pyroclastic rocks, slate, phyllite, and metaconglomerate.
PALEOZOIC	ls	Ls = LIMESTONE AND/OR DOLOMITE	Bluish-gray, dense, recrystallized limestone.
PALEOZOIC	ms	PRE-CRETACEOUS METASEDIMENTARY ROCKS	Dark-gray slate, some graywacke, conglomerate, and tuff. Phyllite and metavolcanic rocks in Columbia and San Andreas quadrangles.
PALEOZOIC	mv	PRE-CRETACEOUS METAVOLCANIC ROCKS	Green schist derived from basaltic and andesitic breccia and tuff (possibly in part equivalent to the metavolcanic rocks of the Calaveras Fm.). Porphyritic flows, flow breccia, and some amphibolite.
PALEOZOIC	P	PALEOZOIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS	Calaveras Formation – slate, phyllite, sheared sandstone, quartz-mica schist, gneiss, graphitic schist, crushed and elongated pebble conglomerate, quartzite, and rhythmically bedded slightly recrystallized to completely recrystallized radiolarian chert. ("Calaveras" is applied as a general name for Sierra Nevada Paleozoic rocks.) Some areas shown as IP may be Mesozoic.
PALEOZOIC	Ls	LIMESTONE AND/OR DOLOMITE	White, blue-gray, and black recrystallized limestone, marble, dolomite, dolomitic limestone, and silicified marble.

The Folsom area is located at the eastern edge of the Central Valley, an assymetric fold basin. It is latest of a sequence of geosynclines whose eastern marginal areas were tilted upward to become the ancestral Sierra Nevada. The valley has been subjected to long-term alluvial deposition from the Sierra Nevada, and probably, before the Sierra was uplifted as a topographic barrier, from areas of what is today the basin range to the east. Many of the Tertiary lavas found in the Sierran Foothills today, for example, were erupted from vents now located in the basin range area east of the Sierran Crest.

Orogeny

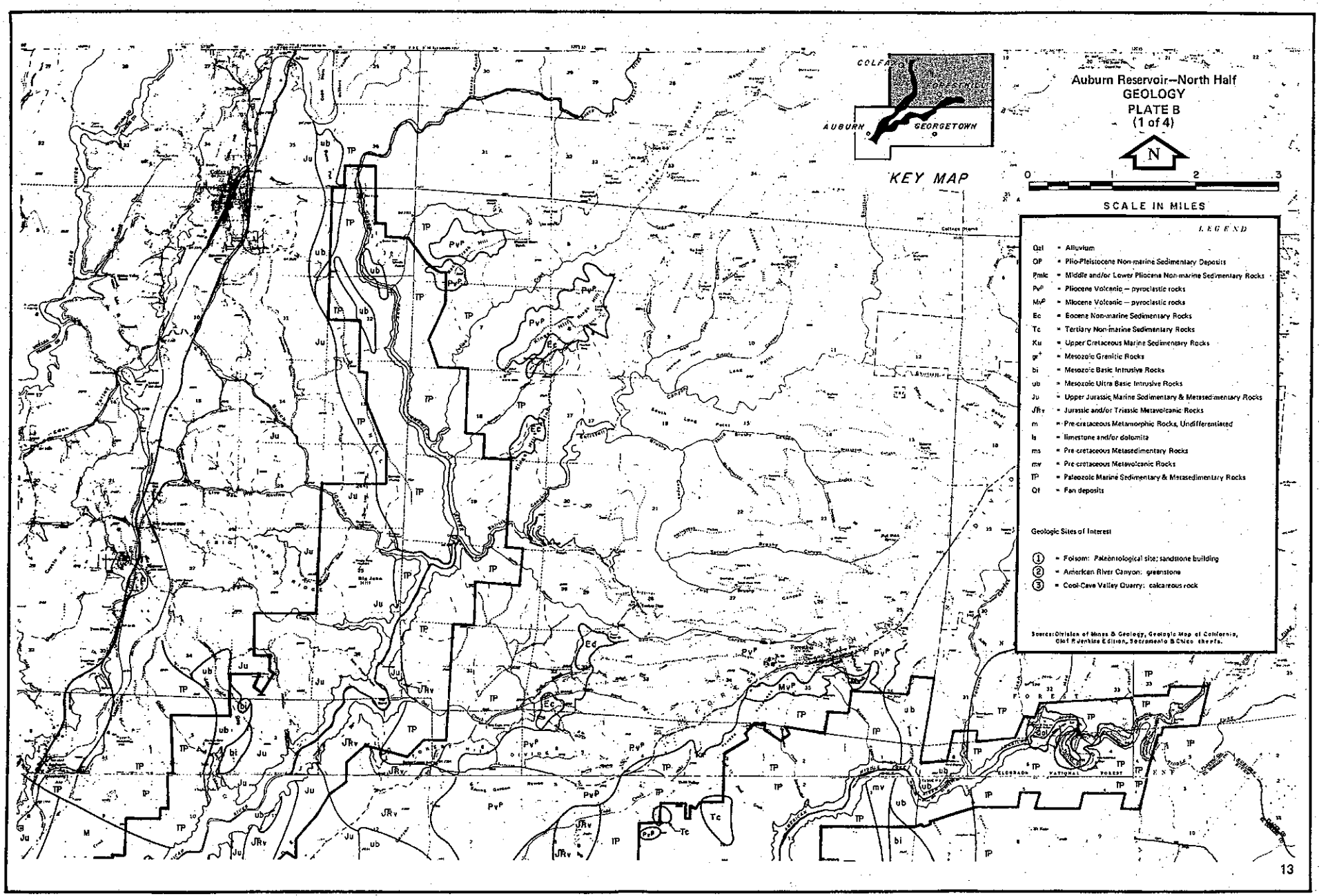
The geology of this region is complex in structure, form, and history (Plate B). The Sierra Nevada in the Paleozoic Era was an inland sea, and a volcanic archipelago west of the present coast line provided a source of volcanic detritus sediments that were deposited over a period of 200 million years. This depositional period was accompanied by periods of deformation, magmatic intrusions, uplift, and volcanic eruptions, resulting in the collection of a body of sedimentary volcanic rocks. This has been called the Calaveras formation; it consists of siliceous shales, sandstones, cherts, local limestone, and associated metavolcanic rocks, schists, and gneiss, and is the underlying material of about 50 percent of the region east of the project area. Late in Mesozoic Time, renewed deposition, uplift, folding, regional metamorphism, faulting erosion, and volcanism (accompanied by extensive magmatic (granite batholith) emplacement) were again followed by uplift and erosion (in the early Cenozoic) which is continuing at the present time.

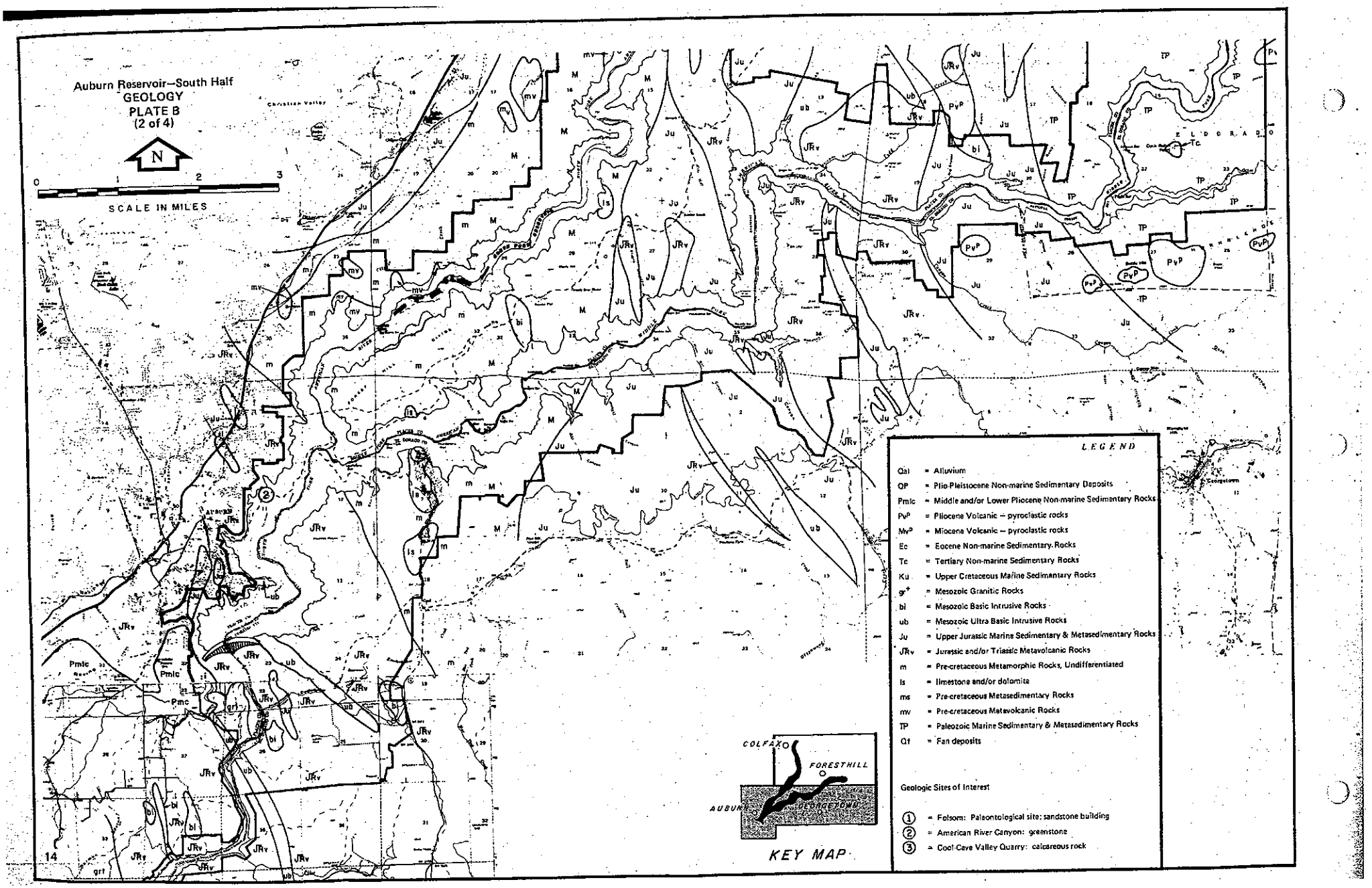
Late Cenozoic uplift, regional tilting to the west, glacial activity, and minor volcanism have created an erosionally dissected, gently rolling upland, capped by scattered remnants of Cenozoic deposits, with steep V-shaped canyons, and the glacially sculptured "sawtooth" crest of the Sierra Nevada on the distant horizon. Recent channel deposits of the American River often accumulate as bars along incised meandors, and as flood plain deposits, where the river emerges onto the floor of the central valley.

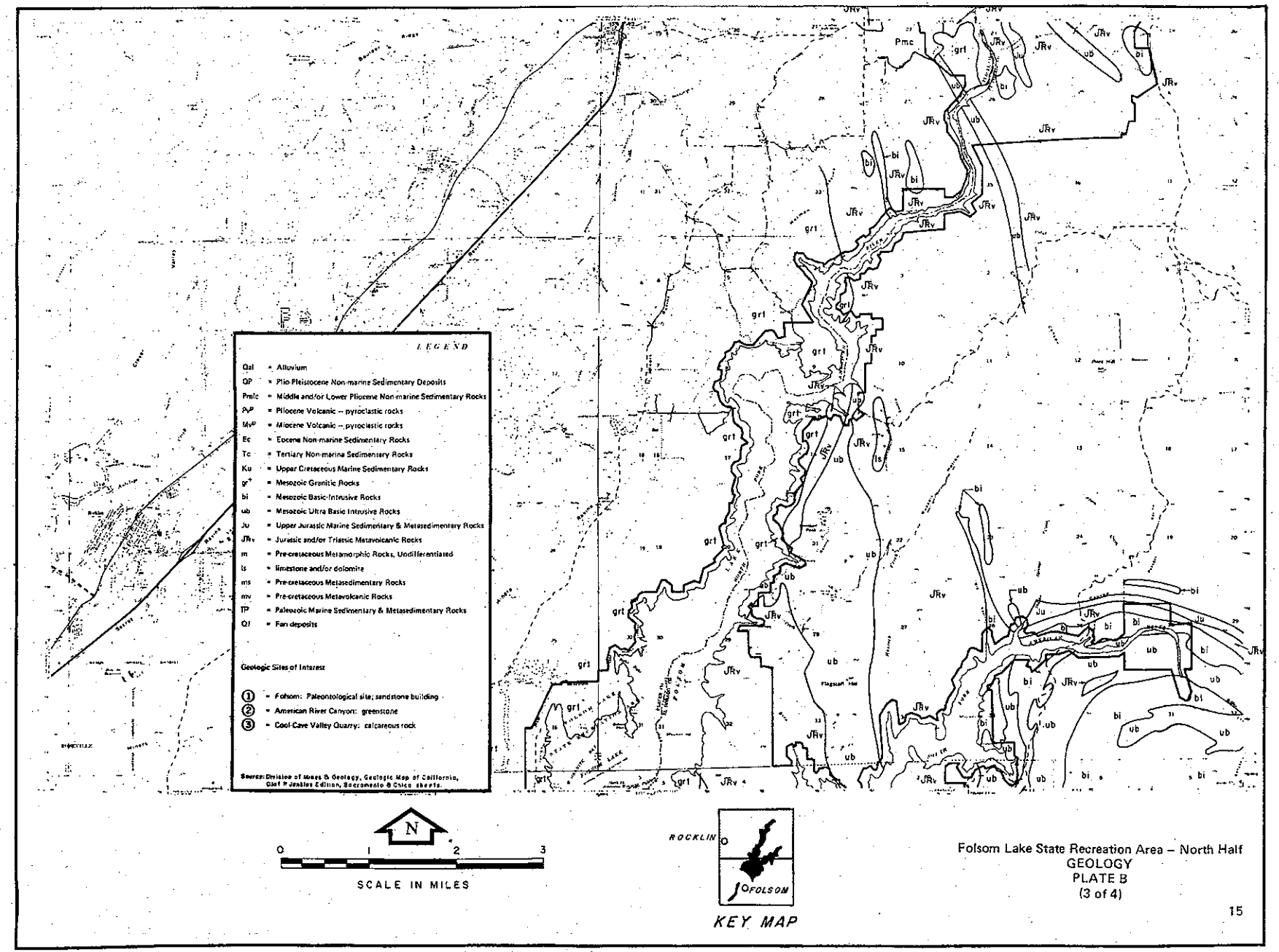
The result of this geologic activity is that 25 percent of the area is underlain by stratified rocks of Jurassic age, and about 20 percent by middle Tertiary volcanic rocks, with small areas all along the north and west shore of Folsom Lake, and in its peninsula during low water stages, of intrusive granite and serpentinic rocks and Eocene auriferous gravels. (See Tables 2 and 3 for Geologic Periods and Orogeny.)

Geomorphology

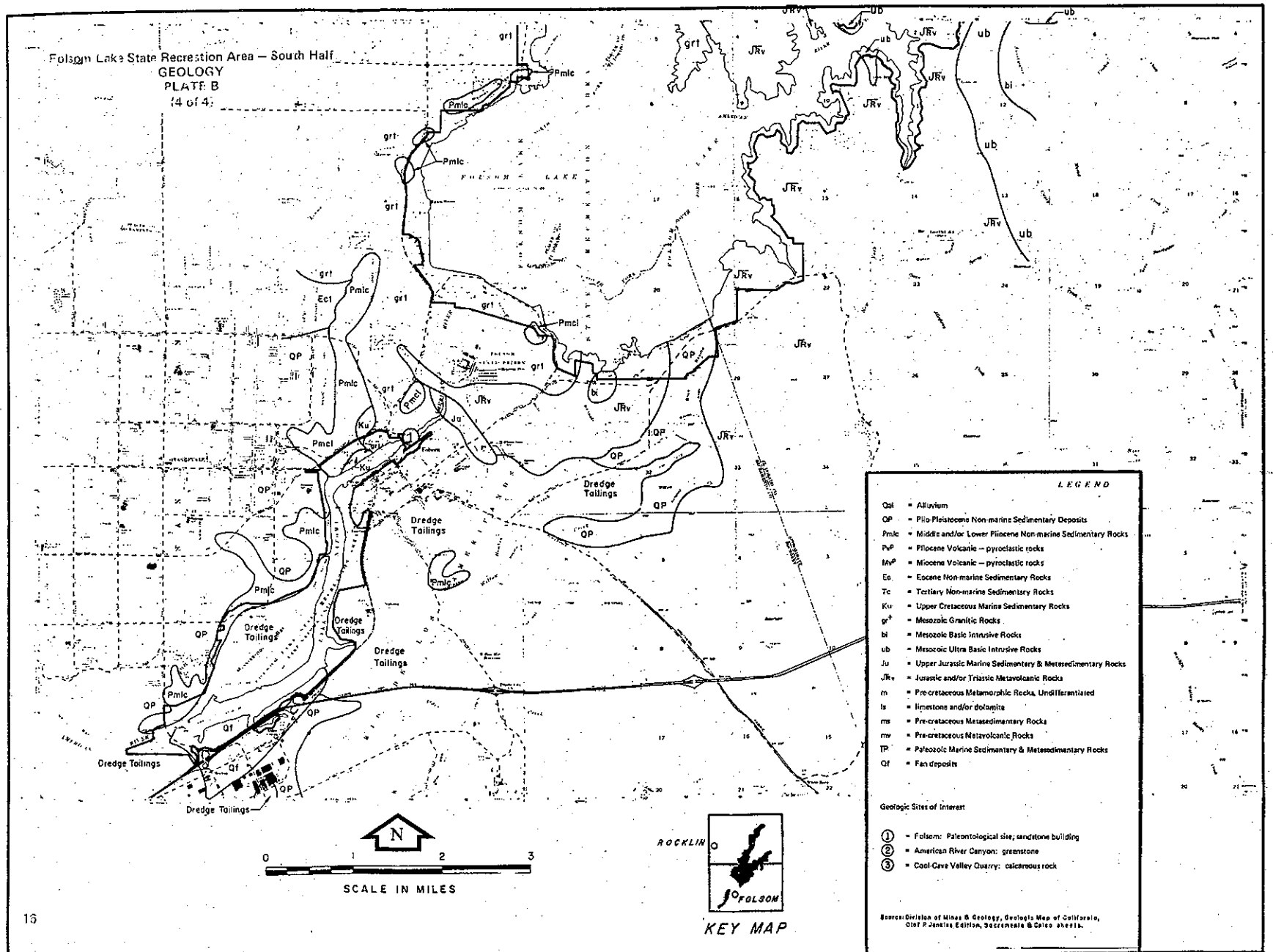
There are three major geomorphic units in the area. The major units are: tertiary river beds; a gently undulating erosional surface; and degradational stages of the American River.


Auburn Reservoir—North Half
GEOLOGY
PLATE B
(1 of 4)
N
0 1 2 3
SCALE IN MILES
KEY MAP
COLFAX
AUBURN
GEORGETOWN
LEGEND
Qal = Alluvium
QP = Plio-Pleistocene Non-marine Sedimentary Deposits
Pmlc = Middle and/or Lower Pliocene Non-marine Sedimentary Rocks
PvP = Pliocene Volcanic — pyroclastic rocks
MvP = Miocene Volcanic — pyroclastic rocks
Ec = Eocene Non-marine Sedimentary Rocks
Tc = Tertiary Non-marine Sedimentary Rocks
Ku = Upper Cretaceous Marine Sedimentary Rocks
gr = Mesozoic Granitic Rocks
bi = Mesozoic Basic Intrusive Rocks
ub = Mesozoic Ultra Basic Intrusive Rocks
Ju = Upper Jurassic Marine Sedimentary & Metasedimentary Rocks
JRv = Jurassic and/or Triassic Metavolcanic Rocks
m = Pre-cretaceous Metamorphic Rocks, Undifferentiated
ls = limestone and/or dolomite
ms = Pre-cretaceous Metasedimentary Rocks
mv = Pre-cretaceous Metavolcanic Rocks
TP = Paleozoic Marine Sedimentary & Metasedimentary Rocks
Qf = Fan deposits
Geologic Sites of Interest
1 = Folsom: Paleontological site; sandstone building
2 = American River Canyon: greenstone
3 = Cool-Cave Valley Quarry: calcareous rock
Source: Division of Mines & Geology, Geologic Map of California, Olaf P. Jenkins Edition, Sacramento & Chico sheets.


Auburn Reservoir–South Half
GEOLOGY
PLATE B
(2 of 4)
N
0 1 2 3
SCALE IN MILES
LEGEND
Qal = Alluvium
QP = Plio-Pleistocene Non-marine Sedimentary Deposits
Pmlc = Middle and/or Lower Pliocene Non-marine Sedimentary Rocks
PvP = Pliocene Volcanic – pyroclastic rocks
MvP = Miocene Volcanic – pyroclastic rocks
Ec = Eocene Non-marine Sedimentary Rocks
Tc = Tertiary Non-marine Sedimentary Rocks
Ku = Upper Cretaceous Marine Sedimentary Rocks
gr+ = Mesozoic Granitic Rocks
bi = Mesozoic Basic Intrusive Rocks
ub = Mesozoic Ultra Basic Intrusive Rocks
Ju = Upper Jurassic Marine Sedimentary & Metasedimentary Rocks
JRv = Jurassic and/or Triassic Metavolcanic Rocks
m = Pre-cretaceous Metamorphic Rocks, Undifferentiated
ls = limestone and/or dolomite
ms = Pre-cretaceous Metasedimentary Rocks
mv = Pre-cretaceous Metavolcanic Rocks
TP = Paleozoic Marine Sedimentary & Metasedimentary Rocks
Qf = Fan deposits
Geologic Sites of Interest
1 = Folsom: Paleontological site; sandstone building
2 = American River Canyon: greenstone
3 = Cool-Cave Valley Quarry: calcareous rock
COLFAX
FORESTHILL
AUBURN
GEORGETOWN
KEY MAP
14



Folsom Lake State Recreation Area – North Half
GEOLOGY
PLATE B
(3 of 4)


Folsom Lake State Recreation Area – South Half
GEOLOGY
PLATE B
(4 of 4)
FOLSOM LAKE
grt
Pmlc
Ect
QP
Ku
Ju
JRv
ub
bi
Dredge Tailings
Qf
LEGEND
Qal = Alluvium
QP = Plio-Pleistocene Non-marine Sedimentary Deposits
Pmlc = Middle and/or Lower Pliocene Non-marine Sedimentary Rocks
PvP = Pliocene Volcanic – pyroclastic rocks
MvP = Miocene Volcanic – pyroclastic rocks
Ec = Eocene Non-marine Sedimentary Rocks
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Ku = Upper Cretaceous Marine Sedimentary Rocks
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Ju = Upper Jurassic Marine Sedimentary & Metasedimentary Rocks
JRv = Jurassic and/or Triassic Metavolcanic Rocks
m = Pre-cretaceous Metamorphic Rocks, Undifferentiated
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1 = Folsom: Paleontological site; sandstone building
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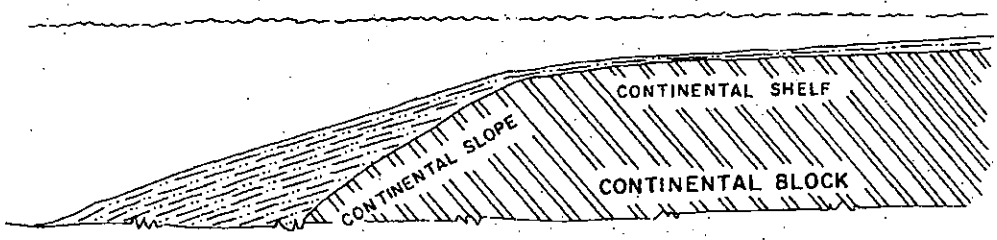
Source: Division of Mines & Geology, Geologic Map of California, Olaf P Jenkins Edition, Sacramento & Chico sheets.
N
0 1 2 3
SCALE IN MILES
ROCKLIN
FOLSOM
KEY MAP

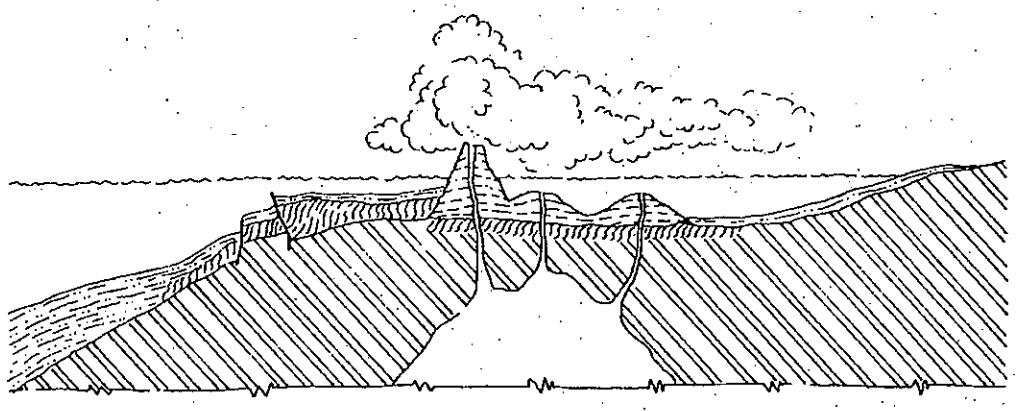
TABLE 2
GEOLOGIC PERIODS

Era	Period	Epoch	Events in geologic history of Sierra Nevada	Duration in years
Cenozoic	Quaternary	Postglacial or Recent	2. New cirque glaciers come into existence during the "little ice age" – roughly, during the last 3,000 years. 1. The glaciers of the last ice age vanish as temperatures mount above the present level during the "climatic optimum".	9,000
		Pleistocene (The Great Ice Age)	3. Beginning after the first ice age strong faulting movements take place at intervals along the eastern flank of the Sierra Nevada. The country to the east sinks, the great escarpment is formed, and the range remains standing as a slanting block. 2. The valleys in the western slope are deepened to canyons, partly by the rivers and partly by the glaciers. 1. Four successive ice ages ensue during each of which the range is extensively covered by glaciers.	1,000,000
	Tertiary	Pliocene	2. The final and greatest uplift takes place at the end of this epoch and the beginning of the next, and the Sierra Nevada attains substantially its present height. 1. The uplifts are followed by a long interval of relative quiescence during which deep and fairly broad valleys are cut in the western slope of the range.	11,000,000
Cenozoic	Tertiary	Miocene and Oligocene	3. The Sierra is further bowed up and attains a height of several thousand feet. It stands high above the country to the east of it, and faulting takes place along some parts of its abrupt east flank. 2. In the northern parts of the range broad floods of volcanic mud pour from fissures and craters near the crest and bury the valleys and intermediate divides on the western slope. Only local flows occur in the central and southern portions of the range. 1. Minor uplifts take place at intervals, and the Sierra is bowed up by degrees to a mountain barrier of moderate height.	26,000,000
		Eocene	2. The streams cut in, and the hills begin to stand out again as low mountain ridges. 1. The lowland, stretching from the Pacific Coast far inland, is gradually upwarped.	20,000,000
Mesozoic	Cretaceous		2. The Sierra region by degrees is reduced to a lowland bearing northwestward-trending rows of hills. 1. The ancestral Sierras are subjected to long-continued stream erosion. The folded strata are worn away over large areas, and the granite is broadly exposed, but the northwestward trend of the ridges and valleys remains in part preserved.	69,000,000
Mesozoic	Jurassic		3. Vast masses of molten granite invade the folded strata from below and slowly crystallize into hard rock. 2. The marine sediments together with remnants of earlier mountain ranges are folded and crumpled into parallel, northwestward-trending ridges of Appalachian type. 1. Layers of mud and limy ooze aggregating thousands of feet in thickness are deposited in shallow sea covering the site of the Sierra Nevada and adjacent parts of California.	25,000,000
Paleozoic	Triassic		Marine sediments and volcanic rocks are deposited during this period, but little is known of the mountain-building events. Sediments accumulate in an ocean basin to thicknesses of thousands of feet and are repeatedly raised and folded into mountain ranges.	30,000,000 328,000,000
Proterozoic			No definite data are at hand.	?

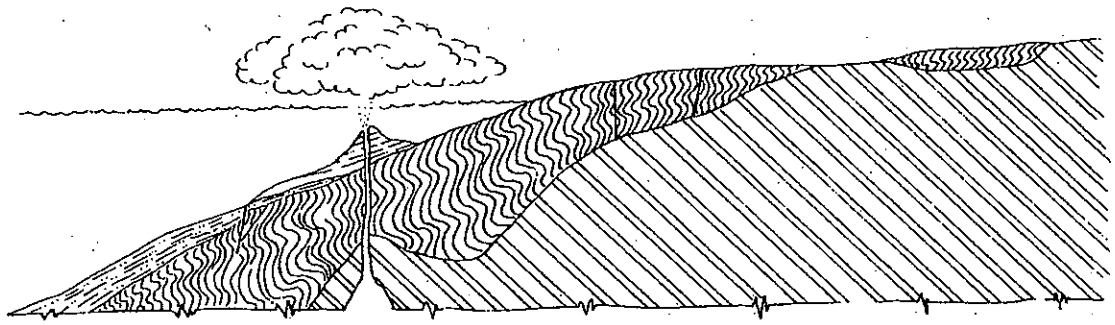
TABLE 3
OROGENY



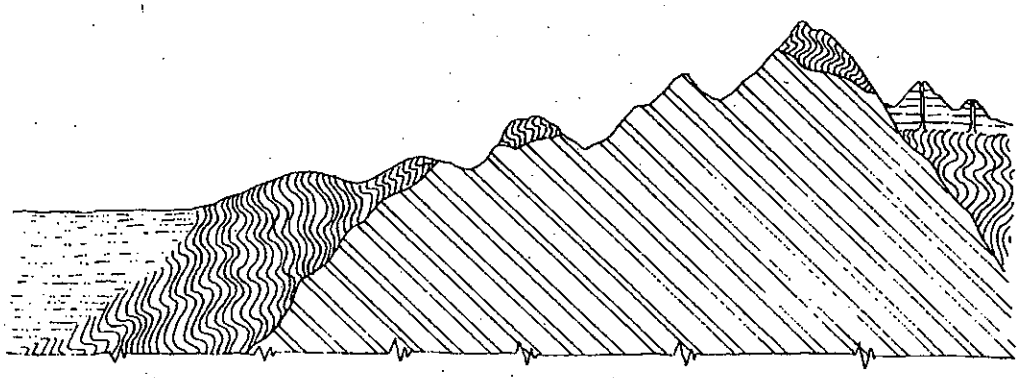
A. The area that is now the Sierra Nevada lies at the edge of the land. The continental block was its foundation; sediments were deposited on the gently sloping continental shelf, and a thick wedge formed on the steep continental slope. Beyond, out of view, lies the deep sea.



B. A chain of offshore volcanoes, some undersea, developed. Pressure was exerted from the west (left), perhaps because a "subduction zone" — a trench in which torn-off parts of the earth's crust are plunging downward into the earth's mantle — was adjacent. Pressure, breakage of rock along faults, together with heat, have metamorphosed the sedimentary rock.



C. Most of the sedimentary rock has been transformed into metamorphic rock by heat and pressure; the area now rises gently above sea level toward the east, while parts of the west are still covered by water.



D. Metamorphism of the old rocks has been completed. Part of the underlying granitic rock has been exposed and eroded; the range has been uplifted; faults now mark the steep east face. To the west, what is now the Great Valley has been filled by sediment, covering much of the metamorphic rock. Not to scale.

Tertiary River Beds: These ancient riverbed deposits bisect the area from east to west, and are common to the Foresthill Divide. Eocene riverbeds have been identified with uniform gradients of 18 meters per kilometer (59 feet/1.6 miles), extending unbroken for 40 kilometers (nearly 25 miles). This gradient is much gentler northwest of Folsom Lake. These river deposits are well-washed quartz-rich boulders, pebbles, sand, and layers of strongly cemented gravel, with gold occurring throughout the deposit. Often, these old river channels and deposits have been capped by volcanic flows.

Gently Undulating Erosional Surface: This unit is most evident today on the Georgetown Divide, and is visible as a remarkably even skyline. Evidences of this old erosional surface are: a) all but the most resistant rocks of the upland surface are deeply decayed and weathered, and some areas are thickly mantled with old, red soils; b) a pronounced brink exists between the upland surfaces and the deeply incised canyons; c) a noticeable increase in gradients of small streams is evident, as they approach or pass the upland canyon brink; and d) extensive lava plain deposits are evident, which indicate a flat country where streams had low gradients and flowed sluggishly, forming meanders which have been superimposed and today are entrenched members, e.g., Long Point and Sore Finger Point on the North Fork of the American River, and Horseshoe-Alabama Bar area of the Middle Fork of the river.

Degradational Stages of the American River: This unit is represented today as sharply entrenched, V-shaped canyons on what used to be a broad, fairly level valley floor, remnants of which are the gently sloping undulating surfaces that separate the narrow V-shaped canyons now occupied by the North and Middle Forks of the American River. For miles, these steep walled canyons, up to 305 meters (1,000 feet) deep, cut across the northwest structural trend of the bedrock.

Additional Geomorphic Features

Limestone Belt: This belt is approximately 122 meters (400 feet) wide; it extends north from Cool, crosses the Middle Fork, goes under the Foresthill Divide, crosses the North Fork, and terminates near Lime Rock. Some Karst features are evident, notably Hawyer Cave, Pioneer Cave, and Pint Grotto.

Terrace Deposits: Terraces, which are probably of glacial outwash origin in the canyons of the American River, are bar and bench deposits of gravel; up to 30 meters (100 feet) deep and several hundred acres in extent, they are capped with red ferruginous clay and red soils. They are 6 to 30 meters (20 to 100 feet) above the present channel, and are unpaired, indicating continued downcutting and lateral erosion by the river, followed by a period of aggradation resulting from the glacial retreat.

Blue Ravine Channel of Ancestral American River: Older terraces from the current river channel cap the bluffs north of Lake Natoma. Gravels of ancestral river crop out in these bluffs.

Gravel Deposits: Gravel deposits or riverwash are at or just above the current river level. On the inside corner of meanders, gravel is deposited as point bars, often developing into flood plains several hundred feet wide.

Drainage

The rivers in this area are in a youthful stage, as is evidenced by the V-shaped valleys with high gradients and accompanying high velocities. Downcutting predominates, and rapids are common. The surrounding area, however, is in early maturity, with drainage well developed, valleys deep, and divides high and narrow, with most of the area subject to erosion by streams.

Generally, the drainage pattern is dendritic, of medium texture, and exhibits some orientation to the north-northwest, due to the trend of the major geologic structure.

Mineral Mining and Economic Geology

This area has a rich history of gold mining, especially placer deposits first mined by pick and pan, then sluicing, followed by drift, seam, and hydraulic processes. Today, minor amounts of placer mining continue. There are also some lode gold mining operations in the area, but most of these mines are now idle. Limestone is now the only commercial product quarried north of Cool, and minor amounts of slate, copper, soapstone, sand and gravel, chromite, and asbestos occur in the area.

Weathering Mass Wasting

In the canyon bottoms, the rock is hard and fresh. On the hillslopes and upland surfaces, weathering is moderately deep, except on Mehrten and on inundated conglomerates, where it is nil. Small ridges and hills on the divide are often erosional remnants. Fluvial transport of material is dominant, as indicated by deposition in Lake Clementine of an estimated 6.8 million cubic yards of material between 1939 and 1963. Soil creep is also evident. Slides exist, although apparently stabilized, in the vicinity of the dam site and at the north abutment of the Auburn-Forest Hill Bridge. Cherokee Flat on the Middle Fork is an old slump. The Bureau of Reclamation has evaluated that part of Auburn bordering the American River Canyon (including the Robie Point area) as to susceptibility of the canyon to soil creep and slides. The Bureau's report, in Department of Parks and Recreation files[1], indicates a number of areas of potentially high instability between the old Division of Forestry office and the Auburn city dump to the south.

Paleontological Resources

There are few fossil plant or animal forms within the project area. Fossils have been found embedded in the bluff areas of Rainbow Bridge and Negro Bar; these fossils are of high paleontological value. Because of their easy accessibility, they have high interpretive value, and are used by many schools for study. They are also subject to overuse, and need protection. These fossil beds are indicated on Plate B.

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1 Auburn Reservoir - Robie Point Area, Geology and Slope Stability Evaluation by Louis Frei, U.S. Bureau of Reclamation. 1966

Slope

The slopes of the Auburn-Folsom area are greatly varied. In the Auburn area, with its steep walled canyons, most of the slopes are in excess of 25 percent. These areas have relatively difficult access, as evidenced by the few roads which cross north-south through the region. In the rolling foothills around Folsom, there are few slopes in excess of 25 percent. A closer examination of slope can be seen in Plate C.*

Faults and Seismic Potential

Major faults trend northeast, north-south, and northwest. These can be observed in detail within the ultrabasic rocks of Flagstaff Hill. A shear zone almost 100 feet wide is exposed in an abandoned quarry in Folsom Prison. There is evidence of small-scale movement along the breaks in this zone. This area can be classified as low in earthquake frequency; however, the earthquake potential remains to be determined. Epicenters and fault lines can be studied in more detail in Plate D.

Edaphic Features

There are many different soils mapping units for the Auburn-Folsom Area. These are named for the major soil series that occur in each unit. A soil series is a group of soils that have about the same kind of profile or sequence of layers. Except for a difference in the surface texture, all members of a soil series have major horizons or layers that are similar in thickness, arrangement, and other characteristics. Some soil areas on the General Soil Map (Plate E) have the same soil series for which they are named, but differ by properties or qualities of major importance to use and management. These are separated (or phased) by indicating differences such as slope, rockiness, cobbliness, or depth of soil.

Some of the soil series names are tentative, and may be changed when soils of the area are correlated into the National Soil Classification System. Any changes in the names will not affect the usefulness of the map, because the soil properties and qualities do not change, and the names are only a means of identifying the map unit.

The mapping units for the Auburn-Folsom Area are placed into major groups based on soil characteristics and qualities, including slope (Table 4A). The major soil groups and mapping units within each group are described further in Appendix III. Additional details of soils phases, types and interpretations are given in Appendix III. Table 4B shows soils-vegetation associations.

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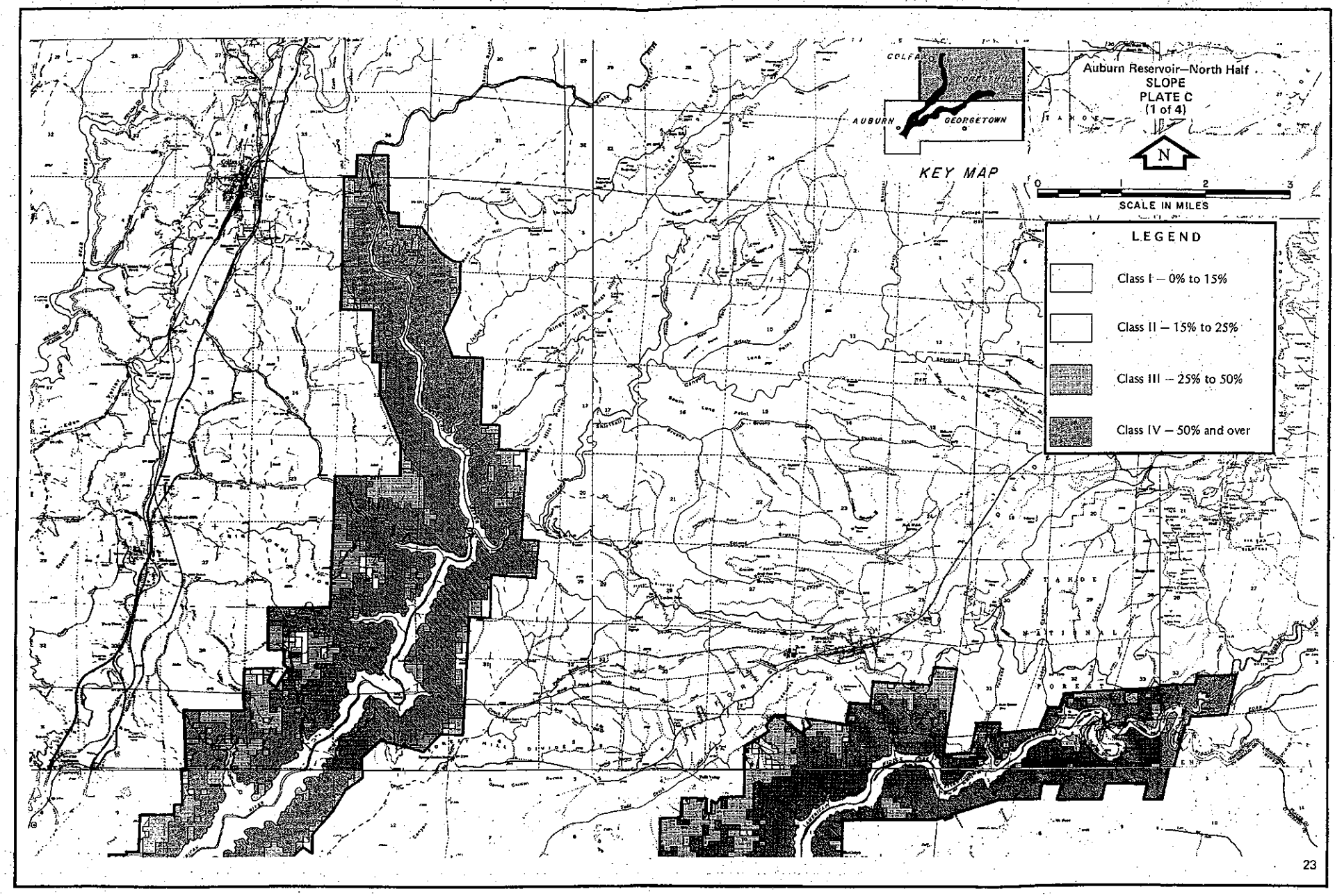
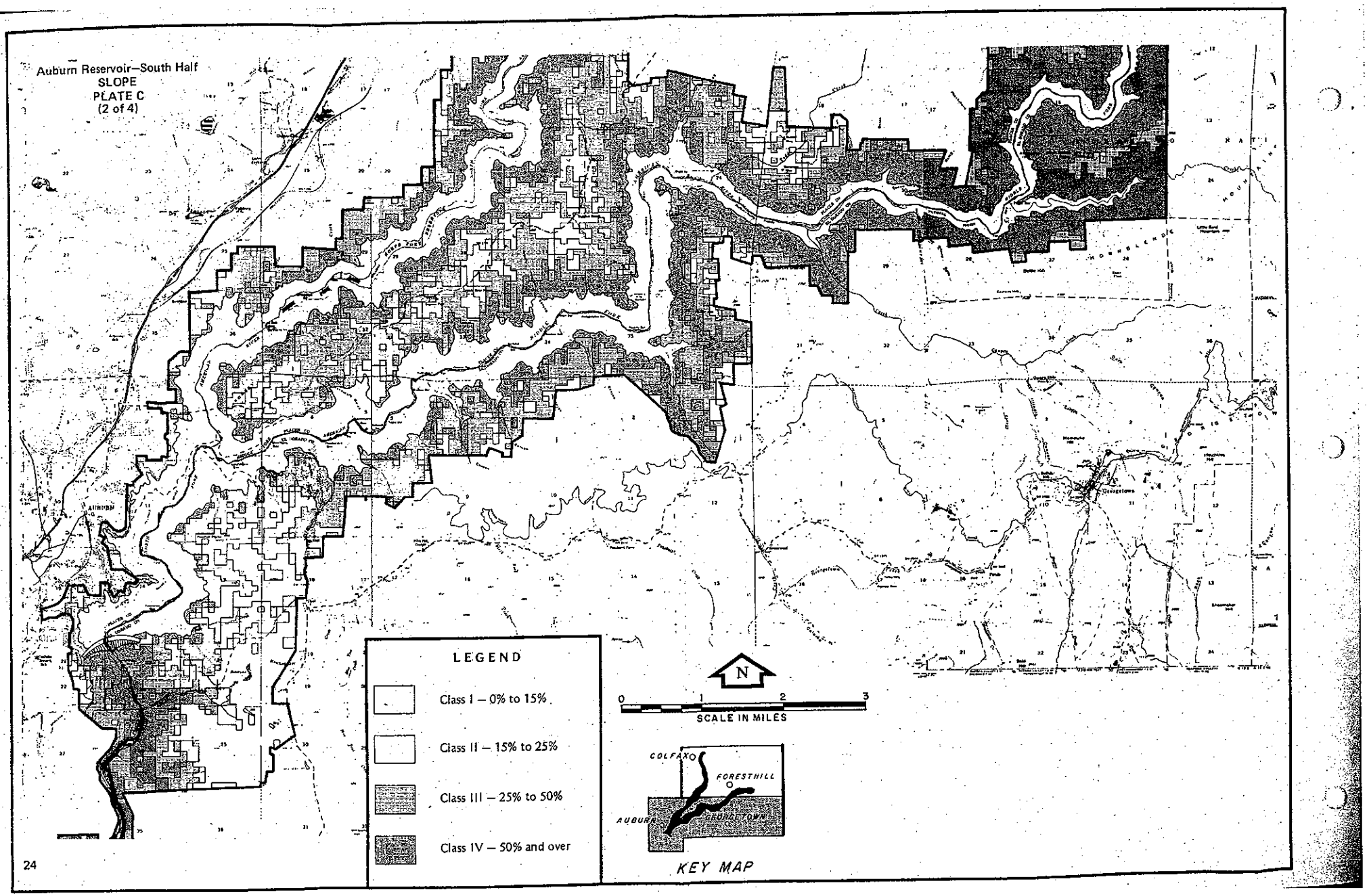
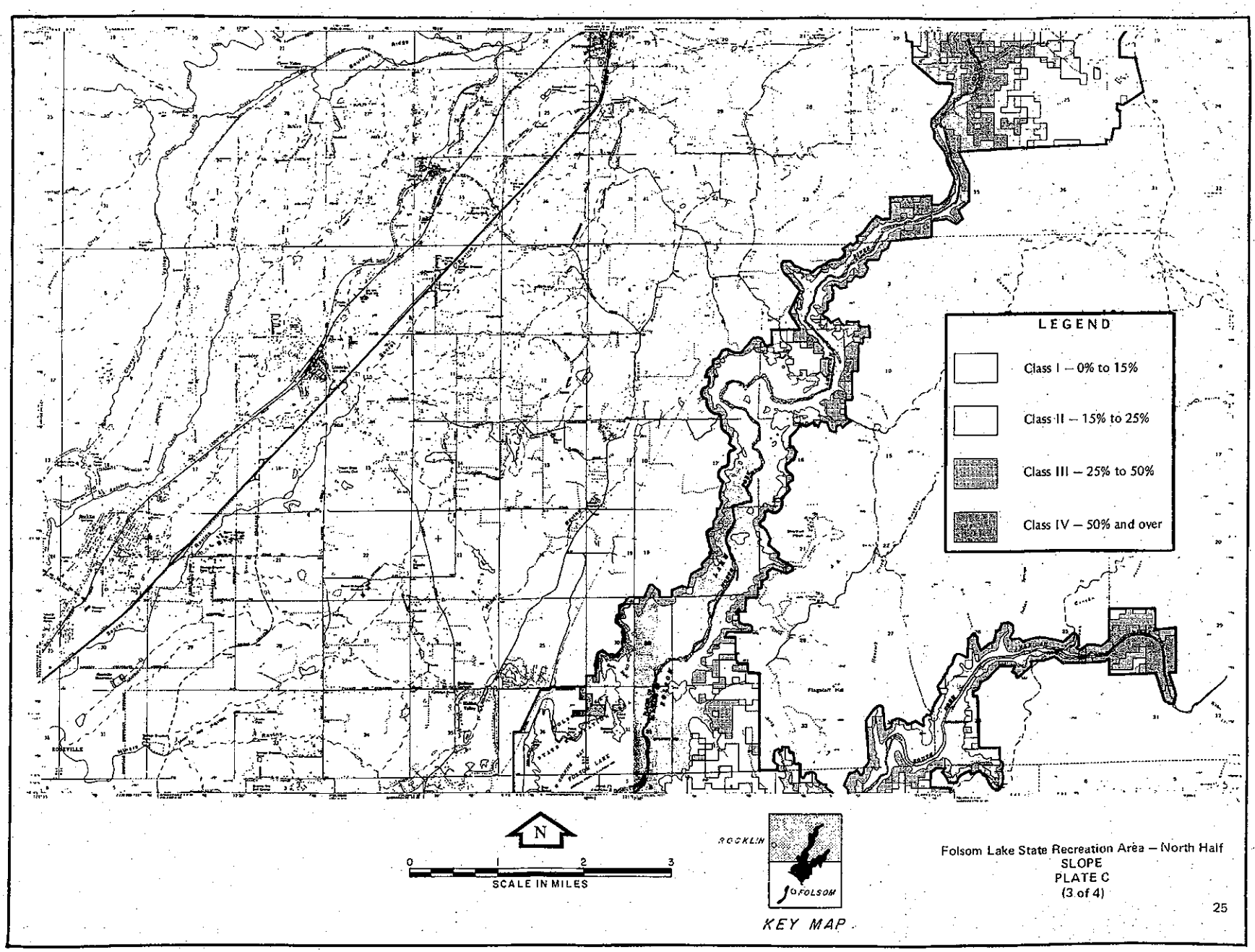
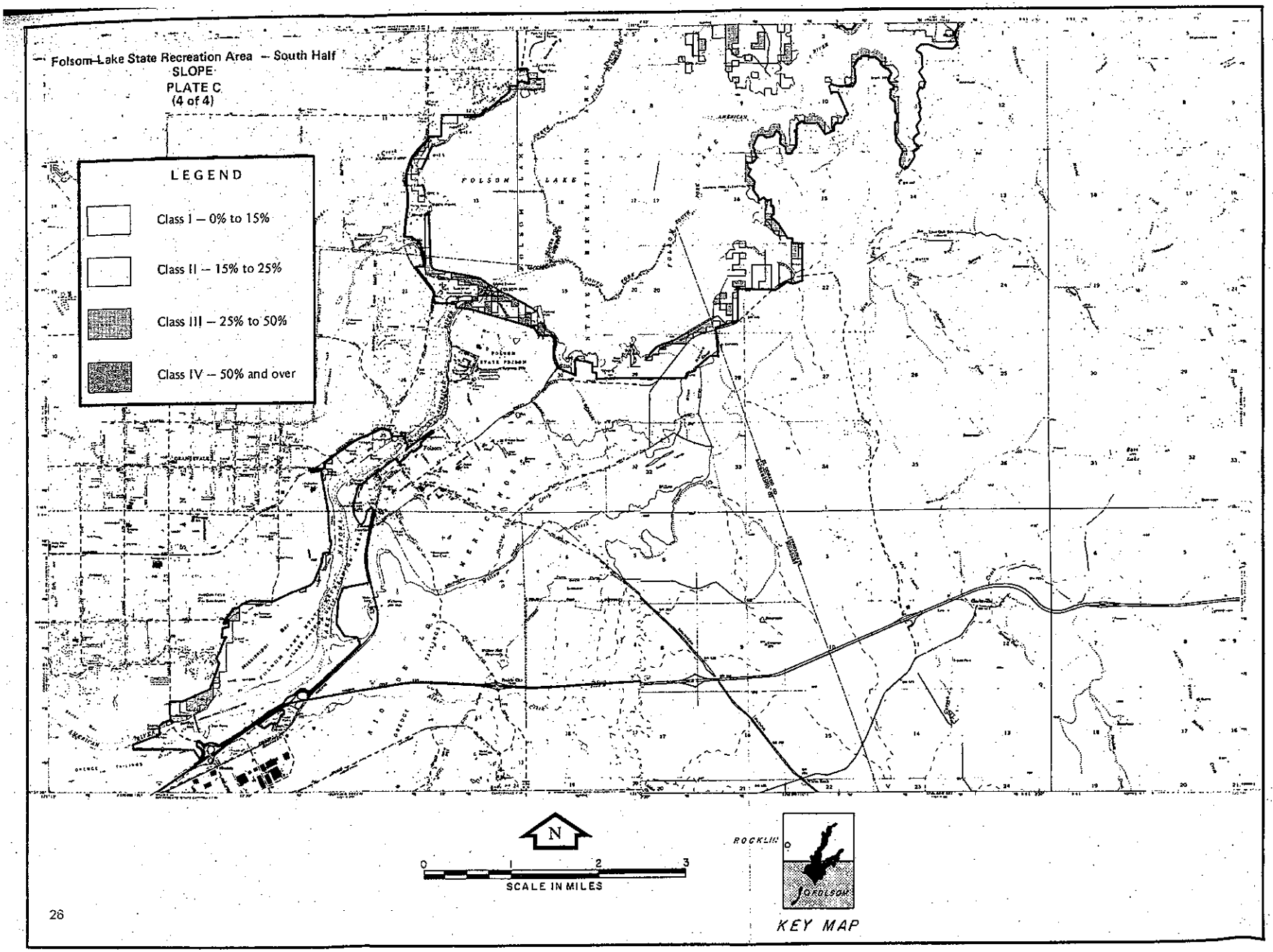
* Slope maps provided by Tahoe National Forest, Vewit Program.

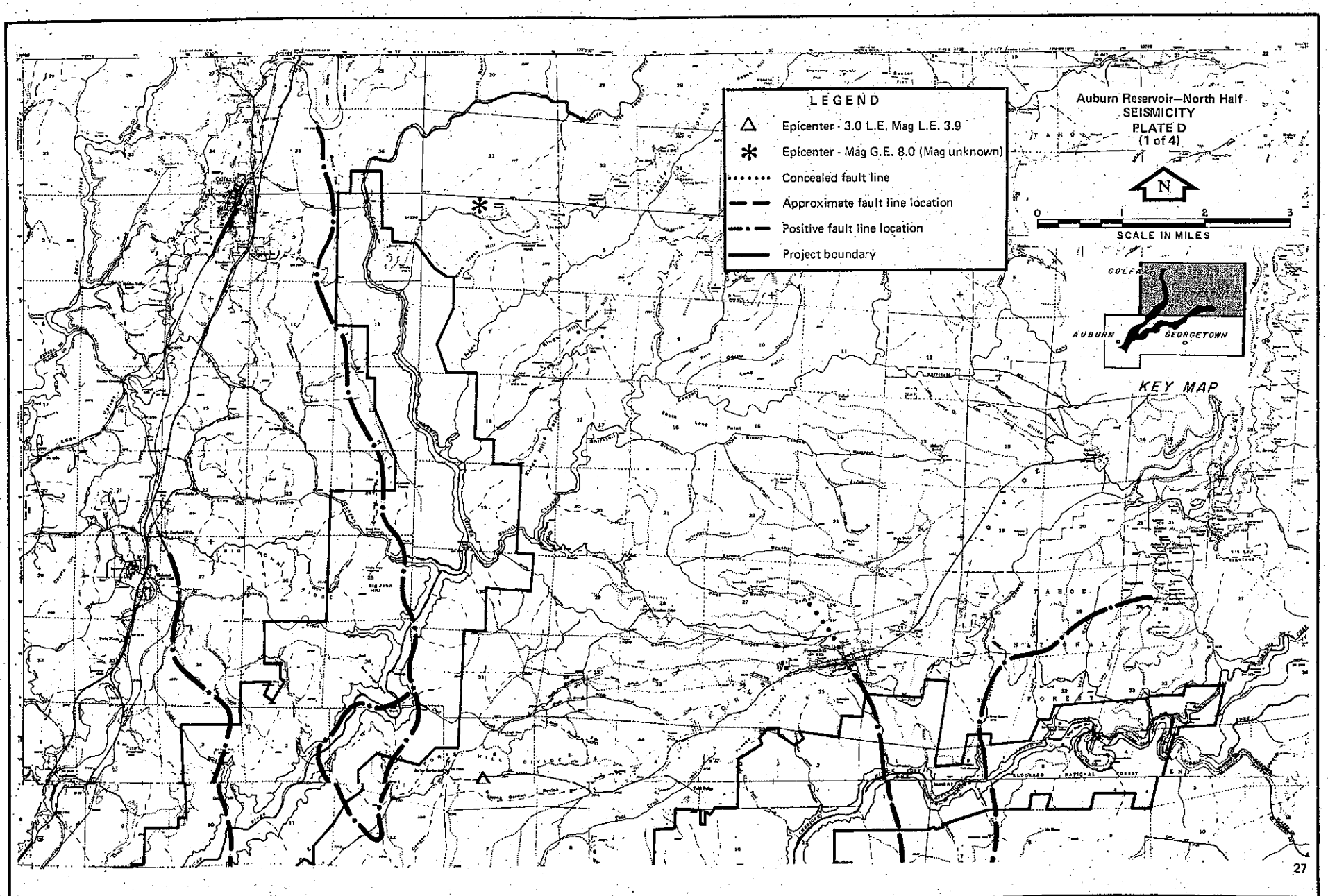

Auburn Reservoir—North Half
SLOPE
PLATE C
(1 of 4)
KEY MAP
AUBURN
GEORGETOWN
N
0 1 2 3
SCALE IN MILES
LEGEND
Class I – 0% to 15%
Class II – 15% to 25%
Class III – 25% to 50%
Class IV – 50% and over

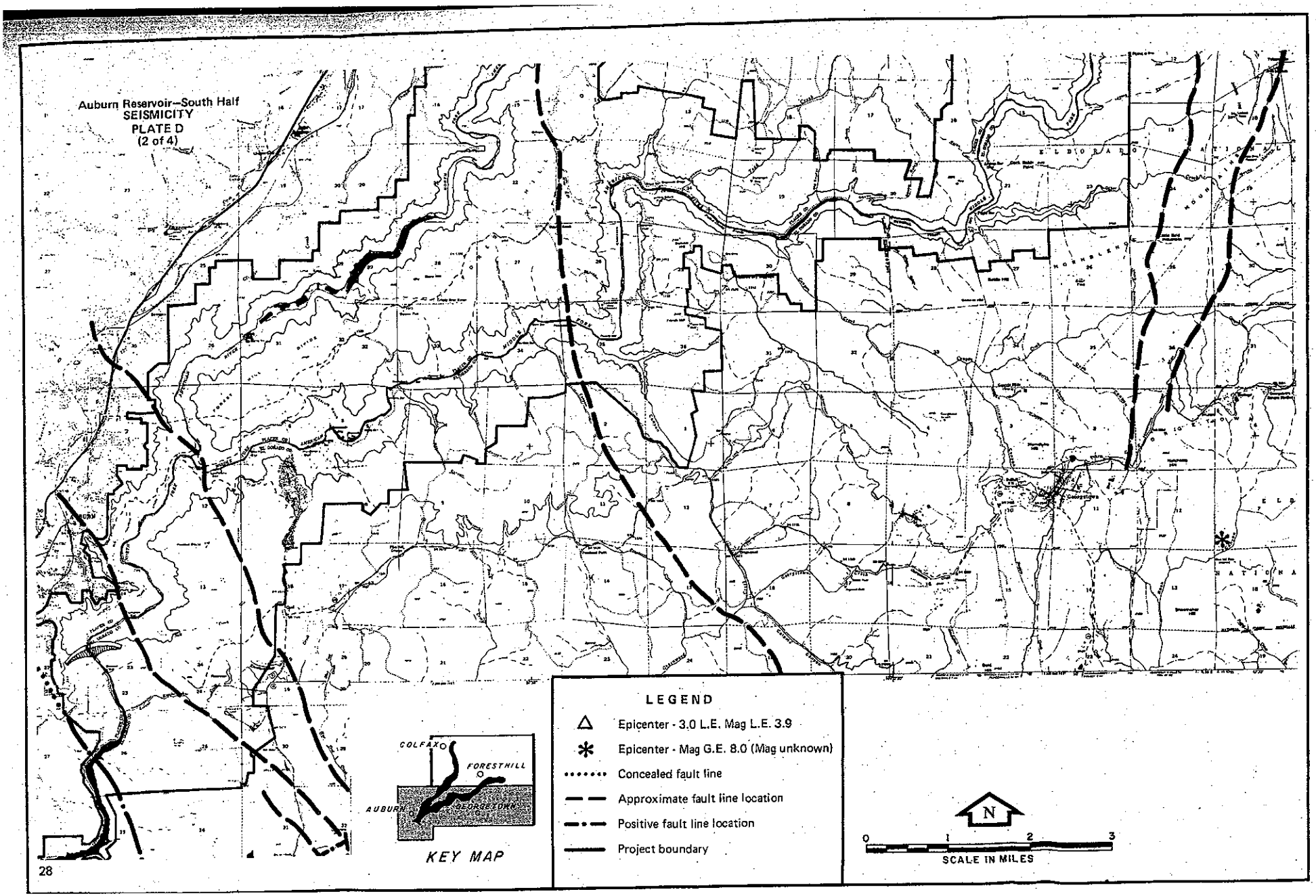

Auburn Reservoir—South Half
SLOPE
PLATE C
(2 of 4)
LEGEND
Class I — 0% to 15%
Class II — 15% to 25%
Class III — 25% to 50%
Class IV — 50% and over
N
0 1 2 3
SCALE IN MILES
COLFAX
FORESTHILL
AUBURN
GROSS TOWN
KEY MAP

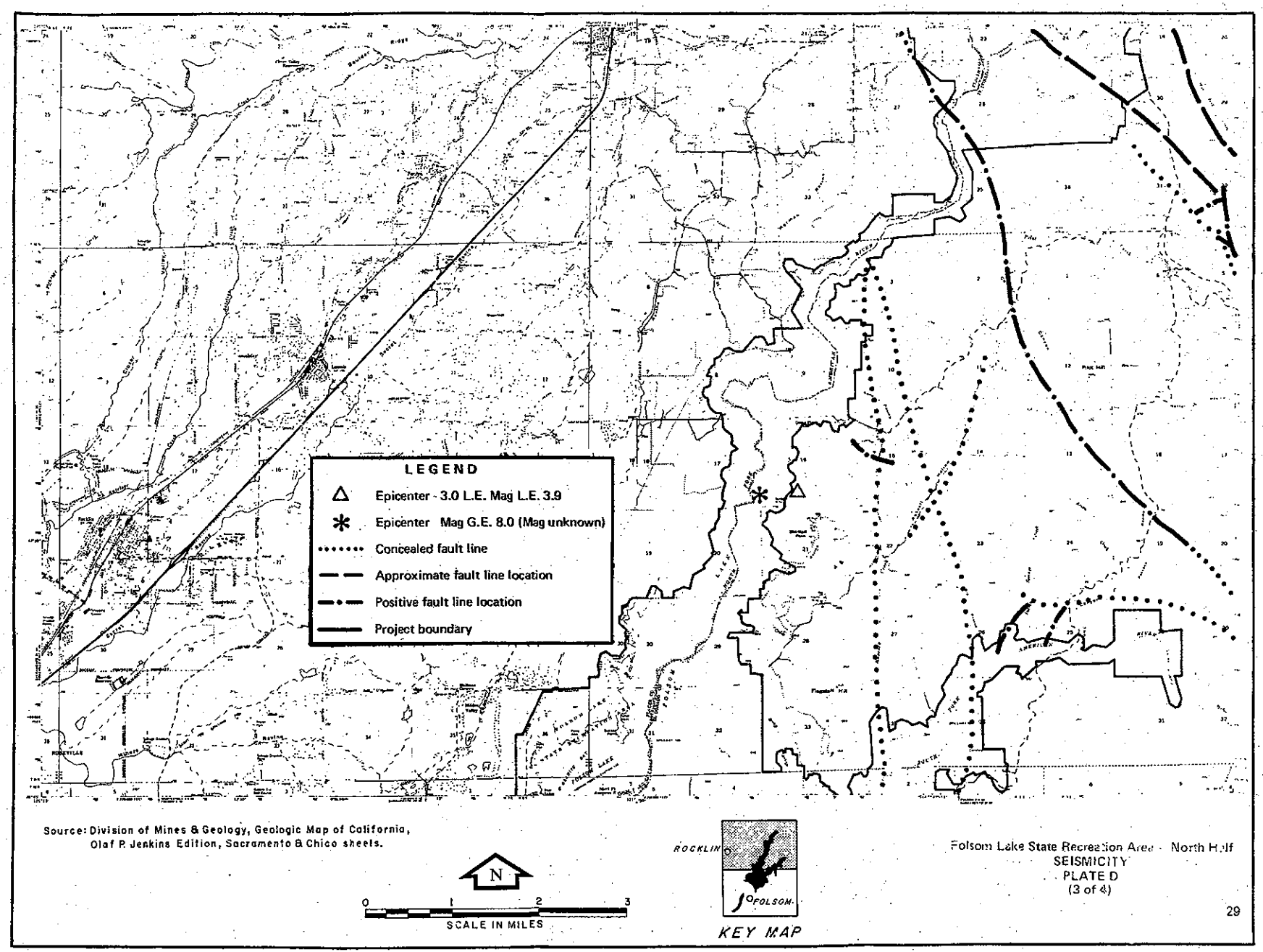


Folsom Lake State Recreation Area – North Half
SLOPE
PLATE C
(3 of 4)


Folsom Lake State Recreation Area – South Half
SLOPE
PLATE C
(4 of 4)
LEGEND
Class I – 0% to 15%
Class II – 15% to 25%
Class III – 25% to 50%
Class IV – 50% and over
FOLSOM LAKE
FOLSOM LAKE STATE RECREATION AREA
N
0 1 2 3
SCALE IN MILES
ROCKLIN
FOLSOM
KEY MAP

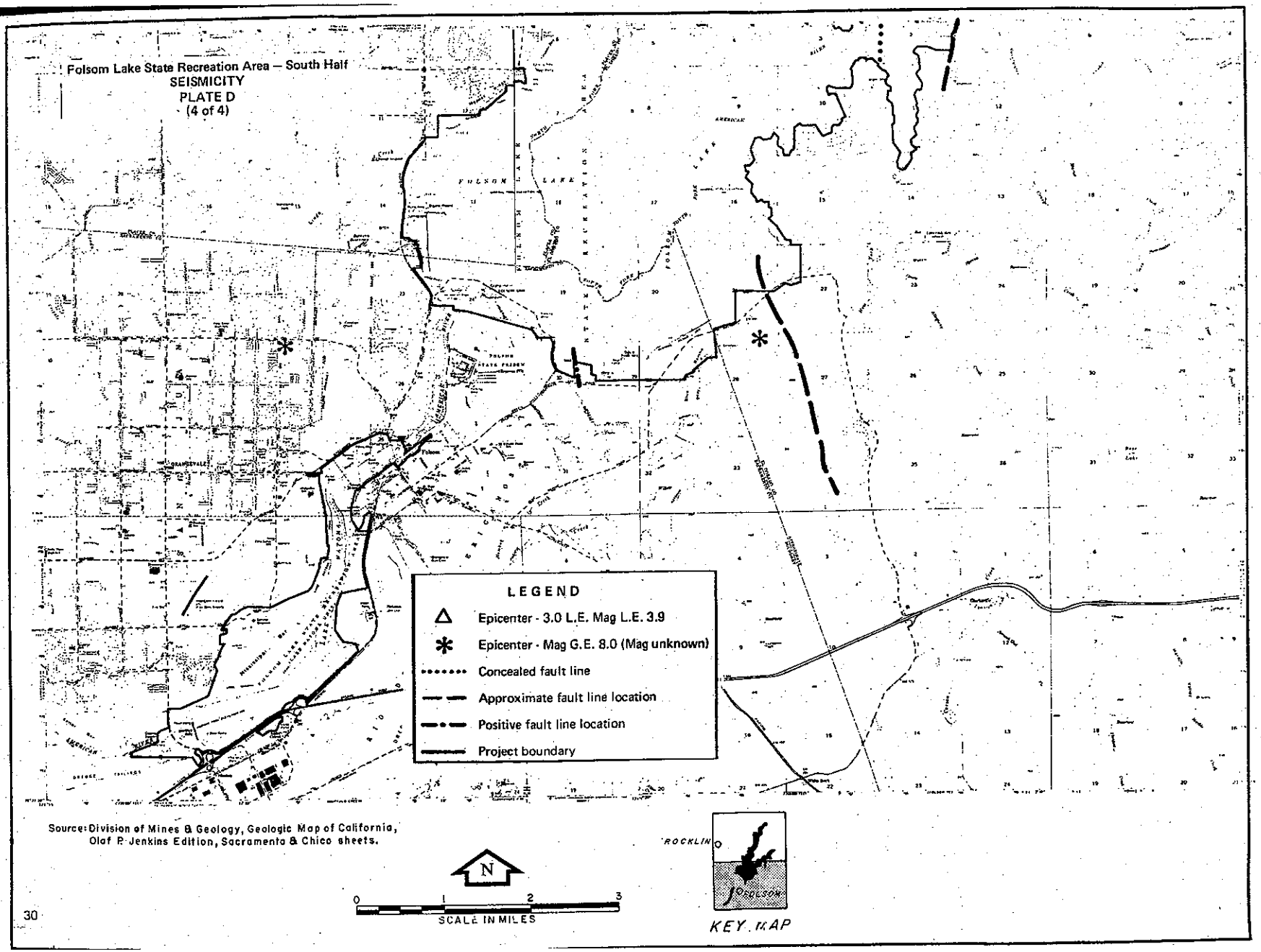

LEGEND
Epicenter - 3.0 L.E. Mag L.E. 3.9
Epicenter - Mag G.E. 8.0 (Mag unknown)
Concealed fault line
Approximate fault line location
Positive fault line location
Project boundary
Auburn Reservoir—North Half
SEISMICITY
PLATE D
(1 of 4)
N
0 1 2 3
SCALE IN MILES
COLFAX
AUBURN
GEORGETOWN
KEY MAP

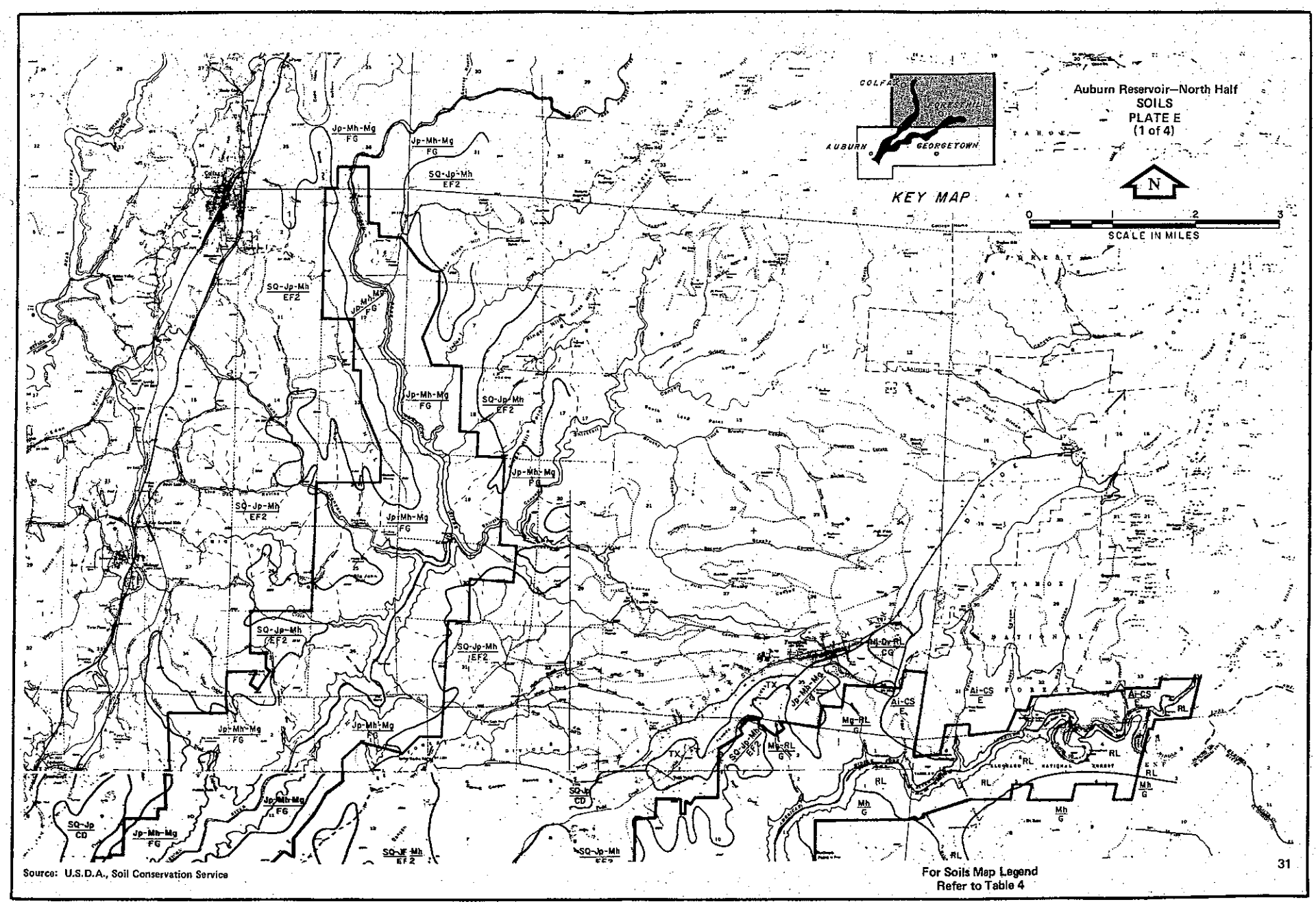

Auburn Reservoir–South Half
SEISMICITY
PLATE D
(2 of 4)
COLFAX
FORESTHILL
AUBURN
GEORGETOWN
KEY MAP
LEGEND
Epicenter - 3.0 L.E. Mag L.E. 3.9
Epicenter - Mag G.E. 8.0 (Mag unknown)
Concealed fault line
Approximate fault line location
Positive fault line location
Project boundary
N
0
1
2
3
SCALE IN MILES



Source: Division of Mines & Geology, Geologic Map of California, Olaf P. Jenkins Edition, Sacramento & Chico sheets.

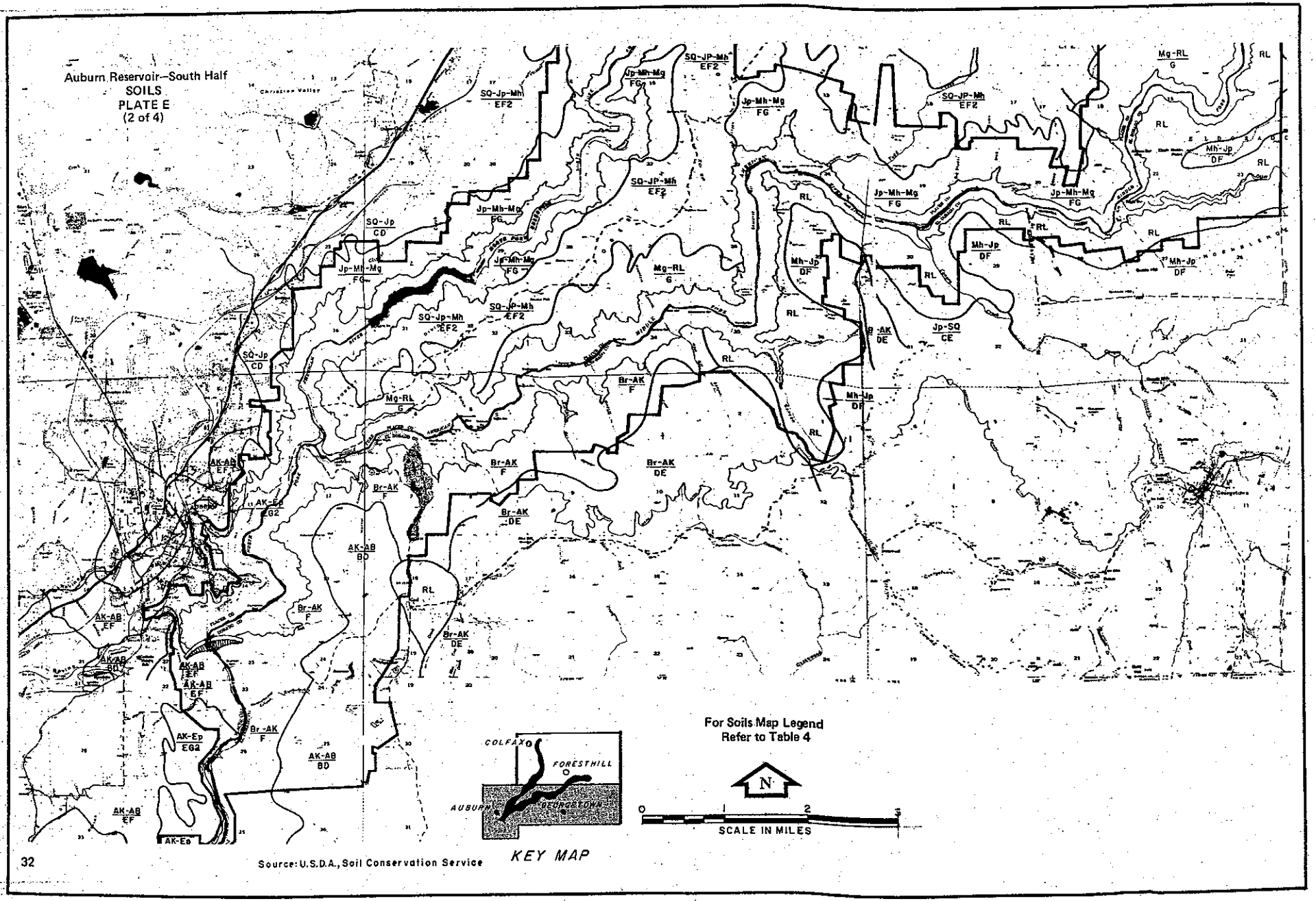
Folsom Lake State Recreation Area - North Half
SEISMICITY
PLATE D
(3 of 4)


Folsom Lake State Recreation Area — South Half
SEISMICITY
PLATE D
(4 of 4)
LEGEND
Epicenter - 3.0 L.E. Mag L.E. 3.9
Epicenter - Mag G.E. 8.0 (Mag unknown)
Concealed fault line
Approximate fault line location
Positive fault line location
Project boundary
Source: Division of Mines & Geology, Geologic Map of California, Olaf P. Jenkins Edition, Sacramento & Chico sheets.
N
0 1 2 3
SCALE IN MILES
ROCKLIN
FOLSOM
KEY MAP



Source: U.S.D.A., Soil Conservation Service

For Soils Map Legend
Refer to Table 4



Source: U.S.D.A., Soil Conservation Service

TABLE 4
SOILS LEGEND

GROUP 1 – AREAS DOMINATED BY SHALLOW, ROCKY SOILS, UNDERLAIN BY METAMORPHIC ROCK

AK-AB / BD	Auburn-Argonaut association, 2 to 15 percent slopes
AK-AB / EF	Auburn-Argonaut association, rocky, 15 to 50 percent slopes
AK / E	Auburn association, rocky, 15 to 30 percent slopes
AK / F	Auburn association, rocky, 30 to 50 percent slopes
AK-Ep / EG2	Auburn-Exchequer association, rocky, 15 to 75 percent slopes, eroded
AK-Wg / CE	Auburn-Whiterock association, rocky, 5 to 30 percent slopes

GROUP 2 – AREAS DOMINATED BY MODERATELY DEEP, ROCKY SOILS UNDERLAIN BY METAMORPHIC ROCK

Br-AK / DE	Boomer-Auburn association, rocky, 9 to 30 percent slopes
Br-AK / F	Boomer-Auburn association, rocky, 30 to 50 percent slopes

GROUP 3 – AREAS DOMINATED BY SHALLOW TO DEEP, ACID SOILS UNDERLAIN BY METAMORPHIC ROCK

Jp-SQ / CE	Josephine-Sites association, 5 to 30 percent slopes
SQ-Jp / CD	Sites-Josephine association, 5 to 50 percent slopes
Jp-SQ / EF	Josephine-Sites association, rocky 15 to 50 percent slopes
SQ-Jp-Mh / EF2	Sites-Josephine-Mariposa association, rocky, 15 to 50 percent slopes, eroded
Mh-Jp / DF	Mariposa-Josephine association, rocky, 9 to 50 percent slopes
Jp-Mh-Mg / FG	Josephine-Mariposa-Maymen association, rocky, 30 to 75 percent slopes
Mh / G	Mariposa association, rocky, 50 to 85 percent slopes

GROUP 4 -- AREAS DOMINATED BY MODERATELY DEEP, EROSIVE SOILS UNDERLAIN BY BASIC ROCK

RI / BD2	Rescue association, 2 to 15 percent slopes, eroded
RI / E2	Rescue association, stoney 15 to 30 percent slopes, eroded
RI / DF2	Rescue association, very stony, 9 to 50 percent slopes, eroded
SW-RI-GB / BF	Sobrante-Rescue-Guenoc association, 2 to 50 percent slopes
CS-Ms-WI / CF	Cohasset-McCarthy-Windy association, 5 to 50 percent slopes

GROUP 5 -- AREAS DOMINATED BY SHALLOW TO VERY SHALLOW, VERY ROCKY OR VERY COBBLY SOILS, UNDERLAIN BY VOLCANIC CONGLOMERATE OR METAMORPHOSED ROCK

Tt-RL / AD	Toomes-Rockland association, 0 to 15 percent slopes
Tt-Io-sr / E	Toomes-Inks-Supan association, 15 to 30 percent slopes
Hj-Dv-RL / CG	Henneke-Dubakella-Rockland association, 5 to 75 percent slopes
Mg-RL / G	Maymen-Rockland association, 50 to 75 percent slopes
RL	Rockland association

GROUP 6 -- AREAS DOMINATED BY DEEP, AND VERY DEEP SOILS UNDERLAIN BY VOLCANIC CONGLOMERATE

Ai-CS / AB	Aiken-Cohasset association, 0 to 5 percent slopes
Ai-CS / CD	Aiken-Cohasset association, 5 to 15 percent slopes
Ai-CS / E	Aiken-Cohasset association, 15 to 30 percent slopes

GROUP 7 -- AREAS DOMINATED BY MODERATELY DEEP AND DEEP, EROSIVE SOILS, UNDERLAIN BY GRANITIC ROCK

AJ-SI / CD	Auberry-Sierra association, 5 to 15 percent slopes
AJ-Ah / F	Auberry-Ahwahnee association, rocky, 30 to 50 percent slopes
Ah-SL / AB	Ahwahnee-Sierra association, 0 to 15 percent slopes
Ah-SL / CD2	Ahwahnee-Sierra association, 5 to 15 percent slopes, eroded
Ah-SL / EF2	Ahwahnee-Sierra association, rocky, 15 to 50 percent slopes, eroded

GROUP 8 – AREAS DOMINATED BY VERY DEEP WELL DRAINED SOILS OF ALLUVIAL PLAINS' LOW TERRACES, AND/OR ALONG STREAM CHANNELS

Pn — Perkins association

Rc-CG — Ramona-Chualar-Sandy alluvial land association

GROUP 9 – AREAS DOMINATED BY SHALLOW, CLAYPAN–HARDPAN SOILS, SOMEWHAT EXCESSIVELY TO POORLY DRAINED SOILS' ON NEARLY LEVEL TO STRONGLY SLOPING TERRACES

Ri-Cg / AD2 — Redding-Corning association, 0 to 15 percent slopes, eroded

GROUP 10 – AREAS DOMINATED BY SHALLOW TO MODERATELY DEEP SOILS FORMED IN PLACE, ON GENTLY ROLLING TO HILLY UPLANDS

Fj-TA-Rr / BD-2 — Fiddyment-Trigo-Rocklin association 2 to 15 percent slopes, eroded

GROUP 11 – AREAS DOMINATED BY SOILS GREATLY ALTERED BY MINING OPERATIONS, AND/OR MINING PITS

TX — Placer diggins - Tailings association. - Pits association

TABLE 4A
SOIL CHARACTERISTICS AND QUALITIES

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
GROUP 1 -- AREAS DOMINATED BY SHALLOW, ROCKY SOILS UNDERLAIN WITH METAMORPHIC ROCK												
AK-~~AB~~ BD	Auburn-Argonaut association, 2 to 15 percent slopes											
	Auburn	Basic rock foothills	Brown loam, massive, hard, slightly acid	Brown or reddish-brown loam, massive, hard, slightly to medium acid	Metabasic rock	Good	Moderate	Medium	Mod.	12-24"	2-4"	Moderate
	Argonaut	Basic rock foothills	Light brownish-gray loam, massive, hard, slightly acid	Yellowish-red clay, prismatic, very hard slightly to medium acid	Metabasic rock	Good to moderately good	Very slow	Medium	Mod.	10-20"	2-4"	Moderate
AK-AB/EF	Auburn-Argonaut association, rocky, 15 to 50 percent slopes	Basic										
	Auburn	Basic rock foothills	Brown loam massive, hard slightly acid	Brown or reddish-brown loam, massive, hard, slightly to medium acid	Metabasic rock	Good	Moderate	Rapid	High	12-24"	2-4"	Moderate
	Argonaut	Basic rock foothills	Brown or yellowish-red loam, massive, slightly hard, slightly acid	Yellowish-red clay, presmatic, very hard slightly to medium acid	Metabasic rock	Good to moderately good	Very slow	Rapid	High	10-20"	2-4"	Moderate
AK/E	Auburn association, rocky, 15to30 percent slopes											
	Auburn	Hilly foothills	Brown silt loam, massive, slightly hard, slightly acid	Reddish-brown silt loam massive, hard, slightly acid	Hard metamorphic rock	Good to excessive	Moderate	Medium	Mod.	12-26"	2-4"	Moderate
AK/F	Auburn association, rocky, 30 to 50 percent slopes											
	Auburn	Steep foothills	Brown silt loam, massive, slightly hard, slightly acid	Reddish-brown silt loam, massive, hard, slightly acid	Hard metamorphic rock	Good to excessive	Moderate	Medium to rapid	High	12-26"	2-4"	Moderate
AK-Ep/EG2	Auburn-Exchequer association, very rocky, 15 to 75 percent slopes, eroded											
	Auburn	Canyon slopes	Brown loam, massive, hard, slightly acid	Brown or reddish-brown loam, massive, slightly to medium acid	Metabasic rock	Good	Moderate	Rapid to very rapid	High	12-24"	2-4"	Moderate
	Exchequer	Canyon slopes	Yellowish-red silt loam, massive, slightly acid	Similar to surface layer, very shallow to bedrock	Metabasic rock	Somewhat excessive	Moderate	Very rapid	High	5-10"	.75-1.5"	Low

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
AK-Wg/CE	Auburn-Whiterock association, rocky, 5 to 30 percent slopes											
	Auburn	Rolling to hilly uplands	Strong brown cobbly silt loam, massive, slightly hard, slightly acid	Yellowish red cobbly silt loam, massive, slightly hard, slightly acid	Hard metamorphased basic rocks	Good	Moderate	Medium to rapid	Slight	12-24"	2-4"	Moderate
	Whiterock	Undulating to rolling uplands	Light brownish gray loam massive, hard, very strongly acid	Pale brown loam, massive, hard, very strongly acid	Hard, fine grained meta-sedimentary rock	Somewhat excessive	Moderate	Medium to rapid	Moderate	5-10"	2"	Low
GROUP 2 – AREAS DOMINATED BY MODERATELY DEEP, ROCKY SOILS UNDERLAIN WITH METAMORPHIC ROCK												
Br-AK/DE	Boomer-Auburn association, rocky, 9 to 30 percent slopes											
	Boomer	Rolling to hilly foothills	Dark brown loam, granular slightly hard, medium acid	Red gravelly sandy clay loam, blocky, hard slightly acid	Metamorphic rock	Good	Moderate	Medium	Mod.	30-40"	4-7"	Moderate
	Auburn	Rolling to hilly foothills	Brown silt loam, massive, slightly hard, slightly acid	Reddish-brown silt loam, massive, hard, slightly acid	Hard metamorphic rock	Good to excessive	Moderate	Medium	Mod.	12-26"	2-4"	Moderate
Br-AK/F	Boomer-Auburn association, rocky, 30 to 50 percent slopes											
	Boomer	Steep foothills	Dark brown loam, granular, slightly hard, medium acid	Red gravelly sandy clay loam, blocky, hard, slightly acid	Metamorphic rock	Good	Moderate	Medium to rapid	High	30-40"	4-7"	Moderate
	Auburn	Steep foothills	Brown silt loam, massive, slightly hard, slightly acid	Reddish-brown silt loam, massive, hard, slightly acid	Hard metamorphic rock	Good to excessive	Moderate	Medium to rapid	High	12-26"	2-4"	Moderate
GROUP 3 – AREAS DOMINATED BY SHALLOW TO DEEP, ACID SOILS UNDERLAIN WITH METAMORPHIC ROCK												
Jp-SQ/CE	Josephine-Sites association, 5 to 30 percent slopes											
	Josephine	Gently rolling to hilly mountains	Brown silt loam, massive, friable, medium acid	Yellowish-red clay loam, Massive, hard, porous, strongly acid	Metasedimentary rock	Good	Moderate	Medium	Mod.	30-60"	6-9"	Moderate
	Sites	Gently rolling to hilly mountains	Reddish-brown loam, granular, friable, medium acid	Red clay, blocky, hard Red clay, blocky, hard, porous, strongly acid	Metamorphic rock	Good	Moderately slow	Medium	Mod.	36-60"	6-10"	Moderate

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
SQ-Jp/CD	Sites-Josephine association, 5 to 15 percent slopes											
	Sites	Mountainous uplands	Brown or reddish-brown loam, granular, slightly hard, medium acid	Yellowish-red or red clay, blocky, hard strongly acid	Metamorphosed rock	Good	Slow	Slow to medium	Mod.	36-60"+	8-12"	Moderate
	Josephine	Mountainous uplands	Brown silt loam or loam granular, slightly hard, medium acid	Reddish-yellow silty clay loam, blocky, strongly acid	Metamorphosed rock	Good	Moderately slow	Slow to mdeium	Mod.	30-50"+	6-9"	Moderate
Jp-SQ/EF	Josephine-Sites association, rocky, 15 to 50 percent slopes											
	Josephine	Hilly to steep mountains	Brown silt loam, massive, friable, medium acid	Yellowish-red clay loam, Massive, hard, porous, strongly acid	Metasedimentary rock	Good	Moderate	Medium to rapid	High	30-60"	6-9"	Moderate
	Sites	Hilly to steep mountains	Reddish-brown loam, granular, friable, medium acid	Red clay, blocky, hard, porous, strongly acid	Metamorphic rock	Good	Moderately slow	Medium to rapid	High	36-60"	6-10"	Moderate
SQ-Jp-Mh/EF2	Sites-Josephine-Mariposa association, rocky, 15 to 50 percent slopes, eroded											
	Sites	Mountainous uplands	Brown or reddish-brown loam, granular, slightly hard, medium acid	Yellowish-red to red clay, blocky, strongly acid	Metamorphosed rock	Good	Slow	Medium to rapid	High	24-48"+	4-8"	Moderate
	Josephine	Mountainous uplands	Brown silt loam or loam, granular, slightly hard, medium acid	Reddish-yellow silty clay loam, blocky, strongly acid	Metamorphosed rock	Good	Moderately slow	Medium to rapid	High	24-40"	3-8"	Moderate
	Mariposa	Mountainous uplands	Brown silt loam, granular, slightly hard, medium acid	Reddish-yellow silty clay loam, blocky, hard, strongly acid	Metamorphosed rock	Good to somewhat excessive	Moderately slow	Rapid	High	15-30"	3-4"	Low
Mh-Jp/DF	Mariposa-Josephine association, rocky, 9 to 50 percent slopes											
	Mariposa	Rolling to steep mountains	Brown silt loam, granular, slightly hard, medium acid	Reddish-yellow silt loam massive, hard, porous, strongly acid	Metasedimentary rock	Good to excessive	Moderate	Medium to rapid	High	15-30"	3-4"	Low
	Josephine	Rolling to steep mountains	Brown silt loam, massive, friable, medium acid	Yellowish-red clay loam, Massive, hard, porous, strongly acid	Metasedimentary rock	Good	Moderate	Medium to rapid	High	30-60"	6-9"	Moderate

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
Jp-Mh-Mq/FG	Josephine-Mariposa-Maymen association, rocky, 30 to 75 percent slopes											
	Josephine	Mountainous uplands and canyon slopes	Brown silt loam, granular slightly hard, medium acid	Yellowish-red clay loam blocky, hard, medium to strongly acid	Metamorphosed rock	Good	Moderately slow	Rapid	High	24-40"	6-9"	Moderate
	Mariposa	Mountainous uplands and canyon slopes	Brown silt loam, granular slightly hard, medium acid	Reddish-yellow silty clay loam, blocky, hard, strongly acid	Metasedimentary rock	Good to somewhat excessive	Moderately slow	Very rapid	High	15-30"	3-4"	Low
	Maymen	Mountainous uplands and canyon slopes	Dark grayish-brown loam, soft, granular, medium acid	Similar to the surface, very shallow to bedrock	Metasedimentary rock	Excessive	Moderate	Very rapid	High	6-10"	.5-1.0"	Low
Mh/G	Mariposa association, rocky, 50 percent plus slopes											
	Mariposa	Very steep mountains	Brown silt loam, granular slightly hard, medium acid	Reddish-yellow silt loam, massive, hard, porous, strongly acid	Metasedimentary rock	Good to excessive	Moderate	Rapid	High	15-30"	3-4"	Low
GROUP 4 – AREAS DOMINATED BY MODERATELY DEEP, EROSIVE SOILS UNDERLAIN WITH BASIC ROCK												
RI/BD2	Rescue association 2 to 15 percent slopes, eroded											
	Rescue	Undulating to rolling foothills	Reddish-brown sandy loam, Massive, slightly hard, Medium acid	Red sandy clay loam, Massive, hard, slightly acid	Weathered gabbrodiorite rock	Good	Moderately slow	Medium	Mod.	24-40"	4-7"	Moderate
RI/E2	Rescue association, stony, 25 to 30 percent slopes, eroded											
	Rescue	Hilly foothills	Reddish-brown sandy loam, massive, slightly hard, medium acid	Red sandy clay loam, massive, hard, slightly acid	Weathered gabbrodiorite rock	Good	Moderately slow	Medium to rapid	High	24-40"	4-7"	Moderate
RI/DF2	Rescue association, very stony, 9 to 50 percent slopes, eroded											
	Rescue	Rolling to steep foothills	Reddish-brown sandy loam massive, slightly hard, medium acid	Red sandy clay loam massive, hard, slightly acid	Weathered gabbrodiorite rock	Good	Moderately slow	Medium to rapid	High	24-40"	4-7"	Moderate
SW-RI-GB/BF	Sobrante-Rescue-Guenoc association, 2 to 50 percent slopes											
	Sobrante	Middle basic rock foothills	Brown loam massive, slightly hard, slightly acid	Brown, reddish-brown heavy loam, blocky, hard, slightly acid	Metabasic rock	Good	Moderate to mod. slow	Medium to rapid	Mod.	20-36"	4-6"	Moderate

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
	Rescue	Middle basic rock foothills	Reddish-brown loam, massive, slightly hard, medium acid	Dark red clay loam blocky, hard, medium acid	Metabasic rock	Good	Moderately slow	Medium to rapid	Mod.	24-40"	4-7"	Moderate
	Guenoc	Middle basic rock foothills	Dark reddish-brown, loam massive, slightly hard, slightly to medium acid	Dark red clay, blocky, hard, slightly to medium acid	Metabasic rock	Good	Slow	Medium to rapid	Mod.	24-36"	4-7"	Moderate
CS-Ms-Wl/CF	Cohasset-McCarthy-Windy association, 5 to 50 percent slopes											
	Cohasset	Mountainous volcanic uplands	Reddish-brown cobbly loam, granular, soft, medium acid	Yellowish-red clay loam, blocky, hard, medium to strongly acid	Andesitic conglomerate	Good	Moderately slow	Medium to rapid	High	30-46"	6-8"	Moderate
	McCarthy	Mountainous volcanic uplands	Dark grayish-brown, cobbly loam, granular, soft, slightly to medium acid	Brown, cobbly loam granular, solft, strongly acid	Andesitic conglomerate	Good	Moderate	Medium to rapid	High	18-30"	2-4"	Moderate
	Windy	Mountainous volcanic uplands	Dark brown stony loam granular, soft, medium acid	Brown stony sandy loam, soft, strongly acid	Andesitic conglomerate	Good	Moderately rapid	Medium to rapid	High	24-36"	2-4"	Moderate
GROUP 5 –	AREAS DOMINATED BY SHALLOW TO VERY SHALLOW, VERY ROCKY OR VERY COBBLY SOILS, UNDERLAIN BY VOLCANIC CONGLOMERATE OR METAMORPHOSED ROCK											
Tt-RL/AD	Toomes-Rock Land association, 0 to 15 percent slopes											
	Toomes	Volcanic tablelands	Brown very cobbly loam, massive, slightly hard, slightly to medium acid	brown very cobbly loam massive, slightly to medium acid	Andesitic conglomerate	Somewhat excessive	Moderate	Medium to rapid	Mod.	8-16"	1-2"	Moderate
	Rock Land	Volcanic tablelands	Miscellaneous land type consisting of exposed conglomerate and very shallow soil areas			excessive	None	Very rapid	Mod.	0-6"	1"	Low
Tt-Io-sr/E	Toomes-Inks-Supan association, 15 to 30 percent slopes											
	Toomes	Volcanic tableland sideslopes	Brown very cobbly loam, massive, slightly hard, slightly to medium acid	Brown very cobbly loam, massive, slightly to medium acid	Andesitic conglomerate	Somewhat excessive	Moderate	Rapid	Mod.	8-16"	1-2"	Moderate
	Inks	Volcanic tableland sideslopes	Brown cobbly loam, massive, hard, slightly to medium acid	Brown, dark brown cobbly sandy clay loam, massive, hard, blocky, medium acid	Andesitic conglomerate	Good	Moderate	Medium	Mod.	20-36"	4-6"	Moderate

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
Hj-Dv-RL/CG	Henneke-Dubakella-Rock Land association, 5 to 75 percent slopes											
	Henneke	Serpentine foothill ridges	Reddish-brown loam, granular, soft, medium acid	Reddish-brown clay loam, blocky, slightly hard, neutral	Serpentine rock	Somewhat excessive	Moderately slow	Rapid to very rapid	High	8-12"	.75 to 1.5"	Very low
	Dubakella	Serpentine canyon slopes	Reddish-brown loam, granular, soft, neutral	Yellowish-red heavy loam, blocky, slightly hard, neutral	Serpentine rock	Somewhat excessive	Moderately slow	Rapid to very rapid	High	9-15"	1-2"	Very low
	Rock Land	Serpentine outcrops	Miscellaneous land type consisting of exposed Serpentine bedrock and very shallow soil areas			Excessive	None	Very rapid	High	0-6"	1"	Very low
Mq-RL/G	Maymen-Rock Land association, 50-75 percent slopes											
	Maymen	Canyon slopes	Dark garyish-brown loam, granular, soft, medium acid	Similar to the surface, very shallow to bedrock	Metamorphosed rock	Somewhat excessive	Moderate	Very rapid	High	10"	.5-1"	Low
	Rock Land	Canyon slopes	A miscellaneous land type consisting of metamorphic rock outcrops and shallow soil areas			Excessive	None	Very rapid	High	0-6"	1"	Low
RL	Rock Land association											
	Rock Land	Undulating to very steep upland			Serpentine rock metamorphic rock	Excessive	—	Ve ry rapid	Mod.	Variable	Less than 1	Very low
GROUP 6 –	AREAS DOMINATED BY DEEP AND VERY DEEP SOILS UNDERLAIN BY VOLCANIC CONGLOMERATE, METAMORHPIC OR GRANITIC ROCK											
Ai-CS/AB	Aiken-Cohasset association, 0 to 5 percent slopes											
	Aiken	Mountainous volcanic uplands	Reddish-brown loam, granular, soft, slightly to medium acid	Red clay, blocky, hard, strongly acid	Volcanic conglomerate	Good	Moderately slow	Slow	Mod.	48"	10-12"	Moderate
	Cohasset	Mountainous volcanic uplands	Reddish-brown loam, granular, soft, slightly to medium acid	Yellowish-red clay loam, blocky, hard, strongly acid	Volcanic conglomerate	Good	Moderate	Slow	Mod.	40"	8-10"	Moderate
Ai-CS/CD	Aiken-Cohasset association, 5 to 15 percent slopes											
	Aiken	Mountainous volcanic uplands	Reddish-brown loam, granular, soft, slightly to medium acid	Red clay, blocky, hard, strongly acid	Volcanic conglomerate	Good	Moderately slow	Medium	Mod.	48"	10-12"	Moderate
	Cohasset	Mountainous volcanic uplands	Reddish-brown loam, granular, soft, slightly to medium acid	Yellowish-red clay loam, blocky, hard, strongly acid	Volcanic conglomerate	Good	Moderate	Medium	Mod.	40"	8-10"	Moderate

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
Ai-CS/E	Aiken-Cohasset association, 15 to 30 percent slopes											
	Aiken	Mountainous volcanic uplands	Reddish-brown loam, granular, soft, slightly to medium acid	Red clay, blocky, hard, strongly acid	Volcanic conglomerate	Good	Moderately slow	Medium	High	48"	10-12"	Moderate
	Cohasset	Mountainous volcanic uplands	Reddish-brown loam, granular, soft, slightly to medium acid	Yellowish-red clay loam, blocky, hard, strongly acid	Volcanic conglomerate	Good	Moderate	Medium	High	40"	8-10"	Moderate
GROUP 7 –	AREAS DOMINATED BY MODERATELY DEEP AND DEEP, EROSIVE SOILS, UNDERLAIN BY GRANITIC ROCK											
Ah-SL/AB	Ahwahnee-Sierra association, 0 to 5 percent slopes											
	Ahwahnee	Granitic foothills	Brown coarse sandy loam, slightly to medium acid	Brown loam, blocky, slightly to medium acid	Granitic rock	Good	Moderate	Slow to medium	Mod.	30-48"	4-6"	Moderate
	Sierra	Granitic foothills	Reddish-brown coarse sandy loam, medium acid	Red sandy clay loam, slightly acid	Granitic rock	Good	Moderately slow	Slow to medium	Mod.	26-48"	5-8"	Moderate
Ah-SL/CD2	Ahwahnee-Sierra association, 5 to 15 percent slopes, eroded											
	Ahwahnee	Granitic foothills	Brown coarse, sandy loam, granular, slightly hard, slightly to medium acid	Brown loam, blocky, hard slightly to medium acid	Granitic rock	Good	Moderate	Medium to rapid	High	30-48"	4-6"	Moderate
	Sierra	Granitic foothills	Reddish-brown coarse sandy loam, massive, slightly hard, slightly to medium acid	Red sandy clay loam, massive, very hard, slightly acid	Granitic rock	Good	Moderately slow	Medium to rapid	High	26-48"	5-8"	Moderate
Ah-SL/EF2	Ahwahnee-Sierra association, rocky, 15 to 50 percent slopes, eroded											
	Ahwahnee	Granitic foothills	Brown coarse sandy loam, granular, slightly hard, slightly to medium acid	Brown loam, blocky slightly to medium acid	Granitic rock	Good	Moderate	Very rapid	High	30-48"	4-6"	Moderate
	Sierra	Granitic foothills	Reddish-brown coarse sandy loam, massive, slightly hard, medium acid	Red sandy clay loam, massive, very hard, slightly acid	Granitic rock	Good	Moderately slow	Very rapid	High	26-48"	5-8"	Moderate

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Depth (Inches)	A.W.C. (Inches)	Inherent Fertility
AJ-SL/CD	Auberry-Sierra association, 5 to 15 percent slopes											
	Auberry	Gently rolling to rolling foothills	Brown coarse sandy loam, massive, slightly hard, medium acid	Brown sandy clay loam, Massive, very hard, slightly acid	Well weathered granodiorite rock	Good	Moderate	Medium	Mod.	40+"	7+"	Moderate
	Sierra	Gently rolling to rolling foothills	Brown sandy loam, massive, hard, medium acid	red clay loam, massive to blocky, very hard, slightly acid	Well weathered granodiorite rock	Good	Moderate	Medium	Mod.	40+"	7+"	Moderate
AJ-Ah/F	Auberry-Ahwahnee association, rocky, 30 to 50 percent slopes											
	Auberry	Steep foothills	Brown coarse sandy loam, massive, slightly hard, medium acid	Brown sandy clay loam, massive, very hard, slightly acid	Well weathered granodiorite rock	Good	Moderate	Rapid	Very high	24+"	4+"	Moderate
	Ahwahnee	Steep foothills	Grayish-brown coarse sandy loam, massive, soft, slightly acid	Light yellowish-brown coarse sandy loam, mass. very hard, slightly acid	Well weathered granodiorite rock	Good to excessive	Moderately rapid	Rapid	Very high	24-40"	3.5-5"	Low to moderate
GROUP 8 –	AREAS DOMINATED BY VERY DEEP WELL DRAINED SOILS OF ALLUVIAL PLAINS AND LOW TERRACES AND ALONG STREAM CHANNELS											
Pn	Perkins association											
	Perkins	Nearly level low terraces	Yellowish brown gravelly loam, massive, hard, medium acid	Yellowish red, gravelly heavy clay loam, angular blocky, very hard neutral	Very gravelly sandy loams to very garvelly clay loams	Good	Slow	Slow to medium	Slight to mod.	60"	6-8"	Moderate
Rc-CG	Ramona-Chualar-Sandy alluvial land association											
	Ramona	Stream terrace	Brown fine sandy loam, massive, hard, slightly acid	Reddish-brown sandy clay loam, blocky, slightly acid	Softly consolidated granitic sediments	Good	Moderately slow	Slow	Mod.	60"	10-12"	Moderately high
	Chualar	Stream terrace	Dark grayish-brown sandy loam, granular, slightly hard, slightly acid	brown sandy clay loam, blocky, neutral, mildly alkaline	Granitic sediments	Good	Moderately slow	Slow	Mod.	60"	10-12"	Moderately high
	Sandy alluvial land	Stream terrace	Pale brown loamy sand, loose, slightly acid to neutral	Light gray to pale yellow, fine sand, silt lenses, neutral	Stratified sands with lenses of silts and clays	Somewhat excessive	Variable	Slow	Mod.	60"	4-8"	Moderate to low

Map Symbol	Soil Name	Position	Profile (dry) Surface Layer	Profile (dry) Subsoil	Substratum or Parent Material	Natural Drainage	Subsoil Perm.	Runoff	Erosion Hazard	Effect. Dept. (Inches)	A.W.C. (Inches)	Inherent Fertility
GROUP 9 –	AREAS DOMINATED BY SHALLOW CLAYPAN–HARDPAN SOILS, SOMEWHAT EXCESSIVELY TO POORLY DRAINED SOILS.											
Ri-cg/AD2	Redding-Corning association 0 to 15 percent slopes, eroded											
	Redding	Gently undulating to rolling terraces	Yellowish-red, gravelly loam, massive, hard, medium acid	Yellowish-red gravelly clay, prismatic, extremely hard, strongly acid	Yellowish-red gravelley indurated pan	Good	Slow to moderate	Medium	Mod.	12-30"	2-5"	Low
	Corning	Gently sloping to rolling terraces, often hummocky	Reddish-brown, gravelly loam, massive, hard, strongly acid	Red clay, angular blocky, extremely hard, strongly acid	Very gravelly sandy clay	Good	Very slow	Medium to rapid	Mod.	14-26"	2-4"	Low
GROUP 10 –	AREAS DOMINATED BY SHALLOW TO MODERATELY DEEP SOILS FORMED IN PLACE, ON GENTLY ROLLING TO HILLY UPLANDS.											
Fj-TA-Rr/BD-2	Fiddyment-Trigo-Rocklin association, 2 to 15 percent slopes, eroded											
	Fiddyment	Gently sloping to rolling terraces	Grayish-brown, fine sandy Loam, massive, hard, medium acid	Yellowish-brown clay prismatic, extremely hard, slightly acid	Firm siltstone and sandstone	Good	Very slow	Medium	Mod, to high	10-15"	2-3"	Low
	Trigo	Undulating to rolling lands	Pale brown fine sandy loam, massive, hard, slightly acid	Pale brown fine sandy loam, massive, hard, slightly acid	White, softly consolidated, siltstone and sandstone	Somewhat excessive	Moderately rapid	Medium	Mod. to high	10-20"	2-3"	Moderate
	Rocklin	Gently sloping to rolling old terraces	Light brown fine sandy loam, massive, hard, slightly acid	Yellowish-red heavy loam, subangular blocky, hard slightly acid	Thin indurated pan over stratified sandy loams and fine sandy loams	Good	Moderate	Slow to medium	Mod.	20-36"	2-4"	Low
GROUP 11 –	AREAS DOMINATED BY SOILS GREATLY ALTERED BY MINING OPERATIONS, AND/OR MINING PITS.											
TX	Placer diggings, Tailings, Pits association											
	Placer diggins	Miscellaneous land type consisting of placer-mined areas, generally near stream channels; some smoothed and re-leveled.				Variable	Variable	Variable	Mod.	60"	Variable	Low
	Tailings	Miscellaneous land type consisting of hydraulic-mined areas, generally very cobbly, debris with little or no fine material				Excessive	Very rapid	Slow	Slight	60"	1"	Low
	Pits	Miscellaneous land type consisting of deep pits and escarpments in the Central Valley				Variable	Very slow	Slow	High	Variable	Variable	Very low

TABLE 4B
SOIL-VEGETATION ASSOCIATIONS

VEGETATION TYPES

SOILS TYPES	Grassland	Grass – Oak Woodland	Grass—Oak Woodland with Scattered Brush and Conifers	Grass – Oak Woodland With Commercial Conifers	Brush With Scattered Pine Oak, and Grass	Coniferous Forest	Coniferous Forest with Scattered Hardwoods	Coniferous Forest With Scattered Brush	Coniferous Forest with any Combination of Hardwoods, Grass and Brush
	Pn - Perkins Association	Ak-AB / EF — Auburn-Argonaut Association, 15-50% slopes	AK-AB / BD — Auburn-Argonaut assoc. 2-15% slopes	Br-AK / DE — Boomer-Auburn assoc. rocky, 9-30% slopes	Rl / E2 — Rescue association stony, 15-30% slopes, eroded	Cs-Ms-Wl / CF — Cohasset-McCarthy windy association 5-50% slopes	Jp-SQ / CE — Josephine-Sites assoc., 5-30% slopes	SQ-JP / CD — Sites-Joesphine assoc., 5-50% slopes	Sw-Rl-GB / BF — Sobrante-Rescue-Guenoc assoc. 2-15% slopes
	Fj-TA-Rr / BD2 — Fidyment-Trigo-Rocklin association 2-15% slopes, eroded	Tt-RL / AD — Toomes-Rockland assoc., 0-15% slopes	AK / E — Auburn association, rocky, 15-30% slopes	Br-AK / F — Boomer-Auburn assoc., rocky, 30-50% slopes	Rl / DF2 — Rescue association, very stony, 9-50% slopes, eroded.	Ai-CS / AB — Aiken-Cohasset assoc., 0-5% slopes	Jp-SQ / EF — Josephine-Sites assoc, rocky, 15-50% slopes	Jp-Mn-Mg / FG — Josephine-Mariposa-Maymen assoc., rocky, 30-75% slopes	Mh-Jp / DF — Mariposa-Josephine assoc., rocky, 9-50% slopes, eroded
		Tt-Io-SR / E — Toomes-Inks-Supan assoc., 15-30% slopes	AK / F — Auburn assoc., rocky, 30-50% slopes	AJ-SC / CD — Auberry-Sierra assoc., 5-15% slopes	Hj-DV-RL / CG — Henneke-Dubakella-Rockland assoc., 5-75% slopes	Ai-CS / CD — Aiken-Cohasset assoc., 5-15% slopes			SQ-Jp-Mh / EF2 — Sites-Josephine-Mariposa assoc., rocky, 15-50% slopes, eroded
		Ah-SL / AB — Ahwahnee-Sierra assoc., 0-15% slopes	AK-Ep / EG2 — Auburn-Exchequer assoc., rocky, 15-75% slopes, eroded	AJ-Ah / F — Auberry-Ahwahnee assoc., rocky, 30-50% slopes	Mg-RL / G — Mayment-Rockland assoc., 50-75% slopes	Ai-CS / E — Aiken-Cohasset assoc., 15-30% slopes			Mh / G — Mariposa assoc., rocky, 50-85% slopes
		Ah-SL / CD2 — Ahwahnee-Sierra assoc., 5-15% slopes, eroded	RL / BD2 — Rescue association, 2-15% slopes, eroded						
		Ah-SL / EF2 — Ahwahnee-Sierra assoc., 15-50% slopes, eroded							
		Rc-CG — Ramona-Chualar-Sandy alluvial land association							
		Ri-cg / AD2 — Redding-Corning assoc., 0-15% slopes, eroded							

Climatic Features

The Sierra Nevada region displays the typical California climatic pattern of wet winters and dry summers[1], except for summer thunderstorms and showers along the higher elevations of the range. Seasonal southward migration of the Pacific high pressure system during the winters allows passage of fronts southeastward across the Sierra. These warm, moist air masses originate over the northern Pacific Ocean. Occasionally, unusually moist storm systems move in directly from the west, producing abnormally large amounts of precipitation in short periods.[2]

As the air masses and frontal systems move eastward, they are greatly modified by the coast range and the Sierra Nevada. As the moist air from the Pacific encounters the mountains, it is forced upward; it cools adiabatically, loses its capacity to hold all of the moisture, and releases large amounts of precipitation along the windward slopes, leaving relatively little moisture for the area east of the Sierra - the desert.

Climatic variations and extremes are typical of mountain areas; the project area is no exception. Temperatures decrease about 16 degrees centigrade (3 degrees F.) per 305 meters (1,000 feet), and average total precipitation increases approximately 25 centimeters (10 inches) per 305 meters (1,000 feet) increase in elevation.

Normally, more than 75 percent of the annual precipitation in winter is during the months from November to March, with 508 to 762 centimeters (200 to 300 inches) of snowfall common in the headwaters of the American River.

During the winter months, a high pressure system occasionally moves into the Great Basin east of the Sierra Nevada, following a frontal passage. A northeast to east flow may develop over the Sierra, with the air warming as it descends the western slopes and canyons into the Sacramento Valley.

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1 The project area is situated in an area classified as a Csa climate according to the Koeppen classification system (Mediterrean subtropical, hot, dry summer).

2 As described by George R. Stewart in Storm.

Precipitation

Air masses which move in from the Pacific Ocean, primarily during the winter months, provide most of the precipitation in the American River basin. Although these storms usually move through the area from the west or northwest, the winds near the ground during periods of precipitation are primarily south to southeasterly, with some local modifications of flows in the lower levels caused by the orientation of ridges and valleys. As the air is lifted by the terrain, precipitation increases to about the 1,524 meter (5,000 foot) level, where the amounts level off, and then decrease slightly with increasing elevation. The American River basin also has several large cross canyons, that cause local rain shadow areas.

Annual precipitation totals in the basin vary from 89 centimeters (35 inches) at Auburn to more than 190 centimeters (75 inches) in the Robertson Flat area (Tables 5 and 6). In general, annual totals increase 23 to 25 centimeters (9 to 10 inches) for each 305 meters (1,000 foot) increase in elevation.[3] South-facing slopes tend to receive the largest effects of the lifting of the moisture laden air, with north-facing slopes tending to be in rain shadows. Average annual precipitation varies greatly from year to year.

Average monthly precipitation reaches its maximum in January, with almost 36 centimeters (14 inches) to be expected at Robertson Flat, and slightly less than 13 centimeters (5 inches) at Folsom. July is the driest month; however, at least a trace of precipitation is to be expected at all stations.

In any given year, monthly winter rainfall may vary considerably from the average. At Blue Canyon, for instance, the average monthly precipitation in January (from records dating from 1931 to 1960) is 29.7 centimeters (11.7 inches), while 1 year in 10 can be expected to have less than 8 centimeters (3.1 inches) in January, and 1 year in 10 may be expected to have 57 centimeters (22.5 inches).

At Auburn, the average annual January rainfall is 18 centimeters (7.1 inches), while one year in ten will have less than 4 centimeters (1.7 inches), and one year in ten may get as much as 35 centimeters (13.8 inches).

Generally, precipitation maxima during July and August are less than 2.54 centimeters (one inch), mostly from infrequent thunderstorms, while amounts of more than 2.54 centimeters (one inch) have been observed primarily in the Blue Canyon-Big Bend area, and along the summit on the eastern edge of the basin.

Limited information is available concerning extreme precipitation conditions. Blue Canyon has had as much as 23.7 centimeters (9.33 inches) in 24 hours (December).

Although no specific information is available from Auburn, an extreme of 13 to 15 centimeters (5 to 6 inches) per day can be expected. Although mid-winter precipitation at Blue Canyon may occur as snow, it usually occurs in the form of rain.

3 Armstrong, F., Stidd, C.K., Moisture-Balance Profile on the Sierra Nevada, Desert Research Institute, University of Nevada, Reno, Nevada.

TABLE 5
PRECIPITATION GRAPH
(Over a 40-Year Period)

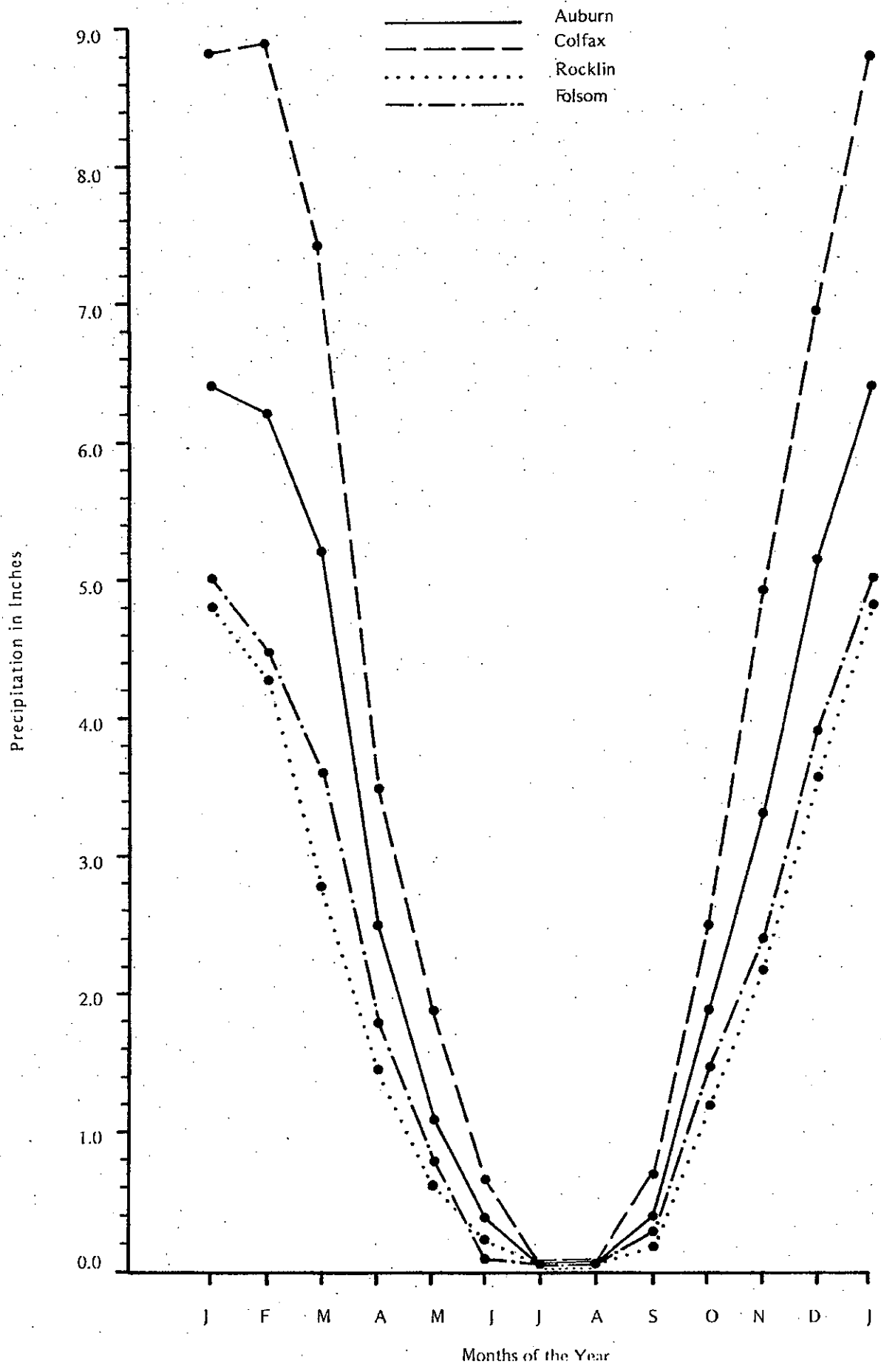

TABLE 6
PRECIPITATION TABLE

Average Monthly Precipitation (10 year average)
Precipitation in Inches

STATION	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL
Auburn	8.58	5.23	4.66	3.36	1.70	.34	.01	.02	.57	1.17	3.01	6.11	34.97
Colfax	11.12	7.47	6.73	4.41	2.56	.54	.02	.05	.63	1.75	4.08	8.79	48.15
Folsom	5.54	2.19	2.92	2.22	.77	.39	.00	.06	.13	.67	2.73	7.19	24.81
Folsom Dam	5.39	5.07	3.94	2.68	1.75	.25	.00	.00	.69	.86	1.42	3.24	24.39
Forest Hill Res.	11.77	8.53	7.29	4.55	2.72	.58	.02	.08	.73	1.95	4.47	9.63	52.32
Georgetown	10.79	7.19	6.79	4.66	2.66	.65	.00	.07	.64	1.80	4.17	8.66	48.03
Georgetown Res.	12.36	8.41	8.13	5.03	2.78	.69	.01	.07	.71	1.95	4.67	10.20	55.01
Rocklin	5.73	3.44	2.73	2.19	.88	.21	.00	.03	.47	.81	1.88	3.87	22.24

Snowfall over the area varies from an average of less than 13 centimeters (five inches) total for the year (only about 2.5 centimeters (1 inch) at Auburn) to more than 508 centimeters (200 inches) at the 1,676-meter (5,500-foot) level. About 35 percent of the total annual precipitation may be expected as snow at 1,524 meters (5,000 feet), with 70 percent as snow at 2,134 meters (7,000 feet).[4] Although annual snowfalls of more than 1,778 meters (700 inches) at the higher elevations have been reported, accumulation of snow on the ground varies high elevation, aspect, and exposure to wind and sun.

Temperature

Temperatures generally decrease with increases in elevation. Only a few widely scattered stations reporting temperature data are available in or immediately adjacent to the project area, but it is apparent that the lines of equal temperature roughly parallel those of precipitation; e.g., they are generally parallel to the terrain contours. In addition to the temperature changes with changes in elevation, variations occur due to differences in aspect and exposure to the wind and sun. The valley floors are usually sheltered from the prevailing winds, thus allowing warm air collection during the day and cold air drainage and ponding during the night. As a result, the valley floors will often experience warmer days and colder nights than expected for a given elevation, particularly in steep canyon areas. Some relief from high afternoon temperatures is afforded by frequent afternoon wind flows up the canyons.

Seasonal variations in maximum and minimum temperatures are shown in Tables 7 and 8. In Auburn, summer high temperatures average 35 degrees Celsius (in the middle 90s F.) with occasional temperatures of more than 37.7 degrees Celsius (100 degrees F.), but nighttime temperatures are cool, normally 16 to 17 degrees Celsius (in the low 60s F.). Winter highs average 12.8 degrees Celsius (in the middle 50s F.), with minimums of -1.1 to -2.2 degrees Celsius (in the middle 30s F.). The mean number of days between periods of freezing temperatures is 275 at Auburn, decreasing to 149 at Blue Canyon. For further freeze data, refer to Table 9.

Winds

High winds are generally associated with frontal conditions, or the presence of high pressure systems in the Great Basin. With frontal conditions (primarily during winter months), the pre-frontal south to southeast flow, often associated with precipitation, may persist for many hours. More than 90 percent of the winds at Auburn that exceed 50 kilometers per hour (31 mph) are from the southeast through south (see Tables 10, 11 and 12). Strong post-frontal west through northwest winds are observed at the crest on the eastern edge of the basin, but the terrain protects most of the American River basin from these strong surface winds.

The surface winds in the area frequently become reoriented by the terrain. At Blue Canyon, the pre-frontal winds are more from the south through southwest.

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4 Land and Water Use in American River, Hydrographic Unit Vol. 1, State of California, Resources Agency, Department of Water Resources, Bulletin No. 94-14, 1965.

The strongest winds at Blue Canyon are from the south-southwest during January and February, but more often, are from the east-northeast and east during the rest of the year. These easterly winds are associated with the high pressure in the Great Basin east of the Sierra Nevada, and are generally warm and dry. Typically, the flow of air will be down the canyons into the Sacramento Valley, with winds at Blue Canyon having reached a maximum of 112 Km/hr. (70 mph). The strong winds may reach down to the canyon floors if the prevailing winds are parallel, but will usually be light and variable in canyons which cross the prevailing flow.

During weak regional wind conditions, surface winds may be thermally induced. In the afternoon, the thermal low inland frequently causes a flow of air from the ocean up the western slope of the Sierra. In the American River basin, this air flow is observed as a flow up the canyons, strongest during the late afternoon hours during spring and summer. At night, this flow dies; a light, cold air drainage from the high ground on the eastern side of the basin develops, and is strongest during the hours near dawn.

TABLE 7
TEMPERATURE TABLE

TEMPERATURES (^{o}F)

	Elev.	Minimum	Ave. Jan.	Ave. July	Maximum
Auburn	1297'	12	45.1	77.2	112
Colfax	2418'	11	43.4	75.1	108
Folsom	218'	15	46.0	79.1	119
Georgetown	2701'	14	42.3	65.4	105
Rocklin	242'	14	46.2	76.8	118

TABLE 8
TEMPERATURE GRAPH

AVERAGE MONTHLY TEMPERATURE

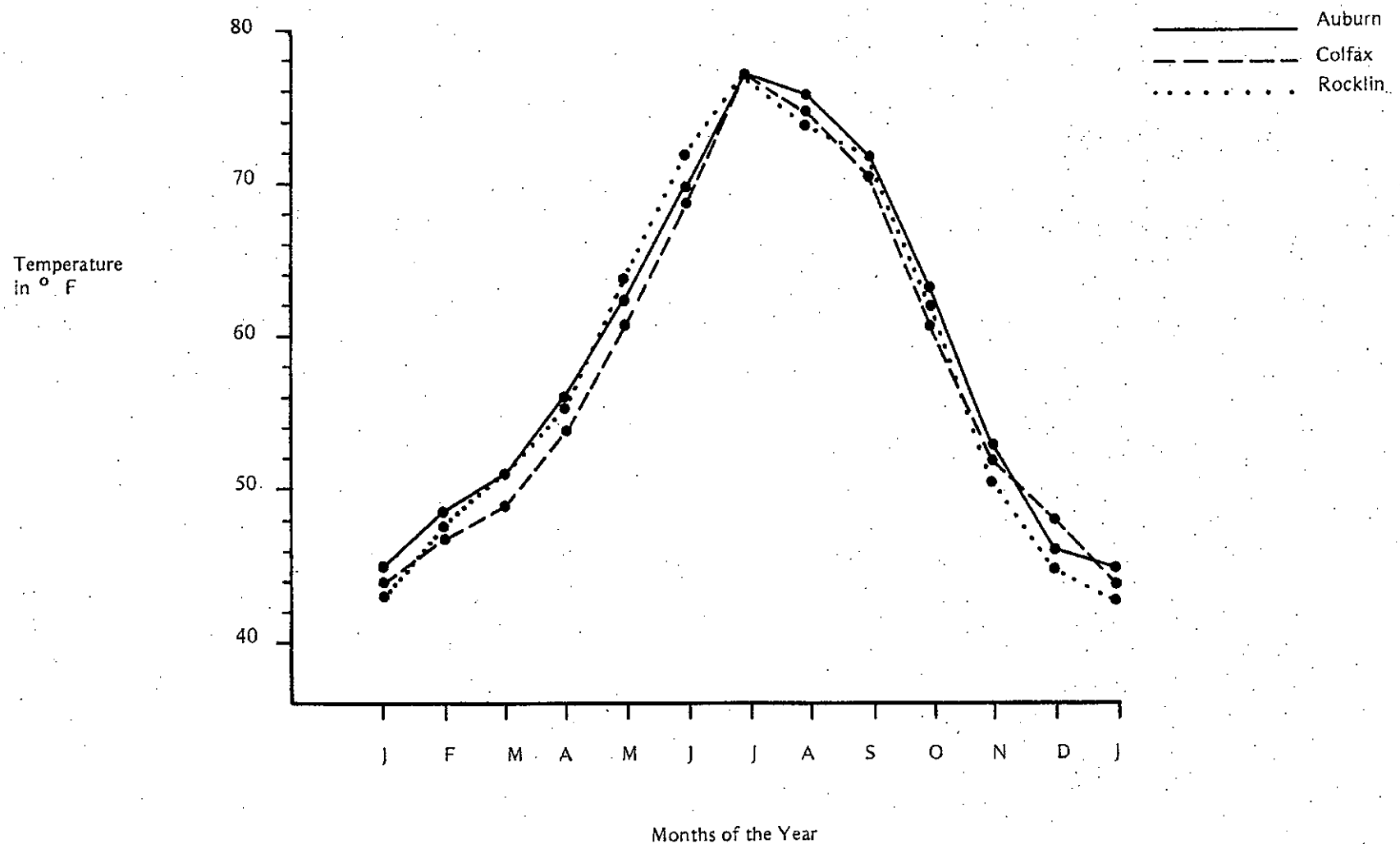


TABLE 9
FREEZE DATA TABLE

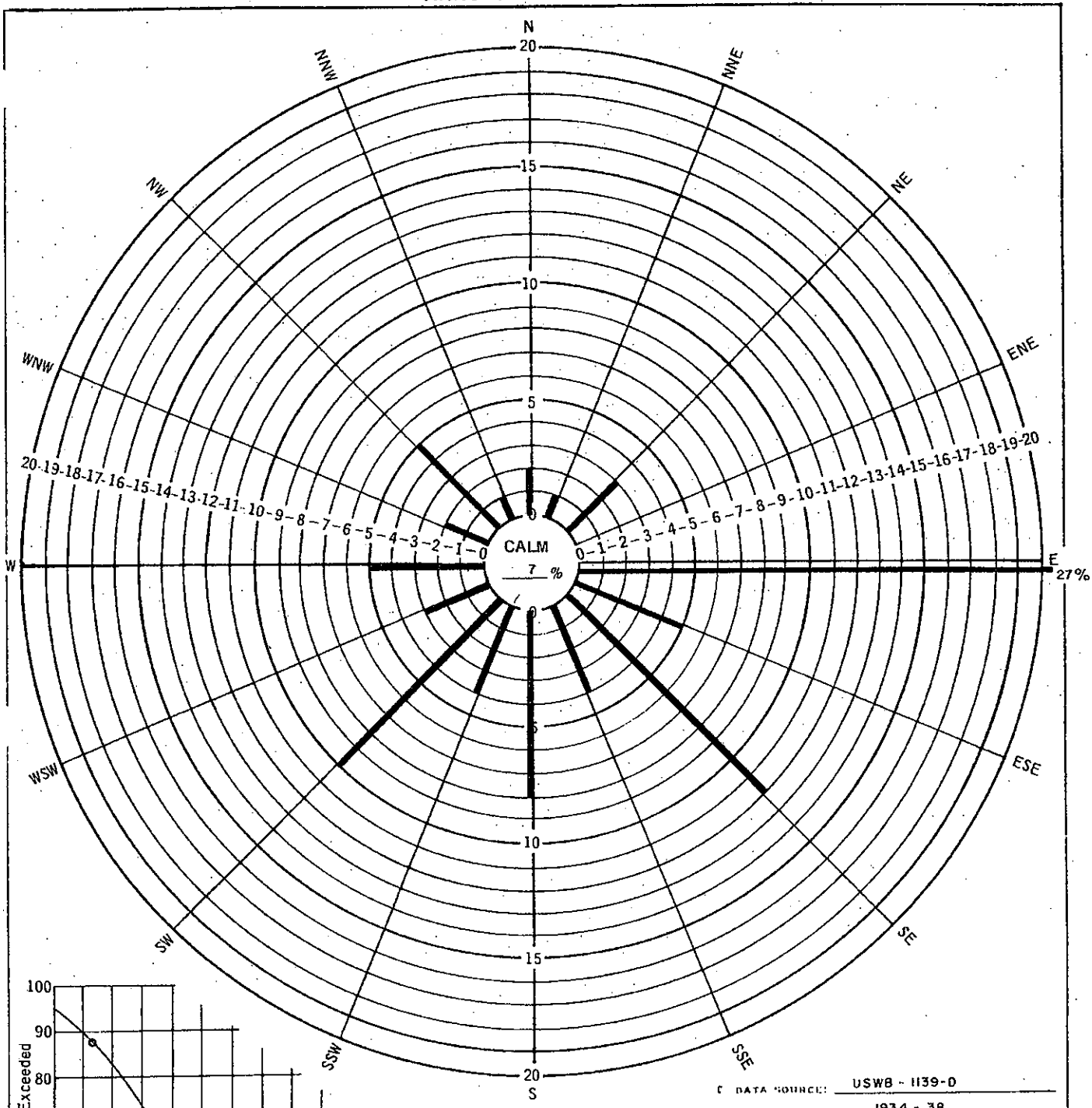
TEMPERATURE EXTREMES AND FREEZE DATA

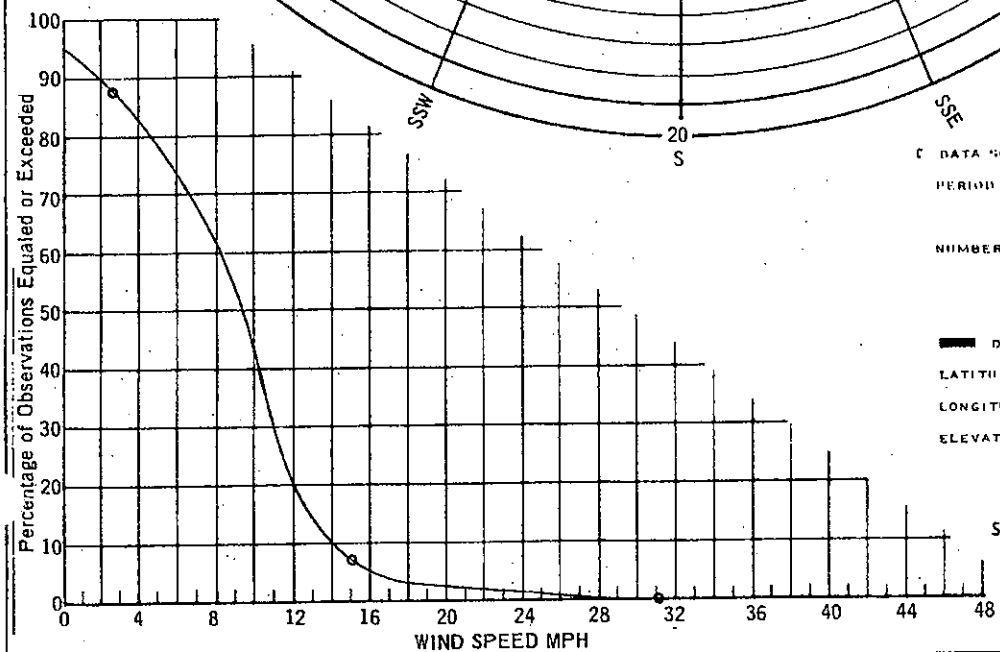
Station	Last Spring Minimum of					First Fall Minimum of					Number of Days between days				
	16°or Below	20°or Below	24°or Below	28°or Below	32°or Below	32°or Below	28°or Below	24°or Below	20°or Below	16°or Below	16°or Below	20°or Below	24°or Below	28°or Below	32°or Below
Auburn	0	0	0	1-31 27°	3-29 32°	11-19 31°	11-29 28°	0	0	0	-	-	--	302	235
Auburn Dam Proj.	0	0	1-30 24°	3-28 28°	5-04 32°	11-09 30°	11-18 28°	0	0	0	-	-	--	235	189
Colfax	0	0	3-27 24°	4-17 27°	5-20 32°	11-11 31°	11-19 27°	11-29 24°	0	0	-	-	247	216	175
Folsom Dam	0	0	0	1-31 26°	3-28 31°	11-18 30°	11-29 26°	0	0	0	-	-	--	302	235
Georgetown Ranger Sta.	0	0	3-26 23°	4-28 28°	5-05 31°	10-28 31°	11-18 26°	12-1 22°	0	0	-	-	250	204	171
Rocklin	0	1-30 20°	1-30 20°	2-22 27°	4-17 32°	10-24 32°	11-19 28°	11-29 24°	0	0	-	-	--	--	--

TABLE 10

State of California — DEPARTMENT OF WATER RESOURCES — The Resources Agency

ANNUAL WIND ROSE





DATA SOURCE: USW8 - 1139-0

PERIOD OF RECORD: 1934 - 38

NUMBER OF OBSERVATIONS: 39,825

DIRECTION BY PERCENT OF TIME

LATITUDE: 38° 56'

LONGITUDE: 121° 04'

ELEVATION: 1,510'

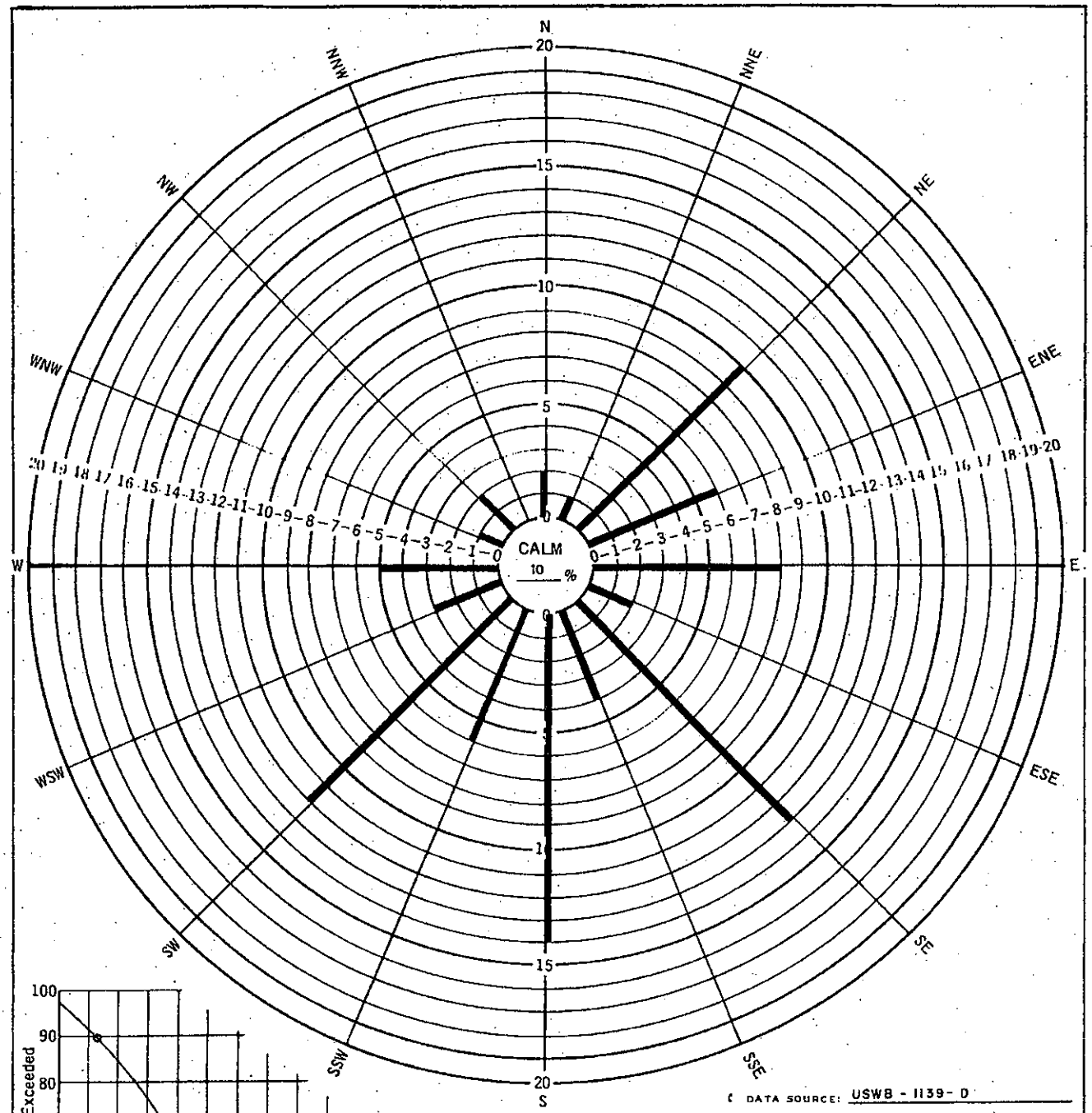
STATION AUBURN A. P.

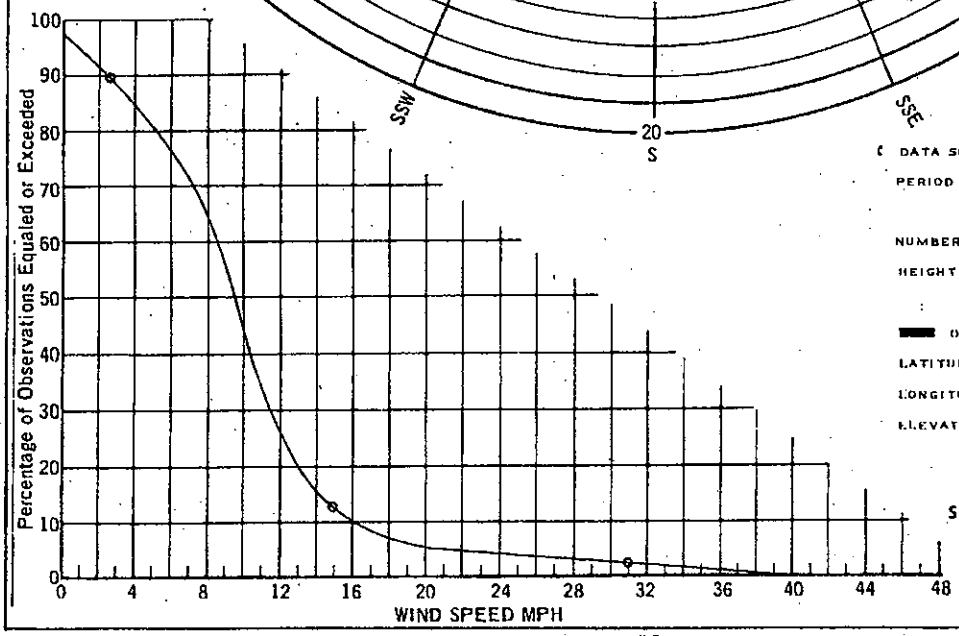
MAX. WIND 61 MPH

TABLE 11

State of California — DEPARTMENT OF WATER RESOURCES — The Resources Agency

ANNUAL WIND ROSE





DATA SOURCE: USWB - 1139- D

PERIOD OF RECORD: 1934 - 38

NUMBER OF OBSERVATIONS: 43,610

HEIGHT ABOVE GROUND (FEET) 55

DIRECTION BY PERCENT OF TIME

LATITUDE: 39° 16'

LONGITUDE: 120° 42'

ELEVATION: 5,280'

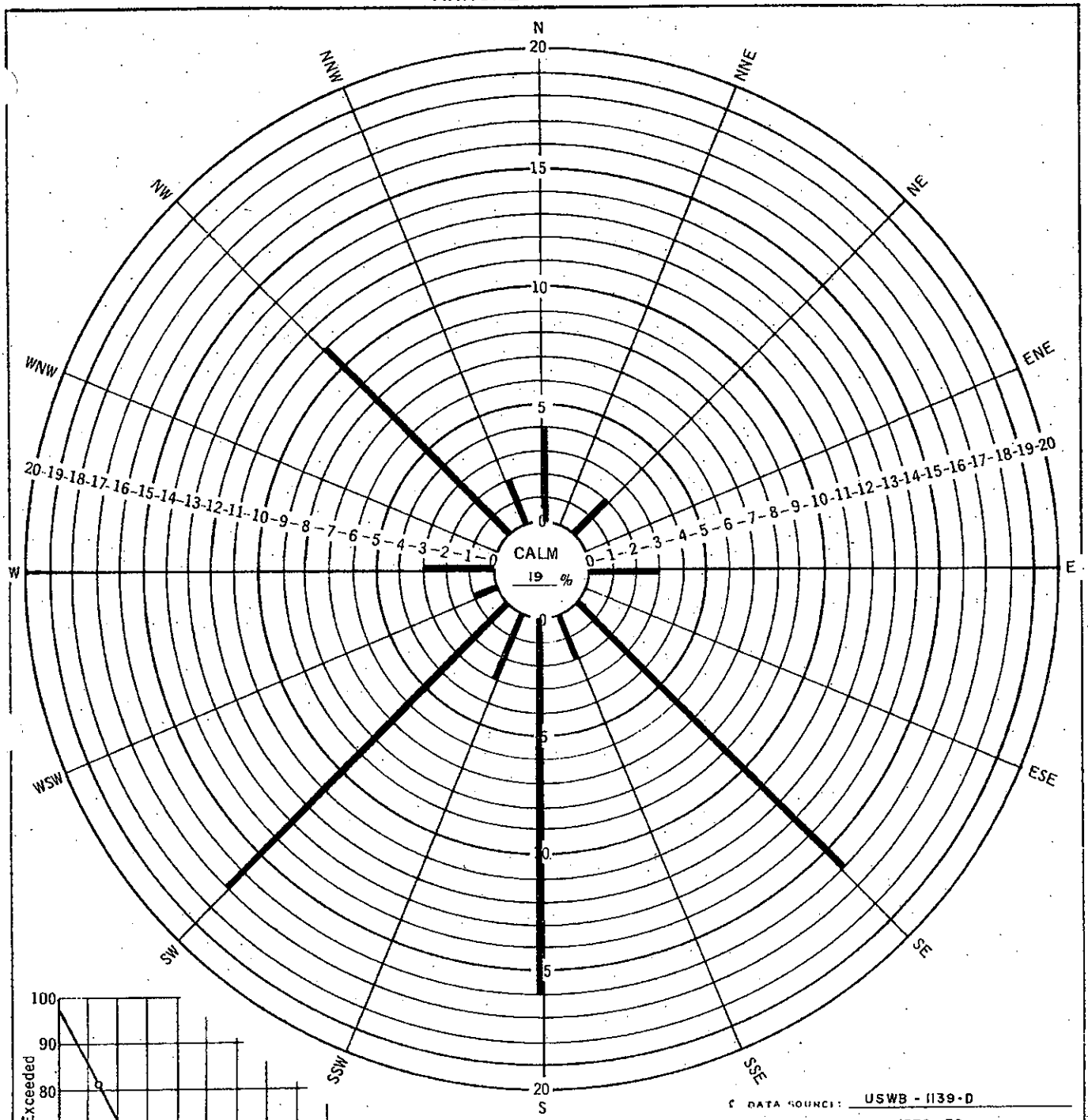
STATION BLUE CANYON

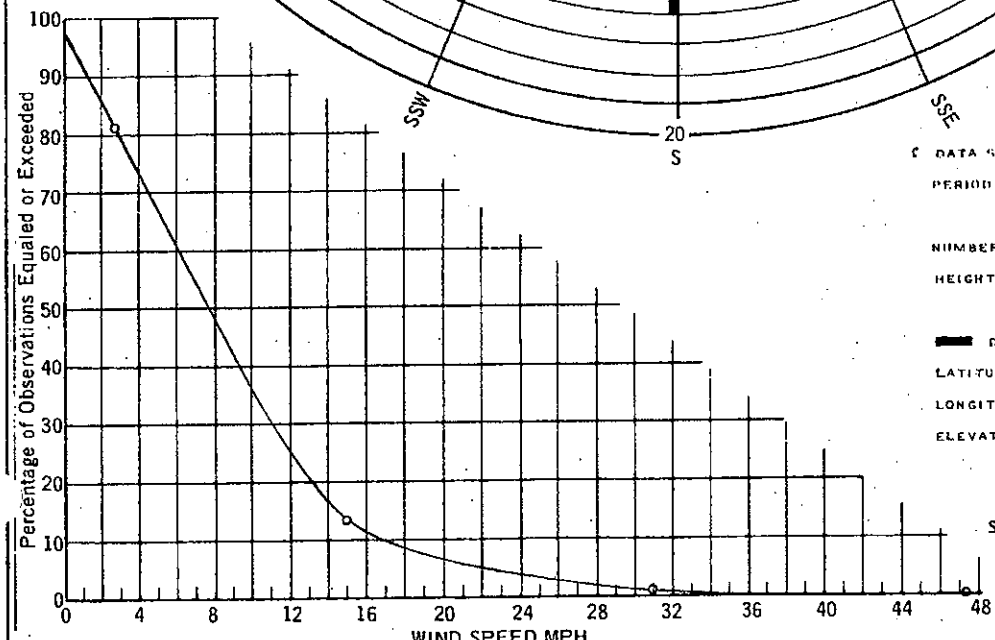
MAX. WIND - 58 MPH

TABLE 12

State of California — DEPARTMENT OF WATER RESOURCES — The Resources Agency

ANNUAL WIND ROSE





DATA SOURCE: USWB - 1139-D

PERIOD OF RECORD: 1930 - 38

NUMBER OF OBSERVATIONS: 78,241

HEIGHT ABOVE GROUND (FEET): 44'

DIRECTION BY PERCENT OF TIME

LATITUDE: 38° 31'

LONGITUDE: 121° 30'

ELEVATION: 17'

STATION SACRAMENTO

Humidity

During the winter and spring months, the relative humidity may be fairly high, typically more than 65 percent as the moist maritime air rises over the Sierras. In the summer and fall, humidities will be moderate to low, usually less than 50 percent. Occasionally, the easterly winds may cause the humidity to drop to less than 10 percent resulting in severe forest fire conditions, particularly in the fall.

Evaporation

Due to low winter temperatures, pan evaporation data are not available for the winter months, except at the lowest elevations. It is estimated in "Placer County Agriculture[5]" that the annual figure in the mountain valleys is about 102 centimeters (40 inches), with lake or reservoir loss 72 to 73 percent of that amount. About 75 to 80 percent of the annual total evaporates during the 6-month period from May to October.

In the Auburn Reservoir Operation Study, it was assumed that Auburn Reservoir evaporation rates will be the same as those already established at Folsom Dam. The study found that loss from evaporation at Auburn would have averaged 7284.3 hectares x .3048 meters deep (18,000 acre-feet) annually, between October 1921 and September 1941.[6] The pan evaporation rates at Folsom average about 172 centimeters (68 inches) annually.[7] These rates appear comparable for the Auburn Reservoir, assuming 4,047 hectares (10,000 acres) maximum surface area, and evaporation loss of approximately 173 centimeters (68 inches) less rainfall of 89 centimeters (35 inches), giving a net loss of 84 centimeters (33 inches); or .84 meters (2.75 feet) times 72 percent yields a net annual loss of 8,013 hectares x .3048 meters deep (19,800 acre feet).

Sunshine and Cloudiness

During the winter months, clouds associated with the passage of the winter storms cover the area much of the time, with about 45 percent of the possible sunshine available. The higher ridges may be in the clouds formed by the air rising over the Sierra during winter storms - especially during the pre-frontal conditions. Fog in the valley floors may occur during cold air drainage conditions, particularly if the moisture content of the air is high. Occasionally, radiation fogs may extend into the Auburn area from the Sacramento Valley, especially in the American River Canyon.

Clouds in mid-summer are mostly associated with thunderstorms on the eastern edge of the American River Basin. Sunshine may be expected 85 to 90 percent of the time, with the most cloudiness occurring at the highest elevations.

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5 U.S. Agricultural Extension Service, 1967.

6 House Document 305, Auburn-Folsom South Unit, Central Valley Project, 1962.

7 Placer County Agriculture, University of California, Agricultural Extension Service, 1967.

Fog conditions in the summer occur in cold ponding areas infrequently. At Auburn, dense fog occurs about 4 percent of the time in the winter, but less than 1 percent of the time the rest of the year. Blue Canyon experiences dense fog almost 14 percent of the time in winter, more than 8 percent in spring, less than 1 percent in summer, and almost 5 percent of the time in the fall. The number of foggy days can be expected to increase with the filling of Auburn Dam.

Nearly all of the thunderstorms occur in the months of June, July, August, and September. During this time, there are approximately 10 days in which one or more thunderstorms can be expected to occur in the Auburn Dam area.

Hydrology

The North Fork American River watershed, in which the Auburn Dam Project is situated, is generally mountainous, with elevations varying from about 152 meters (500 feet) at the base of Auburn Dam to more than 2,438 meters (8,000 feet) at the extreme upper elevations of the basin, the peaks bordering Lake Tahoe. The watershed, extending from the foot to the crest of the Sierra Nevada, is essentially a tilted, fault-block, sloping from east to west (see Plate F). The "Takeline" area of the Auburn area lies in the western portion of the fault block, near where it dips beneath the sediments of the Central Valley. The principal streams in the watershed, the North Fork, the Middle Fork, and Rubicon Rivers, originate along the eastern edge of the basin above the 2,134-meter (7,000-foot) level. The combined drainage area which produces the water supply for Auburn Reservoir exceeds 253,819 hectares (980 square miles) in area.

Principal precipitation input to the American River hydrologic system comes in the form of rainfall or snow. Nearly 50 percent of the annual precipitation received occurs during a 60-day period in the winter. Summers, by contrast, receive less than 1 percent of the annual precipitation, resulting in markedly low natural flow rates in the river system during late summer. Melting snow contributes an estimated 40 percent of the annual runoff in the American River Basin.[8] By April 1, with the average snow line located near the 1,524-meter (5,000-foot) level, the snowpack covers 55 percent of the watershed. At the 1,524-meter (5,000-foot) level, 35 percent of the annual precipitation occurs as snow, while at the 1,778-meter (7,000-foot) level, 75 percent occurs as snow.

Within or immediately adjacent to the watershed, records are available from 46 precipitation gauges, most of which are concentrated at lower elevations. Precipitation levels range from about 90 centimeters (35 inches) at Auburn, elevation 395 meters (1,297 feet), to a maximum of about 191 centimeters (75 inches at Robertson Flat, elevation 1,905 meters (6,250 feet).

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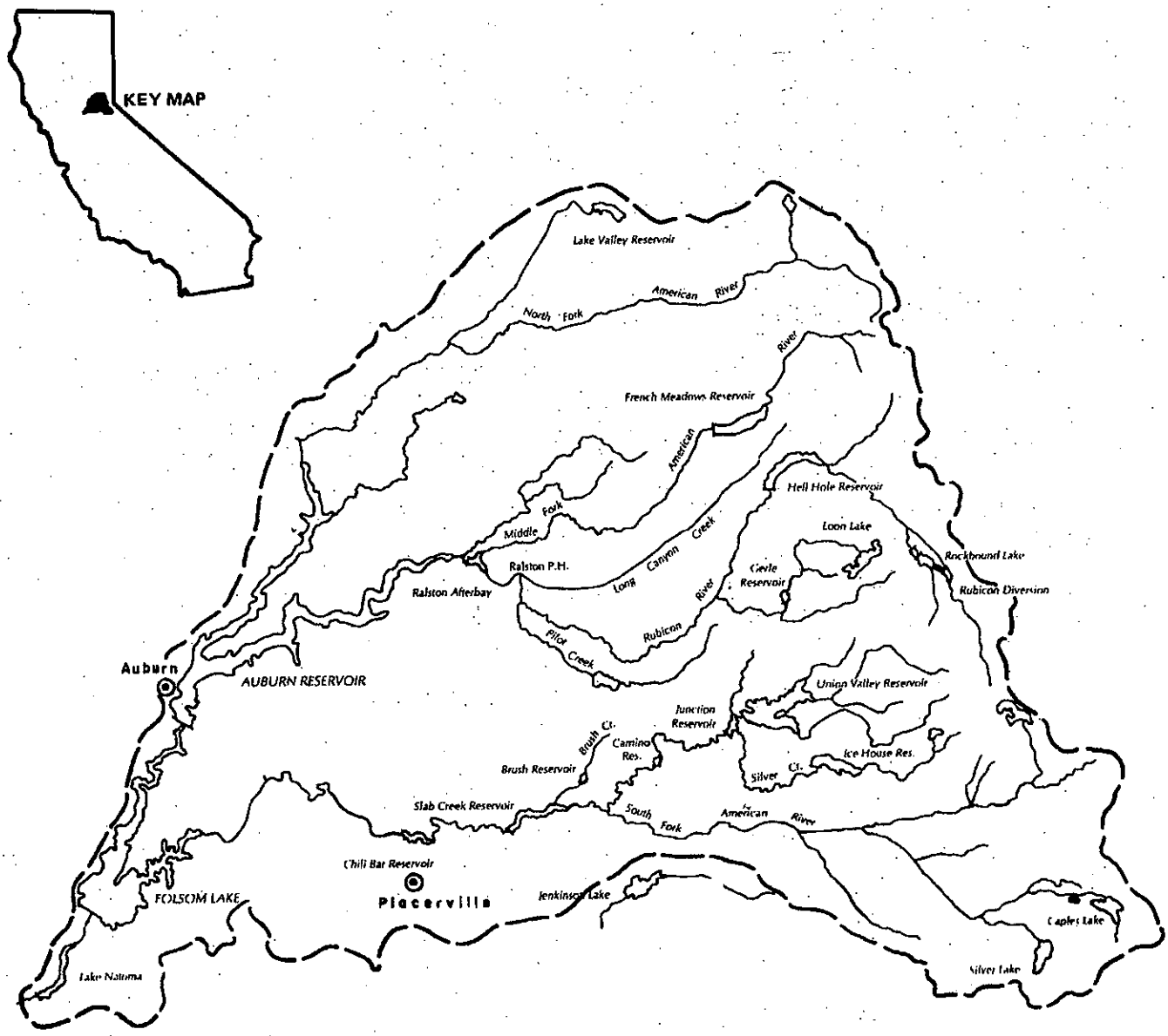
8 Land and Water Use in American River, Hydrographic Unit, Vol. 1, State of California, Resources Agency, Dept. of Water Resources, Bulletin No. 94-14, 1965.

PLATE F – WATERSHED

American River Basin



Surface runoff in the American River Basin is influenced by snowmelt, which delays spring runoff beyond the period of maximum precipitation into late spring and summer. Surface runoff records of 10 years or longer (to 1961) are available for 7 stream gauging stations near the site of Auburn Dam, on the North and Middle Forks of the American River.[9]

Station	Period of Record
1. North Fork American River near Colfax	1911-1941
2. North Fork American River at North Fork Dam	1941-1961
3. North Fork American River, Rattlesnake Bridge	1930-37, 1938-55
4. Middle Fork American River near Auburn	1911-1961
5. Middle Fork American River at French Meadows	1951-1961
6. Rubicon River near Georgetown	1909-14, 1943-61
7. Pilot Creek Near Georgetown	1946-1960

Recorded runoff data at two selected stations in the North Fork and Middle Fork of the American River are presented in Table 13.

Visits to a number of stream gauges in the American River watershed by the Desert Research Institute indicate that most stream gauging stations are located at bedrock; thus, their data are probably representative of total surface and subsurface runoff in the watershed.

Surface water is the principal source of supply in domestic water systems in the area. The Pacific Gas and Electric Company (PG&E) acquired water properties originally developed for mining purposes. The lower portion of the Boardman Canal Water System, supplied from the Yuba and Bear Rivers, was subsequently acquired in 1968 from PG&E by the Placer County Water Agency (PCWA), which was organized in 1957. On the Foresthill Divide, the water supply is from wells and springs. In Colfax, water is supplied directly from the upper Boardman Canal, from PG&E. On the Georgetown Divide, water supplies are obtained from Stumpy Meadows Reservoir, from local streams, and from wells.

Folsom Lake has a flood control pool of 161,874 hectares x .3048 meters deep (400,000 acre-feet), dedicated to providing flood protection to downstream areas. The lake is operated by the Bureau of Reclamation under flood control operating regulations, as prescribed by the U.S. Army Corps of Engineers. Flood protection is provided to the downstream metropolitan area by operation of this flood control space, along with the American River levee system, which has a capacity of 3,255 cubic meters per second (115,000 c.f.s.). However, present-day flood hydrology indicates that the downstream area is not completely protected up to the Standard Project Flood. That part of the metropolitan Sacramento area that would be flooded by occurrence of the Standard Project Flood is estimated to have a population of about 130,000 people.

9 Ibid.

TABLE 13

RECORDED RUNOFF* AT SELECTED STATIONS

	North Fork American River at North Fork Dam	Middle Fork American River near Auburn
Drainage Area (sq. mi.)	343	619
Period of Record	1941-1961	1911-1961
Annual Discharge		
Maximum (af)	1,093,000	1,909,000
Date	1952	1952
Minimum (af)	234,800	229,000
Date	1961	1924
Average (af)	575,600	997,700
Discharge-1960 (af)	374,700	670,400
Percent of Average	65	67
Monthly Discharge		
Maximum (af)	317,400	588,000
Month and year	12/55	5/15
Minimum (af)	1,380	1,380
Month and year	9/44	9/31
Instantaneous Discharge		
Maximum (cfs)	49,100	79,000
Date	12/23/55	12/23/55
Minimum (cfs)	0	20
Date	(a)	9/06/31 9/19/34

*data obtained from USGS Water Supply Papers.

(a) Zero flow several days in August and September 1944.

Numerous reservoirs have been built in the Upper American River Basin. The principal entities involved are the Pacific Gas and Electric Company, the Sacramento Municipal Utility District, the Georgetown Divide Public Utility District, the Placer County Water Agency, and the Bureau of Reclamation. These agencies own and operate dams, reservoirs, canals, and powerplants. Principal water uses are for irrigation and municipal and industrial supplies, for power generation, and for recreation and fish and wildlife purposes. Table 14 lists data concerning the more important existing reservoirs in the American River basin.

Table 14
EXISTING RESERVOIRS IN THE AMERICAN RIVER BASIN

Name	Stream	Owner	Storage Capacity (acre-feet)	Drainage Area (sq. mi.)
Folsom Lake	American River	Bureau of Reclamation	1,010,000	1,875
Lake Natoma	American River	Bureau of Reclamation	8,760	--
Lake Valley		PG&E	8,127	4.7
French Meadows	M.F. American River	Placer County Water Agency	133,700	47.0
Hell Hole	Rubicon River	Placer County Water Agency	208,400	112
Oxbow	M.F. American River	Placer County Water Agency	2,800	429
Rubicon Div.	Rubicon River	SMUD	1,450	27.0
Loon Lake	Gerle Creek	SMUD	76,500	8.0
Stumpy Meadows	Pilot Creek	Georgetown Div. Public Utility District	20,000	15.0
Lake Clementine	N.F. American River	Corps of Engineers	14,600	343.0

Water Quality

Although considerable water quality investigations have been conducted on the lower American River below Folsom Dam, water quality data for the North Fork watershed is sparse. Monthly data are available for 1962, from the gauging station on the Middle Fork of the American River near Auburn. Data for the months of May and September 1962, representing high and low flow conditions, are presented in Table 15.

The Bureau of Reclamation has conducted a monitoring program at several sites above and below the site of Auburn Dam. The program includes monthly sampling for pH, turbidity, and nutrients, at the following sites (see Appendix II):

A. North Fork just above confluence with Middle Fork,
B. Middle Fork just above confluence with North Fork,
C. North Fork just above dam site,
D. Folsom Lake near old confluence of North Fork and South Fork, and
E. Salmon Falls on South Fork,
F. Folsom Lake at Rattlesnake Bar.

In addition, several water quality parameters, including those mentioned above, are measured monthly in the Folsom Lake profiles, approximately 1,000 feet upstream from the dam.

Table 15
WATER QUALITY

Gauging Station Middle Fork American River
Near Auburn

Parameter, units	May (High Flow)	September (Low Flow)
Discharge in cfs	4,120	43
Temperature degree F	53	75
Dissolved oxygen ppm	11.7	9.1
Special conductance (micro-mhos)	28	87
Calcium Ca ppm	3.2	9.9
Magnesium Mg ppm	0.5	2.3
Sodium Na ppm	1.4	3.2
Potassium K ppm	0.3	0.7
Carbonate CO_3 ppm	0	0
Bicarbonate HCO_3 ppm	12	37
Sulfate SO_4 ppm	1.0	6.0
Chloride Cl ppm	2.5	4.4
Nitrate NO_3 ppm	0	0
Flouride F ppm	0	0.1
Baron B ppm	0	0
Silica SiO_2 ppm	9.0	13
Total Dissolved Solids, ppm	24	58
Percent Sodium	27	17
Hardness as $CaCO_3$, ppm	10	34
Turbidity, JTU	8	.5
Coliform (MPN/100ml)	Median for year	6.2
	Maximum for year	620.0
	Minimum for year	0.23

Source: Land and Water Use in American River, Hydrographic Unit, Vol. 1, State of California, Resources Agency, Dept. of Water Resources, Bulletin No. 94-14, 1965.

In the American River System, there are four sets of criteria for water quality and pollution control, as adopted by the Regional Water Quality Control Board. These provide water quality control requirements for the American River downstream from Folsom Dam, for Folsom Lake, and waste discharge requirements for Auburn Dam construction.

The Bureau of Reclamation will abide by these criteria, both during and after construction of Auburn Dam.

A total of 20 waste water sources are located next to, or are tributaries to, the drainage area of the proposed Auburn Dam. Three of the sources are treatment plants located near the damsite on the west side of the American River. They, in turn, discharge their effluent into Auburn Ravine, and ultimately to the Sacramento River. Two sawmills are located at Forest Hill. One is on a tributary to Devil's Canyon and the North Fork of the American River, while the other is in the Middle Fork American River watershed.

A source of sanitary sewage is Todd Valley Trailer Courts, located on the Foresthill Divide at Peachstone Gulch. The Sierra Lakes County Water District is currently the largest source of sanitary sewage in the watershed. It is also at the highest elevation, and is the farthest away from Auburn Dam. This district is now planning to export its waste water to Soda Springs for treatment. Soda Springs is in the Yuba River watershed.

There are no known municipal or industrial sewerage systems completely within the federal take line for Auburn Reservoir.

The subdivision development named Auburn Lake Trails near Cool, next to the reservoir site in El Dorado County, has no sewerage system. Specific waste discharge requirements have not been established by the Regional Water Quality Control Board for this development, but the Interim Basin Plan proposes prohibition of direct discharge into surface waters.

The current means of waste disposal from the Todd Valley Estates, Greenwood Lake Estates, and Sierra Estates subdivisions are by individual sewerage systems, consisting of septic tanks and leach fields.

Existing homes next to the impoundment area also use septic tanks.

Biotic Features

Biotic Provinces and Communities

In discussing the biotic features of the Auburn-Folsom Project Area, it is necessary to consider the biotic provinces and communities present, since they reveal to some extent the relationships of the flora of one area to that of other areas. A biotic province covers a considerable and continuous geographic area, and is characterized by the occurrence of one or more important ecological associations that differ from the associations of adjacent provinces. It is also characterized by peculiarities of vegetation type, ecological climax, flora, fauna, climate, physiography, and soil. Thus, biotic provinces are the result of the interaction of past and present forces - those of the geological history, as well as present climatic and edaphic influences.

The Auburn-Folsom area occupies two provinces, the Californian and the Sierran (Munz and Keck 1949), and the transition zone between them.

The Californian Province lies west of the Sierra Nevada, occupying the Sierra foothills and the valley portions of the project area. There is much endemism within the province, much diversity in climate, but the rains are almost entirely in the winter, with a very long, dry summer season.

The Sierran Province occupies the great montane area, which begins with the Ponderosa Pine Belt, and extends to the summits of the mountains. In its lower and middle elevations (the upper elevations of the project area), there is a large flora element derived from the surrounding lowlands. This is a region of winter snow, and some summer rain.

Each province includes several vegetation types, comprised of one or more plant communities. Within the Auburn-Folsom area, the Californian Province contains three vegetation types; the woodland-savanna type, with the foothill woodland plant community representing it; the chaparral type, with the chaparral plant community; and the grassland type, with the valley grassland plant community. The Sierran Province can be broken down to one vegetation type - the montane coniferous forest, with the Ponderosa pine forest plant community representing it in the project area.

Flora

Climate, topography, aspect, and soil conditions all affect the vegetation that covers the land, and in turn, the animal life. In the valley regions of Lake Natoma and the southern part of Folsom Lake, the vegetation is primarily valley grassland. Around Folsom Lake and in the lower foothills west of Auburn, the vegetation is oak woodland. The chaparral community begins in the vicinity of Auburn, and extends towards the higher elevations near Foresthill, where the Ponderosa pine forest community occurs. Thus, the Auburn-Folsom area represents a large transition between the grassland of the valley, the oak woodland of the foothills, and the coniferous forest of the mountains. The approximate pattern of the four natural communities may be studied in Plate G.

The plant communities represented here are:

BIOTIC PROVINCE	VEGETATION TYPE	PLANT COMMUNITY
Californian	Grassland	Valley Grassland
	Woodland-Savanna	Foothill Woodland
	Chaparral	Chaparral
Sierran	Montane Coniferous Forest	Ponderosa Pine Forest

Each plant community has been described briefly in the following paragraphs. In addition, a plant list arranged by family is included in Appendix IV.

The Valley Grassland Community

The grasses extend up from the valley, through the oaks and pines of the foothill woodlands, past the chaparral, to be shady areas of the Ponderosa pine forest. Many intermittent islands of grasses appear in the midst of chaparral or oak woodland. Grasses are often found among the oaks, as a savanna community with a great variation in the canopy cover.

Although the grasses look like well-adapted native cover, 50 to 90 percent are aliens. Today, a cosmopolitan grass and forb population from Europe, Asia, South Africa, Australia, South America, and the Eastern U.S. dominates the California natives still left in foothill grasslands; nearly 400 foreigners have taken up permanent residence in the state. The most common central foothill grasses are now annuals such as slender wild oat, soft chess, common foxtail and red brome - and they are all aliens. Many native wildflowers hold their own, but new species are still arriving.

DOMINANT PLANTS

Common Name	Scientific Name
Wild oats	Avena spp.
Bromes	Bromus spp.
Foxtails	Hordeum spp.
Needlegrass	Stipa spp.
Bluegrass	Poa
Triple-awned grass	Aristida spp.
Fescue	Festuca spp.

An important feature of the grasslands here is the numerous species of wildflowers displayed most of the year. Among these are:

California buttercup	Ranunculus californicus
Meadow foam	Limnanthes alba
California poppy	Eschscholzia californica
Mustard	Brassica campestris
Curly dock	Rumex crispus
Scarlet pimpernell	Anagallis arvensis
Milkweed	Asclepias spp.
Gilia	Gilia capitata
Baby blue eyes	Nemophila menziesii
Popcorn flower	Plagiobothrys nothofulvus
Monkey flower	Mimulus spp.
Owl clover	Orthocarpus purpurascens
Butter and eggs	O. erianthus
Common horehound	Marrubium vulgare
Lupines	Lupinus spp.
Bur clover	Medicago hispida
Clover	Trifolium spp.
Tidy tips	Layia spp.
Tarweed	Madia spp.; Holocarpa virigata
Goldfields	Baeria chrysostoma
California goldenrod	Solidago californica

Common groundsel	Senecio vulgaris
Yellow star thistle	Centaurea solstitialis
Napa thistle	C. melitensis
Brodiaeas	Brodiaea spp.
Sedges	Carex spp.

The Foothill Woodland Community

The foothill woodlands are composed of broadleaf evergreen and deciduous trees, with some needle-leaf evergreen trees, of which the interior live oak, blue oak, and digger pine are the principal species. Most of the oak woodlands feature a savanna-like growth of spaced trees and grass; however, in some areas, the oaks form a nearly closed canopy (crown densities up to 90 percent). There are some grassy balds that cover ridgetops and slides (crown densities as low as 15 to 20 percent), and in some areas, chaparral shrubs occur beneath and between the oaks, as a subordinate shrub vegetation. Chaparral may predominate on many south-facing slopes, mingling occasionally with the typical trees and shrubs of shores and canyon bottoms; willow, alder, cottonwood and bigleaf maple.

The available moisture varies a great deal, and the varying patterns of foothill woodlands are, in part, a response to water conditions. One of the most effective ways of sharing a meager water supply is by wide spacing - the drier the site, the fewer the trees.

DOMINANT PLANTS

Black oak	Quercus kelloggii
Interior live oak	Q. wislizenii
Canyon live oak	Q. chrysolepis
Digger pine	Pinus sabiniana
Madrone	Arbutus menziesii
California-laurel	Umbellularia californica

OTHER PLANTS

Valley oak	Q. lobata
Coast live oak	Q. agrifolia
Yerba santa	Eriodictyon californicum
Redbud	Cercis occidentalis
California coffeeberry	Rhamnus californica
Buckbrush	Ceanothus cuneatus
Buckeye	Aesculus californica
Coyote bush	Baccharis pilularis
Gooseberry	Ribes spp.

Riparian Woodland

The riparian woodland or streamside woodland community, although not delineated on the vegetation maps, can be found along stream beds, at the edges of small ponds and marsh areas, and in seepage areas and ravines where occasional moisture settles. This is a fragile community, and is easily disturbed.

COMMON PLANTS

Oregon ash	Fraxinus latifolia
California blackberry	Rubus ursinus
California wild rose	Rosa californica
White alder	Alnus rhombifolia
Cottonwood	Populus fremontii
Willow	Salix spp.
Nettles	Urtica holosericea
California wild grape	Vitis californica
Blue elderberry	Sambucus mexicana
Mugwort or wormwort	Artemisia douglasiana

The Chaparral Community

Chaparral is the thick, bushy growth of the dry slopes, ridges, and hillsides, which is known for its short, dense growth aspect, its adaptation to dry conditions, its fire-proneness, and its fire-adapted crown sprouts and sprouting seeds. It is also one of the most effective plant barriers against ground travel by larger animals. Humans and deer alike find mature chaparral, with its profusion of stiff twigs, almost impossible to enter.

The densely aggregated masses of evergreen shrubs of chaparral form one of the most unusual vegetative habitats in the world. Chaparral consists primarily of what can be considered either short trees or tall shrubs, from .6096 to 3.048 meters (2 to 10 feet) in height. The chaparral species may be conveniently divided into two groups - sprouting and nonsprouting forms. Stands of non-sprouting species are killed when heavily burned or chopped, but sprouting species send up new shoots from the crowns or root stalks when burned or cut back. Another distinction between the different forms of chaparral is made according to leaf width - broad-leaved chaparral, as contrasted with slender-leaved chamise. In the lower elevations of the chaparral, both blue oak and digger pine are found throughout. At the higher elevations of the chaparral, dense stands of shrubs can be found on the sides and bottoms of canyons. Within the community are small clearings of grass. The chaparral community begins in the vicinity of Auburn. At the upper limits of the community, the chaparral and Ponderosa pine forest species are commonly intermingled.

Chaparral is tolerant of widely different soil conditions, being found on a large number of soil types. Some chaparral species occupy serpentine soils, which will support few other plant species; however, most of the dense stands of chaparral are found on relatively poor soils, where other plant forms fail to grow. They are usually shallow soils, and are frequently interspersed with stones or concretions, or are so low in organic matter that few grasses or herbs will come in after the brush is burned. Chaparral has long been recognized as a valuable watershed cover that absorbs heavy rains and prevents mudslides, eroding gullies, and floods in the valley below.

DOMINANT PLANTS

Chamise	Adenostoma fasciculatum
Manzanita	Arctostaphylos spp.
California-lilac	Ceanothus spp.

OTHER PLANTS

Digger pine	Pinus sabiniana
Yerba santa	Eriodictyon californicum
Toyon	Heteromeles arbutifolia
Scrub oak	Quercus dumosa
California coffeeberry	Rhamnus californica
Coyote bush	Baccharis pilularis
Willow	Salix spp.
Mountain misery	Chamaebatia foliolosa
Chaparral pea	Pickeringia montana

EXOTIC PLANT

Scotch broom	Cytisus scoparius

Ponderosa Pine Forest Community

The Ponderosa pine forest extends from elevations of about 610 to 1,829 meters (2,000 to 6,000 feet). Most of the Auburn-Folsom area is actually too low for the Ponderosa pine forest to assume the characteristic form it has at elevations above 914 meters (3,000 feet). Around the Folsom area, it occurs in the form of islands in the midst of the surrounding foothill woodlands. In the higher elevations, when the Ponderosa pine and other plants of the Ponderosa pine forest community do occur, they are mixed with plants of the chaparral and foothill woodland communities. These areas are part of a broad marginal band or ecotone between the foothill woodlands and the Ponderosa pine community. Extensive thickets of shrubs grow on the more open and drier slopes. Herbaceous vegetation presents a diversity of species, varying with microclimate. These associations are the result of each species' ability to tolerate physiologically the extremes of environmental factors found within the area. Climate is one prime factor. The extreme summer daytime temperatures and the average precipitation prevailing in the foothill woodland are outside the extremes that species growing in the Ponderosa pine forest can tolerate; therefore, these species do not grow in the lower foothills under natural conditions.

DOMINANT PLANTS

Ponderosa pine	Pinus ponderosa
Incense-cedar	Calocedrus decurrens

OTHER PLANTS

Douglas-fir	Pseudotsuga menziesii
Black oak	Quercus kelloggii
Canyon live oak	Q. chrysolepis
Sugar pine	Pinus lambertiana
Bigleaf maple	Acer macrophyllum
Deerbrush	Ceanothus integerrimus
Mountain misery	Chamaebatia foliolosa
Chinquapin	Castanopsis sempervirens
Currant	Ribes spp.
Cherry	Prunus spp.

Fire Hazard

Fire plays a great role in determining the vegetation patterns of the foothills. It has established a partnership with topography and soil factors, though chance and wind direction often determine the path of a fire. It has been noted that rolling terrains burn less patchily than broken country, and south-facing slopes are more fire-prone than the moister northern exposures. Species and even communities may be shifted about when a vegetation cover is destroyed by fire, and each vegetation type has its own recovery rate. Forests may take hundreds of years to return to their original appearance; brushlands may regain their previous appearance in a decade; annual grasslands recover the following spring.

Rare and Endangered Plant Species

Around the Auburn-Folsom area, there are four rare and endangered plant species (see Table 16 and Plate G):

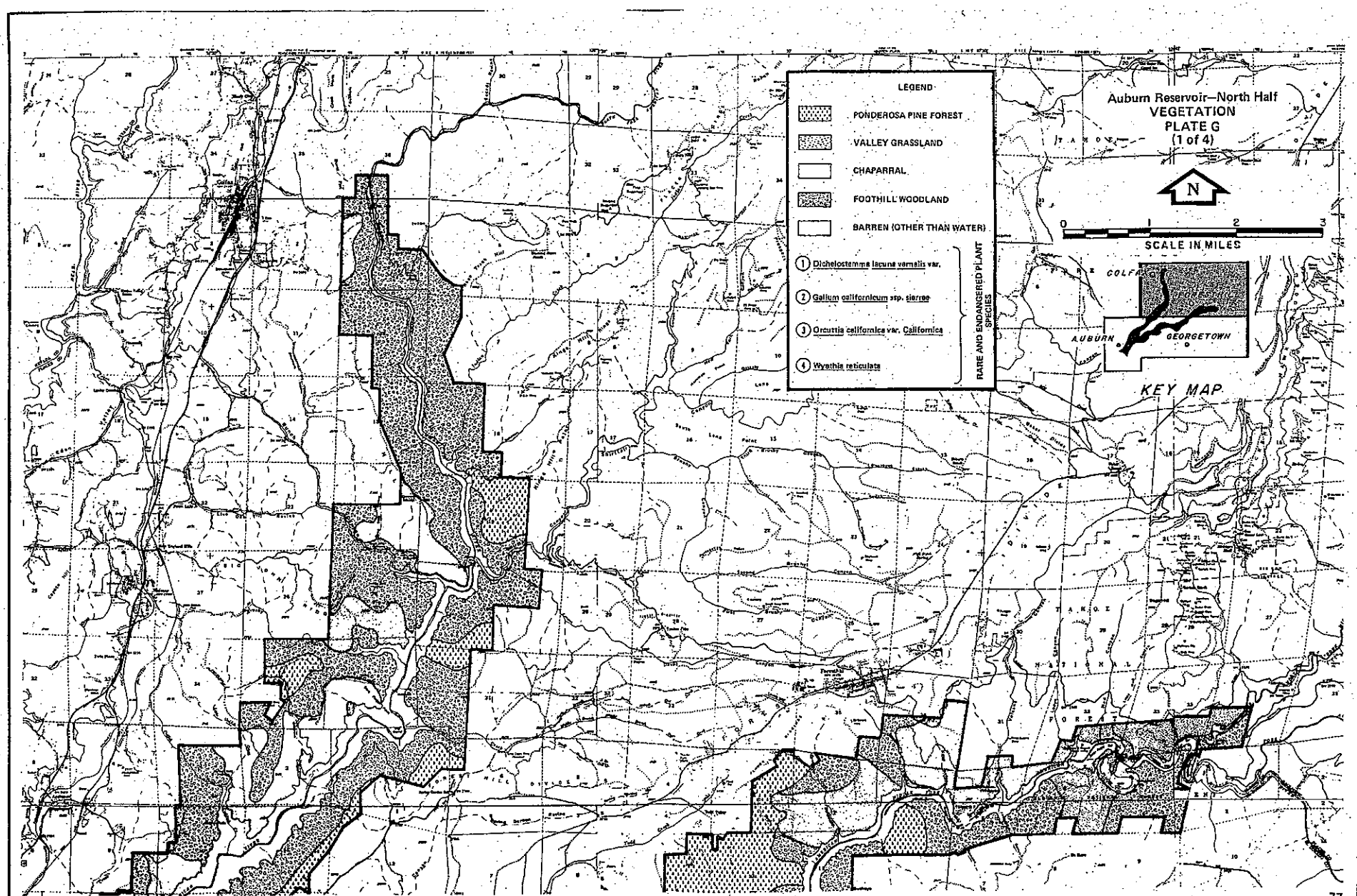
Table 16

RARE AND ENDANGERED PLANT SPECIES

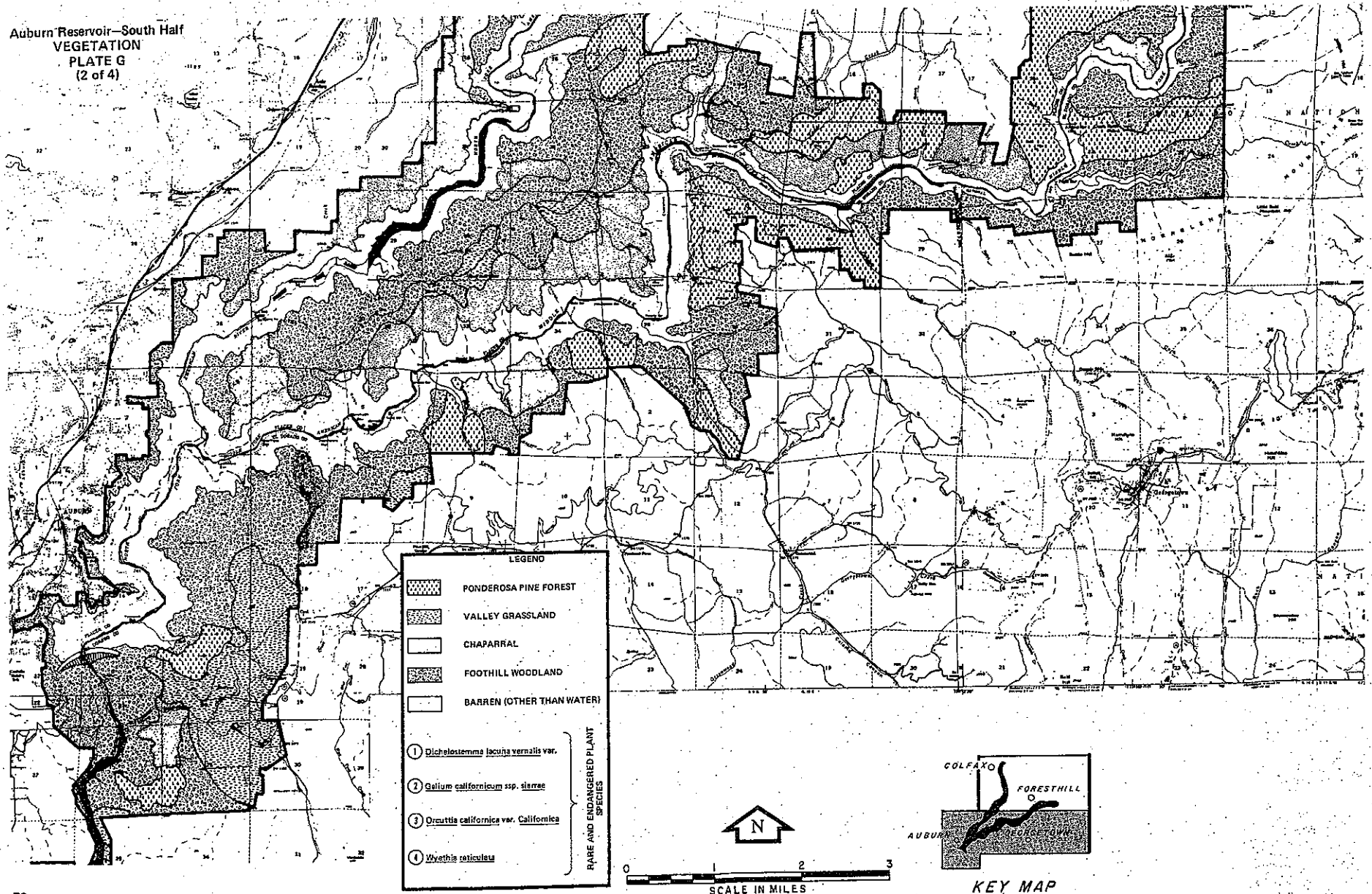
Family	Habitat	Best Time of Year to Sight	Known Location
COMPOSITAE *Wyethia reticulata* Eldorado mule ears	Foothill Woodland and Chaparral 1200'-1500'	May-July	Clarksville Quad
GRAMINEAE *Orcuttia californica* var. *californica* California orcuttia	Grassland	May-June	Folsom Quad
RUBIACEAE *Galium californicum* ssp. *sierrae* Eldorado galium	Foothill Woodland	March-July	Pilot Hill Quad
AMARYLLIDACEAE *Dichelostemma lacuna vernalis* var. Vernal pool brodiaea	Grassland	April-June	Folsom Quad

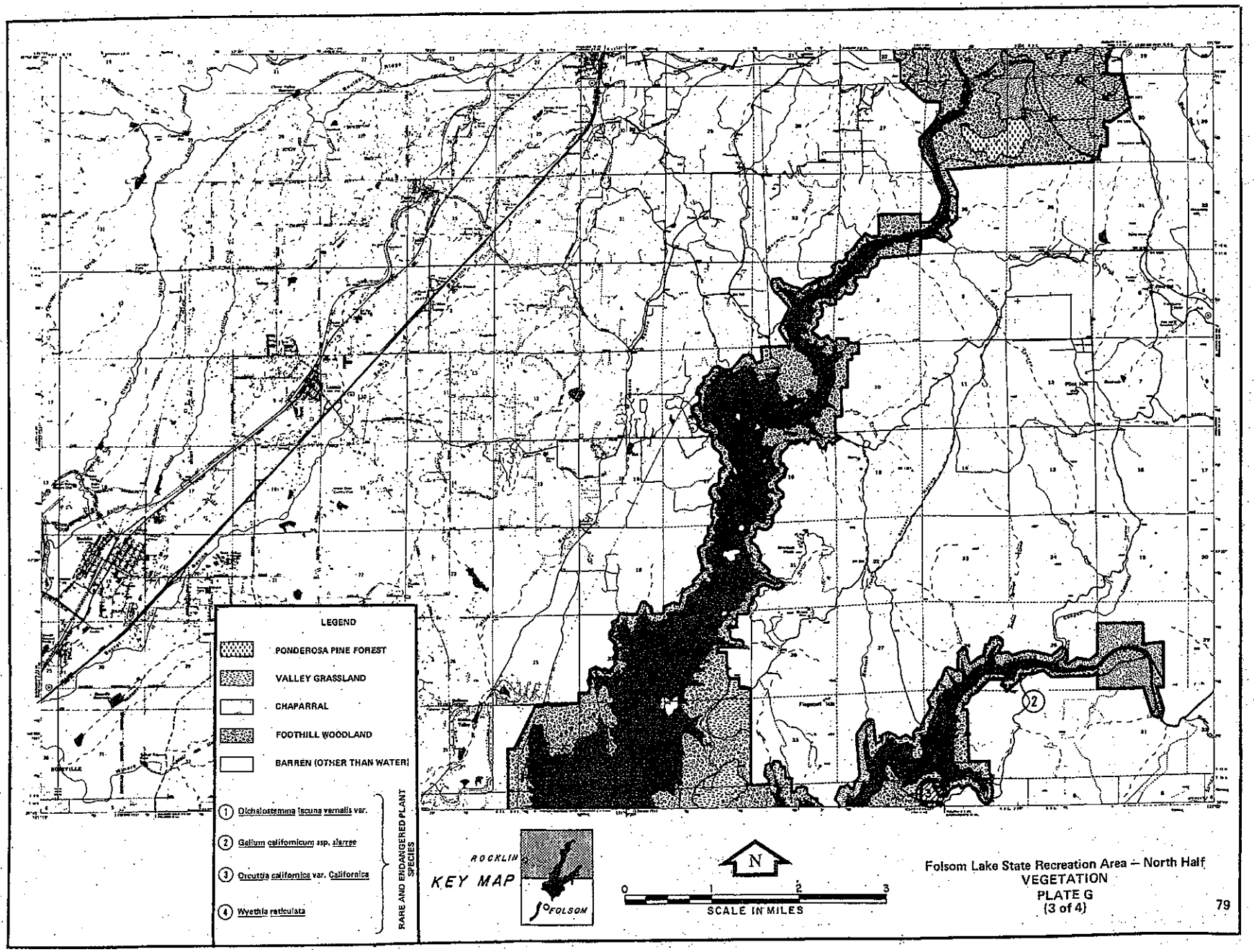
Endemic Plant Species

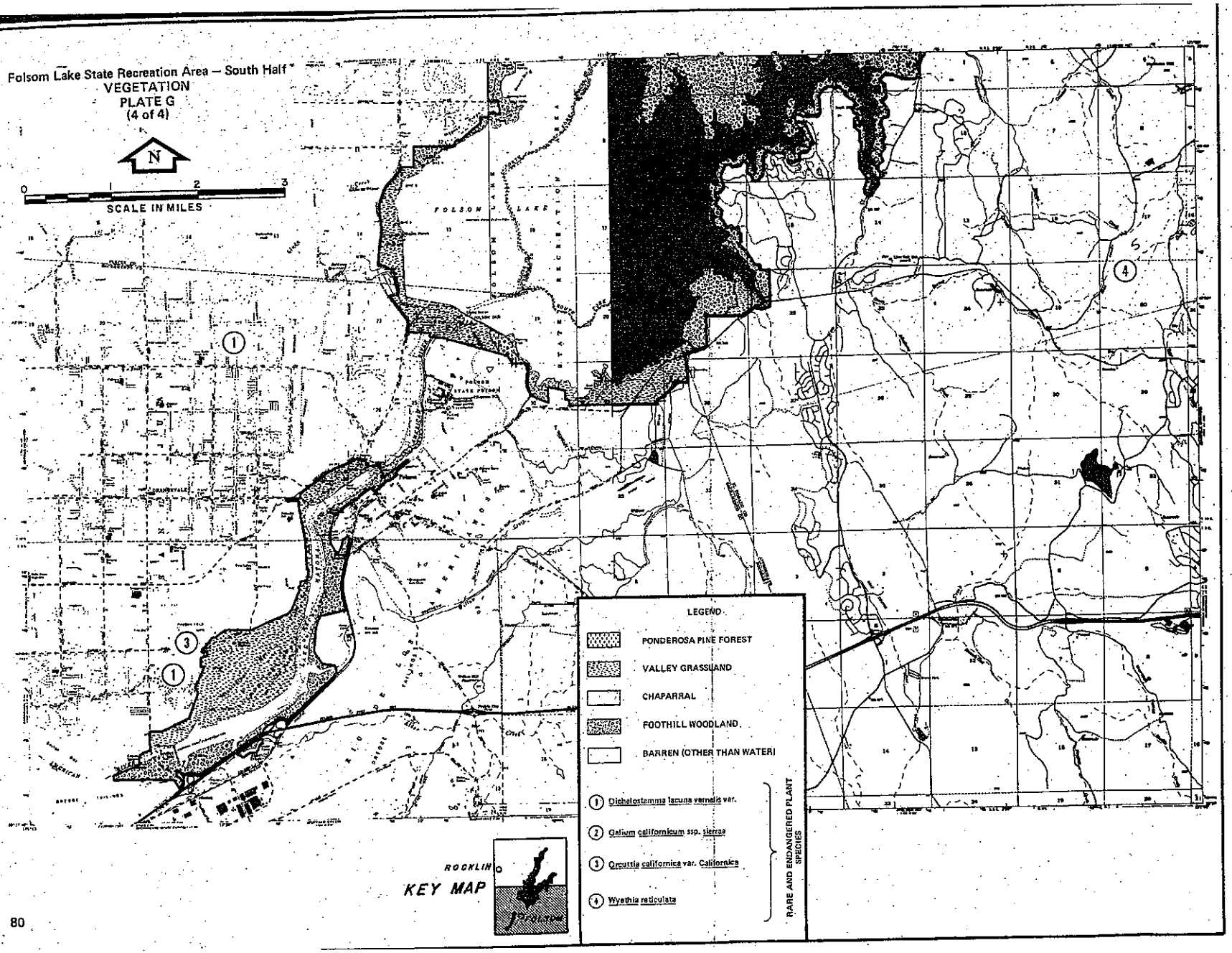
The Auburn-Folsom project area exhibits a high degree of endemism. Many of the endemic species occur only in California, and some only in the vernal-pool situations (see Appendix VI). Further, some of the plants are restricted to limited portions of the pools themselves (see Plate G, Folsom Reservoir Sheets).


LEGEND
PONDEROSA PINE FOREST
VALLEY GRASSLAND
CHAPARRAL
FOOTHILL WOODLAND
BARREN (OTHER THAN WATER)
RARE AND ENDANGERED PLANT SPECIES
1 Dichelostemma lacuna vernalis var.
2 Gallium californicum ssp. sierrae
3 Orcuttia californica var. California
4 Wyethia reticulata
Auburn Reservoir—North Half
VEGETATION
PLATE G
(1 of 4)
N
0 1 2 3
SCALE IN MILES
COLFAX
AUBURN
GEORGETOWN
KEY MAP

Auburn Reservoir—South Half
VEGETATION
PLATE G
(2 of 4)




LEGEND
PONDEROSA PINE FOREST
VALLEY GRASSLAND
CHAPARRAL
FOOTHILL WOODLAND
BARREN (OTHER THAN WATER)
RARE AND ENDANGERED PLANT SPECIES
1 Dichelostemma ixcuna vernalis var.
2 Galium californicum ssp. sierrae
3 Orcuttia californica var. Californica
4 Wyethia reticulata
ROCKLIN
FOLSOM
KEY MAP
N
0 1 2 3
SCALE IN MILES
Folsom Lake State Recreation Area – North Half
VEGETATION
PLATE G
(3 of 4)


Folsom Lake State Recreation Area – South Half
VEGETATION
PLATE G
(4 of 4)
N
0 1 2 3
SCALE IN MILES
FOLSOM LAKE
FOLSOM LAKE STATE RECREATION AREA
LEGEND
PONDEROSA PINE FOREST
VALLEY GRASSLAND
CHAPARRAL
FOOTHILL WOODLAND
BARREN (OTHER THAN WATER)
RARE AND ENDANGERED PLANT SPECIES
1 Dichelostemma lacuna vernalis var.
2 Galium californicum ssp. sierrae
3 Orcuttia californica var. Californica
4 Wyethia reticulata
KEY MAP
ROCKLIN

Eldorado manzanita (Arctostaphylos nissenana) is a rare endemic that is not endangered. It occurs in both El Dorado and Tuolumne Counties, and is considered to be stable, or possibly increasing in numbers.

Also within the project area, the digger pine is found at its lowest elevational ranges, and the knobcone pine is at its easternmost limits.

A few oracle oaks are found around the Folsom area. Some have been found on the trail between Horseshoe Bar and Rattlesnake Bar, and some at Dotons Point. These represent a relatively rare spontaneous hybridization between the black oaks and the white oaks (evergreen forms).

TABLE 17

PALATABILITY OF VEGETATION SPECIES FOR BROWSE

Common Name	General Name	Palatability
Deer brush	Ceanothus integerrimus	Excellent
Buck brush	C. cuneatus	Low Value
	C. lemonii	Excellent
Manzanita	Arctostaphylos spp.	Low Value
Chamise	Adenostoma fasciculatum	Staple
Mountain misery	Chamaebatia foliolosa	Low Value
Interior live oak	Quercus wislizenii	Low Value
Scrub oak	Q. dumosa	Staple
Leather oak	Q. durata	Low Value
Madrone	Arbutus menziesii	Low Value
Toyon	Heteromeles arbutifolia	Low Value
Coffeeberry	Rhamnus californica	Low Value
Yerba santa	Eriodictyon californicum	Staple
Scotch broom*	Cystisus scoparius	Low Value
Willow	Salix spp.	Staple
Chaparral pea	Pickeringia montana	Low Value
Redbud	Cercis occidentalis	Low Value
Buckeye	Aesculus californica	Staple
Gooseberry	Ribes spp.	Low Value
Coyote bush	Baccharis pilularis	Low Value
Laurel	Umbellularia californica	Staple
Bigleaf maple	Acer macrophyllum	Staple
Grasses		
Wild oats	Avena spp.	Staple
Chess	Bromus spp.	Low Value
Foxtail	Hordeum spp.	Low Value
Needlegrass	Stipa spp.	Staple
Blue grass	Poa spp.	Staple
Three-awn	Aristida spp.	Low Value

Fauna

The biotic or plant communities described in the previous pages provide varied and diverse habitats which meet the requirements necessary to maintain a great number of wildlife species.

The complete checklists of fauna (see Appendix V) are based mainly on the ecotypes present, the requirements of the species, and their range boundaries, as listed by various authorities. For these reasons, there may be a few animals listed that do not occur in this specific area. On the other hand, there may be a few animals in the area that do not appear upon the list. This would be especially true for birds, which are highly migratory in nature, and may occur only seasonally or rarely within the area.

Animal Life of the Chaparral Community

Mature chamise is quite meager in wildlife, but the mixed chaparral plant community provides habitat for a surprising number of animals, many with nocturnal habits. These include the coyote, gray fox, and bobcat, who hunt for the rodents and rabbits found there. Reptiles are extremely common in the chaparral community.

Animal life of the Foothill Woodland Community

Most snakes, lizards, and some birds and mammals move freely between the woodland and chaparral communities. The trees, shrubs, and grass of the woodlands offer more than food to the animals who live there. The herbaceous cover provides shade and cover for jackrabbits, quail, and many species of rodents. The oaks serve as observation posts for hawks and other predators, and are a rich food supply for the acorn eaters - scrub jays, mule deer, ground squirrels, and gray squirrels. Predators such as bobcats, coyote, and gray fox often hunt the area for rodents.

Animal life of the Valley Grassland Community

The nutritious grasses provide food for a wide variety of herbivores. The kangaroo rat feeds mainly on the seeds of wild oats and bromes. Meadow mice rely on herbaceous shoots, leaves, and roots, but also eat seeds. Pocket mice and harvest mice are primarily seed eaters, as are many birds. Gophers eat juicy stems, roots, and foliage. As many as 30 gophers may be found on a single grassy acre. Jackrabbits, brush rabbits, and California ground squirrels have a broad menu, and may browse brushy patches, as well as grasslands. The grasslands have certain checks and balances, which prevent too large a population of any species. When the size of the herbivore population begins to threaten its natural food supply, carnivores such as owls, hawks, coyotes, foxes, gopher snakes, and rattlesnakes help control the numbers and re-establish a population balance. In high use areas, these natural controls break down because of human interference. When their numbers are in balance with the capacity of the range, most of the activities of the rodents, gophers, squirrels, etc., are not detrimental. For example, the tunneling of gophers, in effect, loosens and tills the soil.

Animal life of the Ponderosa Pine Forest Community

The marginal zone or ecotone between the foothill woodland and the Ponderosa pine forests represents one of the most favorable combinations for wildlife. The two communities blend in a broad mixture of trees and shrubs, an ample ground cover, and a rich assemblage of animal life.

The oaks are the focal point of a whole subcommunity of animal life. Their acorns and abundant leaf insects attract many birds and tree-climbing mammals. Band-tailed pigeons swallow the acorns whole, and gray squirrels also relish them.

The acorn woodpecker is closely associated with the oaks throughout its entire range. Another resident of the black oak is the pygmy owl. The Sierra Nevada salamander and the California slender salamander can be found using the same runways and old rodent burrows.

The king snake, a good climber, includes amphibians in its diet. It is famous for its ability to kill rattlesnakes, which also roam the wooded grassy areas with rocky outcrops, chaparral, and streamside canyons.

The deeper rock crevices hold ringtails and spotted skunks, which come out at night to forage. Brush heaps conceal western fence lizards, doing their curious pushups off and on during the day, and alligator lizards, climbing through the thickets in search of insects. Gilbert's skink may be found hunting for insects in the surface cover during the late afternoon.

In spring, the slopes abound with many birds: white-throated swifts, red-tailed hawks, canyon wrens (on rocky promontories), black-headed grosbeaks (among open trees near water), Hutton's vireos, and black-throated gray warblers (in the crowns and upper foliage of canyon oak).

Most of the species of fish and wildlife found in the upper sonoran and transition life zones of central California's western foothills are found in the project area.

FISH:

Rainbow Trout: Rainbow trout may be found in both forks of the American River and Lake Clementine. The spawning habits of the rainbow are the key to its survival. The rainbow spawn in the spring, and are rather exacting in requirements of stream gradient, depth, and velocity of water. The eggs are buried in the gravels in the stream bottoms, and the requirements are stringent, as to size of particles.

Brown Trout: The brown trout is very similar in spawning habits to the rainbow except time of year; the brown spawns in the fall.

Smallmouth Bass: The smallmouth can be found in both forks of the American River. The smallmouth spawns in spring, and though not as critical as the trout, prefers certain water temperatures and depths.

The North Fork American River includes Lake Clementine, formed by the North Fork debris dam, which floods 5 miles of this fork. About 5,000 angler-days are spent on Lake Clementine, and about 8,000 angler-days on the river reaches within the Auburn Reservoir site, including .80465 kilometers (1/2 mile) below the damsite.

Game Fish: Folsom Reservoir, located immediately downstream from Auburn damsite, has what is known as a two-story sport fishery. The deep, cold waters support rainbow trout and Kokanee. The upper warm waters support a bass-sunfish-catfish fishery including the following fish:

Smallmouth bass
Largemouth bass
Green sunfish
Red-ear sunfish
White catfish
Brown bullheads

Tagging studies at Folsom Lake by the California Department of Fish and Game have shown a high annual harvest rate for bass and sunfish, and a low annual harvest rate for catfish.

Native Fish: Primarily large minnows.

Sacramento squawfish
Hardhead
Hitch
Roach

Exotic Fish: Introduced as forage for the game fish.

Golden shiner
Fathead minnow

About 200,000 fisherman-days are spent annually on Folsom Reservoir.

The California Department of Fish and Game maintains a catchable trout fishery in Lake Natoma, through annual plants of about 30,000 catchable rainbow trout. The period of stocking is March through July. The Mount Ralston Fish Planting Club also cosponsors a catchable trout stocking program with the County of Sacramento. A limited warm-water fishery also occurs in Lake Natoma, which is similar to that in Folsom Lake. About 75,000 angler-days are spent annually on Lake Natoma.

MAMMALS:

Black-tailed deer (Odocoileus hemionus columbianus): This major big game species in California inhabits lands bordering the North and Middle Fork of the American River. The lower reaches of the Auburn Reservoir area has a resident population of deer. Deer occur in modified numbers on the eastern half of the area, with a relatively dense population occurring along the western half, where orchards and permanent pastures provide an attraction. Population densities run from 10 to 30 deer per square mile. The black-tailed deer requires good natural cover and sufficient browse, which are the two key environmental controls to its existence.

Black Bear (Euarctos americanus): The black bear is normally found in the higher reaches of the coniferous forest, but does have a wide range, and can also be found in the steep canyons of the North and Middle Forks of the American River. It is an omnivorous feeder, eating everything from acorns to rodents. Man has been the prime enemy to the black bear, and its habitat is dictated by man's presence or absence.

Western Gray Squirrels (Sciurus griseus): Gray squirrels are tree squirrels, and their habitat is restricted to areas with tree cover. This ranges from the coniferous in the higher elevations to the oak woodland areas in the valleys and foothills. Gray squirrels seem to adjust well to an association with man; it has a varied diet, and good population in the area. The loss of tree cover is the environmental control which could drive out the gray squirrels.

Bobcat (Lynx rufus): The bobcat population in the area is minor, but its presence is part of the total community. The bobcat prefers the brushy hillsides, with heavy, natural cover and rocky outcroppings. The major part of its diet is made up of rabbits, ground squirrels, mice, pocket gophers, and wood rats. Misconceptions about the predatory habits of the bobcat have led to population reductions in most foothill areas; the increased presence of man has been significant in reducing the population in the area.

Raccoon (Procyon lotor): The raccoon is normally associated with water, but in late summer and fall, it may wander far in search of seasonal foods. It is a meat eater, yet has the most varied diet of any of the furbearers. The density of the raccoon population is probably governed by the availability of seasonal food. The raccoon is very adaptable, but does require cover close to water.

Ringtail (Bassariscus astutus): The ringtail is nocturnal, and subsists mainly on mice and other small rodents. But like the raccoon, it varies its diet with fruits of madrone, cascara, other berries, and sometimes acorns. The ringtail is never found far from water, and an adequate water-cover relationship is important for its continued existence.

Badger (Taxidea taxus): The badger is found from the valley floors to the alpine zone, but prefers the sandy flats where there are numerous burrowing rodents. Badgers subsist on rodents such as gophers and ground squirrels.

Coyote (Canis latrans): The coyote is found throughout the state, and in most life zones. The coyote gets along well with man, and travels over a wide range in its hunt for food. The greater part of its diet is made up of ground squirrels, rabbits, small rodents, insects, and reptiles.

Gray Fox (Urocyon cinereoargenteus): The gray fox prefers dense, brush-covered slopes, from 1,000 to 3,000 feet elevation. It is omnivorous, eats a great many insects and small rodents, and is an excellent hunter.

Opossum (Didelphis marsupialis): The opossum is not native to California. It prefers to live along river bottoms and creeks where the cover is dense. The opossum is nocturnal in habit, and lacks tolerance for cold weather. The latter fact has held its range to below 4,000 feet in the Sierra. It eats a great variety of food, both animal and vegetable.

California Striped Skunk (Mephitis mephitis): This skunk is found throughout all life zones in California, up to about 1828.8 meters (6,000 feet) elevation. It thrives in low mountain and valley farm lands, but never strays far from water, and seems to favor old ditches and stream banks, where the cover is dense. The skunk is omnivorous. In summer, it eats fruits, berries, eggs, all kinds of insects, and small reptiles. In winter, it feeds on hibernating insects, small rodents, and carrion, when it is available.

California Spotted Skunk (Spilogale putoris): Like the striped skunk, the spotted skunk is found throughout all the life zones of California, up to 1,981.2 meters (6,500 feet) elevation. It does not confine itself as closely to water, and prefers rocky, brushy hillsides more than the open floor of the valley.

Weasel (Mustela frenata): The weasel prefers to live and hunt where dense cover produces an abundance of small rodents. It is found through all the life zones, but concentrates in areas that produce an abundance of small rodents. It hunts both day and night, and feeds heavily on mice, rats, rabbits, ground squirrels, birds, and occasionally domestic chickens and rabbits.

BIRDS:

Wood Duck (Aix sponsa): The wood duck nests in the trees along the river banks. Although the population is rather small in the area, the wood duck is one of the most beautiful birds in the United States, and an individual sighting is a thrilling experience. Trees along the river's edge are important for nesting and maintenance of the area's wood duck population.

California Valley Quail (Lophortyx c. californicus): Quail are numerous on the western half of the project area, and occur in scattered flocks throughout the remainder. They are rather easily managed, but do need food, water, and cover. They feed on the ground, but roost in trees or shrubs to escape their enemies. Water and cover are the keys to maintaining quail habitat.

Band-tailed Pigeon (Columba fasciata): The band-tailed pigeon migrates into the area at various times, and are usually numerous in the fall hunting season. The band-tailed pigeon prefers the tree crowns of conifers growing along the steep walls of the river canyons, and is known to nest in the canyons of the project. Poor access to its primary habitats in this area has prevented any appreciable hunting pressure.

Mourning Dove (Zenaidura macroura): The mourning dove is found in every state in the United States, and every county in California. The mourning dove is migratory, and with the first sign of cold weather, it leaves for warmer climates. The dove eats enormous quantities of weed seeds, so it must have water available at least twice each day. It prefers the foothills and valley floors, and is abundant along the river courses and around small ponds and lakes. It has been found nesting in the canyons of the project.

Migratory Birds: No specific counts exist on use of the area by migratory waterfowl; however, it is expected that the following species either now visit or would visit water bodies in the area:

1. Canada goose
2. Green-winged teal
3. Mallard
4. Shoveller
5. Wood duck - (nests along river)
6. Bufflehead
7. Common merganser

AMPHIBIANS:

Not all of the amphibians and reptiles listed below are known to have been collected in the project area, but the canyons and associated lands are included in their ranges.

1. Rough-skinned newt
2. California newt
3. Tiger salamander
4. Long-toed salamander
5. Pacific giant salamander
6. Pacific slender salamander
7. California slender salamander
8. Mount Lyell salamander
9. Eschscholz's salamander

10. Black salamander
11. Arboreal salamander
12. Western toad
13. Southwestern toad
14. Western spadefoot toad
15. Intermountain spadefoot toad
16. Pacific tree-frog
17. Canyon tree-frog
18. Yellow-legged frog
19. Red-legged frog
20. Leopard frog
21. Bullfrog

REPTILES:

1. Pacific pond turtle
2. Western banded gecko
3. Leopard lizard
4. Side-blotched lizard
5. Coast horned lizard
6. Sagebrush lizard
7. Western fence lizard
8. Granite spiny lizard
9. Desert spiny lizard
10. Western skink
11. Gilberts skink
12. Granite night lizard
13. Orange-throated whiptail
14. Western whiptail lizard
15. Foothill alligator lizard
16. Northern alligator lizard
17. California boa
18. Rubber boa
19. Sharp-tailed snake
20. Mountain king snake
21. Common king snake
22. California striped whipsnake
23. Desert striped whipsnake
24. Common whipsnake
25. Western ring-necked snake
26. Racer
27. Western patch-nosed snake
28. Long-nosed snake
29. Glossy snake
30. Western gopher snake
31. Common garter snake
32. Western garter snake
33. Western rattlesnake
34. Speckled rattlesnake
35. Red diamond rattlesnake

INSECTS:

Mosquitos and other waterborne vectors in nuisance numbers are seasonally limited to the time of year when standing water is available. During the balance of the year, they are not plentiful, except in irrigated and seepage areas. Terrestrial vectors associated with ground squirrels and other small furbearers are plentiful, but of no human concern, provided precautions are taken to control them around habitation or intensive recreation areas, such as camping or picnicking sites. Wood ticks are common and seasonally a nuisance in the brush and high grass parts of the basin. Insects and other invertebrates found within the area are as follows:

1. Silverfish
2. Fish mottes
3. Bristletails
4. Springtails
5. Snow fleas
6. Earwigs
7. Straight-winged insects
8. Termites
9. White ants
10. Embiids
11. Psocids
12. Bark lice
13. Book lice
14. Bird lice
15. Biting lice
16. Mayflies
17. Dragonflies
18. Damselflies
19. Dobson flies
20. Mantispids
21. Ant lions
22. Dusty wings
23. Raphidids
24. Lacewings
25. Stoneflies
26. Scorpion flies
27. Caddice flies
28. Caddis flies
29. Case flies
30. Thrips
31. True lice
32. Sucking lice
33. Harvest flies
34. Spittlebugs
35. Treehoppers
36. Leafhoppers
37. Psyllids
38. Aphids

39. Scale insects
40. White flies
41. Beetles
42. Weevils
43. Strepsiterans
44. Twisted-winged insects
45. Stytops
46. Flies
47. Fleas
48. Butterflies
49. Moths
50. Sawflies
51. Horntails
52. Gallflies
53. Ants
54. Wasps
55. Bees
56. Millipedes
57. Thousand-legged worms
58. Galley worms
59. Garden centipedes
60. Centipedes
61. Geophilids
62. Lithobians
63. Scorpions
64. Harvesters
65. Spiders
66. Ticks
67. Mites

RARE AND ENDANGERED SPECIES:

Several species of birds on the Audubon Blue List (a list of birds believed to be declining in numbers in a portion or portions of their range) occur near the project area. Precise locations are often kept secret to preclude harassment by the idly curious, vandals, or unscrupulous hawking enthusiasts.

The appearance of bald and golden eagles in the Folsom Lake area in the winter is of great interest to people of the Sacramento area. The fact that these large birds are disappearing from the foothill areas of California should be reason enough to protect these birds and their habitat.

Also known to visit the project area are the Peregrine falcon and the white-tailed kite, a rare diurnal bird of prey which has for years been persecuted and misunderstood. Predation studies prove they are important cogs in the natural balance.

Although not considered rare or endangered, specimens of a distinctive genus of harvestman (or daddy-longlegs) were found in 1966 at Lime Rock Caves in the Auburn Unit, and in the Alabaster Cave near Folsom Lake State Recreation Area (Briggs 1974).

The filling of the Auburn Reservoir will not inundate the habitat of any rare or endangered wildlife or fish species, insofar as our present information indicates.

Ecological Features

The Auburn-Folsom project area lies within both the lower and the upper sonoran life zones. This includes parts of the Central Valley grassland, and lower reaches of the woodland and chaparral belts. On north and east slopes, the lower extremities of the Ponderosa pine belt can be found.

The wide transition band, from the grassland to the Sierran conifers, dominates the area. (Unnecessary within this band, areas known to be of significant ecological value as natural resources are as follows:)

The North Fork arm of Folsom Lake is important as a resting and feeding area for migratory waterfowl. Buoys exclude watercraft from certain coves in that area from October 1 to April 15 each year to protect wildlife values, while observation by less disturbing means of access is encouraged. In the North Fork area, Anderson Island Natural Preserve provides protection for an important heron rookery with related natural values.

Also of importance as a wildlife refuge is the heron rookery located 200 yards west of Willow Creek Day Use Area on Lake Natoma.

In the Willow Creek Day Use Area, near the pump station, is an area in succession, toward a riparian woodland. The area is of scenic beauty, as well as being an example of near-riparian climax.

The Sweetwater Creek area is also in succession toward a riparian climax. It is unique in that it is one of the few riparian woodland zones on the main lake itself. Such a zone has the added recreational value of being a visual oasis among the more common oak woodland and chaparral areas to be found near the lake.

In the Knickerbocker area, along Knickerbocker Creek in the vicinity of Cool, there is also a prime example of riparian woodland. This area maintains a delicate balance, and is easily disturbed. This area presents a great contrast to the oak savanna and oak woodland surrounding it.

Of unique vegetative and ecological significance are the vernal pools between Orangevale Bluffs and Nimbus Overlook in the Mississippi Bar area. Such pools represent an unusual hybridization climate for plants, which is of scientific value in plant genetics. Many of the plants within these vernal pools are endemic to this specific area (see Plate G. Folsom Reservoir Sheets, Plant Number 2).

Also significant within the band are the knobcone pines, not commonly found on the western slopes of the Sierra Nevada. A pure stand of Ponderosa pine next to Folsom Lake is also of interest. This stand represents the lowest known elevation in the Sierra for this tree species.

The Peninsula heartland is an excellent example of typical oak woodland community, abundant in wildlife, and is isolated from the effects of heavy use.

Before the rapid population increase in the mid 1800s, the Folsom portion of the project area was covered by perennial bunchgrass, winding sloughs and marshes, and riparian communities next to major waterways. The Auburn portion was dominated by fire-dependent plant communities, with forested areas on the less harsh sites. A century of exploitive mining and grazing drastically changed this pristine setting.

Glimpses of these past communities can be found on the harsh, steep slopes of the forks of the American River. Where topography has deterred encroachment by man, natural communities exist. This vegetative mosaic of chamise, manzanita, live oak, digger pine and black oak, interspersed with grassfields and rock outcroppings, represent natural ecological diversity. It is this transition community which is significant to diversified fauna populations.

Geologic diversification comes with the blending of the valley and the western margin of the Sierra.

Climate wields a major force on these plant communities. South and west slopes are dry and fire-prone, and generally have minimal soil development. The protected north and east aspects reflect plant communities of a totally different nature. Here, where moisture exists, temperatures are reduced by an average -7 Celsius (20 degrees F.), and where soil is deeper, conifers, herbs, and forbs, and a more succulent plant community exists. Ponderosa pine and black oak can be found on the north aspects, with an occasional white fir or alder. Digger pine, canyon live oak, manzanita and other vegetation acclimated to harsher sites exist on southern slopes. Climate over eons of time has dominated this vast plant community diversification.

Ecosystems

Introduced Annual Grassland

The foothill and valley grasslands have undergone profound alterations since white men first entered the region. Most of the original native perennial bunchgrasses have been replaced by immigrant annual grasses. Most alien grasses appeared by accident, mixed with crop seed, or caught in the wool or hair of imported livestock. These seeds found a fertile land, with a familiar climate.

Many factors contributed to the displacement of the native grasses. The original grasslands were covered by clumps of perennial bunchgrasses, with bare ground between. These spaces were open to ecological invasion. Years of intense grazing of the preferred bunchgrasses over the less nutritious annual grasses allowed the annuals to gain dominance. Today, the annuals are nearly in complete control, and most perennial grasses such as needlegrass, bluegrass, and melicagrass have retreated under the advance of the annuals. Some pockets of native perennials remain here and there in the foothills.

The Ahwahnee-Sierra soil associations support this ecosystem. The introduced grasslands also occur on Ramona-Chualar-Sandy associations, as well as dredge tailings. These soils are moderately fertile, and are of moderate depth.

The main mammal component of this ecosystem includes jackrabbits, opossum, California mole, California ground squirrel, deer mouse, pocket gopher, and their predators the gray fox, bobcat, and coyote. Common birds include the white-tailed kite, sparrow hawk, California quail, horned lark, and redwing and brewer blackbird. Reptiles and amphibians such as the tiger salamander, California toad, skink, garter snake, and Pacific rattlesnake are characteristic of the introduced grassland ecosystem.

Vernal Pool Ecosystem

Vernal pools are essentially a feature of the lower sonoran life zone. They are best developed at low elevations, seldom occurring above 1,524.0 meters (5,000 feet), although under suitable local conditions, they may extend up to 2,133.6 meters (7,000 feet). They are found mostly in the valley grassland and foothill woodland of the Central Valley, mostly in the older terrace soils on the east side of the valley. Once, they had a much wider distribution. Vernal pools are found where the dense hardpans form, at some depth below the surface. These hardpans are so thick and densely cemented that water from winter rains cannot seep away into the lower soil column; instead, the water accumulates above the hardpan in a "perched" water table. Here, during the winter and spring months, a unique vegetation flourishes. As the rainwater slowly evaporates, concentric rings, each of one particular plant species, bloom and die in a pattern of temporary succession. It begins when the pool is at its largest size, and ends when it is completely dry. There is diversity as well as similarity in species among the vernal pools. The species are not uniformly dispersed throughout the areas of the pools, but tend to be found growing where conditions are best suited for their particular requirements. Thus, there are many aquatics growing in the standing water, and semi-aquatics on the muddy margins; other species may grow best in the vernally moist grassland surrounding the margins of the pools. Still another species will be characteristic of only the dessicated pool beds. Appendix VI is a list of vernal pool species.

Amphibians and reptiles of the vernal pools include the Pacific tree frog, western toad, western spadefoot toad, California tiger salamander, and the southern longtoed salamander. There are also uncountable invertebrate animals that call these pools home: numerous protozoans, from amoebas to rotifers, fairy shrimp, clam shrimp, and a variety of insects. Many birds overwinter or migrate through the area, including godwit, plover, dowitcher, blackbird, and egrets.

Foothill Woodland Ecosystem

The foothill woodland ecosystem covers more area within the project area than any of the other ecosystems (approximately 50 percent). A good indicator of this ecosystem is the digger pine. This ecosystem, like the montane chaparral ecosystem, also varies greatly in species composition. As elevation increases, the ecosystem changes from oak-grassland savanna, with a crown cover of less than 30 percent, to a more dense continuous oak woodland.

This ecosystem is found on moderately shallow soils of the Sites-Josephine-Mariposa, Auburn-Argonaut, and Auburn-Boomer associations. These soils are rather low in fertility, and are found on a variety of slopes.

Characteristic mammals of this ecosystem include spotted and striped skunks, coyote, gray fox, California ground squirrel, gray squirrel, pocket gopher, raccoon, opossum, and most bats. Common birds sighted are the Oregon junco, Brewer blackbird, turkey vulture, western kingbird, scrub jay, acorn woodpecker, and the western bluebird. Amphibians and reptiles within the ecosystem include the western spadefoot toad, California toad, skink, and kingsnake.

Riparian Woodland Ecosystem

The riparian woodland ecosystem has been greatly reduced, due to the alterations of man. This ecosystem is very atypical of California, with the deciduous habitat of all its major tree species, and with the often rampant growth of the vegetation. Not only are the trees so crowded that the foliage of one merges with that of its neighbor without interruption, but the underlayers are also conglomerations of fallen limbs and other debris, berry vines, wild rose snarls, poison-oak patches, rank herbaceous growth, and saplings. Away from the river, the woods usually become more open. Fremont cottonwood, Oregon ash, white alder, and various species of willow are typical species of the riparian woodland vegetation, where the streams course through the foothills.

The riparian woodland ecosystem can be found extensively on both sides of Lake Natoma. Many banks of the lake, which are piled high with the stones from dredge tailings, are being re-invaded by riparian growth. Riparian woodland also occurs along the river and stream beds, at the edges of small ponds and marshy areas, in seepage areas and ravines where occasional moisture settles, and on north-facing slopes, if soils are deep and moist.

The soils of the riparian woodland ecosystem are usually deep, and are associated with alluvial flats. The rich riparian vegetation and its food resources attract many insects - butterflies, wasps, bees, and dayflying moths among them. Such a wealth of insect life, as well as the thick cover, shade, and abundance of water, attract insect feeders, and provide a popular habitat for animals. Many animals of the chaparral and foothill woodland ecosystems frequent the riparian woodland, to evade the heat of day. Characteristic mammals of this ecosystem are the mink, badger, coyote, gray fox, California ground squirrel, beaver, muskrat, and mule deer. In the dense overstory of trees, many birds such as the tree swallow, common crow, common bushtit, robin, American goldfinch, and great blue heron can be seen. Amphibians and reptiles include all salamanders, the California toad, red-legged frog, western pond turtle, skinks, coral-bellied ringneck snake, and garter snake.

Montane Chaparral Ecosystem

This ecosystem occurs primarily on south-facing slopes, where soils are shallow and infertile, and other species fail to grow. It occurs on many steep and rocky hillsides with slopes greater than 25 percent, or where forest or woodland vegetation has been removed. This ecosystem includes the soils of Aiken-Cohasset and Sites-Josephine-Mariposa soil associations, and igneous rockland. Included within the ecosystem is the chaparral plant or biotic community. The montane chaparral ecosystem is composed of at least 40 species of shrubs, occurring in many combinations, with the variations primarily being due to differences in local conditions.

Mammals found within this ecosystem are the ring-tail, long-tailed weasel, gray fox, bobcat, California ground squirrel, black-tailed jackrabbit and the mule deer. Some common amphibians and reptiles include the arbored salamander, fence lizard, horned lizard, kingsnake, garter snake, and the California striped racer. Birds commonly sighted are the red-tailed hawk, California quail, wrentit, rufous-sided and brown towhees, and several species of sparrows.

Western Sierra Ponderosa Pine Forest Ecosystem

The Western Sierra Ponderosa pine forest ecosystem includes all elements of the Ponderosa pine forest plant community or biotic community. This ecosystem comprises only a very small portion of the project area, because it is at the lower limits of its elevational range. It occurs mainly on relatively steep slopes, with moderately deep soils of low fertility. Sites-Josephine-Mariposa and Aiken-Cohasset are common soil associations of the ecosystem.

Mammals of this ecosystem commonly include bats, raccoons, ring-tails, long-tailed weasels, gray foxes, western gray squirrels, deer mice, brush mice, and mule deer. Characteristic birds are the Oregon junco, western tanager, steller jay, band-tailed pigeon, acorn woodpecker, and violet green and tree swallows. The Sierra Nevada and California slender salamanders, skinks, Pacific tree frogs, fence lizards, Pacific rubber snakes, and mountain garter snakes are common amphibians and reptiles of the ecosystem.

CULTURAL RESOURCES

Significant cultural resources exist within the project area. These are described in Volume II, a companion volume to this report on the Auburn-Folsom Project. This is a two-volume unpublished manuscript, entitled, "A Cultural Resource Inventory of Folsom Lake State Recreation Area and the Proposed Auburn Reservoir," which summarizes all prehistoric and historic resources located within the Auburn/Folsom reservoir boundaries before November, 1976. Brief site descriptions, locations, and recommendations based on specific significance factors are included. Special emphasis was placed on the collection and incorporation of archival and oral history, historical photographs, and maps. The addition of this information produced a comprehensive picture of present-day archeological and historical resources within the Auburn/Folsom area.

The cultural resource report, along with its environmental resource companion volume, will be submitted to the Department of Parks and Recreation's Auburn/Folsom Planning Team, so the location of significant archeological/historical and ecological material can be incorporated early into designs for the area's recreational facilities. This coordination will make possible the protection, preservation, and interpretation of valuable cultural and environmental values.

RECREATIONAL RESOURCES

Recreational Facilities

Current public use of the Auburn Reservoir area is restricted by the terrain, a lack of roads to the river, and, except at Lake Clementine, a lack of facilities. Access is limited mainly to river bars and areas in the vicinity where State Highway 49 crosses the American River near the confluence of the Middle and North Forks, and to a few places where secondary or unimproved roads lead down to the river.

The most extensive existing public use area is Lake Clementine, a debris reservoir on the North Fork. The Auburn Area Recreation and Park District operates a small marina, launching ramp, and picnic area on the lake. There are also a number of private boat access cabins on the lake. Current annual recreational use of Lake Clementine is estimated at 55,000 visitor days, which represents capacity, because of the steep terrain surrounding the lake. Other recreational use of the Auburn portion of the project area is estimated at 10,000 visitor days, primarily for hunting and fishing.

Current public use of the rest of the Auburn area is primarily for boating, camping, picnicking, gold panning, swimming, fishing, and hiking, in the undeveloped accessible areas along the stream. Trail bike riding is an important activity along both the North and Middle Forks upstream from their confluence. The Resources Agency of the State of California has rated 9 miles of the North Fork American River above Ponderosa Way as having superior boating quality and outstanding scenic quality. About 7 miles of the Middle Fork above Route 49 have been rated as having good boating quality and excellent scenic quality. A minor amount of horseback riding and organized group use also occurs.

Appreciable numbers of deer hunters have used the Foresthill Divide during October and November, for informal camping and hunting. North of Cool, the canyon slopes and ridges are used during band-tailed pigeon flights for shotgunning. Mountain quail are also hunted in the area.

The Folsom Lake State Recreation Area, with boundary lines on the North Fork contiguous to the Auburn Dam site, has been in operation since 1956. The area is characterized by flat or gently rolling topography. It is the most popular multi-use day and overnight year-round unit in the State Park System.

Such popularity is directly related to its closeness to Sacramento, one of the fastest growing metropolitan areas in the state, and to its ease of access from the San Francisco Bay region.

On major holidays, great numbers of automobiles converge on the access routes to the lakeshore. This major recreation area had a 1976 visitor-day total of 2,241,000. The exceptionally varied recreation facilities at Folsom are located south of Auburn, and also on the American River. Recreation use of this area is summarized in Table 18. Most visitors to the unit use the beach and boat ramps at Granite Bay, the large concession marina at Brown's Ravine, or other facilities located at convenient access points around the lake. Some current recreational uses include:

Water Oriented	Open-Space Oriented	Road Oriented
Swimming	Motorcycling	Driving for pleasure
Fishing	Hiking	Restaurants
Kayaking	Riding (horseback)	Historical sites
Float-Boating	Bird watching	Museums
Gold panning	Hunting	
Camping	Picnicking	
Scuba diving	Camping	
Water skiing	Nature walking	
Canoeing	Spelunking	
	Rock hounding	
	Artifact hunting	
	Off-road driving	
	Rock climbing	

All three reservoirs, Natoma, Folsom, and Auburn, will form a cohesive physical and cultural recreational resource unit linking Sacramento, Placer, and El Dorado Counties, across the "gold country" from the state capital to the Sierra Nevada.

Together, these units form a unique cross section of the physical characteristics and flora and fauna found at the lower edge of the Sierra Nevada Landscape Province, close to where it merges with the Great Valley Landscape Province. These units will also serve to join other recreation areas of local, state, and national significance (i.e., the American River Parkway System, Old Folsom Powerhouse, Marshall Gold Discovery SHP, National/ Western States Pioneer Express Riding Trail, and the proposed National Wild and Scenic Rivers area).

Table 18
RECREATION USE (VISITOR DAYS)[1]
Folsom Lake State Recreation Area

1960	2,404,646
1961	2,202,298
1961-62	2,332,178
1962-63	2,861,264
1963-64	3,593,497
1964-65	3,794,910
1965-66	4,667,199
1966-67	3,946,310
1967-68	3,400,540
1968-69	2,330,465
1969-70	2,540,684
1970-71	2,391,508
1971-72	2,166,871
1972-73	1,944,464
1973-74	1,810,694
1974-75	2,395,201
1975-76	2,241,534

1 Due to the use of different methods of counting and estimating attendance over the years, the decline in attendance shown for 1974-75 and 1975-76 is in question.

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Appendixes

APPENDIX I
Average Emissions of Pollutants - 1973
Sacramento County
Sacramento Valley Air Basin
Tons per Day

August 2, 1976

Stationary Sources	1 ROG	2 TOG	3 PART.	NOX	SO2	CO
Petroleum						
Production						
Refining						
Marketing	10.6	11.1				
Subtotal	10.6	11.1				
Organic solvent users						
Surface Coating	8.2	8.9	0.3			
Dry Cleaning		1.5				
Degreasing	2.0	11.9				
Other						
Subtotal	10.2	22.3	0.3			
Chemical			0.6			
Metallurgical			0.2			
Mineral			5.0			
Food and Ag Processing			2.9			
Pesticides	0.4	0.4				
Wood Processing			1.0			
Combustion of Fuel						
Power Plants						
Other Industrial	0.1	0.3	0.7	2.7	0.4	0.2
Domestic and Commercial	0.3	0.8	0.8	4.2		
Orchard Heaters						
Subtotal	0.4	1.1	1.5	6.9	0.4	0.2
Waste Burning						
Agricultural Debris	2.1	4.1	1.7	0.2		6.6
Forest Management						
Range Improvement	0.2	0.4	0.2			0.6
Dumps						
Conical Burners						
Incinerators						
Other	0.1	0.2	0.3			0.4
Subtotal	2.4	4.7	2.2	0.2		7.6
Miscellaneous Area Sources						
Wild Fires	0.1	0.1	0.1			0.3
Structural Fires	1.0	1.9	1.4	0.1		6.0

Farming Operations			7.3			
Constr. and Demol.			0.8			
Unpaved Roads			1.8			
Utility Equip:Mowers, etc.	1.0	1.1		0.1		7.7
Subtotal	2.0	3.1	11.4	0.2		14.9
Total Stationary	26.1	42.7	25.1	7.3	0.4	21.8
Mobile Sources						
Motor Vehicles - On Road						
Light-Duty Veh. Exh.	34.6	39.0	5.3	43.7	1.3	414
Med.&Heavy-Duty Veh. Exh.	8.7	9.8	0.7	6.7	0.2	86.3
Heavy-Duty Diesel Exh	1.2	1.2	0.9	12.3	1.3	9.3
Motorcycle Exh	1.0	1.1				5.3
Evaporation	22.3	23.1				
Crankcase	1.8	1.9				
Subtotal	69.1	75.7	6.9	62.4	2.8	511
Jet Aircraft	5.2	5.3	0.2	3.0	0.4	8.3
Piston Aircraft	3.9	4.6	0.1	0.1		29.4
Railroads	0.6	0.6	0.1	2.0	0.3	0.7
Ships				0.3	0.1	0.2
The Off-road Veh.	4.6	5.1	0.6	7.0	1.1	33.7
Total Mobile Sources	83.8	91.7	7.9	75.1	4.7	587
TOTAL ALL SOURCES	109.6	133.6	33.0	82.1	5.1	605

1 Reactive Organic Gasses
2 Total Organic Gasses
3 Particulates

Average Emissions of Pollutants - 1973
El Dorado County
Mountain Counties Air Basin
Tons per day

August 2, 1976

Stationary Sources	1 ROG	2 TOG	3 PART.	NOX	SO2	CO
Petroleum						
Production						
Refining						
Marketing	1.3	1.4				
Subtotal	1.3	1.4				
Organic Solvent Users						
Surface Coating	0.5	0.5				
Dry Cleaning		0.2				
Degreasing		0.4				
Other						
Subtotal	0.5	1.1				
Chemical						
Metallurgical						
Mineral			3.9			
Food and Ag Processing						
Pesticides						
Wood Processing						
Combustion of Fuels						
Power Plants						
Other Industrial	0.4	1.1	1.5	0.8	0.2	16.8
Domestic and Commercial	0.2	0.5	0.8	0.7		4.7
Orchard Heaters						
Subtotal	0.6	1.6	2.3	1.5	0.2	21.5
Waste Burning						
Agricultural Debris	0.1	0.1				0.2
Forest Management	1.0	1.9	0.8	0.1		3.1
Range Improvement	0.4	0.8	0.3			1.3
Dumps						
Conical Burners	0.3	0.5	0.7	0.1		4.8
Incinerators						
Other						
Subtotal	1.7	3.3	1.8	0.2		9.4
Miscellaneous Area Sources						
Wild Fires	3.5	6.7	5.1	0.3		22.1
Structural Fires	0.1	0.1	0.1			0.4
Farming Operations			0.1			
Constr. and Demol.						

Unpaved Roads			0.5			
Utility Equip:Mowers, etc.	0.1	0.1				0.6
Subtotal	3.6	6.9	5.8	0.3		23.1
Total Stationary	7.8	14.3	13.8	2.0	0.2	54.0
Mobile Sources						
Motor Vehicles-On Road						
Light-Duty Veh. Exh	2.5	2.8	0.4	3.7	0.1	28.1
Med & Heavy-Duty Veh Exh	1.0	1.1	0.1	0.9		9.2
Heavy-Duty Diesel Exh	0.1	0.1	0.1	1.6	0.2	1.0
Motorcycle Exh	0.1	0.1				0.5
Evaporation	1.9	2.0				
Crankcase	0.2	0.2				
Subtotal	5.7	6.2	0.6	6.1	0.3	38.8
Jet Aircraft						
Piston Aircraft						
Railroads						
Ships						
Other Off-Road Veh	0.4	0.4		0.4	0.1	3.6
Total Mobile Sources	6.1	6.7	0.6	6.6	0.4	42.8
TOTAL ALL SOURCES	13.8	21.0	14.4	8.5	0.6	96.8

1 Reactive Organic Gasses
2 Total Organic Gasses
3 Particulates

Average Emissions of Pollutants - 1973
Placer County
Mountain Counties Air Basin
Tons per Day

August 2, 1976

Stationary Sources	1 ROG	2 TOG	3 PART.	NOX	SO2	Co
Petroleum						
Production						
Refining						
Marketing	1.4	1.5				
Subtotal	1.4	1.5				
Organic Solvent Users						
Surface Coating	0.8	0.9				
Dry Cleaning		0.3				
Degreasing	0.1	0.7				
Other						
Subtotal	0.9	1.9				
Chemical	4.1	4.1				
Metallurgical						
Mineral			5.4			
Food and Ag Processing						
Pesticides						
Wood Processing			0.4			
Combustion of Fuels						
Power Plants						
Other Industrial	0.1	0.2	0.6	0.9		1.5
Domestic and Commercial		0.1	1.2	0.6		7.6
Orchard Heaters						
Subtotal	0.1	0.3	1.8	1.5		9.1
Waste Burning						
Agricultural Debris	0.6	1.1	0.5			1.7
Forest Management	0.3	0.5	0.2			0.9
Range Improvement						
Dumps						
Conical Burners	0.3	0.6	0.4	0.1		6.5
Incinerators	0.1	0.1	0.1			0.1
Other						0.2
Subtotal	1.2	2.3	1.2	0.1		9.4
Miscellaneous Area Sources						
Wild Fires	0.3	0.6	0.5			2.1
Structural Fires	0.1	0.2	0.2			0.3
Farming Operations			1.0			
Constr. and Demol.			0.1			

Unpaved Roads			1.2			
Utility Equip:Mowers, etc.	0.1	0.1				0.8
Subtotal	0.5	0.9	3.0			3.7
Total Stationary	8.3	11.0	11.8	1.6		22.2
Mobil Sources						
Motor Vehicles-on Road						
Light-Duty Veh Exh	4.1	4.6	0.7	6.1	0.2	45.8
Med & Heavy-Duty Veh Exh	1.4	1.6	0.1	1.3		14.1
Heavy-Duty Diesel Exh	0.2	0.2	0.2	2.4	0.2	1.5
Motorcycle Exh	0.2	0.2				0.9
Evaporation	3.1	3.2				
Crankcase	0.3	0.3				
Subtotal	9.2	10.1	1.0	9.8	0.4	62.3
Jet Aircraft						
Piston Aircraft						0.9
Railroads	1.8	1.8	0.4	6.3	1.0	2.2
Ships						
Other Off-Road Veh	1.3	1.4	0.3	3.9	0.6	14.0
Total Mobile Sources	12.3	13.3	1.7	20.0	2.0	79.4
TOTAL ALL SOURCES	20.6	24.3	13.5	21.6	2.0	102.0

1 Reactive Organic Gasses
2 Total Organic Gasses
3 Particulates

APPENDIX II
Water Quality

	Mean	Max	Min	Period of Record
American River at Nimbus Fish Screen				
Water Temperature °C	14.09	21.00	7.00	68-76
Air Temperature °C	22.76	40.00	6.00	68-76
Wind Velocity MPH	1.99	8.00	.00	68-76
Turbulence Hac FIU	3.73	20.00	.30	68-76
Transpiration Inches	41.82	84.00	4.00	68-76
PH su	7.20	8.50	5.70	68-76
Total Alkalinity ($CaCO_3$) Mg/l	21.71	27.00	15.00	68-76
Total Nitrogen Mg/L	.48	3.71	.02	68-74
Total Inorganic N Mg/L	.16	1.10	.02	68-74
Total Organic Carbon Mg/L	2.00	2.00	2.00	70-70
Total Hard ($CaCO_3$)	22.05	31.00	13.00	68-73
Folsom Lake 1000 Ft. Above Dam				
Water Temperature °C	13.68	26.60	5.50	68-76
Air Temperature °C	19.94	35.20	6.00	68-76
Wind Velocity MPH	3.15	20.00	.00	68-76
Turbulence Hac FIU	4.16	130.00	.10	68-76
Transpiration Inches	191.00	384.00	12.00	68-76
PH su	7.13	8.40	5.80	68-76
Total Alkalinity ($CaCO_3$) Mg/l	22.96	31.00	16.00	68-73
Total Nitrogen Mg/L	.35	2.35	.02	68-74
Total Inorganic N Mg/L	.14	1.95	.00	68-74
Total Organic Carbon Mg/L	2.75	5.00	.50	70-70
Total Hard ($CaCO_3$)	23.11	31.00	14.00	68-73
Folsom Lake at Salmon Falls Bridge				
Water Temperature °C	15.37	28.00	4.00	68-76
Air Temperature °C	20.92	38.00	3.00	68-76
Wind Velocity MPH	1.84	10.00	.00	68-76
Turbulence Hac FIU	4.99	63.00	.60	68-76
Transpiration Inches	72.92	180.00	4.00	69-76
PH su	7.37	8.90	6.40	68-76
Total Alkalinity ($CaCO_3$) Mg/l	18.25	33.00	8.00	68-73
Total Nitrogen Mg/L	.43	2.78	.10	68-74
Total Inorganic N Mg/L	.15	.90	.02	68-74
Total Organic Carbon Mg/L	3.00	3.00	3.00	70-70
Total Hard ($CaCO_3$)	18.70	32.00	9.00	68-73

	Mean	Max	Min	Period of Record
North Fork American River Upstream of Middle Fork				
Water Temperature °C	14.20	27.00	6.00	69-76
Air Temperature °C	19.28	37.00	.00	69-76
Wind Velocity MPH	1.13	12.00	.00	69-76
Turbulence Hac FIU	4.23	65.00	.00	69-76
Transpiration Inches	45.63	360.00	3.00	70-76
PH su	7.63	8.80	5.80	69-76
Total Alkalinity ($CaCO_3$) Mg/l	34.16	49.00	16.00	69-73
Total Nitrogen Mg/L	.29	1.15	.11	69-74
Total Inorganic N Mg/L	.07	.52	.02	69-74
Total Organic Carbon Mg/L	1.50	1.50	1.50	70-70
Total Hard ($CaCO_3$)	34.83	57.00	16.00	69-73
Water Temperature °C	12.97	85.00	3.00	68-76
Air Temperature °C	19.49	38.00	2.00	68-76
Wind Velocity MPH	1.47	7.00	.00	68-76
Turbulence Hac FIU	1.98	15.00	.00	68-76
Transpiration Inches	53.44	360.00	4.00	71-76
PH su	7.54	9.20	5.90	68-76
Total Alkalinity ($CaCO_3$) Mg/l	19.93	33.00	13.00	68-73
Total Nitrogen Mg/L	.44	7.67	.11	68-74
Total Inorganic N Mg/L	.09	.90	.02	68-74
Total Organic Carbon Mg/L	2.00	2.00	2.00	70
Total Hard ($CaCO_3$)	21.68	37.00	12.00	68-73

APPENDIX III

SOIL INTERPRETATIONS

The General Soil Map shows the general pattern of dominant soils for the project area. These are soil associations that consist of one or more major soil series as mapping units, with inclusions of other soils in bodies too small to delineate on the scale of the map being used. Several interpretations are made of these general soil map units for broad framework land planning purposes. These interpretations are based on soil characteristics and qualities, and predictions for the major soils within the mapping unit, as to their behavior for specific purposes. All interpretations are based on a soil depth of 5 feet, or less than 5 feet where bedrock is encountered at a lesser depth.

The general soil map units have been interpreted into 6 different groupings. These are shown in "Index of Soil Mapping Units and Interpretive Groupings." All ratings are very general, and are not suited for on-site planning. Other important groupings can be made by predicting the behavior of these soils for other purposes. The soil interpretive groupings that have been made from the General Soil Map are land capability classification, vegetative soil groups, hydrologic soil groups, limitations for septic tank filter fields, soil shrink-swell behavior classes, and soil corrosivity for untreated steel pipe. Definitions and general criteria are discussed in the following pages.

Land Capability Classification

The Land Capability Classification is a national system. It is an interpretive grouping, made primarily for agricultural purposes. The classification begins with individual soils, and groups them into different categories, primarily on their ability to produce common cultivated crops and pasture plants without soil deterioration over a long period of time.

The Land Capability Classification provides three different levels of information:

1. Land Capability Classes. The broadest category places all soils into 8 classes, arranged from I through VIII, with limitations in soil use and risks of soil damage increasing from I to VIII.

2. Land Capability Subclasses. These are subdivisions of the capacity class to show the dominant kind of limitation or hazard. Four subclasses are used: e (erosion), w (wetness or drainage), s (soil), and c (climate).

3. Land Capability Units. These are group classes and subclasses, according to a secondary hazard or limitation, or to supplement the major limitations as defined in terms of a significant soil property. The capability unit is designated by an Arabic number. The unit provides the most specific information in Land Capability Classification.

Legend

The Land Capability Classification is indicated by means of a symbol such as IIIe5. Such a symbol is used to designate a particular kind of land, which is known as a Land Capability Unit.

The first part of the symbol is always a Roman numeral, and indicates the class. The classes from I to VIII express the increasing degree of hazard or limitation. The second part of the symbol is a lowercase letter, and indicates the subclass. The subclass expresses the kind of major limitation or hazard. The third part of the symbol is an Arabic numeral, and indicates the unit. The unit expresses a secondary limitation or hazard or it supplements the subclass.

Example: IIIe5 is Land Capability Unit symbol
III is Class symbol
e is Subclass symbol
5 is Unit symbol

Classes

Land Suited for Cultivation and Other Uses

Class I - Soils in Class I have few limitations that restrict their use.

Class II - Soils in Class II have some limitations that reduce the choice of plants, or require conservation practices.

Class III - Soils in Class III have severe limitations that reduce the choice of plants, or require special conservation practices or both.

Class IV - Soils in Class IV have very severe limitations that restrict the choice of plants, require very careful management, or both.

Land Generally Not Suited for Cultivation

Class V - Soils in Class V have little or no erosion hazard, but have other limitations that are impractical to remove.

Subclasses

(The Major Problem)

e - Erosion

w - Wetness

s - Soil limitation

c - Climatic limitation

Units

(The Secondary Problem)

IIIe5

0 - Coarse underlying material

1 - Erosion hazard

2 - Drainage or overflow

3 - Slowly permeable subsoils

4 - Coarse textures

Class VI - Soils in Class VI have severe limitations that make them generally unsuited for cultivation.

Class VII - Soils in Class VII have very severe limitations that make them unsuited for cultivation.

Class VIII - Soils and land forms in Class VIII have limitations that preclude their use for commercial plant production, and restrict their use to recreation, wildlife, water supply, or aesthetic purposes.

5 - Fine textures

6 - Salinity or alkali

7 - Stony or rocky

8 - Cemented layers or bedrock

9 - Low fertility or toxic elements

10 - Organic soils

In assigning soils to capability grouping, certain basic assumptions must be made. These assumptions are required to group soils consistently, and to use the groupings properly. The assumptions used in classifying these soils are:

1. Classification is based on the effects of combinations of climate and permanent soil characteristics, on risks of soil damage, limitations in use, productive capacity, and soil management requirements.

2. Irrigation water is assumed available for all lands in the county.

3. Soils considered feasible for improvement by drainage, irrigation, removing salts and/or exchangeable sodium, or by protecting from overflow are classified according to their continuing limitations in use, or the risk of soil damage, or both, after the improvements have been installed.

4. The capability classification of the soils in an area may be changed, when major reclamation projects are installed.

5. Capability groupings may be changed, as new information about the soils becomes available.

6. A moderately high level of management is assumed - one that is practical and within the ability of most farmers and ranchers.

Description of Land Capability Units

The soils have been grouped into soil associations, and each soil in the associations has been classified into a land capability unit. The capability unit condenses and simplifies soil information for agricultural planning purposes. A brief description of the capability units follows:

Capability Class I - Very deep, well-drained, moderately coarse to medium-textured, nearly level soils.

This unit consists of very deep, well-drained, moderately rapid to moderately permeable soils, with no physical features limiting root and water penetration. Stratification may exist. Available moisture is 8.0 inches or more for a 5-foot depth. Surface textures are fine sandy loam. Soil reaction ranges from pH 6.1 to 7.3. All soils occur on a slope of less than 2 percent. All locally adapted crops can be grown on these soils.

Capability Unit IIs3 - Very deep, well-drained, moderately coarse-textured nearly level soils, with moderately slow permeability substrata.

These are very deep soils, with moderately slowly permeable subsoils. The surface textures are sandy loam to fine sandy loams. The subsoils are sandy clay loams. The substrata are mostly moderately coarse-textured alluvium that is partially cemented, and moderately slowly permeable. Total available water-holding capacity is about 7.5 to 9.5 inches for a 5-foot profile. Soil reaction ranges from 5.6 to 6.5 in the surface and 6.1 to 7.3 in the subsoil. Slopes are less than 2 percent. These soils are suitable for most locally grown crops, but care is required in management, particularly in irrigation, because of the slowly permeable substrata.

Capability Unit IIs4 - Very deep, well-drained, gravelly, medium-textured, nearly level soils.

Soils of this unit occur on slopes of 0 to 2 percent. The surface soils have gravelly loam textures. The subsoils have gravelly heavy clay loam to light clay textures, with slow to moderately slow permeabilities. The available water-holding capacity is about 6 to 8 inches. Soil reaction is about medium acid (pH 5.6 to 6.0) in the surface, and neutral (pH 6.6 to 7.3) in the subsoil.

There is no erosion hazard. The gravels limit some tillage operations. Except for root crops, these soils can grow most locally adapted crops.

Capability Unit IIw2 - Very deep, somewhat poorly to poorly drained, moderately coarse to moderately fine-textured, nearly level soils.

Soils in this unit have a water table within 3 to 5 feet of the surface during some years, or are artificially drained. Otherwise, the profiles are similar to those of Class I. Stratification is common throughout the 5-foot profile. Textures range from fine sandy loam to silty clay loam. Available water-holding capacity, based on the drained profile, exceeds 6.0 inches for 5 feet. Soil reaction ranges from pH 6.1 to 8.4. Slopes are usually less than 1 percent. Most areas are protected by levees, but some may be subject to infrequent flooding. All but deep-rooted crops are well adapted to these soils.

Capability Unit IIIw2 - Very deep, poorly to very poorly drained, moderately fine-textured soils, on nearly level topography.

These soils occur in basin and delta areas, protected from overflow by levees. They are artificially drained, but have a high water table. The soils have silty clay loam-textured surface soils, some high in organic matter. Subsoils vary from silty clay loams to stratified layers of mineral soil and muck.

Permeability varies from moderately rapid to moderately slow. Soil reaction varies from strongly acid (pH 5.1 to 5.5) to slightly acid (pH 6.1 to 6.5) in the surface soils, and strongly acid (pH 5.1 to 5.5) to medium acid (pH 5.6 to 6.0) in the subsoils.

These soils, because of their permanent high water tables, are best suited to shallow-rooted crops.

Capability Unit IIIw3 - Deep, poorly drained soils of moderately slow permeability, on nearly level slopes.

Soils of this unit are deep, and have moderately slowly permeable subsoils over slowly permeable substrata. The soils consist of loam to silty clay loam surface textures, and sandy clay loam to silty clay loam subsoils. These are underlain by slowly permeable clays, or somewhat indurated clay loams. Soil reaction varies from slightly acid (pH 6.1 to 6.5) to neutral (pH 6.6 to 7.3) in the surface, and neutral to moderately alkaline (pH 7.9 to 8.4) in the subsoils. Available water-holding capacities exceed 5.0 inches. These soils are poorly drained, and unless protected by levees, are subject to overflow. Levees and drainage are needed for maximum crop production.

Capability Unit IIIw4 - Very deep, somewhat poorly to somewhat excessively drained coarse-textured soils, subject to frequent overflow and/or high water tables.

Soils of this unit have mostly loamy fine sand textures throughout, and are generally stratified, with thin lenses of finer-textured soils. There is no erosion hazard. Available water-holding capacity varies from 3 to 5 inches. Soil reaction varies from pH 5.6 to 7.8. Shallow-rooted crops are best suited for these soils.

Capability Unit IIIw5 - Moderately deep to deep, somewhat poorly to poorly drained, slowly to very slowly permeable fine-textured soils, on nearly level topography.

The soils of this unit occur on slopes of less than 2 percent. Textures are clay in the surface and subsoil. Cemented substrata occur at depths of 24 to 60 inches. A water table may exist between 3 and 5 feet below the surface, unless artificially drained. The available water-holding capacity varies from 4 to 10 inches. Reaction varies from slightly (pH 6.1 to 6.5) to medium acid (pH 5.6 to 6.0) in the surface, and mildly (pH 7.4 to 7.8) to moderately alkaline (pH 7.9 to 8.4) in the subsoils, and they may be calcareous in the subsoils. There is no erosion hazard. All locally adapted crops, except for tree crops, are suited to the soils of this unit.

Capability Unit IIIw10 - Very deep, very poorly drained organic soils, on nearly level slopes.

Soils of this unit consist of muck surface soils and peaty muck subsoils. They are medium acid in reaction (pH 5.6 to 6.0). Permeability is moderately rapid. Available water-holding capacity is over 8 inches.

These soils have permanent water tables that are lowered by pumps to depths of about 30 to 48 inches. Levees are required to prevent flooding. The wind erosion hazard is high. These soils are best suited to shallow-rooted crops.

Capability Unit IVe1 - Moderately deep and deep, moderately to strongly sloping soils, over weathered bedrock.

The soils of this unit are 30 to 48 inches deep, over weathered granitic rock. They are permeable and well drained. Surface textures are coarse sandy loams. Subsoil textures range from coarse sandy loam to clay loams. They are slightly (pH 6.1 to 6.5) or medium (pH 5.6 to 6.0) acid in the surface, and slightly acid in their subsoils. Available water-holding capacities range from 3.5 to 7.0 inches. Slopes range from 5 to 15 percent.

These soils have a moderate to high erosion hazard. They are suitable for many locally-grown crops. They require protection against erosion, and careful irrigation water management.

Capability Unit IVe3 - Shallow to moderately deep, very slowly to moderately permeable claypan and hardpan soils, on gentle to strong slopes.

The soils of this unit have fine sandy loam or gravelly loam surface textures, and clay subsoils at depths of 10 to 30 inches. Some are underlain by hardpan. They are medium acid (pH 5.6 to 6.0) to strongly acid (pH 5.5 to 5.5) in the surface, and slightly (pH 6.1 to 6.5) to strongly acid (pH 5.1 to 5.5) in the subsoils. Available water-holding capacities are about 2 to 5 inches. Natural fertility is low. Slopes range from 1 to 15 percent. The soils of this unit have a moderate to high erosion hazard. They are suitable for shallow-rooted crops, such as pasture and small grain, and when irrigated, require careful water management.

Capability IVs8 - Shallow soils over hardpans, and occurring on nearly level to very gentle slopes.

The soils of this unit have loam or sandy loam surface textures, a clay subsoil, and hardpan, at depths varying from 12 to 36 inches. They are medium acid (pH 5.8 to 6.1) in the surface, and slightly acid (pH 6.1 to 6.5) in the subsoils. Available water-holding capacity is about 2 to 5 inches. Slopes range from almost level up to 5 percent.

These soils are suited to shallow-rooted crops, such as pasture or small grains. When irrigated, they require frequent light applications of water for suitable crop production.

Capability Unit IVe8 - Shallow to moderately deep soils on gentle to strong slopes.

The soils of this unit are mostly shallow to moderately deep soils, over siltstone or sandstone; or hardpans that occur on gentle to strong slopes (2 to 15 percent). Soil depths are mostly 10 to 36 inches, but included are some as deep as 36 inches. Surface textures are fine sandy loams. Subsoils are fine sandy loams to heavy loams. Soil reaction is slightly acid (pH 6.1 to 6.5). Subsoil permeabilities are moderately rapid to moderate. Available water-holding capacities are about 2 to 4 inches. Erosion hazards are moderate to high.

These soils are suitable for shallow-rooted crops, such as pasture and grain. They require protection from erosion, and careful water management.

Capability Unit VIs4 - Shallow soils over bedrock or consolidated tuff, occurring on gentle to moderately steep uplands.

The soils in this unit are 10 to 24 inches deep, over fine-grained bedrock or consolidated tuff. Some soils have occasional outcrops. They are sandy loam to silt loam in texture, and slightly (pH 6.1 to 6.5) acid in reaction. They are well to somewhat excessively drained, and are moderately permeable. Available water-holding capacity is about 1.5 to 4 inches.

These soils are suitable for grazing. Yields of annual grasses are good in curing seasons, with favorable rainfall and temperature.

Capability Unit VIe9 - Shallow and moderately deep terrace soils of low fertility on gently rolling to hilly topography.

The soils of this unit are 10 to 36 inches deep. They consist of gravelly loams, with slightly (pH 6.1 to 6.5) to strongly acid (pH 5.1 to 5.5) surface soils, and medium (pH 5.6 to 6.1) to strongly-acid gravelly clay loam and clay loam subsoils. They are moderate to moderately slowly permeable. Available water-holding capacities range from 2 to 6 inches. Slopes range from 2 to 30 percent. The erosion hazard is moderate.

The soils of this unit are low in natural fertility. They are suitable for livestock grazing.

Capability Unit VIIs4 - Very shallow soils on gently rolling to hilly uplands.

The soils of this unit are very shallow. They are mostly less than 10 inches deep, to slate bedrock. They consist of loam-textured soils that are strongly acid (pH 5.1 to 5.6). The available water-holding capacity is about 2 inches. Slopes range from 5 to 30 percent. These soils are suitable for livestock grazing. Due to shallow soil depth, the annual vegetation dries up quickly, and production is only fair in favorable years.

Capability Unit VIIIs4 - Gravelly and cobbly tailings.

The land of this unit consists of piles of cobbles and gravels that are debris resulting from hydraulic mining and dredging operations. There is little soil for plants, but mostly gravelly and cobbly material.

These areas are not suited for agricultural use. They are suitable for recreational areas, and are a source of fill material. Leveled areas are being used for urban and industrial sites.

Range Sites

The capacity of range land to produce forage is dependent on soil, climate, and past use. Range sites are soil areas that produce approximately the same kinds and amounts of forage. There are 6 range sites grouped in the area, and the following briefly describes them. For more detailed information, refer to the Technical Guide in the Auburn Work Unit of the Soil Conservation Service.

RLF - Rocky Loam Foothills

The soils in this range site are 20 to more than 60 inches in depth, to fine-grained bedrock. The surface textures are loams or silt loams, which are rocky or cobbly. Most subsurface textures are clay loams. The soils are permeable and well drained. They are relatively stable. Rock outcrops are common. Inherent fertility is moderate, and available water-holding capacity is more than 5 inches.

Soils like those described, but free of rock, when used as range, are included in this range site.

SRLF - Shallow Rocky Loam Foothills

The soils in this range site are 10 to 25 inches in depth, to fine grained bedrock. They are rocky or very rocky loams and silt loams. They are permeable and well drained. The soils are relatively stable. Rock outcrops are common. Inherent fertility is moderate and available. Water-holding capacity is more than 2 inches. When non-rocky phases of these soils are used for range, they are included in this site.

DGS - Deep Granitic Soils

The soils in this range site are 20 to 60 inches in depth, to weathered granitic material. They have sandy loam surface textures and sandy loam to sandy clay loam subsurface textures. They are moderately permeable and well drained. Rock outcrops are common. Inherent fertility is moderate, and available water-holding capacity is 4 to 8 inches.

When non-rocky phases of these soils are used as range, they are included in this range site.

CU - Clay Uplands

These soils are clays, and in places, are very cobbly; they are generally underlain by hardpans or granitic sediments at 15 to 36 inches. They are well to moderately well drained; some are poorly drained; permeability is very slow. Slopes vary from 3 to 5 percent. Estimated usable forage production under good management averages about 1,500 pounds per acre in favorable years, and 500 pounds per acre in unfavorable years.

INDEX OF SOIL MAPPING UNITS and INTERPRETIVE GROUPINGS

Map Symbol	Soil Name	Percent of Association	Capability Unit		INTERPRETIVE GROUPING								
			Irrigated	Dry	Range Site	Woodland Suitability Group	Veg. Group	Hydro. Group	Septic Tank Filter Fields	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
GROUP 1 –	AREAS DOMINATED BY SHALLOW, ROCKY SOILS UNDERLAIN WITH METAMORPHIC ROCK												
AK-AB/BD	Auburn-Argonaut association, 2 to 15 percent slopes												
	Auburn	70	IVe4	VIs4	Shallow rocky loam foothills	5	G	D	Severe	Moderate[6]	Low[2]	Moderate	Moderate
	Argonaut	20 (10)	IVe3	VIs8	foothills	5	D	D	Severe	Moderate[6,2]	High	Moderate	Moderate
AK-AB/EF	Auburn-Argonaut association, rocky, 15 to 50 percent slopes												
	Auburn	70		VIs41	Foothills	5	G	C	Severe	Moderate[6]	Low[2]	Moderate	High
	Argonaut	20 (10)		VIs8	foothills	5	D	D	Severe	Moderate[6,2]	High	Moderate	High
AK-Ep/EG–2	Auburn-Exchequer association, very-rocky, 15 to 75 percent slopes, eroded												
	Auburn	60		VIIs81	Foothills	5	J	D	Severe	Moderate[2,6]	Low	Moderate	High
	Exchequer	30 (10)		VIIs4	Very shallow lands	5	J	D	Severe	Slight	Low	Moderate	High
AK/E	Auburn association, rocky, 15 to 30 percent slopes												
	Auburn	90 (10)		VIs4	SL	-	G	D	Severe	Moderate[8]	Low	Low	Moderate
AK/F	Auburn association, rocky, 30 to 50 percent slopes												
	Auburn	90 (10)		VIs41	SL	-	G	D	Severe	Moderate[3]	Low	Low	High
AK-Wg/CE	Auburn-Whiterock association, rocky, 5 to 30 percent slopes												
	Auburn	55	VIs4[2]				G[2]	D	Severe		Low	Moderate	
	Whiterock	30	VIIs4				J	D	Severe		Low	Severe	

Map Symbol	Soil Name	Percent of Assoc.	Capability Unit		INTERPRETIVE GROUPING								
			Irrigated	Dry	Range Site	Woodlnd. Suitabil. Group	Veg. Group	Hydro. Group	Sep. Tk Filter Group	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
GROUP 2 –	AREAS DOMINATED BY MODERATELY DEEP, ROCKY SOILS UNDERLAIN WITH METAMORPHIC ROCK												
Br-AK/DE	Boomer-Auburn association, rocky, 9 to 30 percent slopes												
	Boomer	50		VIs8	L	4[2]	G	C	Severe	Moderate	Moderate[2]	Moderate[2]	Moderate
	Auburn	40 (10)		VIs4	SL[2]	-	G	D[2]	Severe	Moderate[3]	Low	Low	Moderate
Br-AK/F	Boomer-Auburn association, rocky, 30 to 50 percent slopes												
	Boomer	55		VIs81	L	5[2]	G	C	Severe	Moderate	Moderate[2]	Moderate[2]	High
	Auburn	40 (5)		VIs41	SL[2]	-	G	D	Severe	Moderate[3]	Low	Low	High
GROUP 3 –	AREAS DOMINATED BY SHALLOW TO DEEP, ACID SOILS UNDERLAIN WITH METAMORPHIC ROCK												
Jp-SQ/CE	Josephine-Sites association, 5 to 30 percent slopes												
	Josephine	60	IVel		-	2	A	C	Severe	Moderate	Moderate	Moderate	Moderate
	Sites	35 (5)	IVel		-	2	A	C	Severe	Moderate	Moderate	High[2]	Moderate
SQ-Jp/CD	Sites-Josephine association, 5 to 15 percent slopes												
	Sites	40	IIIel		5	1	A	C	Severe	Moderate	Moderate	High[2]	Moderate
	Josephine	40 (20)	IIIel		5	1	A	C	Severe	Moderate	Moderate	High	Moderate
Jp-SQ/EF	Josephine-Sites association, rocky, 15 to 50 percent slopes												
	Josephine	75		VIsl	-	2	A	C	Severe	Moderate	Moderate	Moderate	High
	Sites	20 (5)		VIsl	-	2	A	C	Severe	Moderate	Moderate	High	High
SQ-Jp-Mh/EF2	Sites-Josephine-Mariposa association, rocky 15 to 50 percent slopes, eroded												
	Sites	35		VIs81	5	5	G	C	Severe	Moderate	Moderate	High[2]	High
	Josephine	40		VIs81	5	5	G	C	Severe	Moderate	Moderate	High	High
	Mariposa	15 (10)		VIs84	5	7	G	C	Severe	Moderate[6]	Moderate	High	High

Map Symbol	Soil Name	Percent of Assoc.	Capability Unit		INTERPRETIVE GROUPING								
			Irrigated	Dry	Range Site	Woodlnd. Suitabil. Group	Veg. Group	Hydro. Group	Sep. Tk. Filter Fields	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
Mh-Jp/DF	Mariposa-Josephine association, rocky, 9 to 50 percent slopes												
	Mariposa	60		VIs84	-	5[2]	G[2]	C	Severe	Moderate	Low[2]	Moderate	High
	Josephine	30 (10)		VIsl	-	2	A	C	Severe	Moderate	Moderate	Moderate	High
Jp-Mh-Mq/FG	Josephine-Mariposa-Maymen association, rocky, 30 to 74 percent slopes												
	Josephine	35		VIIs81	5	6	J	C	Severe	Moderate	Moderate	High	High
	Mariposa	30		VIIs8	5	7	J	C	Severe	Moderate	Moderate	High	High
	Maymen	30 (5)		VIIs8	5	7	J	C	Severe	Slight[6]	Low	Moderate	High
Mh/G	Mariposa association, rocky, 50 percent plus slopes												
	Mariposa	85 (15)		VIIs8	-	7	J	C	Severe	Moderate	Low	Moderate	High
GROUP 4 –	AREAS DOMINATED BY MODERATELY DEEP, EROSIVE SOILS UNDERLAIN WITH BASIC ROCK												
RI/BD2	Rescue association, 2 to 15 percent slopes, eroded												
	Rescue	85 (15)	IVe8		L	5	G	C	Severe	Moderate	Moderate	Moderate	Moderate
RI/E2	Rescue association, stoney 25 to 30 percent slopes, eroded												
	Rescue	90 (10)		VIs81	L	5	G	C	Severe	Moderate	Moderate	Moderate	High
RI/DF2	Rescue association, very stony, 9 to 50 percent, slopes, eroded												
	Rescue	90 (10)		VIIs7	ERL	5	J	C	Severe	Moderate	Moderate	Moderate	High
SW-RL-GB/BF	Sobrante-Rescue-Guenoc association, 2 to 50 percent slopes				Rocky loam								
	Sobrante	50		VIs81	Foothills	5	G	C	Severe	Moderate	Moderate	Moderate	Moderate
	Rescue	35		VIs81	Foothills	5	G	C	Severe	Moderate	Moderate	Moderate[4]	Moderate
	Guenoc	10 (5)		VIs81	Foothills	5	G	C	Severe	Slight	High	High	Moderate

Map Symbol	Soil Name	Percent of Assoc.	Capability Unit		INTERPRETIVE GROUPING								
			Irrigated	Dry	Range Site	Woodlnd. Suitabil. Group	Veg. Group	Hydro. Group	Sep. Tk. Filter Fields	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
CS-Ms-W1/CF	Cohasset-McCarthy-Windy association, 5 to 50 percent slopes												
	Cohasset	45		VIs1	5	3	A	B	Severe	Moderate	Moderate[2]	High	High
	McCarthy	20		VIs81	5	7	G	B	Severe	Severe	Low	High	High
	Windy	20 (15)		VIs81	5	7	G	B	Severe	Severe	Low	High	High
GROUP 5 -	AREAS DOMINATED BY SHALLOW TO VERY SHALLOW, VERY ROCKY OR VERY COBBLY SOILS UNDERLAIN BY VOLCANIC CONGLOMERATE OR METAMORPHOSED ROCKS												
Tt-RL/AD	Toomes-Rock Land association, 0 to 15 percent slopes												
	Toomes	60		VIIs4	Very shallow lands	5	J	D	Severe	Slight[6]	Low	Moderate	Moderate
	Rock Land	35 (5)		VIIIs8	Very shallow lands	5	J	D	Severe	Slight[6]	Low	Low	Moderate
Tt-Io-sr/E	Toomes-Inks-Supan association, 15 to 30 percent slopes												
	Toomes	40		VIIs4[2]		5	J	D	Severe	Slight[2,6]	Low	Moderate	Moderate
	Inks	30		VIs81	RLF[7]	5	G	D	Severe	Moderate	Moderate	Moderate	Moderate
	Supan	20 (10)		VIs81	RLF[7]	5	G	C	Severe	Moderate	Moderate	Moderate	Moderate
Hj-Dv-RL/CG	Henneke-Dubakella-Rock Land association, 5 to 75 percent slopes												
	Henneke	30		VIIs9	Rough serpentine land	7	J	D	Severe	Slight[6]	Moderate	Moderate	High
	Dubakella	30		VIs9	Rough serpentine land	7	J	D	Severe	Slight[6]	Moderate	Moderate	High
	Rock Land	30		VIIIs8	Very shallow land	7	J	D	Severe	Slight[6]	Low	Low	High
Mq-RL/G	Maymen-Rock Land association 50 to 75 percent slopes												
	Maymen	50		VIIs8	5	7	J	D	Severe	Slight[6]	Low	Moderate	High
	Rock Land	40 (10)		VIIIs8	Very shallow land	7	J	D	Severe	Slight[6]	Low	Low	High

Map Symbol	Soil Name	Percent of Assoc.	Capability Unit		INTERPRETIVE GROUPING								
			Irrigated	Dry	Range Site	Woodld. Suitabl. Group	Veg. Group	Hydro. Group	Sep. Tk Filter Fields	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
RL	Rock Land association												
	Rock Land	90 (10)		VIIIs8			J	D	Severe	Slight	—	—	Moderate
GROUP 6 –	AREAS DOMINATED BY DEEP OR VERY DEEP SOILS, UNDERLAIN BY VOLCANIC CONGLOMERATE, METAMORPHIC OR GRANITIC ROCK												
Ai-CS/Ah	Aiken-Cohasset association, 0 to 5 percent slopes												
	Aiken	80	IIe1		5	1	A	B	Moderate[2]	Severe[4]	Moderate	High[2]	Moderate
	Cohasset	15 (5)	IIe1		5	1	A	B	Moderate	Moderate	Moderate	High	Moderate
Ai-CS/CD	Aiken-Cohasset association, 5 to 15 percent slopes												
	Aiken	65	IIIe1		5	1	A	B	Severe	Severe[4]	Moderate	High[2]	Moderate
	Cohasset	20 (15)	IIIe1		5	1	A	B	Severe	Moderate	Moderate	High	Moderate
Ai-CS/E	Aiken-Cohasset association, 15 to 30 percent slopes												
	Aiken	45	IVe1		5	2	A	B	Severe	Severe[4]	Moderate	High[4]	High
	Cohasset	35 (20)	IVe1		5	2	A	B	Severe	Moderate[4]	Moderate	High	High
GROUP 7 –	AREAS DOMINATED BY MODERATELY DEEP AND DEEP EROSIVE SOILS, UNDERLAIN BY GRANITIC ROCK												
AJ-SL/CD	Auberry-Sierra association, 5 to 15 percent slopes												
	Auberry	80	IVe1		G	5	A	B	Severe	Moderate	Moderate	Moderate	Moderate
	Sierra	15 (5)	IVe1		G	5	A	B	Severe	Moderate	Moderate	Moderate	Moderate
AJ-Ah/F	Auberry-Ahwahnee association, rocky, 30 to 50 percent slopes												
	Auberry	50		VIIs1	G	6	J	B	Severe	Moderate	Moderate[2]	Moderate[2]	Very high
	Ahwahnee	40 (10)		VIIs1	G	7[2]	J	B	Severe	Moderate	Low	Low	Very high

Map Symbol	Soil Name	Percent of Assoc.	Capability Unit		INTERPRETIVE GROUPING								
			Irrigated	Dry	Range Site	Wodlnd. Suitabil. Group	Veg. Group	Hydro. Group	Sep. Tk. Filter Fields	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
Ah-SL/AB	Ahwahnee-Sierra association, 0 to 5 percent slopes												
	Ahwahnee	70	IIIe8		Deep granitic soils	1	G	B	Severe	Moderate	Low	Moderate[2]	Moderate
	Sierra	20 (10)	IIIe8		Deep granitic soils	1	G	C	Severe	Moderate	Moderate	Moderate	Moderate
Ah-SL/CD2	Ahwahnee-Sierra association, 5 to 15 percent slopes, eroded												
	Ahwahnee	60	IVe8		Deep granitic soils	3	G	B	Severe	Moderate	Low	Moderate	High
	Sierra	30 (10)	IVe8		Deep granitic soils	3	G	C	Severe	Moderate	Moderate	Moderate[2]	High
Ah-SL/EF2	Ahwahnee-Sierra association, rocky, 15 to 50 percent slopes, eroded												
	Ahwahnee	70		VIIs1	Deep granitic soils	4	J	B	Severe	Moderate	Low	Moderate[2]	High
	Sierra	20 (10)		VIIs1	Deep granitic soils	4	J	C	Severe	Moderate	Moderate	Moderate	High
GROUP 8 –	AREAS DOMINATED BY VERY DEEP WELL DRAINED SOILS OF ALLUVIAL PLAINS AND LOW TERRACES AND/OR ALONG STREAM CHANNELS												
Pn	Perkins association												
	Perkins	90 (10)	IIsh				A	C	Severe	—	High	High	—
Rc-CG	Ramona-Chualar-Sandy alluvial land association												
	Ramona	35	IIs3		5	5	A	C	Moderate	Moderate	Moderate	Moderate	Moderate
	Chualar	20	IIs3		5	5	A	C	Moderate	Moderate	Moderate	Moderate	Moderate
	Sandy alluvial land	10 (35)[1]	IIIs4		5	5	B	A	Slight[3]	Severe	Low	Low	Moderate

Map Symbol	Soil Name	Percent of Assoc.	Capability Unit Irrigated	Capability Unit Dry	INTERPRETIVE GROUPING Range Site	Woodld. Suitabil. Group	Veg. Group	Hydro. Group	Sep. Tk Filter Fields	Allow. Soil Pressure	Shrink-Swell Behavior	Corrosivity Untreated Steel Pipe	Erosion Hazard
GROUP 9 –	AREAS DOMINATED BY SHALLOW, CLAYPAN-HARDPAN SOILS, SOMEWHAT EXCESSIVELY TO POORLY DRAINED SOILS												
Ri-cg/AD2	Redding-Corning association, 0 to 15 percent slopes, eroded												
	Redding	60	IVe8		Upland terraces	5	G	D	Severe	Moderate[2]	High	High	Moderate
	Corning	30 (10)	IVe3		Upland terraces	5	D	D	Severe	Moderate[2]	High	High	Moderate
GROUP 10 –	AREAS DOMINATED BY SHALLOW TO MODERATELY DEEP SOILS FORMED IN PLACE ON GENTLY ROLLING TO HILLY UPLANDS												
Fj-TA-Rr/BD-2	Fiddyment-Trego-Rocklin association, 2-15% slopes, eroded												
	Fiddyment	50	IVe3[2]				G[2]	D	Severe		High[2]	High[2]	
	Trigo	25	IVe8				G	D	Severe		Low	Low	
	Rocklin	15 (10)	IVe8				G	D	Severe		Moderate	Moderate	
GROUP 11 –	AREAS DOMINATED BY SOILS GREATLY ALTERED BY MINING OPERATIONS AND/ OR MINING PITS												
Tx	Placer diggins, tailings, pits association												
	Placer diggings	50		VIIIsl	5	5	J	Variable	Variable	Variable	Variable	Variable	Moderate[2]
	Tailings	25		VIIIsl	5	5	J	Variable	Slight	Moderate	Variable	Moderate	Slight
	Pits	25		VIIIs8	5	5	J	Variable	Severe	Moderate	Variable	Moderate	High

[1]Percent in parenthesis gives extent of unnamed soils in the association (see descriptions of mapping units.)
[2]Indicates rating to be used when coloring single-purpose interpretive maps.
[3]Coarse textured materials are very porous; effluent may contaminate water supplies.
[4]Moderate limitation in the subsoil which is generally at 24".
[5]Not generally used for this purpose.
[6]The soils are shallow to bedrock.
[7]RLF: Rocky loam foothills.
[8]Firm material or bedrock at depth of approximately 20 inches or less.

VSL - Very Shallow Lands

These are gently sloping to very steep lands, generally less than 10 inches deep, over bedrock. They have low available water-holding capacity, and are quick to dry out in the spring months. Estimated usable forage production under good management is about 400 pounds per acre in favorable years, and very little to none in unfavorable years.

UT - Upland Terrace

The soils that characterize this site are gravelly sandy loams or sandy loams, generally 10 to 36 inches in depth, to claypan over hardpan. Roots and water penetration are severely restricted. Total available moisture is 2 to 4 inches; included are some areas that are strongly acid.

RSL - Rough Serpentine Land

The soils in this site are shallow and very shallow rocky loams that are extremely low in fertility; they are formed in serpentine rock. Forage density is low; 50 percent of the total herbage produced is unpalatable brush species, such as chamise, Yerba Santa, and manzanita.

Woodland Suitability Groupings

The forest soils have been grouped in 7 suitability groups. The 6 characteristics on which the groupings are based are site quality, erosion hazard, equipment limitation, insect and disease hazard, windthrow hazard, the adaptability to management. Each has been given a numerical rating for each characteristic, from 1 to 3, except for erosion hazard, which has ratings from 1 to 4. A rating of 1 indicates high site quality and adaptability to management, and slight hazard and limitation in the other characteristics. A rating of 2 indicates medium or moderate. A rating of 3 indicates low or severe. A rating of 4 in erosion hazard indicates extreme hazard.

Site quality ratings are productivity ratings. A rating of 1 indicates high site quality, and means that fully stocked stands of the major conifer species should produce 500 board feet or more per acre per year without management, if grown to maturity (Scribner Rule). A rating of 2 indicates medium site quality and means that fully stocked stands should produce between 150 and 500 board feet per acre per year without management, if grown to maturity. A rating of 3 indicates low site quality, and means that fully stocked stands would produce less than 150 board feet per acre per year.

Erosion hazard is related to the susceptibility to erosion when the cover is disturbed or removed by logging, fire, or other agents. Extreme erosion rating is given only to soils derived from acid igneous rock.

Equipment limitations are those limitations resulting from slope, wetness, rock outcrops, etc., which interfere with or hamper the operation of mechanical equipment, such as tractors and trucks. In general, the sandy and gravelly soils have fewer equipment limitations than the others. Those with gentle slopes have less than those with steep slopes, but in the winter, they may be too soft to work any kind of equipment. At high elevations, deep snows also prohibit the use of equipment for long periods in the winter.

Insect and disease hazards are usually associated with droughty and shallow soils.

Windthrow hazard is usually highest on shallow and sandy soils; however, it is not particularly serious, except on very shallow soils.

Adaptability to management is more or less a summarization of all qualities that make a particular soil suitable or not suitable to management, including those qualities listed above.

A general description of each suitability group follows:

Woodland Suitability Group 1

Its characteristics are high site quality, slight erosion hazard, moderate and slight equipment limitation, moderate and slight insect and disease hazard, slight windthrow hazard, and high to medium adaptability to management. The soils in this group are the best forest soils.

Woodland Suitability Group 2

Its characteristics are high site quality, moderate erosion hazard, moderate and severe equipment limitations, slight and moderate insect and disease hazard, slight windthrow hazard, and high to low adaptability to management. The soils in this group are good forest soils.

Woodland Suitability Group 3

Its characteristics are high site quality, severe and extreme erosion hazard, severe equipment limitation, slight to moderate insect and disease hazard, slight to moderate windthrow hazard, and medium to low adaptability to management. The soils in this group are also good forest soils, but are not as good as in Group 2.

Woodland Suitability Group 4

Its characteristics are medium site quality, slight erosion hazard, slight to moderate equipment limitation, slight to severe insect and disease hazard, slight to moderate windthrow hazard, and low to high adaptability to management. The soils in this group are fair forest soils.

Woodland Suitability Group 5

Its characteristics are medium site quality, moderate erosion hazard, severe and moderate equipment limitation, severe to slight insect and disease hazard, severe to slight windthrow hazard, and low to high adaptability to management. The soils in this group are also fair forest soils, but are not as good as those in Group 4.

Woodland Suitability Group 6

Its characteristics are medium site quality, slight to extreme erosion hazard, severe to moderate equipment limitation, severe to slight insect and disease hazard, severe to slight windthrow hazard, and low to medium adaptability to management. The soils in this group are poor forest soils.

Woodland Suitability Group 7

Its characteristics are low site quality, slight to severe erosion hazard, slight to severe equipment limitation, severe to moderate insect and disease hazard, slight to severe windthrow hazard, and low to medium adaptability to management. The soils in this group are very poor woodland soils. Intensive management practices are probably not justified, unless they are done to improve scenic and recreational values, as well as to improve forest values.

Vegetative Soil Groups

Soils which have similar plant adaptations have been grouped together into vegetative groupings. There are six vegetative groupings included in this report:

Group A - Suitable for all climatically adapted plants. Soils are deep, moderately coarse to moderately fine textured, well drained, with moderately rapid to moderately slow permeability. Includes Capability Units IIe1, IIs3, IIIe1, IVe1, and VIs1.

Group B - Choice of plants limited by drouthiness and low fertility. Soils are coarse to gravelly medium textured and excessively drained, with less than 5 inches available water holding capacity. Includes Capability Unit IIIs4.

Group C - Choice of plants limited by fine textures. Soils are deep to very deep, moderately fine to fine textured, well drained, with moderately slow to slow permeability. Includes Capability Unit IIIe5.

Group D - Choice of plants limited by very slowly permeable (claypan) subsoils. Soils are shallow to moderately deep, well drained, with slow or very slow subsoil permeability. Included are Capability Units IIIs3, IVe3, IVe4, and VIs8.

Group G - Choice of plants limited by depth. Soils are shallow to moderately deep, well drained, over hardpan, bedrock, or other unfractured dense material. Included are Capability Units IIIe8, IVe4, IVs8, VIs41, VIs81, VIs84.

Group J - Choice of plants depends upon on-site investigations. Soils include those in the miscellaneous nonarable category, and typically include Capability Units VIIs1, VIIs4, VIIs8, VIIs81, VIIs9, VIIIs1, VIIIs8.

Hydrologic Soil Groups

Hydrologic soil groups are used for estimating the runoff potential of soils on watersheds. Four groups are used, based on soil properties that influence runoff.

The soils are classified on the basis of intake of water at the end of long duration storms occurring after prior wetting and opportunity for swelling, and without protective effect of vegetation.

Group A - Soils having high infiltration rates, even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and/or gravel. These soils have a high rate of water transmission, and would result in a low runoff potential.

Group B - Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils, with moderately coarse to medium textures. These soils have a moderate rate of water transmission.

Group C - Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of (1) soils with a layer that impedes the downward movements of water or (2) soils with moderately fine to fine textures and a slow infiltration rate. These soils have a slow rate of water transmission.

Group D - Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of (1) clay soils with a high swelling potential; (2) soils with a high permanent water table; (3) soils with a claypan or clay layer at or near the surface; and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission.

Soil Limitations for Septic Tank Filter Fields

The septic tank filter field is part of the septic tank soil absorption system for on-site sewage disposal. It is a subsurface tile system, laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the natural soil. Criteria and standards used for rating soils are made on the basis of soil limitations. Three degrees of limitations are used - slight, moderate, and severe. These are based on such soil factors as depth, slope, permeability, percolation rate, water table, soil drainage, and overflow or flooding hazard.

Degree of Limitation:

Slight - Soils having a permeability rate greater than 1.0 in./hr.; a percolation rate faster than 45 min./in.; a seasonal water table below 4 feet; drainage better than somewhat poorly drained; slopes less than 5 pecent; no overflow hazard; hard rock or permanent water table more than 6 feet.

Moderate- Soils having a permeability rate greater than 0.63 in./hr.; a percolation rate faster than 75 min./in.; a seasonal water table between 2 and 4 feet; drainage better than poorly drained; slopes are 5 to 9 percent; an overflow problem of no more than once in 10 years; overflow duration less than 48 hours; hard rock or permanent water table between 4 and 6 feet.

Severe - Soils having a permeability rate less than 0.63 in./hr.; a percolation rate slower than 75 min./in.; a seasonal water table above 2 feet; drainage class of poor or very poor; slopes greater than 9 percent; an overflow problem one year in five; overflow duration greater than 48 hours; hard rock or permanent water table less than 4 feet.

Soil Limitations for Allowable Soil Pressure

These ratings show the limitation of a soil for foundation pressure. They are for general planning purposes, and are not a substitute for on-site investigations. Three degrees of limitations are used. These are slight, moderate, and severe, based on allowable ranges of soil pressure in pounds per square foot. These criteria for ratings are based on the Uniform Building Code - Table 28-B.

Degree of Limitation:

Slight - Shallow soils, underlain with hard bedrock or stiff clay.

Moderate- Loamy soils and high shrink-swell clays.

Severe - Loose mineral soils and mineral soils, with high but varying organic matter content, organic soils, and bay mud.

Soil Shrink-Swell Behavior Classes

Shrink-swell is that quality of the soil that determines its volume change with change in moisture content. Much damage to building foundations, roads, and other structures is caused by the shrinking and swelling of soils as a result of wetting and drying. The volume change is influenced by the amount of moisture, and the kind and amount of clay in the soil. Three degrees of limitations are recognized - low, moderate, and high.

The classes are:

Low - These soils range from sands to silt loams with any clay mineral, and include sandy clay loams, if the clay is kaolinitic. The Unified Soil Class can be ML, SM, CL, or SC, and the shrinkage index is less than 5.

Moderate- This class includes the silty clay loam to clay textures, if the clay is kaolinitic, and heavy silt loam, light sandy clays, and silty clay loams with mixed clay minerals. The Unified Soil Class is CH, if the clay is kaolinitic, or CL or ML if the clay minerals are mixed. The shrinkage index is between 5 and 7.

High - This class includes clay loams to clays with mixed or montmorillonitic clays. The Unified Soil Class is CH, with mixed or montmorillonitic clays, and the shrinkage index is greater than 7.

Soil Corrosivity

Soil corrosivity correlates closely with physical, chemical, and biological characteristics and qualities of soil. Structural materials, such as metal or concrete pipe, corrode when buried in soil, and a given material will corrode in some soils more rapidly than in others. Corrosion differs with the general character of the soil. To be meaningful, corrosivity must be given in relation to a specific structural material.

Soil Corrosivity for Untreated Steel Pipe

Three degrees of limitations are used - low, moderate, and high. They are based on soil properties such as texture, drainage, permeability, total acidity, and electrical resistivity of the soil.

Degree of Limitation:

Low - Excessively to well-drained, coarse to medium-textured soils, with very rapid to moderate permeability. pH is greater than 6.5.

Moderate- Moderately well-drained, medium and well-drained, moderately fine-textured soils, with slow and moderately slow and moderate permeability. pH 5.5 to 6.5.

High - Somewhat poorly drained, fine-textured soils, or claypan soils with electrical conductance less than 1 mmho/am$_2$, or poorly drained, moderately fine-textured soils. Organic soils; pH less than 5.5.

Soil Erosion Hazard

The erosion hazard is the inherent nature of a soil that allows it to be eroded, principally by the action of water. The susceptibility to erosion is dependent on soil qualities, including texture, aggregation, structure, infiltration rate, porosity, etc., also external characteristics such as slope, storm intensity and duration, vegetation, and other factors. The erosion hazard as rated in this report is an estimate expressed as the degree of erosion to be expected if the soil is left in a tilled condition, or if protective vegetation is removed by fire or other means before the rainy season, or the soil is irrigated under clean cultivated conditions. Terms used to describe the erosion hazard are:

Slight - Little or no soil loss is expected. The soils are on nearly level slopes or basins and heavy clay textures; or they are very coarse, cobbly land types, with very high infiltration rates, and medium or slow runoff.

Moderate- Rilling can be expected, and small gullies initiated under moderate and heavy rainfall intensities. Severe erosion can result if mismanagement persists. Medium to rapid runoff.

High - Soil will erode easily if disturbed, or if the protective vegetation is removed. Rapid runoff.

DESCRIPTION OF THE SOILS

Group 1 - AREAS DOMINATED BY SHALLOW, ROCKY SOILS UNDERLAIN BY METAMORPHIC ROCK

AK-AB - Auburn-Argonaut Association, rocky, 2 to 15 percent slopes.
BD

The soils of this association occur on undulating to rolling foothills. They are formed on metabasic and metasedimentary schists. Rock outcrops are common. Typically, the vegetation consists of grass-oak woodland, with scattered areas of brush and digger pine. The erosion hazard is slight to moderate.

This association is composed of about 70 percent Auburn soils, 20 percent Argonaut, and 10 percent inclusions of Perkins, Sobrante and Whiterock soils.

The Auburn soils have brown to strong brown slightly acid, rocky silt loam surface soil, and reddish brown to yellowish red, slightly acid to neutral, silt loam subsoil. They are well drained, have medium runoff, and a moderate erosion hazard. Depth to bedrock ranges from 12 to 26 inches. Tombstone-like rock outcrops are common, but scattered areas are rock-free. These soils are formed in parent material weathered from diabase, slates, and schists.

The Argonaut soils have strong brown, slightly-to-medium acid, gravelly loam surface soil, and yellowish red to yellowish brown, slightly acid, massive, heavy and gravelly clay subsoil. The permeability of the subsoil is very slow; these soils have medium runoff, and are moderately erodible. The depth to the clay subsoil ranges from 15 to 20 inches, and the depth to the bedrock ranges from 18 to 30 inches. Tombstone-like rock outcrops are common, but scattered areas are rock-free. These soils formed in material weathered from metaadesite.

The Whiterock soils are pale brown, very shallow, strongly acid, gravelly silt loams, formed in Mariposa slates.

The Perkins soils are brown, moderately deep, gravelly loam, formed from alluvium from Auburn soil material.

The Sobrante soils are brown to strong brown, moderately deep silt loams, formed on metamorphic rocks.

AK-AB - Auburn-Argonaut association, rocky, 15 to 50 percent slopes.
EF

The soils in this association occur on moderately steep and steep foothills. The soils are shallow, rocky, and medium textured; the Argonaut soils have clay subsoils. Most areas are underlain by meta-igneous rock at 10 to 30 inches. Vegetation consists of grass-oak. Elevations range from 200 to 1,600 feet. Mean annual precipitation is 18 to 30 inches, mean annual temperatures are about 60 to 62 degrees F., and the frost-free season is about 230 to 270 days. The soils are used for range, pasture, and some orchard.

This association is composed of about 70 percent Auburn soils and 20 percent Argonaut soils; the remaining 10 percent consists of Sobrante, Exchequer, and minor areas of rock land.

The Auburn soils have brown loam, massive, hard surface layers, with similar loam subsoils, and are underlain by greenstone and schists at 12 to 24 inches. Rock outcrops are common.

The Argonaut soils have brown or yellowish-red massive, slightly hard, loam surface layers, over prismatic, very hard yellowish-red clay subsoils. A line of broken stone usually occurs at the upper part of the subsoil.

The subsoil is underlain by weathered greenstone. The permeability of the subsoil is very slow; runoff is rapid; and the erosion hazard is high. The drainage is good to moderately good. Rock outcrops are common.

Because of their shallow depth and rocky character, these soils have severe limitation for septic tank filter fields and deep excavation.

AK-Ep - Auburn-Exchequer association, very rocky, 15 to 75 percent slopes, EG2 eroded.

This association consists of shallow and very shallow, very rocky, loamy soils, underlain by meta-igneous rock. It occupies moderately steep to very steep canyon and mountainous slopes, mainly along the Bear and American Rivers. Vegetation consists mostly of oak, brush, annual grass, and spotted densities of conifers. Elevations range from 250 to 1,400 feet. Mean annual precipitation is 18 to 30 inches, mean annual air temperatures are about 60 to 62 degrees F, and the frost-free season is about 230 to 270 days.

The Auburn soils make up about 60 percent of this association and the Exchequer soils about 30 percent; the remaining 10 percent consists of Sobrante soils, rock land, and stringers of mixed alluvial land.

The Auburn soils are brown loams, massive, hard, underlain by greenstone and schists of 12 to 24 inches. They are well drained, with rapid to very rapid runoff, and high erosion hazard. Rock outcrops are common.

The Exchequer soils are very shallow, yellowish-red, slightly hard, silt loams, underlain by greenstone at 5 to 10 inches. Rock outcrops are abundant, the available water-holding capacity is .75 to 1.5 inches, and fertility is low. Most areas have a thick cover of brush.

This association occurs on canyon slopes of the major rivers. It is used mostly as rangeland for beef cattle.

The restrictive limitations are rockiness, steep slopes, and shallow soil depth.

AK-Wg - Auburn-Whiterock association, rocky, 5 to 30 percent slopes. CE

This association consists of well and somewhat excessively drained soils, developed in fine-grained metamorphosed basic igenous and metamorphosed sedimentary rock. It occurs on gently rolling to hilly uplands in the eastern part of El Dorado county, and on the lower foothills of the Sierra-Nevada Mountains. Vegetation consists of annual grasses and a few scattered oak. Elevations range from 350 to 800 feet. Mean annual precipitation is about 20 to 22 inches, mean annual air temperature is about 60 degrees F, and the frost-free season is about 275 days.

Auburn soils make up 55 percent and Whiterock 30 percent of this association. The other 15 percent includes Pardee soils and soils having loam surface soil, and clay subsoils which overlie bedrock.

The Auburn soils have strong brown, slightly acid, loam surface soils, and yellowish-red, slightly acid, silt loam subsoils. They are underlain at depths of 12 to 24 inches by fine grained metabasic rocks. Coarse fragments, consisting of stones and cobbles, make up about 25 percent by volume of the soil profile. Rock outcrops are common.

The Whiterock soils consist of light-brownish-gray, very strongly acid, loam surface soils, with pale brown, very strongly acid subsoils, resting on slates. The depth to slate bedrock is 5 to 10 inches. The soil contains fragments of slate, and rock outcrops are common.

Auburn soils are fairly good rangeland. The Whiterock soils are more shallow, and vegetation may dry out quickly with the first dry period in the early spring. Runoff is medium to rapid, but erosion hazards are slight to moderate, because they are relatively stable soils.

AK - Auburn association, rocky, 15 to 30 percent slopes.
E

The soils of this association occur on hilly topography. They are formed on metabasic and metasedimentary rock. Rock outcrops are common. Typically, the vegetation consists of grass-oak woodland, with scattered areas of brush and digger pine. The erosion hazard is moderate.

Minor areas consist of Whiterock and Sobrante soils.

The Auburn soils have brown to strongly brown, slightly acid, rocky silt loam surface soil, and reddish-brown to yellowish-red, slightly acid to neutral, silt loam subsoil. Depth to bedrock ranges from 12 to 25 inches. Tombstone-like rock outcrops are common, but scattered areas are rock-free.

The Whiterock soils are pale brown, very shallow, strongly acid, gravelly silt loams, formed on Mariposa slates. The Sobrante soils are brown to strongly brown, moderately deep, silt loams, formed on metamorphic rock. They occur mainly on concave positions.

AK - Auburn association, rocky, 30 to 50 percent slopes.
F

The soils of this association occur on steep foothills, with occasional very steep slopes that break into the major drainageways. They are formed on metabasic and metasedimentary rock. Rock outcrops are common. Typically, vegetation consists of grass-oak woodland, with scattered areas of brush and digger pine. The erosion hazard is moderate to high.

Minor areas consist of Whiterock and metamorphic rockland.

The Auburn soils have brown to strong brown, slightly acid rocky silt loam surface soil, and reddish-brown to yellowish-red, slightly acid to neutral silt loam subsoil. Depth to bedrock varies from 18 to 26 inches. Tombstone-like rock outcrops are common.

The Whiterock soils are pale brown, very shallow gravelly silt loams, formed on Mariposa slates.

Group 2 - AREAS DOMINATED BY MODERATELY DEEP ROCKY SOILS UNDERLAIN WITH METAMORPHIC ROCK.

Br-AK - Boomer-Auburn association, rocky, 9 to 30 percent slopes.
DE

The soils of this association occur on rolling to hilly foothills. They are found in the metabasic and metasedimentary schists. Rock outcrops are common. The soil ranges in depth from moderately deep to shallow. The vegetation consists of oak-grass woodland and commercial stands of coniferous trees. The erosion hazard is moderate.

This association is composed of 55 percent Boomer soils and 45 percent Auburn soils, with minor areas of Sobrante and Argonaut soils.

The Boomer soils have dark brown to yellowish-red, medium acid, rocky loam surface soil, and reddish-brown to red, medium to slightly acid, gravelly sandy clay loam subsoil. Depth to bedrock ranges from 30 to 40 inches. Rock outcrops are common, but scattered areas are rock-free. These soils occur mainly on north and east-facing slopes.

The Auburn soils have brown to strong brown, slightly acid rocky silt loam surface soil, and reddish-brown to yellowish-red, slightly acid to neutral silt loam subsoil. Depth to bedrock ranges from 12 to 26 inches. Rock outcrops are common. These soils occur mainly on south and west-facing slopes.

The Argonaut soils are strong brown gravelly loams, with a clay subsoil. The depth to bedrock ranges from 18 to 30 inches. They occur mainly on slopes less than 15 percent. The Sobrante soils are brown to strong brown, moderately deep silt loams, and occur mainly in concave positions.

Br-AK - Boomer-Auburn association, rocky, 30 to 50 percent slopes.
F

The soils of this association occur on steep foothills, with occasional very steep slopes that break into major drainageways. They are formed on metabasic and metasedimentary schists. Rock outcrops are common. The soils range in depth from moderately deep to shallow. Vegetation consists of commercial stands of timber and grass-oak woodland. The erosion hazard is high.

This association consists of about 55 percent Boomer soils and 45 percent Auburn soils, with minor inclusions of metamorphic rockland.

The Boomer soils have dark brown to yellowish-red, medium acid rocky loam surface soil, and reddish-brown to red, medium to slightly acid, gravelly sandy clay loam subsoil. Depth to bedrock ranges from 30 to 40 inches. Rock outcrops are common. These soils occur mainly on north and east-facing slopes.

The Auburn soils have brown to strong brown, slightly acid rocky silt loam surface soil, and reddish-brown to yellowish-red, slightly acid to neutral silt loam subsoil. Depth of bedrock ranges from 12 to 26 inches. Rock outcrops are common. These soils occur mainly on south and east-facing slopes.

Group 3 - AREAS DOMINATED BY SHALLOW TO DEEP, ACID SOILS UNDERLAIN WITH METAMORPHIC ROCK.

Jp-SQ - Josephine-Sites association, 5 to 30 percent slopes.
CE

The soils of this association occur on gently rolling to hilly mountains. They are formed on schists and slates. These soils are deep. Vegetation consists of conifers and hardwoods. The erosion hazard is slight to moderate. This association is composed of 62 percent Josephine soils and 38 percent Sites, with minor areas of Mariposa soils.

The Josephine soils have brown to yellowish-brown, medium acid gravelly loam to silt loam surface soil, and yellowish-red to red, strongly acid clay loam subsoil. Depth to bedrock ranges from 30 to 60 inches.

The Sites soils have brown to reddish-brown, medium acid loam surface soil, and yellowish-red to red, strongly acid clay subsoil. The depth to bedrock ranges from 36 to 60 inches. The Mariposa soils are shallow, pink to brown silt loams, developed in metamorphic rock.

SQ-Jp - Sites-Josephine association, 5 to 15 percent slopes.
CD

This association consists of deep and moderately deep, loamy soils, formed in place on metamorphosed slates, schists, and meta-igneous rock. The soils are rocky in places, and most have small slaty fragments in the profile. The association occupies moderately sloping to strongly sloping mountainous uplands. Vegetation is pine-mixed-forest and brush. Elevations range from 2,000 to 3,500 feet. Mean annual precipitation is 40 to 55 inches, mean annual air temperatures are 55 to 60 degrees F, and the frost-free season is 180 to 230 days.

The Sites soils comprise about 40 percent, and the Josephine soils about 40 percent of this association. The remaining 20 percent consists of shallow soils such as Mariposa and Maymen, and small areas of rockland.

The Sites soils have brown or reddish-brown, slightly hard, granular, medium acid loam surface layers and yellowish-red or red, blocky, strongly acid clay subsoils, underlain by metamorphosed rock at 36 to 60 inches. The subsoils are slowly permeable, but these soils have good depth and water-holding capacity for growing trees.

The Josephine soils have similar surface layers, but have more permeable reddish-yellow clay loam subsoils. The depth to bedrock is 30 to 50 inches, and rock outcrops are common in places. These soils produce pine with moderate to high growth rates.

These soils produce conifer forests. Cleared areas are planted orchards and irrigated pasture; some grassy areas are used as range. These soils have a severe limitation for septic tank filter fields on slopes of more than 9 percent; the corrosivity for steel pipe is high.

Jp-SQ - Josephine-Sites association, rocky, 15 to 50 percent slopes.
EF

The soils of this association occur on hilly to steep mountains. They are formed in schists and slates. These soils are deep. Rock outcrops are common. The vegetation consists of conifers and hardwoods. The erosion hazard is moderate to high.

This association is composed of about 78 percent Josephine soils, 22 percent Sites soils, and minor areas of Mariposa soils.

The Josephine soils have brown to yellowish-brown, medium acid rocky loam to silt loam surface soil, and yellowish-red to red, strong acid, clay subsoil. Depth to bedrock ranges from 30 to 60 inches. Rock outcrops and slate fragments are common in the profile.

The Sites soils have brown to reddish-brown, medium acid rocky loam surface soil, and yellowish-red to red, strongly clay subsoil. The depth to bedrock ranges from 36 to 60 inches. Rock outcrops and slate fragments are common in the profile.

The Mariposa soils are shallow, rocky silt loams, developed in metamorphic rock.

SQ-Jp-Mh - Sites-Josephine-Mariposa association, rocky, 15 to 50 percent
EF2 slopes, eroded.

This association consists of deep, moderately deep, and shallow, rocky, loamy soils forming in metasedimentary rock. It occurs on strongly sloping to steep mountainous slopes along Highway 80, from Bowman to Gold Run. Vegetation consists of conifer forest, brush, and open areas of grass. Elevations range from 1,600 to 4,000 feet. Mean annual precipitation varies from 30 to 60 inches, mean annual air temperatures are 50 to 60 degrees F, and the frost-free season is 160 to 230 days.

The Sites soils make up about 35 percent, the Josephine soils, about 40 percent, the Mariposa soils, about 15 percent, and Maymen soils, rock land, and tailings the remaining 10 percent of this association.

The Sites soils have brown or reddish-brown, loam, granular, slightly hard, medium acid surface layers, and yellowish-red or red blocky, hard clay subsoils, underlain by metamorphosed rock at 24 to 48 inches. The subsoils are slowly permeable, but these soils have good depth and water-holding capacity for growing trees. Rock outcrops are common.

The Josephine soils have granular, medium acid, brown, silt loam layers, and reddish-yellow silty clay loam, blocky and strongly acid subsoils. The depth to bedrock is 24 to about 40 inches or more, and rock outcrops are common in places. These soils produce pine with moderate to high growth rates.

The Mariposa soils are moderately shallow; they range in depth from 15 to 30 inches. The surface layers are brown, slightly hard silt loams; the subsoils are reddish-yellow, silty clay loams or clay loams that are blocky, hard, and strongly acid; the bedrock is bedded slates and schists. These soils have rapid runoff and high erosion hazards, and are rather low in fertility. Rock outcrops are abundant.

These soils produce conifer forests. The soil limitation for septic tank filter fields is severe due to steep slopes, slow permeability, and in places, shallow soil depth. The limitation for corrosivity on steel pipe is severe because of the high acidity of the subsoils, particularly the subsoils of the Sites series.

Mh-Jp - Mariposa-Josephine association, rocky, 9 to 50 percent slopes.
DF

The soils of this association occur on rolling to steep mountains. They are formed on schists and slates. These soils are shallow to deep, and rock outcrops are common. The vegetation consists of conifers, hardwoods, and brush. The erosion hazard is moderate to high.

This association is composed of about 70 percent Mariposa soils and 30 percent Josephine soils, with minor inclusions of Maymen and Sites soils.

The Mariposa soils have pink to brown, slightly to medium acid rocky silt loam to loam surface soil, and reddish-yellow, medium to strongly acid silt loam to clay loam subsoil. Depth to bedrock ranges from 15 to 30 inches. Rock outcrops and slate fragments are common in the profile.

The Josephine soils have brown to yellowish-brown, medium acid rocky loam to silt loam surface soil, and yellowish-red to red, strongly acid clay loam subsoil. The depth to bedrock ranges from 30 to 60 inches. Rock outcrops and slate fragments are common in the profile.

The Sites soils are moderately deep rocky loams, developed in slates of schists. The Maymen soils are very shallow rocky loams, developed in resistant slates and schists.

Jp-Mh-Mq - Josephine-Mariposa-Maymen association, rocky, 30 to 75 percent
FG slopes.

This association consists of loamy, rocky, moderately deep and shallow soils, formed in bedded slates and schists. It occupies steep and very steep mountainous uplands and canyon slopes of the American and Bear Rivers. Vegetation consists of conifer-forest and brush. Elevations range from 2,000 to 5,000 feet. Mean annual precipitation is 35 to 60 inches, mean annual air temperature is 50 to 60 degrees F, and the frost-free season is 140 to 230 days.

The Josephine soils comprise about 35 percent of the association, the Mariposa soils about 30 percent, the Maymen soils about 30 percent, and the remaining 5 percent consists of areas of rock land, tailings, and Sites soils.

The Josephine soils have brown loam, slightly hard, granular, medium acid, surface layers, and yellowish-red clay loam blocky, hard, medium to strongly acid subsoils, and are underlain by slates, schists, and meta-andesite, at 30 to 50 inches. They occur most commonly on north-facing slopes, and are moderately good-producing timber soils. Rock outcrops are common.

The Mariposa soils are moderately shallow, brown, slightly hard, granular, silt loams, with reddish-yellow silty clay loam blocky, hard subsoils, underlain by slates and schists of depths of 15 to 30 inches. Rock outcrops are common.

The Maymen soils are thin, dark, grayish-brown, soft, granular loams, that rest abruptly on hard metamorphosed sediments at depths of usually less than 10 inches. Rock outcrops are common; runoff rates are very rapid, and these soils generally have a dense cover of brush.

These soils are mostly the low-producing timber lands of the area, and comprise a sizeable part of the watershed on canyon walls adjacent to the major streams and rivers. They have severe limitations for septic tank filter fields because of their steep slopes, shallow depth, and rocky profiles.

Mh - Mariposa association, rocky, 50 percent plus slopes.
G

The soils of this association occur on very steep slopes that break into the major drainageways. They are formed on schists and slates. These soils are shallow, and rock outcrops are common. The vegetation consists of brush, hardwoods, and conifers.

Minor areas consist of Maymen, Josephine, and Sites soils, and metamorphic rockland.

The Mariposa soils have pink to brown, slightly to medium acid rocky silt loam to loam surface soil, and reddish-yellow, medium to strongly acid silt loam to clay loam subsoil. Depth to bedrock ranges from 15 to 30 inches. Rock outcrops and slate fragments are common in the profile.

The Maymen soils are very shallow, rocky loams, developed in resistant slates and schists. The Josephine and Sites soils are deep loams, formed in slates and schists.

Group 4 - AREAS DOMINATED BY MODERATELY DEEP, EROSIVE SOILS UNDERLAIN WITH BASIC ROCK.

Rl - Rescue association, 2 to 15 percent slopes, eroded.
BD2

The soils of this association occur on undulating to rolling foothills. They are formed in coarse-grained basic igneous rock, and they are easily eroded when cover is disturbed. These soils are moderately deep. The vegetation consists of grass-oak woodland, with scattered areas of chamise brush and pine.

This association is composed of 95 percent Rescue soils and 5 percent Argonaut, with minor areas consisting of Berrendos soils and clayey land.

The Rescue soils have reddish-brown to yellowish-red, medium to slightly acid sandy loam surface soil, and red to yellowish-red, slightly acid sandy clay loam subsoil. These soils are eroded, and have a moderate erosion hazard. The depth to bedrock ranges from 24 to 40 inches.

The Argonaut soils have reddish-brown to yellowish-red clay loam surface soil, and reddish-brown to strong brown massive clay subsoil. The depth to the clay subsoil ranges from 15 to 20 inches. These soils occur in drainageways and concave slopes that generally range from 3 to 9 percent.

The Berrendos soils are brown to dark brown clay loams and clays, from alluvium carried from Rescue soil material. They occur next to streams, and are moderately well to imperfectly drained. The clayey alluvial land is a very dark gray to black, poorly drained clay. It occurs in wet swales and below seeps.

R1 - Rescue association, stony, 25 to 30 percent slopes, eroded.
E2

The soils of this association occur on hilly uplands. They are formed on coarse-grained basic igneous rock, and they are easily eroded when cover is disturbed. These soils are moderately deep, and contain stones in the profile. The vegetation consists of chamise brush, with scattered areas of pine, oak, and grass.

The Rescue soils have reddish-brown to yellowish-red, medium to slightly acid stony sandy loam surface soil, and red to yellowish-red, slightly acid sandy clay loam subsoil. These soils are eroded, and have a high erosion hazard. The depth to bedrock ranges from 24 to 40 inches.

R1 - Rescue association, very stony, 9 to 50 percent slopes, eroded.
DF2

The soils of this association occur on rolling to steep foothills. They are formed in coarse-grained basic igneous rock, and they are susceptible to erosion. These soils are moderately deep and very stony. The vegetation consists of chamise brush, with scattered areas of pine, oak, and grass.

The Rescue soils have reddish-brown to yellowish-red, medium to slightly acid, very strong sandy loam surface soil, and red to yellowish-red, slightly acid, sandy clay loam subsoil. Stones cover 3 to 15 percent of the surface. Depth to bedrock ranges from 24 to 40 inches. These soils are eroded, and have a moderate to high erosion hazard.

Sw-R1-GB - Sobrante-Rescue-Guenoc association, rocky, 2 to 50 percent slopes.
BF

This association consists of moderately deep, rocky, medium textured soils that are formed in place on meta-igneous rock. It occupies the upper foothills at elevations between 1,000 and 2,000 feet, east of Highway 49.

In this transitional zone, the grass-oak areas merge with the conifer forested uplands. Mean annual precipitation is 30 to 40 inches, mean annual air temperatures are 60 degrees F, and the frost-free season is 220 to 275 days.

The Sobrante soils comprise about 50 percent, the Rescue soils, about 35 percent, and the Guenoc soils, about 10 percent of the association. The remaining 5 percent consists of Auburn soils and inclusions of rock land.

The Sobrante soils have brown, loam, massive, slightly hard, slightly acid surface layers, and brown or reddish-brown, heavy loam, blocky, slightly acid subsoils, which are underlain by greenstone and schists at 20 to 36 inches. Rock outcrops are common in places.

The Rescue soils have reddish-brown, loam surface layers, and blocky, hard medium acid, dark red clay loam subsoils, underlain by metabasic rock at 24 to 40 inches. The permeability of the subsoil is moderately slow. Rock outcrops are common in places.

The Guenoc soils have dark reddish-brown, massive, loam, slightly hard surface layers, and dark red, hard clay subsoils, with blocky structure underlain by metabasic rock at 24 to 36 inches. The subsoil permeability is slow. Rock outcrops occur commonly in some areas.

These soils are used mostly for range and timber. The major limitations for use are steep slopes and rock outcrops.

CS-Ms-Wl - Cohasset-McCarthy-Windy association, 5 to 50 percent slopes.
CF

This association consists of deep and moderately deep, mostly cobbly loamy soils, developing in andesitic conglomerate and breccia. They occupy tabular ridges and slopes at elevations of 3,000 to 5,000 feet. The vegetation is predominantly conifer forest. Mean annual precipitation is 40 to 60 inches, mean annual air temperature is 50 to 60 degrees F, and the frost-free season is 140 to 230 days.

The Cohasset soils make up about 45 percent, the McCarthy soils, about 20 percent, and the Windy soils, about 20 percent of the association. The remaining 15 percent consists of Aiken soils, and lesser areas of shallow cobbly soils.

The Cohasset soils are cobbly, granular, soft, reddish-brown loams, over hard, blocky, yellowish-red, clay loams, underlain by cobbly conglomerate at 30 to 46 inches. These soils have a 6 to 8 inch water-holding capacity, and are good timber-producing soils.

The McCarthy soils are dark grayish-brown, granular, soft cobbly loams, with soft granular cobbly loam subsoils, over conglomerate; there is little textural change in the profile with depth. Tuff-cemented conglomerate occurs at 18 to 30 inches.

The Windy soils occur at elevations above 5,000 feet, near Blue Canyon. The surface layers are dark brown, very cobbly and stony loams, with very cobbly or stony brown sandy loam sublayers, underlain by breccia and conglomerate at 24 to 36 inches. The vegetative cover, in places, consists of thick stands of manzanita.

These soils are timber-producing lands, with medium to high site quality for producing Ponderosa pine. Some side slopes of narrow ridges are very steep, and care must be exercised in logging. The cobbliness of the profiles and the short growing season restrict their use as orchard land, and for other intensive agricultural uses. These soils have severe limitations for septic tanks because of steep slopes, and in some cases because of the shallowness of the profiles.

Group 5 - AREAS DOMINATED BY SHALLOW TO VERY SHALLOW, VERY ROCKY OR VERY COBBLY SOILS, UNDERLAIN BY VOLCANIC CONGLOMERATE OR METAMORPHOSED ROCK.

Tt-RL - Toomes-Rock land association, 0 to 15 percent slopes.
AD

This association consists of very shallow, very cobbly, medium-textured soils, underlain by cemented volcanic conglomerate. It occupies tabular ridges on volcanic mudflows just east of Highway 99E, extending from south of Roseville to the City of Lincoln. The vegetation is grass-forb and scattered oak. Elevations range from 180 to 900 feet. Mean annual precipitation is about 17 to 22 inches, mean annual air temperatures are 62 degrees F, and the frost-free season is 220 to 240 days.

Toomes soils make up about 60 percent and Rock land about 35 percent of this association. The remaining 5 percent consists of Inks and Supan soils.

Toomes soils are brown, very cobbly loams, massive, slightly hard, slightly to medium acid, and underlain by a cemented andesitic conglomerate at 8 to 16 inches. They have moderate permeability above the conglomerate, medium to rapid runoff, and low available moisture.

The areas of Rock land consist of exposures of conglomerate, welded tuff, and layered outcrops on side slopes. A large part of the area has a thin mantle of cobbly soil that supports some grass and forbs. The bedrock is hard and not easily broken. The runoff is very rapid, and the moisture holding capacity is very low.

These soils are used agriculturally as rangeland. Urban development has begun on the Sunset City development near Rocklin. These tablelands afford excellent view sites for homes. Because of their shallow depth, cobbliness, and the hardness and density of this bedrock, these soils have severe limitations for septic tanks, installation of underground pipe, and excavation.

Tt-Io-sr - Toomes-Ink-Supan association, 15 to 30 percent slopes.
E

These soils consist of very cobbly, loamy soils, underlain by cemented conglomerate. They occur on moderately steep side hills of volcanic tablelands in the lower foothills. Vegetation consists of oak-grass. Elevations range from 200 to 1,600 feet. Mean annual precipitation is 18 to 28 inches, mean annual air temperatures are about 60 to 62 degrees F, and the frost-free season is about 230 to 270 days.

Toomes soils make up about 40 percent, Inks soils about 30 percent, and Supan soils about 20 percent of this association. About 10 percent consists of inclusions of Ahwahnee soils, and shallow, brown, sandy loam soils, over granitic rock.

The Toomes soils have brown, very cobbly loam, slightly hard, slightly to medium acid surface layers, and are underlain by andesitic conglomerate at 8 to 16 inches. They have rapid runoff and moderate erosion hazard.

The Inks soils have brown, cobbly loam, slightly acid, massive, and hard surface layers, and brown or dark brown, hard, massive, slightly acid, cobbly sandy clay loam subsoils, underlain by stratified conglomerate and mudstone at 20 to 36 inches. These soils are well drained and have moderately good water-holding capacity, but are usually too steep and cobbly to cultivate.

These soils are used mostly for range. They have severe limitations for septic filter fields and for deep excavations, because of shallow depth, cobbliness, and steep slopes.

Hj-Dv-RL - Henneke-Dubakella-Rock land association, 5 to 75 percent slopes.
CG

This association consists of very rocky, very shallow, low-fertility soils, developed on serpentine rock. One major area extends northward from the city of Auburn, roughly paralleling Highway 49; another occurs on the eastern edge of the area, and crops out between the Forest Hill Divide and the towns of Alta and Baxter at higher elevations. Vegetation consists of shrubs, oak, grass, and conifers. Elevations range from 1,000 to 5,000 feet. Mean annual precipitation is between 30 and 60 inches, mean annual air temperatures are 50 to 60 degrees F, and the frost-free season is 140 to 270 days.

The Henneke soils make up about 30 percent; the Dubakella soils about 30 percent; Rock land makes up about 30 percent, and the remaining 10 percent consists of inclusions of moderately deep, loamy soils, formed in serpentine rock under timber and Mariposa and Josephine soils.

The Henneke and Dubakella soils have reddish-brown, soft, granular loam surface layers, and reddish-brown or yellowish-red blocky, slightly hard, heavy loam, or clay loam subsoils that overlie serpentine rock at 8 to 15 inches. The Henneke soils occur in foothills under oak-grass; the Dubakella soils are generally timbered at higher elevations. Both soils have abundant rock outcrops, and many shallow areas over bedrock. The areas of Rock land are mostly barren outcrops of serpentine, and are usually steep and precipitous.

The soils are low-producing brushlands or forested areas. Some areas along Highway 49 are used as home and industrial sites. Most areas have a severe limitation for septic tanks, pipelines, and excavation, because of their shallow depth, rockiness, and steep slopes.

Mq-RL - Maymen-Rock land association, 50 to 75 percent slopes.
G

This association consists of very shallow, very rocky soils, formed in metamorphosed rock on the very steep canyon walls of the American River, mostly above elevations of 1,000 feet. The vegetation consists of brush and scattered conifers. The mean annual precipitation is 25 to 45 inches, the mean annual air temperature is 50 to 60 degrees F, and the frost-free season is about 160 to 240 days.

The Maymen soils comprise about 50 percent of the association; Rock land about 40 percent, and the remaining 10 percent consists of Mariposa, Josephine, and small areas of Sites soils.

The Maymen soils are thin, dark grayish-brown, loam surface layers that are granular and soft, and usually less than 10 inches deep, over hard metamorphosed sedimentary and igneous rock. These soils have very rapid runoff, high erosion hazard, and low water-holding capacity. Rock outcrops are common.

The areas of Rock land are large monolithic rock exposures that jut out on steep canyon walls, coupled with colluvial rubble and stringers of stony alluvium in creek beds.

These soil areas are used by wildlife and as watershed land. Many areas adjoin the proposed Auburn reservoir, and may be used as fill material for the dam, or may become, with great modification, future recreation sites. Some areas are timbered with conifers and oak, which are suited for firewood, poles, and lumber.

RL - Rock land association.

This association consists of Rock land that occurs on hard metamorphic rock and serpentine rock. This association occurs on all slopes. The erosion hazard is slight to moderate. Included are minor areas of very shallow to shallow rocky soils.

Group 6 - AREAS DOMINATED BY DEEP AND VERY DEEP SOILS, UNDERLAIN BY VOLCANIC CONGLOMERATE, METAMORPHIC, OR GRANITIC ROCK.

Ai-CS - Aiken-Cohasset association, 0 to 5 percent slopes.
AB

This association comprises the very deep and deep, loamy soils, underlain by volcanic conglomerate in the mountainous uplands. They occur on broad, flat, or gently sloping tablelands; the more extensive delineations occur in the Foresthill Divide area. Vegetation consists of conifer forest. Elevations range from 2,700 to 3,600 feet. Mean annual precipitation is between 40 and 60 inches, part of which falls as snow; mean annual air temperatures are 55 to 60 degrees F; the frost-free season is 180 to 230 days.

The Aiken soils comprise about 80 percent, and the Cohasset soils about 15 percent of this association. The remaining 5 percent consists of tailings, deep reddish-brown, gravelly soils, and minor inclusions of Sites and Josephine soils.

The Aiken soils have thick, friable, soft, granular, slightly to medium acid, reddish-brown loam surface layers, and strongly acid, red, blocky, hard clay subsoils, and are underlain by weathered conglomerate at 48 to 70 inches. These soils have good moisture-holding capacity and moderate fertility; they comprise some of the best forest lands in the county.

The Cohasset soils have reddish-brown, granular, soft, slightly to medium acid, loam surface layers, and yellowish-red, sometimes cobbly, blocky, hard, clay loam, strongly acid subsoils, and are underlain by cobbly conglomerate at about 40 to 60 inches. These soils have good water-holding capacity, produce rapid-growing timber, are sometimes cobbly, and are generally shallower than the Aiken soils.

These soils comprise the best quality timberlands in the area. Attempts to grow walnuts have been initiated near Forest Hill and Iowa Hill. The townsite of Forest Hill is located on this association. This association has a moderate limitation for septic filter fields, because of moderately slow and slow permeability of the subsoils. The limitation for allowable soil pressure is severe, and corrosivity for steel pipe is high; the shrink-swell hazard is moderate.

Ai-CS - Aiken-Cohasset association, 5 to 15 percent slopes.
CD

This association consists of very deep and deep loamy soils, formed in volcanic conglomerate. It occupies moderately to strongly sloping side-hills of tabular volcanic flows, at elevations mostly above 2,500 feet. Vegetation is mostly conifer forest, dominated by pine. Mean annual precipitation is 40 to 55 inches, mean annual air temperatures are 55 to 60 degrees F, and the frost-free season is 180 to 230 days.

The Aiken soils comprise about 65 percent of this association, the Cohasset soils about 20 percent, and inclusions of deep, reddish-brown, gravelly soils, tailings and McCarthy soils, the remaining 15 percent.

The Aiken soils have reddish-brown, soft, granular, slightly to medium acid loam surface soils, and blocky, hard, red, clay subsoils, and are underlain by volcanic conglomerate.

The Cohasset soils have similar surface layers, less developed clay loam subsoils, and in places, have abundant loose cobbles in the profile. The Cohasset soils tend to occur on the perimeter of volcanic flows, and on the steeper slopes.

These soils are mostly timbered, but most forests consist of regrowth pine and heavy populations of black oak and incense cedar. Isolated homesites are established in some areas, some with small acreages planted to orchards and home gardens. These soils have a severe limitation for septic filter fields on slopes of more than 9 percent; they have severe limitation for allowable soil pressure (see criteria in Appendix III), a high limitation for corrosivity on steel pipe because of the high acidity of the subsoils, and a moderate shrink-swell potential, because of the high percentage of montmorillinitic clay, particularly in the subsoils of the Aiken series.

Ai-CS - Aiken-Cohasset association, 15 to 30 percent.
E

This association consists of deep loamy soils, formed in volcanic conglomerate. It occupies moderately steep side slopes and draws adjoining the volcanic flows, mostly in the vicinity of Forest Hill. Vegetation is conifer forest, dominated by pine. Elevations range from 2,500 to 3,500 feet. Mean annual precipitation is 40 to 55 inches, mean annual air temperatures are 45 to 60 degrees F, and the frost-free season is 180 to 230 days.

The Aiken soils comprise about 45 percent; the Cohasset soils comprise about 35 percent, and inclusions of tailings, deep, gravelly, reddish-brown soils, and Sites and Josephine soils comprise about 20 percent of this association.

The Aiken and Cohasset soils have similar reddish-brown loam surface layers. The Aiken soils have red, clay subsoils; the Cohasset soils have yellowish-red, clay loam subsoils. Both soils are excellent timber-producing soils.

These soils are used mostly for growing timber. Cleared areas have a tendency to erode badly. This association has a severe limitation for septic filter fields, because of steep slopes. Allowable soil pressure and corrosivity of steel pipe limitations are severe or high.

Group 7 - AREAS DOMINATED BY DEEP, SANDY LOAM SOILS, UNDERLAIN WITH GRANITIC ROCK.

AJ-SL - Auberry-Sierra association, 5 to 15 percent slopes.
CD

The soils of this association occur on gently rolling to rolling foothills. They are formed in granodiorite rock, and are easily eroded when cover is disturbed. These soils are deep. The vegetation consists of oak-grass and scattered pockets of commercial conifers.

This association is composed of about 85 percent Auberry soils and 15 percent Sierra soils, with minor areas consisting of Ahwahnee soils.

The Auberry soils have brown, medium acid, coarse, sandy loam surface soil, and light yellowish-brown to brown, medium to slightly acid, sandy clay loam subsoil. The depth to weathered bedrock is more than 40 inches. The erosion hazard is moderate to high.

The Sierra soils have brown, medium to slightly acid, sandy loam surface soil, and yellowish-red to red, slightly acid clay loam subsoil. The depth to weathered bedrock is more than 40 inches. These soils are eroded, and have a moderate to high erosion hazard.

The Ahwahnee soils are moderately deep, grayish-brown coarse sandy loams, formed in granodiorite rock.

AJ-Ah - Auberry-Ahwahnee association, rocky, 30 to 50 percent slopes.
F

The soils of this association occur on steep foothills, with occasional very steep slopes that break into the major drainageways. They are formed in granodiorite rock, and are easily eroded when cover is disturbed. These soils are deep to moderately deep, and contain rock outcrops. The vegetation consists of oak-grass, with scattered areas of commercial conifers and brush.

This association is composed of about 60 percent Auberry soils and 40 percent Ahwahnee, with minor inclusions of Sierra and Chawanakee soils.

The Auberry soils have brown, medium acid, rocky, coarse sandy loam surface soil, and light yellowish-brown to brown, medium to slightly acid, sandy clay loam subsoil. The depth to weathered bedrock is greater than 24 inches. Rock outcrops are common. The erosion hazard is very high.

The Ahwahnee soils have grayish-brown, slightly acid to neutral, rocky, coarse sandy loam surface soil, and light, yellowish-brown, slightly to medium acid, coarse, sandy loam subsoil. Depth to weathered bedrock ranges from 24 to 40 inches. Rock outcrops are common. The erosion hazard is very high. The Ahwahnee soils occur mainly on the steep side slopes that break into the major drainageways.

The Sierra soils are moderately deep to deep, rocky, grayish brown to brown sandy loams, developed from granodiorite rock. The Chawanakee soils are shallow, rocky, grayish-brown, coarse sandy loams, developed from granodiorite rock.

Ah-SL - Ahwahnee-Sierra association, 0 to 5 percent slopes.
AB

The soils in this association occur on nearly level flats and gently sloping foothills. They are forming in place on granitic rock in the lower foothills centered in the Loomis Basin. These soils are deep and moderately deep, light loamy, with medium and moderately fine textured subsoils; they are erosive when left unprotected. Vegetation consists of grass-oak. Elevations range from 150 to 500 feet. Mean annual precipitation is 20 to 27 inches, mean annual temperatures are 60 to 62 degrees F, and the frost-free season is about 230 to 270 days.

This association consists of about 70 percent Ahwahnee soils and 20 percent Sierra soils. The remaining 10 percent consists of granitic alluvium, clayey wet swales, small areas of shallow granitic soils, and rock land.

The Ahwahnee soils have brown, sandy loam, granular, slightly hard, slightly to medium acid surface soils, and brown, loam, blocky, slightly hard, slightly to medium acid, loam subsoils, and underlain by granitic rock at 30 to 48 inches. Some rock outcrop exposures occur.

The Sierra soils have brown or reddish-brown, coarse sandy loam, massive, slightly hard, medium acid surface layers, and red, sandy clay loam, massive, very hard, slightly acid subsoils, underlain by coarse-grained weathered granitic rock at 26 to 48 inches.

The Ahwahnee and Sierra soils are used for orchard, pasture, and range; the towns of Rocklin and Loomis occur on this association, as do many homesites, some industry, and major roadways.

Ah-SL - Ahwahnee-Sierra association, 5 to 15 percent slopes, eroded.
CD2

The soils of this association occur on gently rolling and rolling foothills. They are mostly moderately deep, well drained, and moderately eroded. These soils are formed in granitic rock, and have scattered rock outcrops. Vegetation consists of grass-oak. Elevations range from 150 to 900 feet. Mean annual precipitation is 20 to 28 inches, mean annual temperatures are 60 to 62 degrees F, and the frost-free season is about 230 to 270 days.

This association consists of about 60 percent Ahwahnee soils, 30 percent Sierra soils, and 10 percent soils in wet swales, brown soils forming in granitic rock, with clay loam subsoils, rock land, and shallow soils over quartz diorite.

The Ahwahnee soils are brown, coarse, sandy loams, slightly hard, granular, and slightly to medium acid, with brown, loam, blocky, hard, subsoils that overlie granitic rock at depths of 30 to 48 inches. The bedrock is usually deeply weathered, but hard rock outcrops occur in places.

The Sierra soils have reddish-brown, coarse, sandy loam, massive, medium acid surface layers, and red, sandy clay loam, slightly acid subsoils. The subsoils are underlain by coarse-grained, weathered granitic rock at 26 to 48 inches. The permeability of these soils is moderately slow; the runoff is medium to rapid; the erosion hazard is high.

The soils in this association are used for range, dryland and irrigated pasture, deciduous orchard, and some vineyard. Non-agricultural uses include building locations for homes, schools, some industrial plants, and railroads. Limitations for septic tank filter fields are severe, because the slope exceeds 9 percent.

Ah-SL - Ahwahnee-Sierra association, rocky, 15 to 50 percent slopes, eroded. EF2

The soils in this association occur on the moderately steep and steep uplands in the middle foothill areas near Ophir, Newcastle, and on slopes dropping off into Folsom Reservoir. The soils are well drained, moderately deep, and formed in granitic rock. Rock outcrops occupy from 5 to 20 percent of the surface area, but many slopes are comparatively rock-free. Vegetation is grass-oak. Elevations range from 150 to 900 feet. Mean annual precipitation is 20 to 28 inches, mean annual temperatures are 60 to 62 degrees F, and the frost-free season is about 230 to 270 days.

This association is comprised of about 70 percent Ahwahnee soils, and 20 percent Sierra soils; the remaining 10 percent includes small areas of very shallow soils, formed on granitic rock and areas of rock land.

The Ahwahnee soils have brown, coarse, sandy loam surface layers, and brown, loam subsoils, and are underlain by bedrock at 30 to 48 inches. The runoff is very rapid, and the erosion hazard is high. Rock outcrops are common.

The Sierra soils are reddish-brown, coarse, sandy loams, with red, sandy clay loam subsoils, and are underlain by granitic rock at 26 to 48 inches. Most areas have rock outcrop. The runoff is very rapid, and the erosion hazard is high.

These soils are used for range; some of the gentler slopes are used for orchard, pasture, and vineyard. Part of this association makes up a portion of the shoreline of Folsom Lake (recreation area), and part is urbanized. Steep slopes and rock outcrops are the dominant limitations to most uses.

Group 8 - AREAS DOMINATED BY VERY DEEP, WELL DRAINED SOILS OF ALLUVIAL PLAINS AND LOW TERRACES ALONG STREAM CHANNELS.

Pn - Perkins association.

This association consists of deep soils, formed in well-drained, moderately coarse to moderately fine-textured, gravelly alluvium. It occurs as nearly level low terraces east of Sacramento, at elevations of approximately 75 to 100 feet. Natural cover was grass, but most areas were cultivated and are now becoming urbanized. Mean annual precipitation is 17 to 18 inches, mean annual air temperatures are about 60 degrees F, and the frost-free season is about 280 to 300 days.

Perkins soils make up 90 percent of the association. The remainder is composed of inclusions of tailings and soils of the Redding series.

Perkins soils have yellowish-brown, medium acid, gravelly loam surface soils, and yellowish-red, gravelly, neutral, heavy clay loam subsoils. They are underlain by very gravelly loam to clay loam substrata.

These soils have been used for dry-farmed grain, irrigated orchards, and vineyards. They are rapidly becoming urbanized.

Rc-CG - Ramona-Chualar-Sandy alluvial land association.

The soils of this association occur on nearly level stream terraces. They are developing in alluvium from predominantly granitic sources. They are very deep, mostly well drained, and with light loamy surface layers. Most areas are next to or near stream channels. The vegetation of uncultivated areas consist of annual grass and forbs, and scattered Valley Oak; cottonwood and willow trees are common along stream channels. Elevations range from 30 to 500 feet. Mean annual precipitation is 18 to 25 inches, mean annual temperatures are about 60 to 62 degrees F, and the frost-free season is 230 to 270 days. Most areas are cultivated; some parcels are used as dryland pasture.

Ramona soils comprise about 35 percent, Chualar soils about 20 percent, and Sandy alluvial soils about 10 percent of this association. The remaining 35 percent is composed of inclusions of young soils developed in recent alluvium, other alluvium underlain by hardpans, and strongly sloping phases of Ramona soils on knolls.

The Ramona soils have brown, fine sandy loam, massive surface layers, and reddish-brown, sandy clay loam, blocky subsoils, which are underlain by stratified, softly consolidated, granitic sediments, at depths of 38 to 50 inches. The profile is mostly slightly acid throughout. The subsoil permeability is moderately slow.

The Chualar series are well-drained soils, with dark grayish-brown, sandy loam, granular, slightly acid surface layers, and brown, sandy clay loam, blocky, neutral to mildly alkaline subsoils. The substrata are moderately fine to moderately coarse-textured granitic sediments. The permeability of the subsoil is moderately slow.

The Sandy alluvial land consists of pale brown, loose, loamy sand surface layers, underlain by variably stratified but dominantly fine sands, layered with light gray to pale yellow silts, clays, and fines from mining operations. Permeability is variable, depending on the thickness and continuity of the silt and clay lenses.

This association makes up some of the best soils in the area for growing the widest selection of climatically adapted crops. Limitation for non-agricultural uses such as septic tank filter fields is moderate, because of the moderately slow permeability of the subsoils of the more extensive soils.

Group 9 - AREAS DOMINATED BY SHALLOW, CLAYPAN, AND HARDPAN SOILS, ON NEARLY LEVEL TO SLOPING TERRACES

Ri-cg - Redding-Corning association, 0 to 15 percent slopes, eroded.
AD2

The soils in this association occur on well-drained, nearly level to rolling terraces. They are developing in gravelly, mixed alluvium. They are underlain by claypans, hardpans, or both, and are moderately well drained. These soils commonly have strongly acid subsoils and low fertility levels. The vegetation consists of grass-forb and a few scattered oak. Elevations range from 75 to 250 feet. Mean annual precipitation is 18 to 25 inches, mean annual temperatures are about 60 to 62 degrees F, and the frost-free season is 230 to 270 days. This association is used for range, pasture, and grain.

The Redding soils comprise about 60 percent of the association, and the Corning soils about 30 percent; the remainder is comprised of the Kimball series, and deep, brown, gravelly soils with reddish-brown gravelly clay loam subsoils, plus stringers of alluvium in drainageways.

The Redding soils have reddish-brown, gravelly loam, massive, hard, slightly acid surface layers, over a dark red, blocky, extremely hard, strongly acid claypan. The claypan is underlain at 10 to 15 inches by a very hard indurated hardpan. These soils are very slowly permeable, and have a low water-holding capacity.

The Corning soils have brown, gravelly loam, massive, medium to strongly acid surface layers, and yellowish-red, clay, blocky, strongly acid subsoils, which are underlain at depths of 16 to 24 inches from the surface by semi-consolidated gravelly alluvium. The drainage is good to moderately good; the permeability is very slow in the subsoil; the erosion hazard is moderate.

The soils in this association have restrictive hardpans and strongly acid sublayers, and are rather low in fertility. Limitations for septic tank filter fields are severe, and the corrosivity hazard for untreated steel pipe is high.

Group 10 - AREAS DOMINATED BY SHALLOW TO MODERATELY DEEP SOILS, FORMED IN PLACE ON GENTLY ROLLING TO HILLY UPLANDS.

Fj-TA-Rr - Fiddyment-Trigo-Rocklin association, 2 to 15 percent slopes, eroded.
BD-2

This association consists of well to somewhat excessively drained soils, developed in siltstone and sandstone. It occurs on undulating to rolling uplands northeast of Sacramento and extending to the Placer County line. Elevations range from approximately 100 to 250 feet. The natural vegetation consists of annual grasses. Mean annual precipitation is about 18 to 20 inches, mean annual air temperatures are about 60 degrees F, and the frost-free season is 275 to 300 days. This association comprises about 7 percent of the County.

Fiddyment soils comprise 50 percent, Trigo soils 25 percent, and Rocklin soils 15 percent of the association. The balance consists of about 10 percent inclusions of soils of the San Joaquin and Ramona series, and shallow claypan soils, developed in unconsolidated alluvium.

Fiddyment soils have grayish-brown, medium acid, fine, sandy loam surface soils and yellowish-brown, slightly acid, clay subsoils. Trigo soils have pale brown, slightly acid, fine, sandy loam surface and subsoils, 10 to 20 inches deep, over consolidated siltstones and sandstones. Rocklin soils have light brown, slightly acid, fine, sandy loam surface soils, and yellowish-red, slightly acid, heavy loam subsoils. They are underlain at 20 to 36 inches by a thin hardpan, which rests on top of somewhat cemented stratified sediments.

They have been used extensively for grain and pasture, but many areas are rapidly becoming urbanized. These soils have a moderate to high erosion hazard.

Group 11 - AREAS DOMINATED BY SOILS GREATLY ALTERED BY MINING OPERATIONS AND/OR MINING PITS.

TX - Placer Diggings, Tailings, and Pits association.

This association consists of miscellaneous land types; extensive soil areas have been so altered, excavated, and changed by mining operations that soil characteristics and predictive interpretations are quite variable.

Placer diggings make up about 50 percent, Tailings about 25 percent, and Pits about 25 percent of this association.

Placer diggings consist mostly of gravelly alluvium, near present streams that have been worked by small dredges, rockers, and sluicers. In some areas, most of the mine silts and clays have been removed, and the remaining material consists of sands, gravels, and stones. Many areas have been smoothed over or releveled.

APPENDIX IV
FLORA

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Horsetail	Equisetaceae	Equisetum sp.	Horsetail rush
Fern	Pteridaceae	Pteridium aquilinum	Bracken fern
		Aspidotis californica	California lace fern
		Pellaea mucronata	Bird's foot fern
		Pityrogramma triangularis	Gold fern
		Adiatum Jordani	California maidenhair fern
	Aspidiaceae	Dryopteris arguta	Shield or wood fern
	Blechnaceae	Woodwardia fimbriata	Woodwardia fern
	Polypodiaceae	Polypodium californicum	Licorice fern
Pine	Pinaceae	Pinus attenuata	Knobcone pine
		Pinus ponderosa	Yellow pine
		Pinus sabiniana	Digger pine
		Pseudotsuga Menziesii	Douglas fir
Cypress	Cupressaceae	Calocedrus decurrens	Incense cedar
Yew	Taxaceae	Taxus brevifolia	Western yew
		Torreya californica	California nutmeg
Laurel	Lauraceae	Umbellularia californica	California laurel
Crowfoot	Ranunculaceae	Dephinium patens	Larkspur
		Dephinium Hanseni	Foothill larkspur
		Delphinium hesperium	Western larkspur
		Ranuculus occidentalis	Western buttercup
		Ranunculus californicus	California buttercup
		Ranunculus hevecarpus	Downy buttercup
		Ranunculus muricatus	Downey buttercup
		Ranunculus hystriculus	Downey buttercup
		Ranunculus aquatilis	Water buttercup
		Clematis ligusticifolia	Yerba de chivato
		Clematis Lasiantha	Virgin's bower
		Thalictrum polycarpum	Meadow rue
Barberry	Berberidaceae	Berberis dictyota	Barberry
Mallow	Malvaceae	Malva parviflora	Cheeseweed
		Sidalcea Hartwegii	Checker
Geranium	Geraniaceae	Geranium dissectum	Cranesbill
		Geranium carolinianum	Cranesbill

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Geranium (con't.)		Erodium obtusiplicatum	Stork's bill, filaree
		Erodium botrys	Stork's bill, filaree
		Erodium moschatum	Stork's bill, filaree
		Erodium cicutarium	Red stem filaree
False mermaid	Limnanthaceae	Limnanthes alba	Meadow form
		Limnanthes triata	Meadow form
Caltrop	Zygophyllaceae	Tribulus terrestris	Caltrop or puncture vine
Spurge	Euphorbiaceae	Eremocarpus setigerus	Turkey mullein
		Euphorbia crenulata	Spurge
		Euphorbia maculata	Spurge
Rock rose	Cistaceae	Helianthemum scoparium	Rock rose
Rock nettle	Loasaceae	Mentzelia laevicaulis	Blazing star
Violet	Violaceae	Viola Douglasii	Violet
St. John's wort	Hypericaceae	Hypericum mutilum	St. John's wort
		Hypericum perforatum	Klamath weed
Poppy	Papaveraceae	Platystemon californicus	Creamcups
		Meconella californica	*
		Eschscholzia caespitosa	Frying pan poppy
		Eschscholzia lobbii	Frying pan poppy
		Eshscholzia californica	California poppy
Mustard	Cruciferae	Sterpthanthus polygaloides	
		Strepthanthus diversifolius	
		Lepidium nitidum	Pepper grass
		Thlaspi arvense	Penny grass
		Sisymbrium officinale	Hedge mustard
		Sisymbrium irio	London rocket
		Arabidopsis theliana	
		Brassica campestris	Field mustard
		Raphanus sativus	Wild radish
		Raphanus raphanistrum	Jointed charlock
		Rorippa islandica	Yellow cress
		Nasturtium officinale	Watercress
		Cardamine oligosperma	Bitter cress
		Tropidocarpum gracile	
		Capsella bursa-pastoris	Shepherd's purse

*When no common species name is given, it means that none is known.

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Mustard (con't.)		Athysanus pusillus	
		Thysanocarpus radians	Fringe pod
		Thysanocarpus curvipes	Fringe pod
		Erysimum capitatum	Wallflower
		Lobularia maritima	Sweet alyssum
Pink	Caryophyllaceae	Stellaria media	Common chickweed
		Cerastium viscosum	Mouse-ear chickweed
		Spergula arvensis	Sand spurrey
		Silene gallica	Windmill pink
		Silene california	Indian pink
		Tunica prolifera	Pink grass
		Saponaria officinalis	Bouncing bet
Purslane	Portulaceae	Portulaca oleracea	Purslane
		Calandrinia ciliata	Red maids
		Montia perfoliata	Miner's lettuce
Buckwheat	Polygonaceae	Eriogonum umbellatum	Wild buckwheat
		Eriogonum latifolium	Wild buckwheat
		Rumex angiocarpus	Sheep sorrel
		Rumex conglomeratus	
		Rumex crispus	Curly dock
		Rumex pulcher	Fiddle dock
		Polygonum puncatum	Water smartweed
		Polygonum convolvulus	Black bindweed
Goosefoot	Chenopodiaceae	Chenopodium ambrosioides	Mexican tea
Storax	Styracaceae	Styrax officinalis	Snowdrop bush
Primrose	Primulaceae	Dodecatheon Hendersonii	Shooting star
		Dodecatheon Hansenii	Shooting star
		Dodecatheon Clevelandii	White shooting star
		Anagallis arvensis	Scarlet pimpernel
Plantain	Plantaginaceae	Plantago major	Common plantain
		Plantago lanceolata	Ribgrass, English plantain, or buckhorn
		Plantago Hookeriana	Ribgrass, English plantain, or buckhorn
Heath	Ericaceae	Arbutus Menziesii	Madrone
		Arctostaphylos manzanita	Parry manzanita
		Arctostaphylos viscida	White leaf manzanita
		Arctostaphylos nissenana	Eldorado manzanita
Gentian	Gentianaceae	Centaurium floribundum	Century
		Centaurium venustum	Canchalagua

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Olive	Oleaceae	Fraxinus latifolia	Oregon ash
Dogbane	Apocynaceae	Vinca major	Periwinkle
Milkweed	Asclepiadaceae	Asclepias cordifolia	Milkweed
		Asclepias speciosa	Milkweed
		Asclepias fascicularis	Milkweed
Morning glory	Convolvulaceae	Convolvulus occidentalis	Morning glory
		Convolvulus arvensis	Bindweed
Phylox	Polemoniaceae	Allophyllum divaricatum	
		Microsteris gracilis	
		Gilia capitata	Gilia
		Gilia tricolor	Gilia
		Navarretia intertexta	
		Navarretia pubescens	
		Navarretia squarrosa	
		Linanthus dichotomus	Evening snow
		Linanthus montanus	Mustang clover
		Lananthus androsaceus	
		Linanthus bicolor	
Waterleaf	Hydrophyllaceae	Nemophila maculata	Fivespot
		Nemophila Menziesii	Baby blue eyes
		Nemophila heterophylla	Small white nemophila
		Phacelia tanacetifolia	
		Phacelia cicutaria	Fiddleneck
		Phacelia imbricata	
		Eriodictyon californicum	Yerba santa
Borage	Boraginaceae	Cynoglossum grande	Hound's tongue
		Myosotis versicolor	Forget-me-not
		Cryptantha intermedia	White foreget-me-not
		Plagiobothrys nothofulvous	Popcorn flower
		Amsinckia Menziesii	Fiddleneck
		Amsinckia intermedia	Fiddleneck
Nightshade	Solanaceae	Solanum Xantii	Nightshade
		Datura meteloides	Thornapple or jimson weed
		Datura stramonium	Thornapple or jimson weed
		Nicotiana glauca	Tree tobacco
		Nicotiana acuminata	Tobacco
		Nicotiana Bigelovii	Indian tobacco
		Nicotiana attenuata	Coyote tobacco

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Figwort	Scrophulariaceae	Mimulus cardinalis	Scarlet monkey flower
		Mimulus guttatus	Common monkey flower
		Mimulus tricolor	Monkey flower
		Mimulus Kelloggii	Monkey flower
		Mimulus aurantiacus	Bush monkey flower
		Verbascum Thapsus	Common mullein
		Verbascum blattaria	Moth mullein
		Penstemon heterophylla	Beard tongue
		Penstemon breviflorus	Beard tongue
		Scrophularia californica	Figwort or bee plant
		Collinsia heterophylla	Chinese houses or innocence
		Collinsia tinctoria	
		Collinsia sparsiflora	
		Linaria canadensis	Toad flax
		Veronica persica	Speedwell
		Pedicularis densiflora	Indian warrior
		Orthocarpus lithospermoides	Creamsacs
		Orthocarpus densiflorus	Owl's clover
		Orthocarpus purpurascens	Owl's clover
		Orthocarpus erianthus	Butter and eggs or Johnny tuck
		Orthocarpus attenuatus	
		Castilleja foliolosa	Paintbrush
		Castilleja subinclusa	Paintbrush
		Cordylanthus Hansenii	Bird's beak
Broomrape	Orobanchaceae	Orobanche uniflora	Broomrape
Vervain	Verbenaceae	Verbena bonariensis	Vervain
		Verbena hastata	Verbain
		Lippia nodiflora	Garden lippia
Mint	Labiatae	Trichostema lanceolatum	Vinegar weed or blue curls
		Scutellaria tuberosa	Skullcap
		Scutellaria california	Skullcap
		Scutellaria austinae	Skullcap
		Marrubium vulgare	Horehound
		Lamium amplexicaule	Giraffe's head
		Stachys stricta	Hedge nettle
		Salvia sonomensis	Sage
		Lepechinia calycina	Pitcher sage
		Monardella villosa	Coyote mint
		Mentha arvensis	
		Mentha spicata	Spearmint

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Stonecrop	Crassulaceae	Tillaea erecta	Pygmy weed
		Parvisedum pumilum	
		Dudleya cymosa	Rock lettuce or liveforever
		Sedum spathulifolium	Stonecrop or orpim
Saxifrage	Saxifragaceae	Boykinia elata	
		Saxifraga californica	California saxifrage
		Lithophragma heterophylla	Woodland star
		Lithophragma affinis	Woodland star
		Philadelphus Lewisii	Mock orange or syringa
Rose	Rosaceae	Potentilla glandulosa	
		Fragaria californica	Strawberry
		Sanguisorba minor	
		Adenostoma fasciculatum	Chamise or Greasewood
		Chamaebatia foliolosa	Mountain misery
		Cercocarpus betuloides	Mountain mahogany
		Rubus ursinus	California blackberry
		Rubus leucodermis	Western raspberry
		Rosa californica	California wild rose
		Prunus illicifolia	Hollyleaf cherry
		Prunus virginiana	Western chokecherry
		Malus sylvestris	Common apple
		Amelanchier pallida	Service berry
		Heteromeles arbutifolia	Toyon or Christmas berry
Pea	Leguminosae	Cercis occidentalis	Redbud or Judas tree
		Pickeringia montana	Chaparral pea
		Lupinus densiflorus	Lupine
		Lupinus Stiversii	Lupine
		Lupinus succulentus	Lupine
		Lupinus Benthamii	Bentham's lupine
		Lupinus vallicola	Lupine
		Lupinus bicolor	Dwarf lupine
		Lupinus micranthus	Lupine
		Lupinus albifrons	Bush lupine
		Lupinus formosus	Lupine
		Lupinus latifolius	Lupine
		Cytisus scoparius	Scotch broom
		Medicago sativa	Alfalfa
		Medicago hispida	Bur clover
		Melilotus albus	Sweet clover
		Melilotus indicus	Sweet clover
		Trifolium procumbens	Hop clover

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Pea (con't.)		Trifolium dubium	Shamrock clover
		Trifolium ciliolatum	Tree clover
		Trifolium repens	White clover
		Trifolium pratense	Red clover
		Trifolium incarnatum	
		Trifolium barbigerum	
		Trifolium microcephalum	Big head clover
		Trifolium tridentatum	Tomcat clover
		Trifolium obtusiflorum	Creek clover
		Trifolium depauperatum	
		Lotus grandiflorus	Bird's foot trefoil
		Lotus strigosus	Pink annual lotus
		Lotus subpinnatus	Yellow annual lotus
		Lotus humistratus	Bird's foot trefoil
		Lotus Purshianus	Bird's foot trefoil
		Lotus scoparius	Deerweed
		Amorpha californica	False indigo or lead plant
		Robinia pseudo-acacia	Locust
		Astragalus gambellianus	Milkvetch, rattleweed, or locoweed
		Lathyrus latifolius	Everlasting pea
		Lathyrus nevadensis	Pea
		Lathyrus sulphureus	Pea
		Vicia americana	Vetch
		Vicia villosa	Winter vetch
		Vicia sative	Spring vetch
		Vicia angustifolia	Common vetch
Sycamore	Plantanaceae	Platanus racemosa	Sycamore or plane tree
Birch	Betulaceae	Alnus rhombifolia	White alder
Beech	Fagaceae	Quercus Kelloggii	California black oak
		Quercus morehus	Oracle oak
		Quercus Wislizenii	Interior live oak
		Quercus lobata	Valley oak
		Quercus Douglasii	Blue oak
		Quercus dumosa	Scrub oak
		Quercus durata	Leather oak
		Quercus chrysolepis	Canyon or golden oak
Wax myrtle	Myricaceae	Myrica Hartwegii	Sierra sweet bay
Walnut	Juglandaceae	Jugland Hindsii	Black walnut

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Willow	Salicaceae	Populus Fremontii	Fremont's cottonwood
		Salix Goodingia	Black willow
		Salix laevigata	Red willow
		Salix Hindsiana	Sandbar or valley willow
		Salix melanopsis	Longleaf willow
		Salix lasiolepsis	Arroyo willow
Nettle	Urticaceae	Urtica holosericea	Nettle
Loosestrife	Lythraceae	Lythrum hyssopifolia	Loosestrife
Evening primrose	Onagraceae	Jussiaea repens	
		Zauschneria californica	California fuchsia
		Epilobium paniculatum	Willow herb
		Boisduvalia densiflora	
		Clarkia purpurea	
		Clarkia biloba	
		Clarkia unguiculata	
		Clarkia rhomboidea	
		Oenothera Hookeri	Evening primrose
Birth wort	Aristolochiaceae	Aristolochia californica	Pipevine or Dutchman's pipe
Grape	Vitaceae	Vitis californica	California wild grape
Buckthorn	Rhamnaceae	Rhamnus crocea	Buckthorn or red berry
		Rhamnus californica	Coffeeberry
		Ceanothus integerrimus	Deerbrush
		Ceanothus leucodermis	Chaparral whitethorn
		Ceanothus Lemmonii	Lemmon ceanothus
		Ceanothus cuneatus	Buckbrush
Mistletoe	Loranthaceae	Arceuthobium campylopodum	Dwarf mistletoe
		Phoradendron flavescens	American mistletoe
Quassia	Simarubaceae	Ailanthus altissima	Tree of heaven
Buckeye	Hippocastanaceae	Aesculus californica	Buckeye or horse chestnut
Maple	Aceraceae	Acer macrophyllum	Bigleaf or canyon maple
Sumac	Anacardiaceae	Rhus diversiloba	Poison oak
		Rhus trilobata	Squaw bush

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Carrot	Umbelliferae	Sanicula crassicaulis	Common sanicle or snakeroot
		Sanicula bipinnatifida	Purple sanicle
		Sanicula bipinnata	Poison or yellow sanicle
		Sanicula tuberosa	
		Caucalis microcarpa	
		Torilis japonica	Hedge parsley
		Anthriscus candicina	Bur-chervil
		Scandix pecten-veneris	Shepherd's needle
		Daucus carota	Wild carrot or Queen Anne's lace
		Apium graveolens	Celery
		Conium maculatum	Poison hemlock
		Perideridia Kelloggii	
		Foeniculum vulgare	Sweet fennel
		Tauschia Hartwegii	
		Lomatium utriculatum	
		Lomatium marginatum	
		Eryngium Vaseyi	
Dogwood	Cornaceae	Cornus glabrata	Brown dogwood
Silk tassel	Garryaceae	Garrya Fremontii	Silk tassel bush
		Garrya Congdoni	Silk tassel bush
Madder	Rubiaceae	Galium parisiense	Bedstraw
		Galium aparine	Rough bedstraw
		Galium Nuttallii	Climbing bedstraw
		Cephalanthus occidentalis	Button bush
Honeysuckle	Caprifoliaceae	Sambucus mexicanus	Blue elderberry
		Symphoricarpos rivularis	Snowberry
		Lonicera interrupta	Honeysuckle
		Lonicera hispidula	Honeysuckle
Valerian	Valerianaceae	Plectritis macrocera	
		Plectritis ciliosa	
		Plectritis california	
		Plectritis macroptera	
Teasel	Dipsaceceae	Dipsacus fullonum	Fuller's teasel
Gourd	Cucurbitaceae	Marah fabaceus	Wild cucumber
		Marah Watsonii	Big root
Bellflower	Campanulaceae	Githopsis specularioides	

C ...ion Family Name	Scientific Family Name	Sc ...ific Species Name	Common Species Name
Sunflower	Compositae	Wyethia helenoides	Mule ears
		Wyethia augustifolia	Mule ears
		Balsamorhiza deltoides	Balsam root
		Balsamorhiza macrolepis	Balsam root
		Helianthus annus	Common sunflower
		Helianthus californicus	
		Helianthella californica	
		Xanthium spinosum	Spiny clotbur or Spanish thistle
		Xanthium strumarium	Cocklebur
		Achyrachaena mollis	Blow wives
		Layia Fremontii	Tidy tips
		Layia pentachaeta	Tidy tips
		Madia rammii	Tarweed
		Madia elegans	Common madia
		Madia anomala	Plump seeded madia
		Hemizonia fitchii	Fitch's spikeweed
		Holocarpha virgata	Tarweed
		Calycadenia truncata	Rosin weed
		Calycadenia multiglandulosa	Rosin weed
		Helenium puberulum	Sneezeweed
		Baeria chrysostoma	Goldfields
		Baeria platycarpha	
		Eriophyllum lanatum	
		Pseudobahia heermannii	
		Chaenactis glabriuscula	
		Blennosperma nanum	
		Grindelia camporum	Gumplant
		Heterotheca grandiflora	Telegraph weed
		Haplopappus arborescens	Golden fleece
		Solidago occidentalis	Western goldenrod
		Solidago californica	California goldenrod
		Aster chilensis	
		Erigeron foliosus	Wild daisy or fleabane
		Lessingia leptoclada	
		Baccharis pilularis	Chaparral broom or coyote brush
		Anthemis cotula	Mayweed or dog fennel
		Achillea borealis	Yarrow
		Matricaria matricarioides	Pineapple weed
		Cotula coronopifolia	Brass buttons
		Artemisia douglasiana	Mugwort, wormwood, or sagebrush
		Senecio douglassii	Groundsel or ragwort
		Senecio vulgaris	Common groundsel
		Gnaphalium palustre	Cudweed or everlasting
		Gnaphalium californicum	Cudweed or everlasting
		Anaphalis margaritacea	Pearly everlasting

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Sunflower (con't.)		Psilocarphus brevissimus	
		Micropus californicus	
		Brickellia california	
		Silybum marianum	Milk thistle
		Cirsium vulgare	Bull thistle
		Cirsium californicum	Sierra thistle
		Centaurea melitensis	Tocalote
		Centaurea solstitialis	Barnaby's thistle or star-yellow thistle
		Cichorium intybus	Chicory
		Microseris Lindeleyi	
		Agoseris heterophylla	Mountain dandelion
		Agoseris grandiflora	Mountain dandelion
		Stephanomeria virgata	
		Tragopogon dubius	Goat's beard
		Hypochoeris glabra	Cat's ear
		Sonchus asper	Sow thistle
		Lactuca serriola	Prickly lettuce
Water plantain	Alismataceae	Machaerocarpus californicus	
		Sagittaria latifolia	Wappato or tule
Lily	Liliaceae	Chlorogalum pomeridianum	Soap plant or amole
		Chlorogalum augustifolium	Soap plant or amole
		Zigadenus venenosus	Death camas
		Erythronium multiscapoideum	Adder's tongue or fawn lily
		Fritillaria micrantha	Brown bells
		Lilium Humboldtii	Humboldt lily or tiger lily
		Calochortus albus	Fairy latern or globe lily
		Calochortus venustus	Mariposa lily or lilac
		Calochortus superbus	
		Calochortus luteus	Yellow mariposa lily
		Odontostomum Hartiwegii	Camas lily
Duckweed	Lemnaceae	Lemna sp.	Duckweed
Cattail	Typhaceae	Typha domingensis	
		Typha latifolia	Soft flag
Amaryllis	Amaryllidaceae	Allium hyalinum	Wild onion
		Allium serratum	Wild onion
		Bloomeria crocea	Golden stars
		Brodiaea laxa	Ithuriel's spear
		Brodiaea lutea	Golden brodiaea or pretty face
		Brodiaea hyacinthina	White brodiaea
		Brodiaea elegans	Harvest brodiaea
		Brodiaea coronaria	Harvest brodiaea

Common Family Name	Scientific Family Name	Scientific Species Name	Common Species Name
Amaryllis (con't.)		Brodiaea pulchella	Bluedicks or wild hyacinth
		Brodiaea multiflora	
		Brodiaea volubilis	Snake lily or twining brodiaea
Iris	Iridaceae	Iris Hartwegii	Iris
		Iris macrosiphon	Iris
		Sisyrinchium bellum	Blue-eyed grass
Orchid	Orchidaceae	Habenaria unalascensis	Rein orchid
		Habenaria elegans	Rein orchid
Rush	Juncaceae	Juncus sp.	Rush
Sedge	Cyperaceae	Scirpus acutus	Common tule
		Carex Bolanderi	Wood sedge
Grass	Gramineae	Bromus mollis	Soft chess
		Poa annua	Annual bluegrass
		Briza minor	Quaking grass
		Hordeum sp.	Wild barley or foxtail
		Lollium sp.	Rye grass
		Avena barbata	Wild oats
		Avena fatua	Wild oats

APPENDIX V — FAUNA
(MAMMALS)

Common Name	Scientific Name	Habitats	Where Found Mostly	Food
	Order Marsupialia			
Virginia opossum	Didelphis virginiana	Sav OW RW Gr	In woodlands, along streams in hollow trees and brush piles	Fruits, vegetables, nuts, meat, eggs, carrion
	Order Insectivora			
Trowbridge shrew	Sorex trowbridgei	RW OW MF	Moist situations; very secretive	Insects, isopods and conifer (douglas fir) seeds
Vagrant shrew	Sorex vagrans	RW	Moist situations; very secretive	Insects, sow bugs, centipedes, spiders, slugs
Ornate shrew	Sorex ornatus	Gr OW RW Ch	Moist situations; very secretive	Insects, sow bugs, centipedes, spiders, slugs
California mole	Scapanus latimanus	OW RW Gr Sav Ch MF	Pushing a ridge of moist soil, beneath the surface	Insects, earthworms and the like
	Order Chiroptera			
Yuma myotis	Myotis yumanensis	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Long-eared myotis	Myotis evotis	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Fringed myotis	Myotis thysanodes	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Long-legged myotis	Myotis volans	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
California myotis	Myotis californicus	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Small-footed myotis	Myotis subulatus	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Silver-haired bat	Lasionycteris noctivagans	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Western pipistrel	Pipistrellus hesperus	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Big brown bat	Eptesicus fuscus	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Red bat	Lasiurus borealis	OW RW Ch Str	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Hoary bat	Lasiurus cinereus	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Western big-eared bat	Plecotus townsendi	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Pallid bat	Antrozous pallidus	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
Mexican freetail bat	Tadarida brasiliensis	Most	Hanging in caves, crevices, hollow tree holes	Insects, by echo location, at night
	Order Carnivora			
Black bear	Ursus americanus	RW MF	Foraging in moist forest; dens in hollow tree	Small mammals, eggs, honey, carrion, garbage, berries nuts, tubers, insects and their larvae
Raccoon	Procyon lotor	RW OW Sav Ch MF	Along streams and lakeshore near wooded or rocky areas	Fruits, nuts, grain, insects, frogs, crayfish, bird eggs
Ringtail	Bassariscus astutus	Ch Ro RW OW	Brushy, rocky areas near water; strinctly nocturnal	Small mammals, insects, birds, fruit, lizards and various invertebrates
Longtail weasel	Mustela frenata	RW MF Sav Ro OW	Any area near water throughout the year	Small mammals and birds primarily

Plant Community symbols: **RW — Riparian woodland; OW — Oak woodland; Sav — Savanna; Gr — Grassland; Ch — Chaparral; MF — Montane forest (yellow pine forest); La — Lake; Str — Streams; Ma — Marshes; Ro — Rocky areas.**

Common Name	Scientific Name	Habitats	Where Found Mostly	Food
Mink	Mustela vison	RW Str OW MF	Along streams and lakeshore	Small mammals, birds, eggs, frogs, crayfish, fish
Badger	Taxidea taxus	Gr Sav Ch OW	Rolling grasslands, foothills, meadows	Mostly small rodents by digging out burrows
Spotted skunk	Spilogale putorius	Ch Ro OW RW	Brushy or sparsely wooded areas along streams	Mice, birds, eggs, insects, carrion, some vegetable matter
Striped skunk	Mephitis mephitis	RW OW Sav Ro Gr Ch	Open mixed woods and brushland	Mice, eggs, insects, grubs, berries, carrion
Coyote	Canis latrans	All but water	Open woodlands, brushy, rocky areas, grasslands	Predominantly small rodents and rabbits
Gray fox	Urocyon cinereoargenteus	OW Ch Ro RW Sav	Open woodlands and chaparral-covered foothills	Chiefly small mammals; also fruits, nuts, birds, eggs
Mountain lion	Felix concolor	Ch Ro RW OW Sav MF	Coniferous forests and chaparral-covered foothills	Largely deer; also hares, rodents, some domestic animals
Bobcat	Lynx rufus	Ch OW RW Sav Ro MF	Rocky, brushy country primarily	Small mammals, birds, carrion
	Order Rodentia			
California ground squirrel	Citellus beecheyi	All but water	Near burrows under fallen logs or in rocky areas	Green vegetation, seeds, acorns, mushrooms, berries, birds, eggs, insects
Western gray squirrel	Sciurus griseus	OW RW MF	Among or in oak trees	Acorns, seeds of conifers and the like
Valley pocket gopher	Thomomys bottae	Gr RW Sav OW Ch	Mounds of earth in valleys and meadows	Roots and tubers as well as some surface vegetation
Little pocket mouse	Perognathus longimembris	Ch	Valleys and slopes with sandy soil	Small seeds
San Joaquin pocket mouse	Perognathus inornatus	Gr	Dry, open, grassy, or weedy areas with fine soil	Small seeds
Californi pocket mouse	Perognathus californicus	Ch	Slopes covered with chaparral or live oaks	Small seeds
Kangaroo rat	Dipodomys heermanni	Gr OW Ch	Dry grasslands and sparse chaparral	Seeds, much green vegetation
Beaver	Castor canadensis	RW Str MF	Streams or ponds with alders, willows, and the like on banks	Bark and small twigs of maple, willow, alder
Harvest mouse	Reithrodontomys megalotis	All but water	Thick grassy or weedy areas	Seeds, fruit, some insects
California mouse	Peromyscus californicus	Ch OW	Slopes covered with live oak and dense chaparral	Acorns, seeds, fruits, cheese, bacon, butter
Deer mouse	Peromyscus maniculatus	All but water	Grasslands in some areas, forest in others	Acorns, seeds, fruits, insects
Brush mouse	Peromyscus boylei	Ch Ro MF	Semi-arid brushy, rocky areas	Pine nuts, acorns, seeds, berries
Pinon mouse	Peromyscus truei	Ch	Rocky terrain with pines and brush	Seeds and nuts
Dusky-footed woodrat	Neotoma fuscipes	OW Ch RW Ro MF	Large stick house in heavy chaparral thickets	Seeds, nuts, acorns, fruits, green vegetation, and fungi
Bushytail woodrat	Neotoma cinerea	Ro MF Gr	Rock crevices, under logs in pine forests	Green vegetation, twigs, shoots
California vole	Microtus californicus	Gr Sav	Mainly marshy ground and wet meadows	Grasses, sedges, and other green vegetation
Muskrat	Ondatra zibethica	Str Gr RW	Marshes, edges of ponds, streams, and the lake	Aquatic vegetation, clams, frogs, fish
Western jumping mouse	Zapus princeps	RW OW MF	Lush growths of grasses and herbs near streams	Primarily seeds
Porcupine	Erethizon dorsatum	OW RW MF	Usually forested areas, but also in brush	Buds, small twigs, inner bark of trees, fond of salt
	Order Lagomorpha			
Blacktail jack rabbit	Lepus californicus	Gr Ch Sav OW RW	Open grasslands and woodlands	A variety of green herbs and shrubs

Common Name	Scientific Name	Habitats	Where Found Mostly	Food
Desert cottontail	Sylvilagus auduboni	Gr Sav OW Ro Str RW	Near thick brush in open foothills and valleys	Grass, leaves of various plants, fruit, acorns
Brush rabbit	Sylvilagus bachmani	Ch	Feeding near dense thickets	Forbs and grasses
	Order Artiodactyla			
Mule deer	Odocoileus hemionus	Ch RW OW Sav	Many habitats with necessary browse plants	Browses on shrubs, twigs, grass, herbs

APPENDIX V — FAUNA
(BIRDS)

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
Loons	**Gaviidae**							
Common loon	Gavia immer	U		U	U	La	On the lake	Primarily fish; in addition, crabs, amphibians, shellfish, aquatic vegetation
Arctic (Pacific) loon	Gavia arctica		*	*		La	On the lake	Primarily fish; in addition, crabs, amphibians, shellfish, aquatic vegetation
Red-throated loon	Gavia stellata		*	*		La	On the lake	Primarily fish; in addition, crabs, amphibians, shellfish, aquatic vegetation
Grebes	**Podicipedidae**							
Red-necked grebe	Podiceps grisegena			*		La	On the lake	Fish, water insects and their larvae, beetles, and tadpoles, crustaceans, own feathers
Horned grebe	Podiceps auritus		U	U		La Ma	On the lake	Fish, water insects and their larvae, beetles, and tadpoles, crustaceans, own feathers
Eared grebe	Podiceps caspicus	U		U	U	La Ma	On the lake	Fish, water insects and their larvae, beetles, and tadpoles, crustaceans, own feathers
Western grebe	Aechmophorus occidentalis		U	U		La Ma	On the lake	Fish, water insects and their larvae, beetles, and tadpoles, crustaceans, own feathers
Pied-billed grebe	Podilymbus podiceps	C	C	C	C	La Ma	On the lake	Fish, water insects and their larvae, beetles, and tadpoles, crustaceans, own feathers
Cormorants	**Phalacrocoracidae**							
Double-crested cormorant	Phalocrocorax auritus	R	R	R	R	La Str	On the lake	Fish crustaceans
Herons, egrets, bitterns	**Ardeidae**							
Great blue heron	Ardea herodias	C	C	C	C	Ma Str La Gr	Edge of lake, marshy areas, or nesting in digger pines	Frogs, tadpoles, pocket gophers, field mice, crayfish, aquatic insects, some fish
Green heron	Butorides virescens	U	U	U	U	Str La RW	Willow-bordered ponds, streams; tree nester	Frogs, fish, hoppers, and other aquatic insects
Common egret	Casmerodius albus	U	U	U	U	Ma La Str	Marshes, tules at lake or stream margin; mudflats	Frogs, snakes, mice, moles, grasshoppers and other insects
American bittern	Botaurus lentiginosus	U	U	U	U	Ma	Marshes, tules at lake or stream margin	Frogs, small fish, mice, lizards, grasshoppers, large insects

S — Spring; Su — Summer; F — Fall; W — Winter

Abundance symbols: R — Rare; M — Migrant; C — Common; U — Uncommon; A — Abundant; * — Accidental (or freak) sightings.

Plant Community symbols: RW - Riparian woodland; OW — Oak woodland; Sav — Savanna; Gr — Grassland; Ch — Chaparral; MF — Montane forest (yellow pine forest); La — Lake; Str — Streams; Ma — Marshes; Ro — Rocky areas.

Common Name	Scientific Name	Season Found And Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
Ducks, geese, swans	Anatidae							
Whistling swan	Olor columbianus			MU	MU	La RW Gr	On the lake, stopover during migration	Aquatic plants and seeds
Canada goose	Branta canadensis		A	A	A	Ma La Gr	On the lake or feeding on grasses nearby	Grasses, seeds, aquatic plants, eelgrass, barley, tule potato
Cackling goose	B. minima	U		U	U	Ma La Gr	On the lake or feeding on grassez nearby	Grasses, seeds, aquatic plants, eelgrass, barley, tule potato
White-fronted goose	Anser albifrons	U		U	U	Ma La Gr	On the lake or feeding on grasses nearby	Grasses, grain, aquatic plants
Snow goose	Chen hyperborea	U		U	U	Ma La Gr	Feeding on land during day. on water at night	Rice and grain stubble in the fall and green grass
	Anatinae							
Mallard	Anas platyrhynchos	C	C	C	C	Ma La Str	Near or on water; nester	Sedges, grasses, pond weeds, wild celery, cultivated grains, rice, insects, crustacea, small fish
Gadwall	Anas strepera	U		U	U	Ma La Str	Lake, streams, ponds, marshes	Parts of aquatic plants and bulbs at pond and marsh edge; grain, acorns, waterbugs, insects
Pintail	Anas acuta	U		U	U	Ma La Gr	Lake, ponds, marshes, grasslands	Surface feeders; pond weeds, sedges, grasses, barley, rice
Green-winged teal	Anas carolinensis	R		R	R	Ma La RW	Lake, ponds, marshes	Surface feeders; pond weeds, sedges, grasses, barley and rice; tadpoles
Blue-winged teal	Anas discors	*				Ma La Str	Near or on water	Surface feeders; pond weeds, sedges, grasses, barley and rice; crustacea, snails, tadpoles
Cinnamon teal	Anas cyanoptera	U	U	U	U	Ma Str La	Lake, streams, ponds, marshes	Surface feeders; pond weeds, sedges, grasses, barley and rice; crustacea, snails, tadpoles
American widgeon	Mareca americana	U		U	U	Ma Gr	Lake, ponds, marshes	Wholly vegetarian: leaves, stems and buds of pond weed, grasses, wild celery
Shoveler	Spatula clypeata	U		U	U	Ma La	Lake, ponds, marshes	Most carnivorous surface feeder; snails, tadpoles, aquatic insects; also grasses
Wood duck	Aix sponsa	U	U	U	U	Str RW La	Streams, ponds, marshes, lake; tree nester	Water insects, acorns, chestnuts, wild rice and aquatic plants, rushes
	Aythyinae							
Ring-necked duck	Aythya collaris	R		R	R	La Ma RW	Lakes, ponds, streams, marshes; diving for food	Water insects, small frogs, fish, crayfish, aquatic plants
Canvasback	Aythya valisineria	U		U	U	La Ma	Lake; diving for food	Snails, fish tadpoles
Lesser scaup	Aythya affinis	R		R	R	La Ma	Lake, marshes; diving for food	50 percent vegetable material (more than other divers); also fish and aquatic animals
Common goldeneye	Bucephala clangula	C		C	C	La RW	Lake, marshes; diving for food	Fish, tadpoles, crustaceans, some aquatic plants
Barrow's goldeneye	Bucephala islandica	R		R	R	La RW	Lake, marshes; diving for food	Crustaceans from under rocks at bottom of lake (bird turns rocks with bill)
Bufflehead	Bucephala albeola	U		U	U	La MF RW	Lake, marshes; diving for food	Fish, tadpoles, crustaceans, and other aquatic organisms beneath water surface

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
	Oxyurinae							
Ruddy duck	Oxyura jamaicensis	C	C	C	C	La Ma	Lake, marshes; diving for food	75 percent aquatic plants
	Merginae							
Hooded merganser	Lophodytes cucullatus	R		R	R	La RW	Lake, marshes; diving for food	Primarily fish
Common merganser	Mergus merganser	C	U	C	C	La Str	Lake, marshes; diving for food	Primarly fish
Red-breasted merganser	Mergus serrator	*		*	*		Lake, marshes; diving for food	Primarily fish
Vultures, hawks, eagles	**Cathartidae**							
Turkey vulture	Cathartes aura	MC	C	MC	U	Sav OW Gr Ch Ro	Soaring, perched in trees, on ground eating carrion	Carrion
	Elaninae							
White-tailed kite	Elanus leucurus	U	U	U	U	RW Ma Sav Gr	Hovering in midair or perching	Mice, rats, gophers, large insects, reptiles
	Accipitrinae							
Sharp-shinned hawk	Accipiter striatus	U		U	U	MF OW	Forests and thickets	Primarily sparrows and warblers; also insects, mice, chipmunks
Cooper's hawk	Accipiter cooperii	C	C	C	C	RW OW MF	Woodlands, canyons, river groves	50 percent wild birds (blackbirds, jays, quail, coves, flickers, meadowlarks, and other birds of this size); also rodents
	Buteoninae							
Red-tailed hawk	Buteo jamaicensis	C	C	C	C	Sav OW Gr Ro RW	Tree tops, soaring, power poles	Primarily ground squirrels, also rabbits, rats, mice, some birds and insects
Red-shouldered hawk	Buteo lineatus	U	U	U	U	RW	Woodland areas near water	Rats, mice, rabbits, small birds, reptiles
Swainson's hawk	Buteo swainsoni	MU	*		MU	Sav Gr	Soaring over open foothills, sparse tree areas	Large numbers of grasshoppers; also rats, mice, small reptiles
Rough-legged hawk	Buteo lagopus	R		R	R	Ma RW Gr	Open grasslands, marshes, fields, soaring	Rats, mice, rabbits, small birds, reptiles
Golden eagle	Aquila chrysaetos	U	U	U	U	Sav OW Gr Rp MF	Soaring above rolling foothills	Ground squirrels and rabbits; may occasionally take a fawn; all types of birds, living or dead
Bald eagle	Haliaeetus leucocephalus	U		U	U	La Str	Soaring over hills; lake and river margins; in trees	Chiefly dead or dying fish, carrion
	Circinae							
Marsh hawk	Circus cyaneus	U	U	U	U	Ma Gr	Flying low over marshes, grassland areas	Small birds, mice, rats, snakes, frogs, large insects
	Pandionidae							
Osprey	Pandion haliaetus	R		R	R	La Str	Soaring over lake, large streams	Primarily fish

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
	Falconinae							
Prairie falcon	Falco mexicanus	R		R	R	Ro Gr	Flying swiftly over open fields and hills	Lizards, sparrows, pigeons, quail, ducks, jack rabbits, ground squirrels
Pigeon hawk	Falco columbarius	R		R	R	OW RW	Flying over woodland areas	Swallows, swifts, sandpipers, dragonflies
Sparrow hawk	Falco sparverius	C	C	C	C	Sav OW Gr RW Ro	On power poles or hovering over open fields	Mostly grasshoppers; also other insects, small birds, mice, reptiles
Quail, pheasant	**Phasianidae**							
California quail	Lophortyx californicus	C	C	C	C	Ch Gr	Chaparral mixed with grassland, woodland edges	Insects and seeds, bugs, berries of over 100 different plants
Ring-necked pheasant	Phasianus colchicus	C	C	C	C	Gr OW Gr RW Ro	Grassland, brush, irrigated land	Seeds of pines, oaks, chickweed; also beets, tomatoes, peas, beans, corn, insects
Cranes, rails, gallinule, coots	**Gruidae**							
Sandhill crane	Grus canadensis	MU		MU	MU	Ma La Gr	Soaring over marshes, grassland, lake margin	Omnivorous: Grain, acorns of blue oak, rods and bulbs of aquatic plants, frogs, mice, insects
	Rallidae							
Virginia rail	Rallus limicola	R	R	R	R	Ma	Marshes, tules	Aquatic plants, insects, frogs, crustaceans, mollusks, seeds, buds
Common gallinule	Gallinula chloropus	R	R	R	R	Ma La	Marshes, tules	Primarily seeds, roots, soft parts of aquatic plants; snails, worms, insects
American coot	Fulica americana	C	C	C	C	La Ma Str	Lake, marshes, tules	Leaves and seeds of aquatic plants, snails, insects, tadpoles, crustaceans, small fish
Shorebirds, gulls, terns	**Charadriidae**							
Killdeer	Charadrius vociferus	C	C	C	C	La Str Gr Ma	Near ponds, lakeshore, weeds	97 percent beetles, grasshoppers, ants, flies, bugs, snails, worms, weevils, caterpillers, ticks, some weed seeds
	Scolopacidae							
Common snipe	Capella gallinago	U		U	U	Ma	Grasslands, marshes	Earthworms and larvae of mosquitos and water insects
Spotted sandpiper	Actitis macularia	U		U	U	Str La	Shoreline of lake and streams	A great variety of land and water insects and an occasional small fish
Greater yellowlegs	Totanus melanoleucus	U		U	U	Ma Gr Str	Streams, vernal pools, marshes, mudflats	All types of aquatic bugs and insects
Lesser yellowlegs	Totanus flavipes	R		R	R	Ma	Streams, vernal pools, mudflats, marshes	Aquatic bugs and insects
Baird's sandpiper	Erolia bairdii		*			Ma	Shoreline of lake, ponds, mudflats	Aquatic buds and insects
Least sandpiper	Erolia minutilla	U		U	U	Ma La	Mudflats, marshes; shoreline of lake, ponds	Aquatic bugs and insects
Dunlin	Erolia alpina	U		U	U	Ma	Mudflats, marshes; shoreline of lake, ponds	Aquatic bugs and insects
Long-billed dowitcher	Limnodromus scolopaceus	U		U	U	Ma	Mudflats, marshes; shoreline of lake, ponds	Seeds, aquatic insects, larvae of midges
Western sandpiper	Ereunetes mauri	U		U	U	Ma	Mudflats, marshes; shoreline of lake, ponds	Primarily aquatic insects

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where found Mostly	Food
	Larinae							
Glaucous-winged gull	Larus glaucescens	R		R	U	La	On lake or soaring	Omnivorous: Plant and animal food, refuse, carrion
Western gull	Larus occidentalis	R		R	R	La	On lake or soaring	Omnivorous: Plant and animal food, refuse, carrion
Herring gull	Larus argentatus	C		C	C	La	On lake or soaring	Omnivorous: Plant and animal food, refuse, carrion
California gull	Larus californicus	A	C	A	A	La RW Gr OW	On lake or soaring; in summer immature birds only	Omnivorous: Plant and animal food, refuse, carrion
Ring-billed gull	Larus delawarensis	A	C	A	A	La RW Gr	On lake or soaring; in summer immature birds only	Omnivorous: Plant and animal food, refuse, carrion
Bonaparte gull	Larus philadelphia	U		U	U	RW	On lake or soaring	Omnivorous: Plant and animal food, refuse, carrion
	Sterninae							
Forster's tern	Sterna fosteri	MR		MR	MR	Ma La	Soaring over lake and marshes; diving	Fish, dragonfiles, hoppers, aquatic insects
Caspian tern	Hydroprogne caspia	MR		MR	MR	La	Soaring over lake and marshes; diving	Primarily fish
Pigeons, doves	Columbidae							
Band-tailed pigeon	Columba fasciata	U		U	U	OW MF	Oak canyons, chaparral, olive trees, flying in flocks	Acorns main food supply; also wild berries, nuts, seeds
Mourning dove	Zenaidura macroura	C	C	C	U	Sav OW RW Gr	Open oak woodland, grassland, chaparral	99 percent weed seeds
Roadrunners	Cuculidae							
Roadrunner	Geococcyx californianus	R	R	R	R	Ch	Running across sparse brushland, chaparral	Lizards, snakes, tarantulas, scorpions, grasshoppers, crickets, mice, small birds
Owls	Tytonidae							
Barn owl	Tyto alba	U	U	U	U	Ro Gr Sav OW	Dense foliage or hillside cave; night hunter	Mice, rats, gophers, bats, birds, reptiles, fish, large insects
Screech owl	Otus asio	U	U	U	U	OW RW	Holes in trees; oak woodland, riparian trees; night hunter	75 percent grasshoppers, crickets, beetles, and mice
Great horned owl	Bubo virginianus	C	C	C	C	OW Sav Ro RW MT	Tree cavities, dense foliage, cave; night hunter	Sparrows, jays, copper hawks, red-tailed hawks, snakes, frogs, lizards, skunks, rodents
Pygmy owl	Glaucidium gnoma			*		MF OW	Tree cavities; day hunter	Small birds, lizards, insects, mice
Short-eared owl	Asio flammeus	R	R	R	R	Ma Gr	Flying low; day hunter (late light)	Primarily mice; also large insects and small birds
Poorwills	Caprimulgidae							
Poorwill	Phalaenoptilus nuttallii	U	U	U		Ch	Rocks, bare ground, broken chamisal chaparral	Mainly nocturnal insects

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
Swifts, hummingbirds	Apodidae							
Black swift	Cypseloides niger	MR		MR		Ro	Soaring	Flying insects
Vaux's swift	Chaetura vauxi	MU		MU		Ro	Soaring over lake, canyons	Flying insects
White-throated swift	Aeronautes saxatalis	U	U	U	R	Ro	Nesting on granite cliffs, soaring over lake, hills	Winged ants, flies, beetles
	Trochilidae							
Black-chinned hummingbird	Archilochus alexandri	C	C	C	U	RW OW	Riparian woodland	Insects and nectar, usually from red flowers
Costa's hummingbird	Calypte costae	*	*			Ch	Normally desert-type habitat	Aphids, small insects, spiders, nectar; favors red flowers
Anna's hummingbird	Calypte anna	C	C	C	C	Ch OW	Mixed woodland and chaparral; often near sticky monkey flower, manzanita, tree tobacco	Aphids, small insects, spiders, nectar; favors red flowers
Rufous hummingbird	Selasphorus rufus	MC		MC		Ch	Manzanita, tree tobacco, fuchsia	Aphids, small insects, spiders, nectar; favors red flowers
Allen's hummingbird	Selasphorus sasin		MR			Ch	Wooded or brushy canyons	Aphids, small insects, spiders, nectar; favors red flowers
Calliope hummingbird	Stellula calliope	MR		MR		MF	Migrates through area during very short periods; mixed brush, canyons castilleja, and penstemon	Aphids, small insects; spiders, nectar from gooseberry, currant, manzanita,
Kingfishers	Alcedinidae							
Belted kingfisher	Megaceryle alcyon	C	C	C	C	Str Ro La	Perched or flying near lake, stream, pond	Primarily minnows, suckers, similar nongame fish
Woodpeckers	Picidae							
Yellow-shafted flicker	Colaptes auratus		*				Woodland, grassland	45 percent ants, 9 percent crickets, grasshoppers, and the like; also berries and acorns
Red-shafted flicker	Colaptes cafer	C	U	C	C	RW MF OW	Woodland, grassland, digger pine	45 percent ants, 9 percent crickets, grasshoppers, and the like; also berries and acorns
Acorn woodpecker	Melanerpes formicivorus	A	A	A	A	OW MF	Active in oak-pine areas of park	Acorns, tree-boring insects, grubs, ants flying insects
Lewis' woodpecker	Asyndesmus lewis	U		U	U	OW MF	Oak grassland in winter	1/3 acors; also flying insects, grassphoppers, beetles, crickets
Yellow-bellied sapsucker	Sphyrapicus varius	U		U	U	MF RW	Mixed woodland and conifer forest areas	Tree sap and delicate cambium layer of willow, oak, or yellow pine; also insects
Red-breasted sapsucker	Sphyrapicus varius	U		U	U		Mixed woodland and conifer forest areas	Tree sap and delicate cambium layer of willow, oak, or yellow pine; also insects
Hairy woodpecker	Dendrocopos villosus	U	U	U	U	MF RW	Mixed woodland and conifer forest areas	Main diet wood-boring beetle larvae; also caterpillars, ants, nuts

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1	2	3	4	5	Where Found Mostly	Food
Downy woodpecker	Dendrocopos pubescens	C	C	C	C	RW	OW				Riparian softwoods, willows, cottonwoods	Primarily ants, eggs of wood-borers, scale insects, caterpillars
Nuttall's woodpecker	Dendrocopos nuttallii	C	C	C	C	OW	RW				Dry ridges, blue oaks, digger pines, near streams	Primarily ants, eggs of wood-borers, scale insects, caterpillars
Perching birds, flycatchers, horned larks	**Tyrannidae**											
Western kingbird	Tyrannus verticalis	C	C	U		Sav	Gr				Flycatching in oak grasslands from wire fence	Low-flying moths, grasshoppers, wasps, bees (drones only)
Ash-throated kingbird	Myiarhus cinerascens	C	C	U		Ch	OW	RW			Chaparral brush, nesting in tree holes, fly catching	Low-flying moths, grasshoppers, wasps, bees (drones only)
Black phoebe	Sayornis nigricans	C	C	C	C	Ro	RW				Fly catching near water	Aquatic bugs, insects, flies, wasps, wild bees (drones only)
Say's phoebe	Sayornis saya	U		U	U	Ro	Gr				Fly catching near ground in fields	Insects, spiders, and the like
Traill's flycatcher	Empidonax traillii	MU			MU	RW					Willow thickets; secretive — see only for short periods	Wasps, bees, beetles, flies, caterpillars, moths, grasshoppers
Western flycatcher	Empidonax difficilis	MU			MU	RW	MF	OW			Riparian growth; seen only for short periods; a few stay to nest at higher elevations	Mostly wasps and bees; also ladybird beetles, grasshoppers
Western wood peewee	Contopus sordidulus	C	C	C		MF	OW	RW			Flycatching from high branches	99 percent insectivorous (2,500 flies, gnats, bees, and the like in a single day)
	Alaudidae											
Horned lark	Eremophila alpestris	C	U	C	C	Gr					Fences, low grasses, bare earth	Major food vegetable matter (cultivated crops); also caterpillars and grasshoppers
Swallows, jays, magpies and crows	**Hirundinidae**											
Violet-green swallow	Tachycineta thalassina	C	C	U	R	MF	Ro	OW			Over water or nesting in old woodpecker holes, rock crevices	Flies, wild bees, wasps, winged ants, moths, and the like
Tree swallow	Iridoprocne bicolor	C	C	U	R	RW	Ma	MF			Over water or nesting in old woodpecker holes, rock crevices	Flies, wild bees, wasps, winged ants, moths, and the like
Bank swallow	Riparia riparia	U	U			Ro	Cr				Over water; nesting in holes in vertical faces of banks and cliffs	Flies, wild bees, wasps, winged ants, moths, and the like
Rough-winged swallow	Steigidopteryx ruficollis	C	C			Ro	Gr				Over water or nesting in holes in banks or rock crevices	Flies, wild bees, wasps, winged ants, moths, and the like
Barn swallow	Hirundo rustica	C	C	U		Ro	Gr				Over water or field; mud nesting under bridge, or roof of barn or garage	Flies, wild bees, wasps, winged ants, moths, and the like
Cliff swallow	Petrochelidon pyrrhonota	C	C	U		Ro	Gr				Over water; mud nesting on cliffs or under bridges	Flies, wild bees, wasps, winged ants, moths, and the like
	Corvidae											
Steller's jay	Cyanocitta stelleri	U		U		MF	OW	RW			Conifers; oak woodlands during heavy winters	Omnivorous: wasps, bees, eggs and young of other birds, berries, acorns, nuts

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
Scrub jay	Aphelocoma coerulescens	A	A	A	A	OW Ch	Mixed woodland, chaparral	Omnivorous: 27 percent insects, snails, mice, frogs, eggs and young birds; 73 percent acorns, seeds, berries, and the like
Yellow-billed magpie	Pica nuttalli	A	A	A	A	Sav OW Gr RW	Open grassland with scattered oaks	Omnivorous: grasshoppers, bees, ants, carrion, acorns
Common crow	Corvus brachyrhynchos	A	A	A	A	RW OW Sav Gr	In flocks in live oaks, willows, cottonwoods	Small rodents, insects, frogs, snails, lizards, eggs, acorns, grain
Tits, nuthatches, dippers	**Paridae**							
Plain titmouse	Parus inornatus	C	C	C	C	OW	Old woodpecker holes and natural crevices	Harmful species of scale insects, moths, weevils, leaf hoppers
Common bushtit	Psaltriparus minimus	C	C	C	C	OW Ch RW	Feeding and in hanging nests in chaparral and oak woodland	80 percent plant lice and scale insects; also leaf hoppers, caterpillars, and the like
	Sittidae							
White-breasted nuthatch	Sitta carolinensis	C	C	C	C	MF OW	Feeding on bark of limbs and trunks; hole nester	Beetles, spiders, ants from branches and bark of trees
Red-breasted nuthatch	Sitta canadensis	R		R	R	MF	Conifers; other trees at lower elevations in heavy winters	Mainstay fir and pine seeds; also eats insect larvae, beetles, spiders, moths
	Certhiidae							
Brown creeper	Certhia familiaris	U		U	U	MF	Feeding on trunks in spiral, bottom to top	Bark insects
	Chamaeidae							
Wrentit	Chamaea fasciata	C	C	C	C	Ch	Chaparral, chamise, scrub oak, buckbrush	Mostly ants from bark surfaces and wild berris (mostly poison oak)
	Cinclidae							
Dipper	Cinclus mexicanus	R	R	R	R	Str La	Feeding in cold, swift-flowing streams with shade and many insects	Mosquito and caddis fly larvae, water bugs, beetles, trout fry
Wrens, mockingbirds, thrushes	**Troglodytidae**							
House wren	Troglodytes aedon	RU	RU	RU	RU	OW RW MF Ch	Foraging in chaparral areas or nesting in cavities in oak trees	98 percent grasshoppers, crickets, beetles, caterpillars, ants, bees, wasps, spiders
Winter wren	Troglodytes troglodytes	MR		MR	*	MF	Foraging mouse-like in matted ground vegetation	Forest insects
Bewick's wren	Thryonames bewickii	C	C	C	C	Ch RW OW	Chaparral, digger pines, oaks; riparian areas	Bark beetles, leaf hoppers, ants
Long-billed marsh wren	Telmatodytes palustris	C	C	C	C	Ma	Marshes, pond edges; tules cattails, bulrushes	wasps, caterpillars, moths, spiders
Canyon wren	Catherpes mexicanus	U	U	U	U	Ro	Talus slopes, rock walls in steep canyons	Insects and their larvae from surface of marsh
Rock wren	Salpinctes obsoletus	C	C	C	C	Ro	Talus slopes, rock walls, rodent burrows	Insects and spiders from rocky crevices
								Spiders, beetles, and the like from rocky crevices

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
	Mimidae							
Mockingbird	Mimus polyglottus	C	C	C	C	Sav	Most any area, but often near dwelling	50 percent snails, bugs, hoppers, beetles; 50 percent berries, raisin, nuts
California thrasher	Toxostoma redivivum	U	U	U	U	Ch	Dense chaparral; tall trees or rocks for lookouts	40 percent ants, wasps, beetles cutworms, spiders; also wild berries of chaparral
	Turdidae							
Robin	Turdus migratorius	C	U	C	C	MF Gr RW	Probing about on ground for insects and worms; perching on berry bushes and trees; tree nester	Worms, insects, and the like, during summer; wild fruits and berries in winter
Varied thrush	Ixoreus naevius	U		U	U		Dense oak woodlands, tall growths of chaparral	Toyon and manzanita berries, acorns, and insects from the ground
Hermit thrush	Hylocichla guttata	U		U	U	MF	Forest floor, dense growths; wild grapes, shrub fruits	44 percent vegetable; wild fruits, tree and shrub seeds; also ants, caterpillars
Swainson thrush	Hylocichla ustulata	R	R			RW	Riparian thickets of willows, blackberry, and the like	44 percent vegetable; wild fruits, tree and shrub seeds; also ants, caterpilars
Western bluebird	Sialia mexicana	C	C	C	C	OW MF Sav Gr RW	Flycatching from fence or tree near grassland; hole nester	Hoppers, caterpillar, worm-producing larvae
Mountain bluebird	Sialia currucoides				MU	MF	Open areas in heavy winters	90 percent insects; 10 percent wild fruit and berries
Townsend's solitaire	Myadestes townsendi	MR			MR	MF	Near berry supply in heavy winters	Seeds of foothill plants in winter; insects in spring and summer
Gnatcatcher, kinglets, pipit, waxwing, phainopepla	**Sylviidae**							
Blue-gray gnatcatcher	Polioptila caerulea	U		U	U	OW Ch RW	Blue oaks, chaparral with mixed oaks	Mostly insects that are too small to interest other birds
Golden-crowned kinglet	Regulus satrapa	R			MR	MF	Wide tolerance and range of habitat during winter	Insects, their eggs and larvae; scale, plant lice, and the like
Ruby-crowned kinglet	Regulus calendula	C		C	C	MF	Trees and shrubs	95 percent minute insects
	Motacillidae							
Water pipit	Anthus spinoletta	C		C	C		Grassland and mudflats	Weed seeds, grasshoppers, crickets, ants, flies, caterpillars, grubs
	Bombycillidae							
Cedar waxwing	Bombycilla cedrorum	C		C	C	OW	Flying in flocks, feeding ravenously on berries	90 percent fruit, berries, buds, petals, seeds
	Ptilogonatidae							
Phainopepla	Phainopepla nitens	U	U	U	U	OW	Perched on highest branch of tree near mistletoe	Mostly berries of mistletoe and manzanita

Common Name	Scientific Name	Season Found and Abundance S Su F Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
Shrikes, vireos, warblers, meadowlarks	**Laniidae**				
Northern shrike	Lanius excubitor	*		Very rare; in open terrain with "lookout posts"	Insects, spiders, seeds
Loggerhead shrike	Lanius ludovicianus	U U U U	Sav Gr OW	Open country, perched on wire	Entirely carnivorous: mice, small birds, and large insects impaled on thorns or barbed wire ("Butcher bird")
	Sturnidae				
Starling	Sturnus vulgaris	C C C C	Gr OW	Open country near ranches and fields; hole nester	Insects, berries, seeds
	Vireonidae				
Hutton's vireo	Vireo huttoni	U U U U	OW RW	Prefers oaks; woods and adjacent brush	90 percent caterpillars, bugs beetles, spiders; 10 percent berries
Solitary vireo	Vireo solitarius	MU MU	MF OW RW	Feeding in riparian growth	90 percent caterpillars, bugs, beetles, spiders; 10 percent berries
Warbling vireo	Vireo gilvus	MU MU	RW OW	Leafy crowns of riparian woodlands	90 percent caterpillars, bugs, beetles, spiders; 10 percent berries
	Parulidae				
Orange-crested warbler	Vermivora celata	C U C C	Ch OW RW MF	Brushy woodlands, open hillsides, streams	90 percent insects: leaf bugs, plant lice, ants; 10 percent seeds, leaf galls
Nashville warbler	Vermivora ruficapilla	MU MU	MF OW Ch	Feeding in trees	Caterpillars and larvae that feed on leaves
Yellow warbler	Dendroica petechia	MU MU	RW	Willows, cottonwoods, alders near streams	Insects from leaf gleaning and fly catching
Myrtle warbler	Dendroica coronata	U U U		Woods, thickets, wet areas. in foliage at tips of branches	Insects from leaf gleaning and flycatching
Audubon's warbler	Dendroica auduboni	C C C	MF OW	Woods, thickets, wet areas; in foliage at tips of branches	Insects from leaf gleaning and flycatching
Black-throated warbler	Dendroica nigrescens	U U U	OW MF	Open mixed woods and dry oak slopes	Insects from leaf gleaning and flycatching
Townsend's warbler	Dendroica townsendi	MU MU	OW	Dense upper foliage of oaks, laurels, madrones, conifers	Insects, spiders
Hermit warbler	Dendroica occidentalis	MU MU	MF	Dense upper foliage of oaks, laurels, madrones, conifers	Insects, spiders
MacGillivray's warbler	Oporornis tolmiei	MU MU	Ch RW MF	Dense undergrowth; shady, damp thickets	Insects, spiders
Yellowthroat	Geothlypis trichas	R R R R	Ma RW	Swamps, marshes, streamside thickets	Moths, larvae, flies, ants
Yellow-breasted chat	Icteria virens	R R	RW	Riparian thickets; willow, blackberry, wild grape	Bugs, worms, wild berries, grapes
Wilson's warbler	Wilsonia pusilla	MC MC	RW Ch	Riparian thickets; most common warbler	Strictly insectivorous, feeding by foraging and flycatching

Common Name	Scientific Name	Season Found and Abundance S	Su	F	Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
	Ploceidae							
House sparrow	Passer domesticus	C	C	C	C		Near human habitation	Miscellaneous food from garbage dumps and the like; insects, seeds
	Icteridae							
Western meadowlark	Sturnella neglecta	A	A	A	A	Gr	Open grassy fields, meadows	70 percent cutworms, caterpillars, grasshoppers; also seeds
Yellow-headed blackbird	Xanthocephalus xanthocephalus	U	U	U	R	Ma La	Marshes, tules, feeding in fields	Insects, small fruits, seeds, waste grain
Red-winged blackbird	Agelaius phoeniceus	C	C	C	C	Ma Gr	Marshes, tules, feeding in fields	Insects, small fruits, seeds, waste grain
Bicolored redwing	A.p. californica	C	C	C	C	Ma Gr	Marshes, tules, feeding in fields	Insects, small fruits, seeds, waste grain
Tricolored blackbird	Agelaius tricolor	U	U	U	U	Ma Gr	Marshes, tules, feeding in fields	Primarily insectivorous:caterpillars, bugs, beetles, ants, wasps, scale insects
Bullock's oriole	Icterus bullockii	C	C			RW Sav OW Gr	River groves, oak woodlands; nest a hanging pouch	50 percent waste grain and seeds; 50 percent bugs, hoppers, worms, weevils
Brewer's blackbird	Euphagus cyanocephalus	A	A	A	A	Sav Gr OW MF RW	Lakeshore, open country, roosting and nesting in trees	25 percent hoppers, bugs, insects stirred up by cattle; also grain and weed seeds
Brown-headed cowbird	Molothrus ater	U	U	U	U	RW Gr OW	Pastures, meadows, riparian groves; large winter roosts	
	Thraupidae							
Western tanager	Piranga ludoviciana	MU	*		MU	MF OW	Oaks, shrub berries, mixed woodland; flycatching	80 percent flies and insects; also wild fruits and berries
	Fringillidae							
Black-headed grosbeak	Pheucticus melanocephalus	C	C			RW OW MF Ch	Pine-oak woods, chaparral, riparian groves, parks and the like	Mostly scale insects, coddling moths, caterpillars, beetles
Blue grosbeak	Guiraca caerulea	*	*			RW MA	Low, thick, brushy riparian vegetation	2/3 insects; also weed seeds
Lazuli bunting	Passerina amoena	U	U			Ch Gr RW	Brushy slopes, streamsides; areas of plant diversity	2/3 insects; also weed seeds
Purple finch	Carpodacus purpureus	C		U	C	MF OW RW	Conifers, oaks, shrubs, berries, buds; wary	Primarly buds and wild fruits (manzanita, coffeeberry, willow buds)
House finch	Carpodacus mexicanus	C	C	C	C	Sav Gr OW Ro RW	Fields, orchards, mixed woodlands; near people	Primarily weed seeds; also wild fruits
Pine siskin	Spinus pinus	MU			MU	MF Gr	Mixed woodlands, weeds, conifers	Seeds of cone bearers, alders, willows; also aphids, plant lice, hoppers
American goldfinch	Spinus tristis	C	C	C	C	RW Ch Gr	Riparian areas, weedy fields	Primarily weed seeds, such as thistle, dandelion, composite wildflowers
Lesser goldfinch	Spinus psaltria	C	C	C	C	Ch	Open brush, scattered trees, weedy fields	Primarily weed seeds, such as thistle, dandelion, composite wildflowers
Lawrence's goldfinch	Spinus lawrencei	U	U	*		OW MF Gr Ch	Pine-oak woods, chaparral, weedy fields	Primarily weed seeds, such as thistle, dandelion, composite wildflowers
Rufus-sided towhee	Pipilo erythrophthalmus	C	C	C	C	Ch RW OW	Chaparral, underbrush; river-bottom tangles	Beetles, bugs, other insects

Common Name	Scientific Name	Season Found and Abundance S Su F Wt	Habitat Preference 1 2 3 4 5	Where Found Mostly	Food
Brown towhee	Pipilo fuscus		Ch OW RW	Brushy, stony areas; open chaparral slopes	50 percent weed seeds; also seeds and insects from the ground
Savannah sparrow	Passerculus sandwichensis		Gr Ma	Fields, meadows, open areas	Grass and weed seeds; also many beetles and insect pests
Vesper sparrow	Pooecetes gramineus		Ch	Fields, meadows, roadsides	1/3 beetles, grasshoppeers; also weed seeds
Lark sparrow	Chondestes grammacus		Sav Gr OW Ch	Open terrain with scattered bushes and trees	Seed, grain, wild oats, lupine pods, "ground bugs," caterpillars
Rufous-crested sparrow	Aimophila ruficeps		Ch Gr	Grassy hillsides with sparse, low bushes	Grass and weed seeds; also various insects
Sage sparrow	Amphispiza belli		Ch	Open chaparral, brushy hills	Grass and weed seeds; also various insects
Slate-colored junco	Junco hyemalis			Mixed woods, roadsides, weeds, in flocks Oregon juncos	Grass and weed seeds; also weevils, ants, spiders, flies
Oregon junco	Junco oreganus		MF OW	Mixed woods, roadsides, weeds, in flocks	Grass and weed seeds; also weevils, ants, spiders, flies
Chipping sparrow	Spizella passerina		MF OW	Open woodlands, orchards, conifers, brush thickets	42 percent insects; remainder weed seeds
White-crowned sparrow	Zonotrichia leucophrys		Ch Gr	Low brush, broken chaparral, roadside weeds, gardens	Weed seeds and insects
Gold-crested sparrow	Zonotrichia atricapilla		Ch	Streamside thickets and broken chaparral	99 percent seeds, berries, buds, flower parts
White-throated sparrow	Zonotrichia albicollis		Ch	Streamside thickets, broken chaparral	Seeds, berries, wild fruit, some insects
Fox sparrow	Passerella iliaca		Ch RW	Ground scratcher under ceanothus and manzanita	Seeds, berries, wild fruit, some insects
Lincoln sparrow	Melospiza lincolnii		Gr	Lowland thickets, weeds, bushes	Seeds, berries, wild fruit, some insects
Song sparrow	Melospiza melodia		RW Ma Ch	Marshes, brush, roadsides	Seeds, berries, wild fruit, some insects

APPENDIX V – FAUNA
(AMPHIBIANS AND REPTILES)

Common Name	Scientific Name	Habitat	Where Found Mostly	Food
AMPHIBIANS				
Mole Salamanders	**Ambystomidae**			
Tiger salamander	Ambystoma tigrinum	Gr La Str Ma Sav OW RW MF	Under objects near water	Earthworms, mollusks, insects, fish, other salamanders, small snakes, frogs, baby mice
Pacific giant salamander	Dicamptodon ensatus		Coldstreams or seepages, under logs, bark, rocks and other objects	Snakes, rodents and insects
Long-toed salamander	Ambystoma macrodactylum	All habitats	In piles of rotten wood, under bark, near water	A scavenger; pieces of ants, beetles, flies; a few live aquatic insects
Newts	**Salamandridae**			
California newt	Taricha torosa sierrae	Gr OW RW FM Str	Under rocks, logs, in rotten wood, or breeding in streams	Earthworms, small snails, slugs, sow bugs, insects and their larvae
Lungless salamanders	**Plethodontidae**			
Yellow-eyed salamander	Ensatina eschscholtzi zanthoptica	OW RW MF Ch	Under rotting logs, bark and rocks in wellshaded canyons	Earthworms, sow bugs, millipedes, centipedes, spiders, ticks, ants
Sierra-Nevada salamander	Ensatina eschscholtzi platensis	OW RW MF Ch	Under rotting logs, bark and rocks in wellshaded canyons	Earthworms, sow bugs, millipedes, centipedes, spiders, ticks, ants
California slender salamander	Batrachoseps attenuatus	Sav OW RW MF	Under logs, boards, bark, in damp litter and rotting logs	Earthworms, slugs, sowbugs, aphids, caterpillars, weevils, ants
Arboreal salamander	Aneides lugubris	OW RW Ch MF Ro	On ground and in hollow trees, damp caves and mine shafts, and rock crevices	Fungus, beetles, caterpillars, sow bugs, ants
Black salamander	Aneides flavipunctatus	OW MF	Under logs, bark boards and rocks along streams	
Mount Lyell salamander	Hydromantes platycephalus	Ro	Granite exposures of Sierra Nevada: Rock fissures, seepage of streams, spray zone of water falls	Centipedes, spiders, termites, beetles; flies and their larvae
Spadefoot toads	**Pelobatidae**			
Western spadefoot toad	Scaphiopus hammondi	Gr Sav RW Ma Str	Open vegetation and short grass, where soil is sandy or gravelly	Ants, beetles, grasshoppers, crickets
True toads	**Bufonidae**			
California toad	Bufo boreas halophilus	Gr Sav RW OW Str La	In and near ponds, lakes, rivers, and streams	Bees crayfish, sow bugs, spiders, grasshoppers, caddis flies, moths, mosquitos, beetles
Southwestern toad	Bufo microscaphus	RW Str	Along streams with willows and other vegetation	

Plant Community symbols: RW – Riparian woodland; OW – Oak woodland; Sav – Savanna; Gr – Gressland; Ch – Chaparral; MF – Montane forest (yellow pine forest); La – Lake; Str – Streams; Ma – Marshes; Ro – Rocky areas.

Common Name	Scientific Name	Habitat	Where Found Mostly	Food
Tree frogs	Hylidae			
Pacific tree frog	Hyla regilla	RW OW Ma Str La MF Gr	A ground dweller found in low plant growth near water	Leaf hoppers, midges, small craneflies, parasitic flies, ants, beetles, spiders
Canyon tree frog	Hyla arenicolor	Str OW MF	Niches on sides of boulders or in stream banks	
True frogs	Ranidae			
Red-legged frog	Rana aurora draytoni	Ma Str La RW Gr	A pond frog found in or near water where cattails and the like provide good cover	Isopods, beetles, caterpillars, silverfish, mosquitos
Leopard frog	Rana pipiens	Str Ma RW	In clear or muddy water near aquatic vegetation	
Foothill yellow-legged frog	Rana boylei	Str MF RW Gr	A stream or river frog of woodland and forest, found near riffles, rocks, and sunny banks	Grasshoppers, hornets, carpenter ants, craneflies, water striders, mosquitos, moths, snails
Bullfrog	Rana catesbiana	Ma La Str	Highly aquatic; in or near permanent quiet water with thick growth of cattails, and the like	Earthworms, snails, crustaceans, insects, small fish, frogs, snakes, turtles, young alligators, small birds and mammals
REPTILES				
Water turtles	Testudinidae			
Western pond turtle	Clemmys marmorata	Ma La Str RW	A thoroughly aquatic turtle; seen basking on logs, cat tails, mats and mudbanks	Aquatic plants, insects, carrion
Iguanids	Iguanidae			
Northwestern fence lizard	Sceloporous occidentalis occidentalis	Ro OW Sav Ch Gr	Sunning on lower trunks near ground, fence posts, rocks, logs, sides of buildings	Insects and spiders
Northern sagebrush lizard	Sceloporous graciosus graciosus	Ch Ro MF Ch	A ground dweller; usually near bushes, brush heaps, logs, well-illuminated rocks	Insects, spiders, mites, ticks, scorpions, snails
Granits spiny lizard	Sceloporus o. orcuttii	OW Ch MF	On granite outcrops	Insects, lizards, buds and fleshy fruits
Desert spiny lizard	Sceloporus magister	RW	In crevices, under logs and other objects on the ground	Insects, lizards, buds and flesy fruits
Coast horned lizard	Phrynosoma coronatum frontale	Ch Gr Sav OW Ro Mf RW	Along sandy washes with scattered low bushes for cover and open areas for sunning	Ants and other insects
Leopard lizard	Crotaphytus wislzenii	Gr	Open gravelly sandy areas	Insects, spiders, small mammals, lizards, blossoms and seeds
Skinks	Scincidae			
Western skink	Eumeces skiltonianus skiltonianus	Cr OW Ch Sav Ro MF	Rocky habitats with abundant plant growth near stream; under rocks, logs and bark	Insects, spiders, sow bugs
Gilbert's skink	Eumeces gilberti placerensis	Cr OW Ch Sav Ro MF	Rocky habitats with abundant plant growth near stream; under rocks, logs, and bark	Insects and spiders

Common Name	Scientific Name	Habitat	Where Found Mostly	Food
Whiptails	**Teiidae**			
California whiptail	Cnemidophorus tigris mundus	Cr Ch Ro Sav OW	Semi-arid habitats where plants are sparse with open areas for running	Insects
Orange-throated whiptail	Cnemidophorus hyperythrus	Ch	Washes and other sandy areas with rocks and brush patches	
Alligator Lizards	**Anguidae**			
California alligator lizard	Gerrhonotus multicarinatus multicarinatus	Gr Ch OW Sav Ro MF RW	Moist bottoms of canyons with abundant plant cover; old wood piles and trash heaps	Insects, slugs, centipedes, scorpions, spiders (Black widow) eggs, young birds
Sierra alligator lizard	Gerrhonotus coeruleus palmeri	OW RW MF Gr	Inside rotten logs, under bark, rocks, and the like; cooler, damper places than those prefered by the California alligator lizard	Insects, spiders, millipedes, snails
Legless lizards	**Anniellidae**			
Silvery legless lizard	Anniella pulchra	Ch OW MF RW	Under rocks, logs and boards	Insects, spiders
Geckos	**Gekkonidae**			
Banded gecko	Coleonyx variegatus	Ch	Cool canyons in crevices near water	Spiders, ticks, centipedes
Night lizards	**Xantusiidae**			
Granite night lizard	Xantusia henshawi			
Boas	**Boidae**			
Pacific rubber boa	Charina bottae bottae	Gr OW RW MF	In and beneath logs, under rocks, bark, and the like; a good swimmer, burrower and climber	Small mammals and lizards
Colubrids	**Colubridae**			
Coral-bellied ringneck snake	Diadophis punctatus pulchellas	OW RW Gr MF Ch	Moist habitats, usually on the ground under bark, rotting logs, stones or boards	Slender and other salamanders, small frogs, lizards, snakes, insects, worms
Western ring-necked snake	Diadophis punctatus amabilis	OW MF Gr Ch	On the ground under bark, beneath and inside rotting logs and under stones	Salamanders, frogs, lizards, insects, small snakes, worms
Sharp-tailed snake	Contia tenuis	OW RW Gr MF	Under logs, bark, and rocks near streams on warm days following rains	Slugs only, for which food its long teeth are especially suited
Western yellow-bellied racer	Coluber constrictor mormon	Gr Sav RW OW	Open grassy areas near rocks, logs, and other lizard basking sites; also grassy stream banks	Lizards, frogs, small mammals, insects
Coachwhip	Masticophis flagellum ruddocki	Gr Ch OW RW Sav	Avoids dense vegetation; more tolerant of warm, dry areas than most snakes	Small mammals, birds and their eggs, lizards, snakes, insects, carrion
California striped racer	Masticophis lateralis lateralis	Ch OW Gr Sav Ro	In chaparral areas with scattered grassy Patches, rocky gullies, or stream courses	Frogs, lizards, snakes, small mammals, birds, insects
Striped whipsnake	Masticophis taeniatus	Gr OW MF	Rocky stream courses, in rock outcrops rodent burrows and in trees and shrubs	Lizards, snakes, small mammals

Common Name	Scientific Name	Habitat	Where Found Mostly	Food
Pacific gopher snake	Pituophis melanoleucus catenifer	Gr Ch OW RW Sav MF	In grassland and open brushland; hisses flattens head, and vibrates head like rattler	Rodents, rabbits, birds and their eggs; occasionally lizards
Common kingsnake	Lampropelitis getulus californiae	Ch OW Ro Gr Sav	In vicinity of rock outcrops, slumps of vegetation; under rotting logs and rocks	Snakes (including rattlers), lizards frogs, birds and their eggs, small mammals
California mountain kingsnake	Lampropeltis zonata multicincta	RW OW Ch MF	In vicinity of well-illuminated rocky streams in wooded areas with rotting logs	Lizards, snakes, birds (nestlings). small mammals
Western long-nosed snake	Rhinocheilus lecontei lecontei	Gr Sav OW Ch	Nocturnal: on roadways at night; a good burrower; underground during day	Lizards and their eggs, small mammals, insects
Valley garter snake	Thamnophis sirtalis fitchi	All habitats	Tends to stay near water, retreating to it when frightened	Fish, toads, frogs, tadpoles, salamanders, birds, small mammals, slugs, earthworms, leeches
Mountain garter snake	Thamnophis elegans elegans	All habitats	Usually in damp environments near water; sometimes far from water	Fish, toads, frogs, tadpoles, salamanders, birds, small mammals, slugs, earthworms, leeches, lizards, snakes
Sierra garter snake	Thamnophis couchi couchi	Ma Str La	Primarily a snake of rivers and streams, but found in various aquatic habitats	Fish, fish eggs, frogs, toads, tadpoles, salamanders, earthworms, leeches
California night snake	Hypsiglena torquata nuchalata	Gr Ch OW Sav Ro	Rock crevices, under rocks, boards, and other surface litter in sandy areas	Frogs and lizards
Glossy snake	Arizona elegans	Ch Gr OW	Open sandy or loamy areas with some rocks	lizards, snakes, small mammals
Western patch-nosed snake	Salvadora hexalepis	Gr Ch	Sandy, rocky areas	
Vipers	**Viperidae**			
Northern pacific rattlesnake	Crotalus viridis oreganus	Gr Ch OW RW Sav MF Ro	Rock outcrops, talus, rocky stream courses, ledges	Small mammals and birds primarily, but also lizards and frogs
Speckled rattlesnake	Crotalus mitchelli	Gro OW Ch	Barren rocky bluffs and open brushland	
Red diamond rattlesnake	Crotalus ruber	Gr Ch	Rocky brushy areas	

APPENDIX VI

VERNAL POOL PLANT SPECIES

* means the species is endemic to California
\+ means the species is generally restricted to vernal pools
† means the species is generally found in dried or muddy vernal pools

Isoetaceae
- Isoetes nuttallii
- Isoetes orcuttii * +

Ophioglossaceae
- Ophioglossum californicum +

Marsileaceae
- Marsilea vestita + †
- Pilularia americana +

Ranunculaceae
- Myosurus minimus +
- Ranunculus aquatilis
- Ranunculus pusillus

Malvaceae
- Sida hederacea
- Sida hirsuta * +

Limnanthaceae
- Limnanthes alba * +
- Limnanthes floccusa
- Limnanthes douglasii +

Cruciferae
- Lepidium latipes * +

Elatinaceae
- Elatine rubella +
- Elatine californica * +

Portulacaceae
- Montia ballii +
- Montia verna

Primulaceae
- Centunculus minimus +

Plantaginaceae
- Plantago bigelovii + †
- Plantago heterophylla

Polemoniaceae
- Navarretia leucocephala +
- Navarretia minima +
- Navarretia pauciflora *
- Navarretia plieantba * +
- Navarretia bakeri * +
- Navarretia prostrata * +
- Navarretia intertexta
- Navarretia nigellaeformis * + †
- Navarretia beterandra * + †
- Naverretia pubescens + †

Boraginaceae
- Plagiobothrys bumistratus * +
- Plagiobothrys acantbocarpus +
- Plagiobothrys leptocladus
- Plagiobothrys stipitatus +
- Plagiobothrys bracteatus + †
- Plagio bothrys undulatus * + †
- Plagiobothrys reticulatus

Scrophulariaceae
- Gratiola ebracteata
- Veronica peregrina
- Mimulus tricolor + †
- Mimulus latidens
- Mimulus angustatus * + †
- Orthocarpus campestris +
- Orthocarpus erianthus

Lentibulariaceae
- Utricularia vulgaris
- Utricularia gibba

Labiatae
- Pogogyne douglasii * +
- Pogogyne nudiuscula * +
- Pogogyne abramsii + †
- Pogogyne xixyphoroides + †

Crassulaceae
- Tillaea aquatica †

Leguminosae
Astragalus tener *

Lythraceae
Lythrum hyssopifolia
Lythrum californicum

Onagraceae
Boisduvalia cleistogama * + †
Boisduvalia glabella + †

Callitrichaceae
Calitriche marginata + †
Callitriche longipedunculata * +

Umbelliferae
Eryngium vaseyi * + †
var. *vallicola*
var. *globosum*
Eryngium armatum * +
Eryngium pinnatisectus * + †
Eryngium aristulatum * + †
var. *parishii*

Campanulaceae
Downingia insignis +
Downingia elegans + †
Downingia bicornuta +
Downingia pusilla
Downingia pulchella *
Downingia ornatissima *
Downingia cuspidata
Downingia bella * +
Downingia concolor * +
Downingia yina +
Legenere limosa * + †

Compositae
Layia chrysanthemoides * +
Lasthenia fremontii * + †
Lasthenia glaberrima +
Lasthenia glabrata * +
Blennosperma nanum *
Blennosperma bakeri * +
Psilocarphus brevissimus + †
Psilocarphus oregonus + †
Psilocarphus tenellus + †
Evax caulescens * + †
Gnaphalium palustre

Alismataceae
Machaerocarpus californicum
Alisma triviale +

Lilaeaceae
Lilaea scilloides

Juncaceae
Juncus bufonius + †
Juncus uncialis +
Juncus ensifolius
Juncus supiniformis

Cyperaceae
Heleocharis acicularis +
Cyperus eragrostis

Gramineae
Pleuropogon californicus
Orcuttia greenei *
Orcuttia californica + †
Orcuttia tenuis +* +
Orcuttia pilosa * +
Deschampsia danthonioides + †
var. *gracilis*
Alopecurus saccatus
Alopecurus pallescens
Alopecurus bowellii
Agrostis microphylla +
var. *intermedia*
var. *hendersoni*
Agrostis tandilensis +
Phalaris lemmonii * +