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GAZETTEER OF SURFACE WATERS  
OF CALIFORNIA

PART II. SAN JOAQUIN RIVER BASIN

PREPARED UNDER THE DIRECTION OF JOHN C. HOYT

BY

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In cooperation with the State Water Commission and the  
Conservation Commission of the State of California



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**NOTE.**

A complete list of the gaging stations maintained in the San Joaquin River basin from 1888 to July 1, 1912, is presented on pages 100-102.

# GAZETTEER OF SURFACE WATERS IN SAN JOAQUIN RIVER BASIN, CALIFORNIA.

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## INTRODUCTION.

This gazetteer is the second of a series of reports on the surface waters of California prepared by the United States Geological Survey under cooperative agreement with the State of California as represented by the State Conservation Commission, George C. Pardee, chairman; Francis Cuttle; and J. P. Baumgartner, and by the State Water Commission, Hiram W. Johnson, governor; Charles D. Marx, chairman; S. C. Graham; Harold T. Powers; and W. F. McClure. Louis R. Glavis is secretary of both commissions. The reports are to be published as Water-Supply Papers 295 to 300 and will bear the following titles:

295. Gazetteer of surface waters of California, Part I, Sacramento River basin.
296. Gazetteer of surface waters of California, Part II, San Joaquin River basin.
297. Gazetteer of surface waters of California, Part III, Great Basin and Pacific coast streams.
298. Water resources of California, Part I, Stream measurements in the Sacramento River basin.
299. Water resources of California, Part II, Stream measurements in the San Joaquin River basin.
300. Water resources of California, Part III, Stream measurements in the Great Basin and Pacific coast river basins.

The gazetteers embrace descriptions of all the streams named on the best available maps. For the San Joaquin basin these maps are chiefly those published by the United States Geological Survey as sheets of the Topographic Atlas of the United States. For districts not yet mapped by the Survey, Land Office maps, a manuscript map of the San Joaquin Valley by A. J. Fisk, jr., and H. R. Johnson, J. L. LeConte's map (manuscript) of a portion of the Sierra Nevada in central California, a map of the Sierra Nevada in central California issued as publication No. 12 of the Sierra Club, and Punnett's county maps have been used.

Each stream is described as rising near the point at which its beginning is shown on the map, and the elevation of that point is given as the elevation of the source. It is of course recognized that

this method does not give results of great precision, but it probably causes no greater errors in the determination of length and fall than would be caused by extending each stream to the head of the divide between its basin and that of the adjoining streams. It should be understood, however, that all statements of elevation, length, and fall are merely approximate.

The Survey maps used in the preparation of the gazetteer of streams in the San Joaquin basin are listed below in alphabetic order. An index map showing the area covered by each sheet may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

*Topographic sheets covering areas in San Joaquin River basin.<sup>1</sup>*

Bakersfield.	Mount Whitney.
Big Trees.	Olancho.
Dardanelles.	Orestimba-Panoche-Cantua special. <sup>2</sup>
Kaiser.	Sonora.
Kaweah.	Tehipite.
Kernville.	Tejon.
Mariposa.	Yosemite.
Mount Goddard.	Yosemite National Park.
Mount Lyell.	Yosemite Valley.

### GAZETTEER.

The letter L or R in parentheses after the name of a stream indicates that the stream is a tributary from the left or right, respectively, to the stream into which it flows. The word "sheet" refers to Geological Survey atlas sheets.

**Ackerson Creek** (R); Tuolumne County; Stanislaus National Forest; rises in the western part of T. 1 S., R. 20 E., Mount Diablo base and meridian, on the southern and eastern slopes of Bald Mountain at altitude 7,000 feet; flows, in general, south of west 6 miles to its junction with South Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 2,900 feet, of which 1,500 feet occurs in the first 2 miles; middle course of creek lies through Ackerson Meadow. Yosemite National Park map.

**Agua Fria Creek** (R); Mariposa County; rises in northern part of T. 6 S., R. 18 E., Mount Diablo base and meridian; flows southeastward into Mariposa Creek; much shorter than Buckeye Creek, which is mapped as tributary to it. Mariposa sheet; Land Office map of California, 1907.

**Alder Creek** (R); Madera County; rises in the northwestern part of T. 6 S., R. 22 E., Mount Diablo base and meridian, in the Fresno grove of big trees, at altitude 5,600 feet above sea level; flows southward 2 miles into Nelder Creek (tributary through Lewis Fork of Fresno River to Fresno River and thus to San Joaquin River); fall, 1,000 feet. Mariposa sheet.

**Alder Creek** (R); Mariposa County; Yosemite National Park; rises in the southeastern part of T. 3 S., R. 21 E., Mount Diablo base and meridian, at altitude 7,600 feet above sea level; flows southwestward 7 miles into South Fork of Merced River; fall, 4,000 feet. Yosemite National Park map.

<sup>1</sup> An act of Congress approved Feb. 18, 1897, prescribes that the maps shall be disposed of by sale. They are sold at the rate of 5 cents a sheet of standard size. If 100 or more standard topographic atlas sheets or their equivalent in value in other maps are ordered, a discount of 40 per cent will be made from the retail price—that is, 100 standard topographic atlas sheets will cost \$3.

<sup>2</sup> Advance copy of a map prepared for publication, probably with a different title, in a Survey report on the west border of the San Joaquin Valley.

**Alkali Creek (R);** Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 2 N., R. 24 E., Mount Diablo base and meridian, at altitude 9,350 feet above sea level; flows southwestward 5 miles into Conness Creek (tributary through Tuolumne River to San Joaquin River); fall, 1,300 feet; intermittent. Yosemite National Park map.

**Alpine Creek (R);** Fresno County; Sierra National Forest; rises in the northern part of T. 11 S., R. 30 E., Mount Diablo base and meridian, at altitude 11,000 feet above sea level; flows southward 5 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,500 feet, of which 2,000 feet is made in the last mile. Tehipite sheet.

**Alpine Creek (R);** Tulare County; Sequoia National Forest; rises in the east central part of T. 19 S., R. 31 E., Mount Diablo base and meridian, at altitude 8,200 feet above sea level; flows eastward  $2\frac{1}{2}$  miles, then southeastward  $2\frac{1}{2}$  miles into Little Kern River tributary to Kern River; fall, 2,200 feet; tributaries, Pecks Canyon and Mountaineer creeks. Kaweah sheet.

**Amador Creek (L);** Amador County; rises in the southern part of T. 7 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,000 feet above sea level; flows irregularly westward 8 miles into Rancheria Creek (tributary to Dry Creek and thus through Mokelumne River to the San Joaquin); fall, 1,400 feet. Jackson sheet.

**Amphitheater Lake;** Fresno County; Sierra National Forest; 1 mile north of Dumb-bell Lakes; two small inflowing streams; outlet, Cataract Creek to Palisade Creek; altitude, 10,700 feet; fall of outlet, 1,900 feet. Mount Goddard sheet.

**Amphitheater Lake;** Tulare County; Sequoia National Forest; western part of T. 17 S., R. 32 E., Mount Diablo base and meridian, in a glacial cirque on the eastern slope of the Great Western Divide; no outlet, but the basin is topographically tributary to Soda Creek, which flows through Big Arroyo to Kern River. Kaweah sheet.

**Angels Creek (R);** Calaveras County; rises in the southeastern part of T. 3 N., R. 14 E., Mount Diablo base and meridian, at altitude 3,100 feet above sea level; flows southwestward 12 miles, then southward 6 miles to its junction with Stanislaus River (tributary to the San Joaquin); fall, about 2,500 feet; principal tributary, Sixmile Creek. Jackson and Big Trees sheets. Land Office map of California, 1907.

**Antelope Creek (R);** Amador County; rises in the southwestern part of T. 8 N., R. 14 E., Mount Diablo base and meridian, near Antelope Springs, at altitude 4,500 feet above sea level; flows southwestward  $4\frac{1}{2}$  miles, then southeastward 1 mile into Mill Creek; fall, 1,600 feet. Pyramid Peak, Big Trees, and Jackson sheets.

**Arndt Lake;** Tuolumne County; Yosemite National Park; southeastern part of T. 3 N., R. 22 E., Mount Diablo base and meridian; outlet, a stream half a mile long, flowing northward to Rancheria Creek (tributary through Tuolumne River to the San Joaquin) near upper end of Kerrick Canyon; altitude, 9,250 feet; fall of outlet, 100 feet. Yosemite National Park map.

**Arnot Creek (R);** Alpine County; Stanislaus National Forest; rises just south of the south line of T. 8 N., R. 20 E.,  $1\frac{1}{2}$  miles south of east of Highland Lake, at altitude 8,600 feet above sea level; flows southwestward 6 miles, then southeastward 2 miles into Clark Fork (tributary through Middle Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); fall, 2,400 feet. Dardanelles sheet.

**Arrow Creek (L);** Fresno County; rises in Sierra National Forest, on the south slope of Arrow Peak (altitude 12,927 feet); flows southwestward 5 miles into South Fork of Kings River (tributary to San Joaquin River); passes through several lakes; fall, 4,300 feet, of which 1,300 feet occurs in half a mile at the mouth. Mount Whitney and Tehipite sheets.

**Ashland Creek (L);** rises in the southern part of T. 8 N., R. 13 E., at altitude 4,000 feet above sea level; flows southwestward 6 miles into Sutter Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin); fall, 1,800 feet. Jackson sheet.

**Avalanche Creek** (L); Fresno County; Sierra National Forest; rises in the southeastern part of T. 13 S., R. 31 E., Mount Diablo base and meridian, on the north slope of Avalanche Peak (altitude 11,264 feet); flows northward  $2\frac{1}{2}$  miles into South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,000 feet. Tehipite sheet.

**Avalanche Creek** (L); Mariposa County; Yosemite National Park; rises in the western part of T. 3 S., R. 21 E., at altitude 7,000 feet above sea level; flows north of west 3 miles into Merced River (tributary to San Joaquin River); fall, 4,000 feet. Yosemite National Park map.

**Avenal Creek** (L); Fresno and Kings counties; rises in the northeastern part of T. 23 S., R. 15 E., flows southeastward 22 miles, then, in general, northeastward 10 miles into San Joaquin Valley south of Tulare Lake; sinks below the foothills; carries water only during the rainy season. Manuscript map of San Joaquin Valley (compiled by Fisk and Johnson); Land Office map of California, 1907.

**Babcock Lake**; Mariposa County; western part of T. 2 S., R. 24 E., Mount Diablo base and meridian; inlet, Fletcher Creek; outlet, Fletcher Creek to McClure Fork (tributary through Merced River to the San Joaquin); altitude, 8,850 feet; fall of Fletcher Creek in the mile between Babcock Lake and McClure Fork, 950 feet, Mount Lyell sheet.

**Backbone Creek** (L); Fresno County; rises in; on the east slope of Backbone Mountain, at altitude 2,500 feet above sea level; flows northwestward 2 miles into San Joaquin River; fall, 1,300 feet; intermittent. Kaiser sheet.

**Badger Lake**; Madera County; northern part of the Sierra National Forest; one-half mile east of the northern end of Thousand Island Lake; one inlet; outlet, a stream one-half mile long, flowing northeastward into Middle Fork of San Joaquin River; elevation, 9,800 feet; very small.

**Bald Mill Creek** (L); Fresno County; rises in the northeastern part of T. 10 S., R. 23 E., on the north slope of Bald Mountain, at altitude 4,500 feet above sea level; flows northwestward  $3\frac{1}{2}$  miles into San Joaquin River in the Horseshoe Bend; fall, 3,300 feet. The upper part of this basin is an open meadow and contains several settlements. Kaiser sheet.

**Basin Creek** (R); rises in the western part of T. 29 S., R. 32 E., Mount Diablo base and meridian; flows southwestward into Caliente Creek near Pampa. Its basin joins the basin of the Kern on the northern border. A peculiar feature of this basin is a mountain valley known as Walkers Basin (altitude, 3,200 feet above sea level). Gaging station near Havalah (1911-12). Manuscript map of San Joaquin Valley (compiled by A. J. Fisk, jr., and H. R. Johnson); Bull. U. S. Geol. Survey No. 140, 1896, pp. 264-266.

**Basin Slope Creek** (L); Tuolumne County; rises in the southern part of T. 2 N., R. 17 E., on the western slope of The Basin, at altitude 4,000 feet above sea level; flows south of west  $3\frac{1}{2}$  miles into North Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 1,800 feet. Sonora sheet.

**Battle Creek** (R); Tulare County; Sequoia National Forest; rises in the northeastern part of T. 18 S., R. 29 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows southwestward 3 miles into South Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 2,400 feet; intermittent; tributary, Bennett Creek. Kaweah sheet.

**Baxter Creek** (R); Fresno County; rises in Sierra National Forest, on the western slope of Mount Baxter (altitude 13,118 feet); flows southwestward 1 mile, then westward 2 miles, into South Fork of Woods Creek (tributary through Woods Creek to South Fork of Kings River and thus through Kings River to the San Joaquin); fall, 2,400 feet. Mount Whitney sheet.

**Bean Creek** (R); Mariposa County; rises in the southwestern part of T. 2 S., R. 17 E., Mount Diablo base and meridian; at altitude 3,200 feet above sea level; flows north of

east  $4\frac{1}{2}$  miles into Smith Creek (tributary through North Fork of Merced River and thus to the San Joaquin); fall, 400 feet; principal tributary, Dutch Creek; intermittent. Sonora sheet.

**Bear Gulch Creek** (R); Madera County; rises in the northwestern part of T. 8 S., R. 20 E., Mount Diablo base and meridian, at altitude 1,600 feet above sea level; flows southeastward 3 miles into Fresno River (tributary to San Joaquin River); fall, 400 feet. Mariposa sheet.

**Bear Creek** (R); Calaveras County; rises in the eastern part of T. 7 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; flows, in general, southwestward 8 miles into Middle Fork of Mokelumne River (tributary through the Mokelumne to the San Joaquin); fall, 1,900 feet. Big Trees and Jackson sheets.

**Bear Creek** (L); Calaveras County; rises in the eastern part of T. 3 N., R. 11 E., Mount Diablo base and meridian, on the west slope of Bear Mountain, at altitude 2,500 feet above sea level; flows southeast  $2\frac{1}{2}$  miles, southwest 2 miles, northwest 7 miles to Calaveras River (tributary to San Joaquin River); fall, 1,900 feet. Jackson sheet.

**Bear Creek** (R); Fresno County; Sierra National Forest; formed by junction of East and South forks 5 miles east of the east boundary of T. 7 S., R. 27 E., Mount Diablo base and meridian. The South Fork drains the larger area and is here considered the continuation of the main stream. This fork rises on the western slope of the Pinnacles, flows northwestward to the junction of the East Fork, beyond which the creek continues in a northwesterly course about 3 miles, then turns and flows west and southwest to its junction with the San Joaquin; length of Bear Creek to the head of the South Fork, about 15 miles; total fall, 5,400 feet, well distributed throughout. This creek, like all the other headwater tributaries of the South Fork of San Joaquin River, derives much of its supply from glacial lakes high up on the slopes of the mountains. Only 3 of these lakes are named on the map, but about 50 are shown. Mount Goddard sheet.

**Bear Creek** (L); Fresno County; Sierra National Forest; rises in the northwestern part of T. 10 S., R. 27 E., Mount Diablo base and meridian, on the north slope of Nelson Mountain, in a glacial lakelet at altitude 9,300 feet above sea level; flows southwestward 6 miles into Dinkey Creek (tributary to North Fork of Kings River and thus through Kings River to the San Joaquin); fall, 3,300 feet; principal tributary, Laurel Creek. Kaiser sheet.

**Bear Creek** (L); Mariposa County; Sierra National Forest; rises in the northwestern part of T. 5 S., R. 19 E., Mount Diablo base and meridian, at altitude 3,100 feet above sea level; takes a general northwesterly course 7 miles to its junction with Merced River (tributary to San Joaquin River) at Bear Creek station on the Yosemite Valley railroad; fall, 1,900 feet. Yosemite sheet.

**Bear Creek** (R); Mariposa and Merced counties; rises in the central part of T. 4 S., R. 17 E.; takes a general southwesterly course to San Joaquin Valley, across which it flows into several channels; carries practically no water after the rainy season; principal tributary, Burns Creek; drainage area (W. Ham. Hall), 166 square miles. Gaging station at base of foothills (1878-1884). Fisk and Johnson map. Bull. U. S. Geol. Survey No. 140, 1895, p. 295.

**Bear Creek** (L); Tulare County; Sequoia National Forest; rises in the northeastern part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 7,500 feet above sea level; flows northwestward  $2\frac{1}{2}$  miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule River to Tule River and thus to Tulare Lake basin); fall, 3,000 feet. Gaging station near Daunt (1911-12). Kaweah sheet.

**Bear Creek** (L); Tulare County; Sequoia National Forest; rises in the southern part of T. 19 S., R. 30 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southwestward  $7\frac{1}{2}$  miles into North Fork of Tule River (tributary through Tule River to Tulare Lake basin); fall, 4,600 feet; principal tributary, Rancheria Creek. Kaweah sheet.

**Bear Creek (L);** Tuolumne County; rises in the western part of T. 1 N., R. 14 E., Mount Diablo base and meridian,  $3\frac{1}{2}$  miles southwest of Rawhide on the west slope of Table Mountain, at altitude 1,400 feet above sea level; flows northwestward into Stanislaus River; length, about 5 miles; fall, 1,000 feet; intermittent. Sonora sheet.

**Bear Creek, East Fork (R);** Fresno County; rises in Sierra National Forest, 3 miles northwest of Pine Creek Pass at altitude 12,700 feet above sea level; flows south of west  $4\frac{1}{2}$  miles, passing through several lakes, to its junction with Bear Creek (tributary to South Fork of San Joaquin River); fall, 2,500 feet. The basin of this creek comprises less than 10 square miles and includes more than two dozen small lakes. Mount Goddard sheet.

**Bear River (R);** Amador County; rises in the central part of T. 9 N., R. 17 E., Mount Diablo base and meridian, at altitude 8,900 feet above sea level; flows southwestward 17 miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 5,600 feet; principal tributary, Tragedy Creek. Pyramid Peak and Big Trees sheets.

**Beartrap Creek (R);** Tulare County; Sequoia National Forest; rises in the western part of T. 14 S., R. 29 E., Mount Diablo base and meridian, on the east slope of Big Baldy Ridge, at altitude 7,500 feet above sea level; flows, in general, southeastward 4 miles into Stony Creek (tributary through North Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 1,250 feet. Tehipite sheet.

**Bearup Lake;** Tuolumne County; Yosemite National Park; northwestern corner of T. 2 N., R. 21 E., Mount Diablo base and meridian; inlet, Frog Creek; outlet, Frog Creek to Lake Eleanor on Eleanor Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); altitude, 7,550 feet. Yosemite National Park map.

**Beasore Creek (R);** Madera County; rises in the west-central part of T. 5 S., R. 23 E., Mount Diablo base and meridian; in a small lake at altitude 8,100 feet above sea level; flows southeastward 6 miles into Chiquito Creek (tributary to San Joaquin River); in Johnson Meadows in the western part of T. 6 S., R. 24 E.; fall, 3,100 feet; open meadow near head. Kaiser sheet.

**Beaver Creek (R);** Amador County; rises in the southern part of T. 8 N., R. 15 E., at altitude 6,000 feet above sea level; flows southward 2 miles, then southeastward 1 mile into Bear River (tributary through North Fork of Mokelumne River to Mokelumne River and thus to the San Joaquin); fall, 2,700 feet. Pyramid Peak and Big Trees sheets.

**Beaver Creek (L);** Tuolumne County; rises in the southeastern part of T. 6 N., R. 17 E., Mount Diablo base and meridian, at altitude 7,400 feet above sea level; flows southwestward 17 miles into North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus River and thus to the San Joaquin); fall, 4,900 feet, of which 1,000 feet is made in the last  $1\frac{1}{2}$  miles; drainage basin long and narrow; tributaries small and unimportant; the south grove of the Calaveras big trees lies on the divide between this creek and Griswold Creek. Big Trees sheet.

**Beck Lakes;** Madera County; eastern part of the Sierra National Forest, southeast of the Minarets and north of Iron Mountain; inlet, King Creek, which flows through the lakes to junction with Middle Fork of San Joaquin; two lakes connected by very short channel, the eastern, 10,010 feet above sea level, the western, 100 feet higher. Mount Lyell sheet.

**Becknell Creek (L);** Mariposa County; rises in the southeastern part of T. 6 S., R. 18 E., at altitude about 2,000 feet above sea level; flows southward 6 miles into Chapman Creek (tributary through Chowchilla River to the San Joaquin); fall, 1,000 feet. Mariposa sheet.

**Belknap Creek (R);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 20 S., R. 31 E., Mount Diablo base and meridian, at altitude 8,500 feet above sea level; flows west of south  $3\frac{1}{2}$  miles into South Fork of Middle Fork of Tule

River (tributary through Middle Fork of Tule to Tule River and thus to Tulare Lake basin); fall, 3,400 feet. Kaweah sheet.

**Bench Canyon Creek** (R); Madera County; rises in the northwestern part of the Sierra National Forest south of Foerster Peak, at altitude 11,000 feet above sea level; flows south of east 3 miles into North Fork of San Joaquin River (tributary to Middle Fork of San Joaquin); fall, 2,400 feet. Mount Lyell sheet.

**Bench Lake**; Fresno County; Sierra National Forest, 4 miles west of Mount Pinchot; outlet, a stream half a mile long flowing northward into South Fork of Kings River (tributary to San Joaquin River); altitude, 10,485 feet; fall of outlet, 900 feet. Mount Whitney sheet.

**Bench Lakes**; Fresno County; Sierra National Forest, west of Goat Crest; three small glacial lakes connected by channels less than half a mile long, discharging by a stream flowing west and then north to the Middle Fork of Dougherty Creek (tributary through Dougherty Creek to Middle Fork of Kings River and thus through Kings River to the San Joaquin); the highest of the lakes is 10,300 feet above sea level, the lowest is 10,050 feet; the group also includes a small lake without outlet, lying one-third mile south of the others. Tehipite sheet.

**Bennett Creek** (L); Tulare County; Sequoia National Forest; rises in the northwestern part of T. 18 S., R. 30 E., Mount Diablo base and meridian, at altitude 6,500 feet above sea level; flows westward 2 miles and southwestward 1 mile into Battle Creek (tributary through South Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 3,100 feet; intermittent. Kaweah sheet.

**Benson Lake**; Tuolumne County; Yosemite National Park; eastern part of T. 2 N., R. 22 E., Mount Diablo base and meridian; inlet, Piute Creek, which flows through the lake to its junction with Tuolumne River (tributary to the San Joaquin), and a stream from Smedberg Lake; altitude, 8,050 feet; fall of Piute Creek in the 8 miles below the lake, 3,600 feet; the lake is about three-fourths mile long and one-third mile in maximum width. Yosemite National Park map.

**Beulah Lake**; Tuolumne County; Stanislaus National Forest; 2 miles north of west from the south end of Emigrant Lake and  $2\frac{1}{2}$  miles south of Granite Dome; one inlet; outlet, a stream 3 miles long flowing, in general, southwestward and passing through three small lakes to its junction with West Fork of Cherry Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); altitude, 8,700 feet; fall of outlet above the West Fork, 800 feet. Yosemite National Park map.

**Big Arroyo** (R); Tulare County; Sequoia National Forest; rises in the southwestern part of T. 15 S., R. 32 E., Mount Diablo base and meridian, in a small lake on the eastern slope of the Great Western Divide, at altitude 11,100 feet above sea level; flows, in general, southeastward 14 miles to its junction with Kern River near Funston Camp; fall, 4,500 feet; principal tributaries Soda and Willow creeks, and a stream from the Five Lakes; the head of the stream lies in the Ninelake basin. Tehipite, Kaweah, and Olancha sheets.

**Big Canyon Creek.** See Canyon Creek, Big.

**Big Creek** (L); Fresno County, formed in the eastern part of T. 8 S., R. 26 E., Mount Diablo base and meridian, by the junction of the East and South forks; the South Fork rises in Hot Springs Pass (elevation, 9,778 feet); flows irregularly westward 3 miles through Rock Meadow to head of Long Meadow, where it turns and flows northward to its junction with the East Fork; the length of this branch is about 6 miles and the fall above the junction is 1,000 feet; the East Fork rises on the south slope of Kaiser Ridge, just south of the line between Ts. 7 and 8 S., at altitude 10,000 feet above sea level; flows southward 2 miles, then southwestward 3 miles to its junction with the South Fork. The fall of this branch above the junction is 1,600 feet. Below the junction Big Creek flows very irregularly westward about 15 miles; it unites with the San Joaquin in the central part of T. 8 S., R. 24 E.; fall below the East and South forks,

6,400 feet; lower course lies through a deep canyon; upper part of drainage area, open; the basin contains a number of small lakes, three of which—Nellie, Red, and Coyote lakes—are named on the map; principal tributary below the South and East forks, North Fork. Kaiser sheet.

**Big Creek (R);** Fresno County; Sierra National Forest; rises in the northwestern part of T. 10 S., R. 25 E., Mount Diablo base and meridian, in Summit Meadow, at altitude 6,000 feet above sea level; takes a general southerly course to its junction with Kings River (tributary to the San Joaquin); principal tributary, Rush Creek; length, 15 miles. Gaging station at Tollhouse (1910-1912). Kaiser sheet; Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Big Creek (L);** Mariposa County; rises in the eastern part of T. 5 S., R. 22 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows southwestward 3 miles, then northwestward 10 miles into South Fork of Merced River (tributary to the San Joaquin); fall, about 4,500 feet; water from this creek is diverted to the basin of Fresno River by the lumber company's flume. Gaging station at Sugarpine (1910-1912). Mariposa and Yosemite sheets.

**Big Creek (L);** Tuolumne County; rises near Smith station, in the western part of T. 1 S., R. 17 E., at altitude 2,800 feet above sea level; flows northwestward 9 miles into Tuolumne River (tributary to San Joaquin River); fall, 1,600 feet, of which 800 feet occurs in little more than a mile at the entrance to Tuolumne River; upper valley broad and open. Sonora sheet.

**Big Creek,** East and South forks, Fresno County. See *Big Creek*.

**Big Creek, North Fork (R);** Fresno County; rises in the southern part of T. 7 S., R. 26 E., Mount Diablo base and meridian, on the south slope of Kaiser Ridge, near Kaiser Pass, at altitude 9,200 feet above sea level; flows southwestward 6 miles into Big Creek (tributary to San Joaquin River); fall, 2,400 feet. Kaiser sheet.

**Big Grizzly Creek.** See *Grizzly Creek, Big*.

**Big Humbug Creek.** See *Humbug Creek, Big*.

**Big Indian Creek.** See *Indian Creek, Big*.

**Big Meadow Creek.** See *Meadow Creek, Big*.

**Big Sandy Creek.** See *Sandy Creek, Big*.

**Bishop Creek (R);** Mariposa County; Yosemite National Park; rises in the central part of T. 3 S., R. 21 E., at altitude 7,600 feet above sea level; flows southwestward 5 miles into South Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 4,300 feet. Yosemite National Park map.

**Bitter Creek (L);** Kern County; rises in the southeastern part of T. 10 N., R. 24 W., at altitude 4,000 feet above sea level; flows eastward 2 miles, then northward toward Buena Vista Lake Reservoir, in San Joaquin Valley. Mount Pinos sheet.

**Bitter Creek (R);** Tulare County; Sierra National Forest; rises in the northern part of T. 22 S., R. 35 E., Mount Diablo base and meridian, at altitude 6,700 feet above sea level; flows eastward  $2\frac{1}{2}$  miles into South Fork of Kern River (tributary to Kern River); fall, 1,100 feet. Olancha sheet.

**Black Creek (R);** Calaveras County; rises in the southern part of T. 2 N., R. 12 E., Mount Diablo base and meridian; flows southeastward into Stanislaus River (tributary to San Joaquin River); length, 8 miles. Land Office map of California, 1907.

**Black Peak Fork (R);** Madera County; rises in the Sierra National Forest, on the north slope of Black Peak (altitude, 10,507 feet); flows northeastward 4 miles into West Fork of Granite Creek (tributary through Granite Creek to San Joaquin River); fall, 2,400 feet; tributaries, stream from Lillian Lake and several unnamed streams. Mount Lyell sheet.

**Blacks Creek (R);** Mariposa County; rises in the western part of T. 2 S., R. 16 E., at altitude 2,600 feet above sea level; flows southward 3 miles, then southwestward 1 mile into Maxwell Creek (tributary through Merced River to San Joaquin River); fall, 1,100 feet; intermittent. Sonora sheet.

**Blade Creek** (R); Mariposa County; rises in the central part of T. 6 S., R. 19 E., at altitude 2,000 feet above sea level; flows southeastward 4 miles into West Fork of Chowchilla River (tributary through Chowchilla River to the San Joaquin); fall, 800 feet. Mariposa sheet.

**Blanket Creek** (L), Tuolumne County; rises in the southeastern part of T. 1 N., R. 15 E., Mount Diablo base and meridian, at altitude 1,850 feet above sea level; flows westward 2 miles into Rough and Ready Creek (tributary through Tuolumne River to San Joaquin); fall, 200 feet; intermittent. Sonora sheet.

**Bloods Creek** (R); Alpine and Calaveras counties; Stanislaus National Forest; rises 4 miles northwest of Highland Reservoir and 1 mile northwest of Silver Valley, at altitude 8,000 feet above sea level; flows southwestward  $5\frac{1}{2}$  miles, passing through Bear Valley, into North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus River and thus to the San Joaquin); fall, 1,900 feet. Big Trees sheet.

**Blue Canyon Creek** (R); Fresno County; Sierra National Forest; rises in a group of glacial lakelets on the west slope of Blue Canyon Peak (altitude 11,838 feet); flows, in general, southwestward  $7\frac{1}{2}$  miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 6,400 feet, of which 2,800 feet is made in the last mile. Mount Goddard and Tehipite sheets.

**Blue Creek** (L); Calaveras County; Stanislaus National Forest; rises in the southwestern part of T. 7 N., R. 17 E., Mount Diablo base and meridian, at altitude 6,800 feet above sea level; flows somewhat north of west 14 miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 3,800 feet. Big Trees sheet.

**Blue Lakes**; Alpine County; Stanislaus National Forest; one inlet; outlet, Deer Creek to North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); two lakes, each nearly a mile long, connected by a channel one-half mile long; altitude of the lower lake (called East Lake on the Land Office map) 8,500 feet; altitude of the upper lake (West Lake) 8,625 feet. Markleeville sheet.

**Boatfish Creek** (L); Kern County; Sierra National Forest; rises in the southern part of T. 27 S., R. 33 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows northwestward 7 miles to its junction with Kern River near Vaughn; fall, 3,600 feet. Kernville sheet.

**Bog Creek** (R); Tulare County; rises in the northwestern part of T. 15 S., R. 31 E., in Long Meadow, at altitude 10,300 feet above sea level; flows northward  $7\frac{1}{2}$  miles into Sugarloaf Creek (tributary through Roaring River to South Fork of Kings River) near the lower end of Sugarloaf Valley; fall, 3,500 feet; principal tributary, West Fork. Tehipite sheet.

**Bold Creek.** See Sandy Creek, Big.

**Bonell Gulch Creek** (L); Mariposa County; Stanislaus National Forest, rises in the eastern part of T. 3 S., R. 18 E., Mount Diablo base and meridian, at altitude 3,500 feet above sea level; flows northwestward 3 miles into Bull Creek (tributary through North Fork of Merced River to Merced River and thus to the San Joaquin) at Kinsley; fall, 700 feet. Yosemite sheet.

**Bonito Creek** (L); Tulare County; Kern National Forest; rises in the northwestern part of T. 22 S., R. 34 E., Mount Diablo base and meridian, in Bonito Meadows, at altitude 8,300 feet above sea level; flows eastward  $1\frac{1}{2}$  miles into Rattlesnake Creek (tributary to Kern River); fall, 800 feet. Olancho sheet.

**Boulder Creek** (R); Alpine County; Stanislaus National Forest; rises in the western part of T. 7 N., R. 21 E., Mount Diablo base and meridian, at altitude 8,600 feet above sea level; flows southward 2 miles into Clark Fork (tributary through Middle Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); fall, 1,600 feet. Dardanelles sheet.

**Boulder Creek** (L); Tulare and Fresno counties; Sequoia National Forest; in the southwestern part of T. 14 S., R. 30 E., Mount Diablo base and meridian, at altitude 9,350 feet above sea level; flows, in general, northwestward 10 miles to its junction with South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 6,000 feet; principal tributary, Big Meadow Creek. Tehipite sheet.

**Boundary Creek** (L); Madera County; rises in the eastern part of the Sierra National Forest, near Mammoth Pass, at altitude 9,200 feet above sea level; flows westward 2 miles into Middle Fork of San Joaquin River in Reds Meadows; fall, 1,850 feet. Mount Lyell sheet.

**Branigan Lake**; Tuolumne County; Yosemite National Park, western part of T. 2 N., R. 21 E., Mount Diablo base and meridian; inlets from two lakes, one west and one south of Andrews Peak; outlet, a stream 2 miles long flowing southwestward to Falls Creek (tributary through Tuolumne River to the San Joaquin) just above Vernon Lake; altitude, 7,350 feet; fall of outlet, 700 feet. Yosemite National Park map.

**Breeze Creek** (R); Tuolumne County; Yosemite National Park; rises in the west central part of T. 2 N., R. 22 E., Mount Diablo base and meridian, 1 mile west of Piute Mountain, at altitude 9,500 feet above sea level; takes a circuitous but in general southwesterly course to its junction with Deep Canyon Creek, through which it enters Rancheria Creek (tributary through Tuolumne River to the San Joaquin); fall, 2,800 feet. Yosemite National Park map.

**Breeze Lake**; Madera County; Yosemite National Park, eastern part of T. 4 S., R. 23 E., just north of Gale Peak; outlet, a stream 2 miles long flowing northwestward to South Fork of Merced River (tributary through Merced River to the San Joaquin); altitude, 9,600 feet. Yosemite National Park map.

**Brewer Creek** (R); Tulare County; rises in the central part of T. 14 S., R. 32 E., on the western slope of Mount Brewer (altitude 13,577 feet); flows westward about 4 miles into Roaring River (tributary to South Fork of Kings River); fall, about 4,500 feet. Tehipite sheet.

**Bridalveil Creek** (L); Mariposa County; Yosemite National Park; rises in the northern part of T. 4 S., R. 22 E., at altitude 8,100 feet above sea level; flows northwestward 10 miles into Merced River (tributary to San Joaquin River) at the lower end of Yosemite Valley; fall, about 4,000 feet. The falls by which it enters the valley are world famous. Yosemite National Park map.

**Brin Canyon Creek** (L); Tulare County; Sierra National Forest; rises in the northwestern part of T. 23 S., R. 33 E., Mount Diablo base and meridian, at altitude 5,700 feet above sea level; flows westward 2 miles into Kern River; fall, 2,100 feet. Kernville sheet.

**Browns Creek** (L); Madera County; rises in the central part of T. 7 S., R. 23 E., in Browns Meadow, at altitude 6,500 feet above sea level; flows southwestward 4 miles into South Fork of Little North Fork of San Joaquin River, at the junction with Sand Creek; fall, 2,900 feet. Kaiser sheet.

**Brush Canyon Creek** (R); Fresno County; Sierra National Forest; rises in the eastern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, at altitude 8,500 feet above sea level; flows southeastward 2 miles, then southward 1 mile into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 6,000 feet, of which 2,500 feet is made in the last mile. Tehipite sheet.

**Brush Creek** (L); Tulare County; Sierra National Forest; rises in the northwestern part of T. 23 S., R. 34 E., Mount Diablo base and meridian, at altitude 9,100 feet above sea level; flows northwestward  $3\frac{1}{2}$  miles, then irregularly westward 5 miles into Kern River, which it enters in the southeastern part of T. 22 S., R. 32 E.; fall, 5,300 feet. Kernville sheet.

**Bubbs Creek** (L); Tulare County; rises in Sierra National Forest, 3 miles south of the Fresno County line, on the western slope of the Sierra, at altitude 12,115 feet

above sea level; flows northwestward about 15 miles to its junction with South Fork of Kings River, near the head of Kings River Canyon; fall, about 7,000 feet; principal tributaries, Vidette, East, North Guard, Charlotte, and Sphinx creeks; basin contains many lakes. Mount Whitney and Tehipite sheets.

**Buck Canyon Creek (R);** Tulare County, Sequoia National Forest; rises in the western part of T. 15 S., R. 31 E., Mount Diablo base and meridian, in Moose Lake at altitude 10,550 feet above sea level; flows, in general, southwestward 6 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 5,700 feet. Tehipite sheet.

**Buck Creek (R);** Madera County; Yosemite National Park, rises on the western part of T. 4 S., R. 23 E., at altitude 8,500 feet; flows southward 2 miles into South Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 1,800 feet. Yosemite National Park map.

**Buckeye Creek (L);** Mariposa County; rises near Mariposa at altitude 2,500 feet above sea level; flows southward into Agua Fria Creek, tributary through Mariposa Creek to the San Joaquin. Mariposa sheet.

**Budd Creek (L);** Tuolumne County; Yosemite National Park, rises in the western part of T. 1 S., R. 24 E., Mount Diablo base and meridian, in a small lake on the south slope of Cathedral Peak, at altitude 9,950 feet above sea level; flows east of north  $2\frac{1}{2}$  miles into Tuolumne River (tributary to San Joaquin River); fall, 1,400 feet. Yosemite National Park map.

**Buena Vista Creek (L);** Mariposa County; Yosemite National Park, rises on the north slope of Buena Vista Peak (altitude, 9,777 feet); flows northward 4 miles into Illilouette Creek (tributary through Merced River to San Joaquin River); fall, 1,800 feet. Yosemite National Park map.

**Buena Vista reservoir;** Kern County, southeast of Tulare Lake; receives surplus waters from Kern River and the waste of the tail end of all Kern Island canals. The reservoir occupies the north end of what was formerly Buena Vista Lake. It was formed by constructing a dike or levee 5.5 miles long on the township line passing the east end of the old lake bed. A railroad was built across the levee connecting Bakersfield with Sunset. Portions of this levee have within recent years been washed out, flooding large areas on the lake bed, which had been brought under cultivation. In years of extremely high stream flow water from the reservoir passes northward toward the Tulare Lake basin and may possibly reach Tulare Lake itself. It is said that previous to 1906 no water from Kern River had reached Tulare Lake for 25 years. The bed of Kern Lake, which formerly received part of the flood waters of Kern River, is now under cultivation. Fisk and Johnson map.

**Bull Creek (L);** Mariposa County; Stanislaus National Forest, rises in the central part of T. 2 S., R. 19 E., Mount Diablo base and meridian, west of the Merced Grove of big trees, at altitude 5,500 feet above sea level; takes a general southwesterly course 10 miles to its junction with North Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 3,500 feet; many short tributaries. Yosemite and Sonora sheets.

**Bullfrog Lake;** Fresno County; Sierra National Forest,  $1\frac{1}{2}$  miles west of Kearsarge Pass; inlet, stream from Kearsarge Lakes; outlet, a stream less than a mile long, flowing west of south to Bubbs Creek (tributary to South Fork of Kings River); altitude, 10,634 feet; fall of outlet, 1,000 feet. Mount Whitney sheet.

**Bullrun Creek (R);** Tulare and Kern Counties; Sierra National Forest; rises in the northwestern part of T. 24 S., R. 32 E., Mount Diablo base and meridian; flows southeastward 6 miles, then northeastward 2 miles into Kern River. Land Office map of California, 1907; Kernville sheet.

**Burns Creek (L);** Mariposa County; rises in the southeastern part of T. 4 S., R. 16 E.; flows southwestward into Bear Creek (tributary to the San Joaquin); fall, 500 feet; intermittent. Sonora sheet.

**Burnt Camp Creek** (R); Tulare County; Sequoia National Park; rises in the western part of T. 18 S., R. 30 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southwest 2 miles into South Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 2,700 feet; intermittent. Kaweah sheet.

**Burnt Corral Creek** (R); rises 1 mile north of the north line of T. 9 S., R. 28 E., Mount Diablo base and meridian, at altitude 10,000 feet above sea level; flows, in general, southward 5 miles into Post Corral Creek (tributary through North Fork of Kings River to Kings River and thus to the San Joaquin); fall, 1,800 feet. Mount Goddard sheet.

**Burton Lake**; Sacramento County;  $1\frac{1}{2}$  miles west of the junction of Cosumnes River with the Mokelumne; a water body 3 miles long, connected with Mokelumne River by a short channel, fed by overflow from the Mokelumne. Lodi sheet.

**Butte Creek** (R); Eldorado County; rises in the southwestern part of T. 10 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,500 feet above sea level; flows southwest 4 miles into North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,400 feet. Placerville sheet.

**Cabin Creek** (L); Fresno County; Sequoia National Forest; rises in the southwestern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, 2 miles northeast of Sanger Sawmill, at altitude 5,500 feet above sea level; flows northwestward 2 miles into Kings River (tributary to the San Joaquin); fall, 4,000 feet. Tehipite sheet.

**Cactus Creek** (L); Tulare County; Sequoia National Park; rises in the central part of T. 15 S., R. 29 E., Mount Diablo base and meridian, on the south slope of Pine Ridge, at altitude 7,000 feet above sea level; flows southward 2 miles, then southwestward 5 miles into North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 5,200 feet; tributaries, Cedar and Maple creeks. Tehipite sheet.

**Calaveras River** (R); formed near San Andreas, in Calaveras County, by the confluence of its North and South forks. The South Fork, which drains the larger area and is here considered the continuation of the main stream, rises on the east slope of Harmon Peak, in the southern part of T. 2 N., R. 12 E., Mount Diablo base and meridian, at altitude 2,000 feet above sea level, and flows, in general, northwestward 13 miles to its junction with the North Fork, from which the main stream flows southwestward, uniting with the San Joaquin a few miles west of Stockton; total length, about 80 miles—35 miles in the valley and 45 miles in the mountains; drainage area above the border of the San Joaquin Valley about 500 square miles.

The basin is almost wholly a foothill region; the highest point is 6,000 feet in altitude, but only a very small part exceeds 4,000 feet. The hills are low and separated by small irregular valleys.

In the lower foothills vegetation consists of grass, brush, and scrubby timber, chiefly oak; the upper part of the basin supports a heavy growth of timber. The Calaveras grove of big trees (*Sequoia gigantea*) is partly in this basin and partly in the Stanislaus basin to the south.

The mean annual precipitation ranges from about 15 inches in the valley to 22 inches in the low foothills and 35 or 40 inches in the upper part of the basin; the little snow that falls in this area quickly disappears.

The river is torrential in winter and dry for a few months during the summer. It is not especially suitable for irrigation unless assisted by storage.

Gaging station near Bellota (1878-1884), at Jenny Lind (1907-1912).

Surveys and data: Calaveras, Jackson, and Lodi sheets. Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 211-212.

**Calaveras River, North Fork** (R); rises in the northern part of T. 5 N., R. 14 E., Mount Diablo base and meridian, in Calaveras Valley, at altitude 3,100 feet above sea level; flows north of west 6 miles, then very irregularly and with many bends and turns southwestward 15 miles to its junction with the South Fork of Calaveras River

(tributary to Calaveras River) 2 miles west of San Andreas; fall, 2,300 feet; principal tributaries, Esperanza and Jesus Maria creeks. Big Trees and Jackson sheets.

**Calaveritas Creek** (R); Calaveras County; formed by the junction of O'Neil and McKinneys creeks, in the central part of T. 4 N., R. 13 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows southwest 5 miles, then north of west 5 miles into South Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 600 feet. See O'Neil Creek. Big Trees and Jackson sheets.

**Caliente Creek** (R); rises in the eastern part of T. 30 S., R. 32 E., Mount Diablo base and meridian, at the south end of the Sierra, and flows northwestward to a point near Pampa, then southwestward into the lower end of San Joaquin Valley; principal tributaries, Tehachapi and Basin creeks.

The basin of Caliente Creek proper is characterized by sandy soil and slopes that are somewhat less steep than those in Basin and Tehachapi creeks. Many of the canyons are narrow, but more are broad and flat and afford a large area of absorbent material to take up any water than may start down their courses. This stream, and other streams flowing from the Tehachapi Mountains toward Buena Vista reservoir, begins to sink as soon as it leaves the box canyons in the mountains. The surface water of the stream during the late summer does not reach far into the plains to renew the loss by evaporation from the absorbing sands. During the winter the floods are so large as to do considerable damage, and several persons have been drowned in the creek. Gaging station at base of foothills (1911). Manuscript map of San Joaquin Valley (compiled by A. J. Fisk, jr., and H. R. Johnson); Bull. U. S. Geol. Survey No. 140, 1896, pp. 264-266.

**Camanche Creek** (L); Calaveras County; rises in the southern part of T. 3 N., R. 9 E., Mount Diablo base and meridian; at altitude 600 feet above sea level; flows irregularly northwestward into Mokelumne River (tributary to San Joaquin River); length, 4 miles; fall, 300 feet. Jackson sheet.

**Camp Creek** (R); Eldorado County; rises in the northwestern part of T. 9 N., R. 16 E., Mount Diablo base and meridian,  $1\frac{1}{2}$  miles north of the head of the North Fork of the Cosumnes, at altitude 7,000 feet above sea level; flows, in general, northwestward 16 miles, then southwestward 10 miles into North Fork of Cosumnes River (tributary through Cosumnes River to the Mokelumne and thus to the San Joaquin); fall, 5,200 feet; principal tributaries, Stonebreaker and Sly Park creeks. Pyramid Peak and Placerville sheets.

**Camp Creek** (L); Tuolumne County; Yosemite National Park; rises in the northern part of T. 2 N., R. 23 E., Mount Diablo base and meridian, at altitude 9,800 feet; flows north of west  $1\frac{1}{2}$  miles into Piute Creek (tributary through Tuolumne River to the San Joaquin); fall, 900 feet. Yosemite National Park map.

**Campbell Creek** (R); Tulare County; rises in the eastern part of T. 20 S., R. 28 E., Mount Diablo base and meridian, at altitude 1,250 feet above sea level; flows southeastward 6 miles into Tule River (tributary to Tulare Lake basin); fall, 450 feet; intermittent. Kaweah sheet.

**Canebrake Creek** (L); Kern County; Sierra National Forest; rises in the southwestern part of T. 26 S., R. 37 E., Mount Diablo base and meridian, at altitude 6,200 feet above sea level; flows west of north about  $8\frac{1}{2}$  miles, then west and southwest  $2\frac{1}{2}$  miles into Chimney Creek (tributary through South Fork of Kern River to Kern River); fall, 3,200 feet; intermittent in lower part of course. Kernville sheet.

**Cane Canyon Creek** (R); Kern County; Sierra National Forest; rises in the north-central part of T. 27 S., R. 36 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southwestward 2 miles, then north of west 5 miles into Kelso Creek (tributary to South Fork of Kern River); fall, 3,000 feet; intermittent. Kernville sheet.

**Cannell Creek** (L); Tulare and Kern counties; Sierra National Forest; rises in the western part of T. 24 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,000

feet above sea level; flows somewhat west of south  $4\frac{1}{2}$  miles, then north of west  $4\frac{1}{2}$  miles to Kern River; fall, 5,200 feet; in its east-west stretch crosses boundary between Tulare and Kern counties several times; near its head is Cannell Meadow. Kernville sheet.

**Canoas Creek** (L); Fresno County; rises in the northwestern part of T. 23 S., R. 16 E.; flows northeastward into San Joaquin Valley; length, 10 miles; sinks on leaving the foothills; carries water only during the rainy season. Manuscript map of San Joaquin Valley (compiled by Fisk and Johnson); Land Office map of California, 1907.

**Cantua Creek** (L); Fresno County; rises in the northeastern part of T. 18 S., R. 12 E.; flows north of east 18 miles into San Joaquin Valley; sinks below the foothills; principal tributary, Salt Creek; carries no water after the rainy season.

**Canyon Creek, Big** (L); Eldorado County; rises in the southwestern part of T. 9 N., R. 11 E., Mount Diablo base and meridian, at altitude 1,700 feet above sea level; flows, in general, southwestward  $3\frac{1}{2}$  miles into North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 800 feet. Placerville sheet.

**Canyon Creek, Big** (R); Eldorado County; rises in the northern part of T. 9 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows west of south 11 miles into Cosumnes River (tributary through Mokelumne River to the San Joaquin); fall, 1,200 feet; principal tributaries, Slate and French creeks. Placerville sheet.

**Cardinal Lake**; Fresno County; Sierra National Forest, west slope of Cardinal Mountain (elevation 13,388 feet); outlet, a stream 1 mile long flowing southwestward to South Fork of Kings River; altitude 11,447 feet; fall of outlet, 1,000 feet. Mount Whitney sheet.

**Cargyle Creek** (R); Madera County; rises in the Sierra National Forest on the south slope of Iron Mountain (altitude 11,157 feet); flows southward 5 miles into North Fork of San Joaquin River (tributary to Middle Fork of San Joaquin) just above Junction Butte; fall, 5,000 feet; several small unnamed tributaries. Mount Lyell sheet.

**Carson Creek** (R); Calaveras County; rises in the northeastern part of T. 2 N., R. 13 E., Mount Diablo base and meridian, at altitude 1,700 feet above sea level; flows, in general, south of west 5 miles to its junction with Stanislaus River (tributary to the San Joaquin); fall, 1,000 feet. Jackson sheet.

**Carson Creek** (R); Eldorado and Sacramento counties; rises in the southeastern part of T. 10 N., R. 8 E., Mount Diablo base and meridian, at altitude 1,000 feet above sea level; flows very irregularly southwestward into Deer Creek (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); length, 12 miles; fall, 800 feet, of which 500 feet occurs in the first 3 miles. Sacramento sheet.

**Carter Creek** (L); Mariposa County; rises in the north central part of T. 6 S., R. 21 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; takes a general course south of west about 5 miles to its junction with Peterson Creek (tributary through North Fork of Fresno River to Fresno River and thus to the San Joaquin) near Hills ranch; fall, 2,300 feet. Mariposa sheet.

**Cartridge Creek** (L); Fresno County; Sierra National Forest; rises in Sixteen Lake basin, at altitude 11,050 feet above sea level; flows northwestward 5 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 4,000 feet. Tehipite sheet.

**Cartridge Creek, South Fork** (L); Fresno County; Sierra National Forest; rises on the north slope of Cirque Crest, at altitude 12,000 feet above sea level; flows west of north 3 miles into Cartridge Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); fall, 4,000 feet. Tehipite sheet.

**Cascade Creek** (R); Mariposa County; Yosemite National Park; rises in the southern part of T. 1 S., R. 21 E., Mount Diablo base and meridian, at altitude 8,800 feet above sea level; flows southwestward 9 miles, then southeastward 2 miles to its junc-

tion with Merced River (tributary to San Joaquin River) at the lower end of Yosemite Valley; fall, 4,800 feet, of which 2,000 feet occurs in the last mile; principal tributary, Tamarack Creek. Yosemite National Park map.

**Cascade Creek** (L); Tuolumne County; Stanislaus National Forest; rises 4 miles west of Eagle Peak, at altitude 7,600 feet above sea level; flows westward  $4\frac{1}{2}$  miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 3,900 feet, of which 1,300 feet is made in the last half mile. Dardanelles and Big Trees sheets.

**Castac Lake**; Kern County; southern part of the Castac grant; Cuddy Canyon Creek approaches the lake from the west, but has seldom, even in flood, been seen to discharge into it; the lake seldom overflows the divide (altitude 3,500 feet above sea level) between it and Grapevine Creek, which is only 12 feet above the ordinary water level. Tejon sheet; Bull. U. S. Geol. Survey No. 140, 1896, pp. 256-257.

**Castle Creek** (L); Tulare County; Sequoia National Park; rises in the southeastern part of T. 16 S., R. 30 E., Mount Diablo base and meridian, at altitude 8,300 feet above sea level; flows northward 4 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,800 feet; intermittent at head. Kaweah and Tehipite sheets.

**Cat Creek** (R); Eldorado County; rises in the central part of T. 9 N., R. 15 E., Mount Diablo base and meridian, on the south slope of Leek Spring Hill (altitude 7,640 feet); flows southwestward 5 miles into Middle Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River, and thus to the San Joaquin); fall, 2,500 feet. Pyramid Peak sheet.

**Cataract Creek** (L); Fresno County; Sierra National Forest; rises in Amphitheater Lake, on west slope of the Palisades, 10,700 feet above sea level; flows west of north 2 miles into Palisade Creek (tributary to Middle Fork of Kings River, and thus through Kings River to the San Joaquin); fall, 1,900 feet. Mount Goddard sheet.

**Cathedral Creek** (L); Tuolumne County; Yosemite National Park; rises in the northeastern part of T. 1 S., R. 23 E., Mount Diablo base and meridian, one-half mile west of Fairview Dome, at altitude 8,300 feet above sea level; takes a general northwesterly course about  $7\frac{1}{2}$  miles to its junction with the Tuolumne River (tributary to San Joaquin River); fall, 3,100 feet; principal tributary, South Fork. Yosemite National Park map.

**Cathedral Creek, South Fork** (L); Tuolumne County; Yosemite National Park; rises in the western part of T. 1 S., R. 23 E., Mount Diablo base and meridian, on the south slope of Tuolumne Peak, at altitude 10,500 feet above sea level; flows northward 4 miles into Cathedral Creek (tributary through Tuolumne River to the San Joaquin); fall, 3,200 feet. Yosemite National Park map.

**Cathedral Fork** (R); Mariposa County; Yosemite National Park; rises in Cathedral Pass at altitude 9,700 feet above sea level; flows southward  $4\frac{1}{2}$  miles into Echo Creek; fall, 1,500 feet. Yosemite National Park map.

**Cathedral Lake**; Mariposa County; Yosemite National Park, 1 mile west of Cathedral Peak; outlet, Tenaya Creek to Merced River (tributary to San Joaquin River); altitude, 9,250 feet, in the 2 miles between Cathedral Lake and Tenaya Lake, Tenaya Creek falls about 1,100 feet. Yosemite National Park map.

**Cedar Canyon Creek** (R); Eldorado County; rises in the northern part of T. 9 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,800 feet above sea level; flows southwestward 3 miles into Steeley Fork of North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,100 feet; principal tributary, String Canyon Creek. Placerville sheet.

**Cedar Creek** (R); Eldorado County; rises in the north central part of T. 8 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,400 feet above sea level; flows westward 4 miles, then southwestward 4 miles into South Fork of Cosumnes

River (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 1,400 feet; called Brownsville Creek on Punnett's map of Eldorado County, on which the name Cedar Creek is applied to a northern branch of the stream. Placerville sheet.

**Cedar Creek (L);** Stanislaus County; rises in the southeastern part of T. 4 S., R. 5 E.; flows southeastward 4 miles into Ingram Creek (tributary to San Joaquin River). Orestimba-Panoche-Cantua special map.

**Cedar Creek (L);** Tulare County; Sequoia National Park; rises in the northern part of T. 16 S., R. 29 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows westward 2 miles into Cactus Creek (tributary through North Fork of Kaweah River to Kaweah River and thus to Tulare Lake Basin); fall, 2,500 feet. Tehipite sheet.

**Chagoopa Creek (L);** Tulare County; Sequoia National Forest; rises in the east central part of T. 16 S., R. 32 E., Mount Diablo base and meridian, on the east slope of Kaweah Peaks, at altitude 12,400 feet above sea level; flows, in general, southeastward 6 miles into Funston Creek (tributary to Kern River); fall, 4,200 feet. Though the maps (Mount Whitney and Olancha sheets) show Chagoopa Creek a tributary to Funston it is much longer than the latter creek and drains a much larger area and might, therefore, more properly be considered the principal stream and Funston Creek the tributary.

**Chapman Creek (R);** Mariposa County; rises in the southern part of T. 6 S., R. 18 E., south of Moore Hill (altitude 2,600 feet); flows in general somewhat east of south to its junction with Chowchilla River in the northeastern part of T. 8 S., R. 18 E.; length from Chowchilla River to the head of the West Branch (considered the continuation of the main stream) about 7 miles; fall, about 1,400 feet. The East Branch of Chapman Creek is called Becknell Creek. Mariposa sheet.

**Charlotte Creek (R);** Fresno County; rises in Sierra National Forest, on Mount Bago (altitude 11,868 feet); flows northwestward  $1\frac{1}{2}$  miles through Charlotte Lake, then south of west  $2\frac{1}{2}$  miles into Bubbs Creek (tributary to South Fork of Kings River); fall, below Charlotte Lake (altitude, 10,406 feet), 2,900 feet. Mount Whitney sheet.

**Charlotte Lake;** Fresno County; Sierra National Forest, northeast base of Mount Bago; inlet, Charlotte Creek; outlet, Charlotte Creek to Bubbs Creek (tributary to South Fork of Kings River); altitude, 10,406 feet. Mount Whitney sheet.

**Cherokee Creek (R);** Calaveras County; rises  $1\frac{1}{2}$  miles northwest of Altaville in the western part of T. 3 N., R. 13 E., Mount Diablo base and meridian, at altitude 1,600 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles, then northwestward  $4\frac{1}{2}$  miles into South Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 500 feet. Jackson sheet.

**Cherry Creek (R);** Tuolumne County; Stanislaus National Forest, formed by the junction of North and East Forks in a triangle at the base of Gillett Mountain, Mercur Peak, and Bartlett Peak. The North Fork, which drains the larger area and is therefore considered the continuation of the main stream, rises in the western part of T. 4 N., R. 21 E., Mount Diablo base and meridian, at altitude 9,500 feet above sea level and flows southwestward about 9 miles, falling in this distance 2,700 feet; the principal tributary of this fork is the stream from Emigrant Lake; the East Fork rises in the eastern part of T. 4 N., R. 21 E., on the south slope of Grizzly Peak at altitude 9,800 feet above sea level and flows southwestward 13 miles, passing through Helen and Huckleberry Lakes and falling in this distance 2,900 feet; below the forks Cherry Creek takes an irregular but, in general, southwesterly course to its junction with Tuolumne River (tributary to San Joaquin River); length from the head of North Fork to Tuolumne River, 35 miles; fall in this distance, 7,100 feet; fall below the forks, 4,500 feet; principal tributaries below the North and East forks, West Fork and Eleanor Creek; the headwaters drain many small lakes. Gaging station at Eleanor trail crossing (1901). Yosemite National Park map.

**Cherry Creek, East Fork.** *See* Cherry Creek.

**Cherry Creek, North Fork.** *See* Cherry Creek.

**Cherry Creek, West Fork (R);** Tuolumne County; Stanislaus National Forest; rises in upper Relief Valley 2 miles northwest of Granite Dome, at altitude 9,000 feet above sea level; flows southwestward 15 miles to its junction with Cherry Creek (tributary through Tuolumne River to the San Joaquin); fall, 4,000 feet; maximum width of the basin, about 5 miles; tributaries few and unimportant; basin contains a number of lakes some of which are mapped as without outlet; the only one named on the map is Beulah. Yosemite National Park sheet.

**Chili Gulch Creek (R);** rises in the northwestern part of T. 5 N., R. 12 E., Mount Diablo base and meridian, south of Mokelumne Hill, at altitude 1,700 feet above sea level; flows southwestward 4 miles, then southeastward 3 miles into North Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 1,000 feet. Jackson sheet.

**Chilkoot Lake;** Madera County; western part of T. 6 S., R. 23 E.; one inlet; outlet, Willow Creek to Little North Fork of San Joaquin River; altitude, 7,500 feet; nearly one-half mile long and wide. Kaiser sheet.

**Chilnualna Creek (R);** Mariposa County; Yosemite National Park; rises in the northern part of T. 4 S., R. 22 E., on the south slope of Horse Ridge, at altitude 9,500 feet above sea level; flows southwestward 8 miles into South Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 5,300 feet, of which 1,600 feet is made in less than a mile. Yosemite National Park map.

**Chimney Creek (L);** Tulare and Kern counties; Sierra National Forest; rises in the northwestern part of T. 24 S., R. 37 E., Mount Diablo base and meridian, in Chimney Meadow, at altitude 6,100 feet above sea level; flows, in general, southwestward 14 miles to its junction with South Fork of Kern River; fall, 3,200 feet; principal tributary, Canebrake Creek; intermittent in lower part of course. Kernville sheet.

**China Creek (L);** Madera County; rises in the southwestern part of T. 7 S., R. 22 E., Mount Diablo base and meridian, at altitude 3,500 feet above sea level; flows, in general, northwestward 5 miles to its junction with Fresno River (tributary to San Joaquin River) at Fresno Flats; fall, 1,300 feet. Mariposa sheet.

**Chiquito Creek (R);** Madera County; rises in the southeastern part of T. 4 S., R. 23 E., in a small lake on the western slope of Redtop Mountain, at altitude 8,650 feet; flows southwestward  $1\frac{1}{2}$  miles to Chiquito Lake, then, in general, southeastward 17 miles to its junction with the San Joaquin, in the northern part of T. 7 S., R. 24 E.; fall, 5,650 feet; principal tributaries, Mugler, Beasore, and West Fork; the basin is about 14 miles long, 10 miles in maximum width, and includes a number of high meadows. Kaiser and Mount Lyell sheets.

**Chiquito Creek, West Fork (R);** Madera County; rises in the northern part of T. 6 S., R. 23 E., at altitude 6,900 feet above sea level; flows southeastward  $7\frac{1}{2}$  miles, then northeastward 1 mile to its junction with Chiquito Creek (tributary to San Joaquin River) in the southern part of T. 6 S., R. 24 E.; fall, 3,100 feet; many small, unnamed tributaries, draining the southeastern slope of Chiquito Ridge. Kaiser sheet.

**Chiquito Lake;** Madera County; northern part of T. 5 S., R. 23 E.; inlet and outlet, Chiquito Creek (tributary to San Joaquin River) altitude 7,923 feet. Mount Lyell sheet.

**Chowchilla River (R);** rises in Madera County, where it is formed by the junction of the East and West forks in T. 7 S., R. 20 E., Mount Diablo base and meridian; the East Fork rises on the south slope of the Chowchilla Mountains in T. 5 S., R. 21 E., at altitude 6,000 feet above sea level and flows southwestward; the West Fork rises in the southern part of T. 4 S., R. 19 E., at altitude 4,200 feet above sea level, and flows, in general, southeastward; the forks unite in Bailey Flats in Madera County, whence their combined waters flow southwestward to the lower San Joaquin; principal tributaries below the forks, Split Rock, and Chapman Creeks from the north, and

Willow Creek from the south. The stream is characterized by sudden, short freshets and its lower bed is dry from June until the fall rains. Gaging station at base of foothills (1878-1884). Mariposa sheet; Bull. U. S. Geol. Survey No. 140, 1896, p. 295.

**Chowchilla River, East and West forks.** *See* Chowchilla River.

**Chowchilla River, Middle Fork (L);** rises in the southwestern part of T. 5 S., R. 20 E., Mount Diablo base and meridian, at altitude 3,000 feet above sea level; flows west of south 8 miles to its junction with the West Fork of Chowchilla River (tributary through Chowchilla River to the San Joaquin); fall about 2,000 feet. Mariposa sheet.

**Cinnamon Creek (R);** Tulare County; Sequoia National Forest; rises in the southern part of T. 17 S., R. 29 E., Mount Diablo base and meridian, on the south slope of Case Mountain, at altitude 5,700 feet above sea level; flows southwestward  $4\frac{1}{2}$  miles into South Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 4,200 feet; intermittent. Kaweah sheet.

**Clark Canyon Creek (L);** Mariposa County; Yosemite National Park, rises on the north slope of Mount Clark (altitude 11,506 feet); flows northward 3 miles into Merced River (tributary to San Joaquin River) one-third mile below the mouth of Echo Creek; fall, 3,400 feet. Yosemite National Park map.

**Clark Creek (R);** Eldorado County; rises in the northern part of T. 8 N., R. 9 E., Mount Diablo base and meridian, at altitude 1,000 feet above sea level; flows irregularly southward into Cosumnes River (tributary through Mokelumne River to the San Joaquin); fall, 700 feet. Placerville sheet.

**Clark Fork (R);** Mariposa County; Yosemite National Park; rises on the western slope of Mount Clark (altitude 11,506 feet); flows southwestward 4 miles to its junction with Ottoway Creek, 1 mile above the point at which the latter joins Illilouette Creek (tributary through Merced River to San Joaquin River); fall, 2,800 feet. Yosemite National Park map.

**Clark Fork, Stanislaus River.** *See* Stanislaus River, Clark Fork.

**Clavey River (R);** Tuolumne County; Stanislaus National Forest; rises 3 miles southwest of the southwest corner of T. 5 N., R. 20 E., at altitude 8,800 feet above sea level; flows southwestward 17 miles, southward 11 miles, then westward 3 miles into Tuolumne River (tributary to San Joaquin River); fall, 7,200 feet; principal tributaries, Lily, Trout, Twomile, Hull, and Reed Creeks; the lower course of the river is through a deep canyon. Gaging station near Tuolumne (1910-1912). Dardanelles (on which it is called Middle Fork of Tuolumne River), Big Trees, and Sonora sheets.

**Clear Creek (L);** Eldorado County; rises in the southeastern part of T. 9 N., R. 13 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; flows irregularly westward 5 miles into Steeley Fork of North Fork of Cosumnes River (tributary through Cosumnes River to the Mokelumne and thus to the San Joaquin); fall, 1,300 feet. Pyramid Peak and Placerville sheets.

**Clear Creek (R);** Eldorado County; rises in the northeastern part of T. 10 N., R. 12 E., Mount Diablo base and meridian, at altitude 3,800 feet above sea level; flows southwestward 7 miles into North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 2,100 feet. Placerville sheet.

**Clear Creek (R);** Tulare County; Sequoia National Park; rises in the north central part of T. 18 S., R. 30 E., Mount Diablo base and meridian, on the south slope of Homers Nose, at altitude 7,000 feet above sea level; flows west of south 2 miles into South Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 2,800 feet; intermittent. Kaweah sheet.

**Clicks Creek (R);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 20 S., R. 31 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows northeastward 5 miles into Little Kern River (tributary to Kern River) at Burnt Corral Meadows; fall, 2,000 feet. Kaweah sheet.

**Cliff Creek (L);** Tulare County; Sequoia National Forest; rises in the northwestern part of T. 17 S., R. 32 E., in a small lake on the western slope of the Great Western Divide, at altitude 10,000 feet above sea level; flows northwestward 8 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 4,700 feet; principal tributary, Deer Creek. Several lakes south of the lake from which Cliff Creek flows are mapped as without outlet. Tehipite and Kaweah sheets.

**Clover Creek (R);** Tulare County; Sequoia National Park; formed in the northwestern part of T. 15 S., R. 30 E., Mount Diablo base and meridian, by the junction of its east and west forks; short streams draining the southern slopes of Kettle Peak; flows southward into Marble Fork of Kaweah River (tributary through Middle Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); length to head of West Fork 5 miles; fall, 2,400 feet. Tehipite sheet.

**Coarse Gold Creek (L);** Madera County; rises in the central part of T. 7 S., R. 21 E., Mount Diablo base and meridian, on the south slope of Deadwood Peak, at altitude 4,000 feet above sea level; flows very irregularly southwestward about 10 miles, then, in general, somewhat north of west 6 miles to its junction with Fresno River (tributary to San Joaquin River); fall, 2,200 feet; intermittent. Mariposa sheet.

**Cobbs Creek (R);** Tuolumne County; rises in the southwestern part of T. 1 S., R. 16 E., Mount Diablo base and meridian, near Bigoak Flat, at altitude 3,300 feet; flows southward into Moccasin Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,300 feet; intermittent. Sonora sheet.

**Coffeepot Canyon Creek (L);** Tulare County; Sequoia National Park; rises in the northwestern part of T. 18 S., R. 30 E., Mount Diablo base and meridian, on the north slope of Homers Nose, at altitude 7,000 feet above sea level; flows northwestward  $2\frac{1}{2}$  miles into East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,200 feet; intermittent. Kaweah sheet.

**Cold Canyon Creek (L);** Eldorado County; rises in the northeastern part of T. 8 N., R. 12 E., Mount Diablo base and meridian, at altitude 3,100 feet above sea level; flows southwestward  $1\frac{1}{2}$  miles, then northwestward 1 mile into Cedar Creek (tributary through South Fork of Cosumnes River to the Middle Fork of Cosumnes River and thus through Cosumnes River and Mokelumne River to the San Joaquin); fall, 800 feet. Placerville sheet.

**Cold Canyon Creek (R);** Tuolumne County; Yosemite National Park, rises in the southwestern part of T. 2 N., R. 24 E., Mount Diablo base and meridian, at altitude 9,350 feet above sea level; flows southwestward 5 miles into Conness Creek (tributary through Tuolumne River to San Joaquin River); fall, 1,800 feet; intermittent. Yosemite National Park map.

**Cold Creek (R);** Amador County; Stanislaus National Forest; rises in the southwestern part of T. 9 N., R. 17 E., Mount Diablo base and meridian; at altitude 8,700 feet above sea level; flows southwestward 9 miles into North Fork Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 3,200 feet. Pyramid Peak sheet.

**Cold Creek (R);** Fresno County; rises in the Sierra National Forest, on the southern slope of Silver Divide, near Silver Pass; flows southwestward 7 miles, then southeastward 3 miles to its junction with Mono Creek (tributary to South Fork San Joaquin River); a number of small branching tributaries. Mount Goddard sheet.

**Columbine Lake;** Tulare County; Sequoia National Forest; northwestern part of T. 17 S., R. 32 E., Mount Diablo base and meridian; outlet northward to a small lake one-half mile southeast of the lake from which Cliff Creek flows to the Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); altitude, 10,900 feet above sea level. Kaweah sheet.

**Comb Creek (L);** Fresno County; Sierra National Forest; rises on the western slope of Comb Spur, at altitude 10,500 feet above sea level; flows west and southwest

to its junction with Lewis Creek (tributary to South Fork of Kings River and thus through Kings River to the San Joaquin); length, 4 miles; fall, 4,500 feet. Tehipite sheet.

**Conness Creek** (R); Tuolumne County; Yosemite National Park, rises in the southern part of T. 2 N., R. 24 E., Mount Diablo base and meridian, northwest of Conness Mountain at altitude 11,300 feet above sea level; flows southwestward  $7\frac{1}{2}$  miles into Tuolumne River (tributary to San Joaquin River); fall, 3,000 feet; principal tributaries, Alkali and Cold Canyon creeks. Yosemite National Park map.

**Converse Creek** (L); Fresno County; Sequoia National Forest; rises in the western part of T. 13 S., R. 28 E., Mount Diablo base and meridian, 1 mile south of Converse basin at altitude 6,600 feet above sea level; flows, in general, northwestward 5 miles into Kings River (tributary to San Joaquin River); fall, 5,300 feet. Tehipite sheet.

**Copper Creek** (R); Fresno County; Sierra National Forest; rises in Grouse Lake on the southwestern slope of Goat Mountain, at altitude 10,550 feet above sea level; flows southward 5 miles into South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,500 feet. Tehipite sheet.

**Cora Lakes**; Madera County; southern part of the Sierra National Forest, in Detachment Meadow; outlet, a stream  $2\frac{1}{2}$  miles long flowing south of east into North Fork San Joaquin River; three small lakes connected by short channels; the uppermost lake is about 8,350 feet above sea level; the lowest is 8,300 feet; fall of outlet, 1,900 feet. Mount Lyell sheet.

**Corral Creek** (R); Tuolumne County; Stanislaus National Forest; rises in the central part of T. 1 N., R. 18 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; flows, in general, somewhat east of south 6 miles to its junction with Tuolumne River (tributary to San Joaquin River); fall, 2,500 feet, of which 900 feet occurs in the last half mile; intermittent. Gaging station near Groveland (1910-1912). Sonora sheet.

**Corral Hollow Creek** (L); Alameda and San Joaquin Counties; rises in the northeastern part of T. 5 S., R. 4 E.; flows westward 3 miles, northwestward 7 miles, then east and northeast 11 miles to San Joaquin Valley south of Tracy; intermittent. Punnett's map of Sacramento and San Joaquin Counties. Called Buenos Ayres Creek on Land Office map, 1907.

**Cosgrove Creek** (R); Calaveras County; rises in the southern part of T. 5 N., R. 11 E., Mount Diablo base and meridian, at altitude 1,200 feet above sea level; flows, in general, southwestward 9 miles to its junction with Calaveras River (tributary to San Joaquin River); fall, 650 feet. Jackson sheet.

**Cosumnes River** (R); Eldorado County; formed near Nashville in the northern part of T. 6 N., R. 10 E., Mount Diablo base and meridian, by the junction of its North and Middle forks. The North Fork, which drains the larger area and is, therefore, considered the continuation of the main stream, rises in the western part of T. 9 N., R. 16 E., on the north slope of Alder Hill (altitude 7,785 feet), and flows very irregularly westward to the southeastern part of T. 9 N., R. 10 E., where it turns abruptly and flows almost directly south to its junction with the Middle Fork in the northeastern part of T. 8 N., R. 10 E.; the Middle Fork receives the South Fork about 2 miles above its junction with the North Fork; below the forks the Cosumnes flows southwestward to its junction with Mokelumne River about 6 miles east of Walnut Grove.

The basin drained by the Cosumnes lies on the western slope of the Sierra, but it does not reach the crest of the Sierra like the basins of the Mokelumne on the south and the American on the north, between which it is wedged. Its total area above the valley rim is about 580 square miles. It is characterized by many low hills, separated by small, irregular valleys. The streams flow in somewhat parallel and regular, shallow canyons, separated by prominent ridges. Altitudes range from 200 feet in the foothills to 7,700 feet in the eastern border.

The mean annual precipitation ranges from 20 inches in the valley to 35 or 40 inches at the upper elevations; the snowfall in the area is comparatively light and the snow soon disappears. The vegetation consists of grass, brush, and scraggy, scrubby timber in the lower foothills and good timber in the middle and upper areas. A small part of the upper basin is included in a national forest.

Little irrigation, if any, is practiced in this area; the minimum flow of the stream is so small that little power could be developed without storage.

Gaging station below Michigan Bar (1878-1884); at Michigan Bar (1907-1911).

Pyramid Peak, Placerville, and Lodi sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 219-220.

**Cosumnes River, Middle Fork (L);** Eldorado County; rises in the western part of T. 9 N., R. 16 E., Mount Diablo base and meridian, on the south slope of Alder Hill (altitude 7,785 feet); flows southwestward 8 miles, westward 7 miles, northwestward 11 miles, then southwestward 10 miles to the northeastern part of T. 8 N., R. 10 E., where it unites with the North Fork of Cosumnes to form Cosumnes River (tributary through Mokelumne River to the San Joaquin); fall, 6,200 feet; principal tributaries, North Fork of Middle Fork of Cosumnes and South Fork of Cosumnes rivers; basin long and narrow. Pyramid Peak and Placerville sheets.

**Cosumnes River, Middle Fork, North Fork of (R);** rises in the eastern part of T. 9 N., R. 14 E., Mount Diablo base and meridian, at altitude 5,900 feet above sea level; flows, in general, south of west 10 miles into Middle Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 3,000 feet. Pyramid Peak and Placerville sheets.

**Cosumnes River, South Fork (L);** Eldorado County; rises in the western part of T. 8 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,300 feet above sea level; flows westward 10 miles, then, in general, somewhat north of west 8 miles to its junction with the Middle Fork of Cosumnes (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 3,400 feet; principal tributaries, Scott, Indian, On It, and Cedar Creeks and South Fork of South Fork of Cosumnes River. Pyramid Peak and Placerville sheets.

**Cosumnes River, South Fork, South Fork of (L);** Eldorado County; rises in the western part of T. 8 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,300 feet above sea level; flows southwest, west, and northwest to its junction with the South Fork of Cosumnes River (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); length, 16 miles; fall, 2,400 feet. Pyramid Peak and Placerville sheets.

**Cotton Creek (L);** Mariposa County; rises in the southern part of T. 4 S., R. 16 E., Mount Diablo base and meridian, at altitude 1,700 feet above sea level; flows westward 5 miles into Merced River (tributary to San Joaquin River); fall, 1,100 feet. Sonora sheet.

**Cottonwood Creek (R);** Madera County; rises in the southern part of T. 9 S., R. 20 E., Mount Diablo base and meridian, at altitude 1,200 feet above sea level; flows southeastward 9 miles to its junction with San Joaquin River, in the northwestern part of T. 11 S., R. 21 E.; fall, 800 feet. Mariposa sheet.

**Cottonwood Creek (R);** Madera County; rises in the southern part of T. 9 S., R. 20 E., Mount Diablo base and meridian; flows southwestward into San Joaquin Valley; derives its water from seepage from irrigation above; carries water to the San Joaquin only at flood stages, at which times it carries also overflow from Fresno River which reaches it from a sloughlike channel; at ordinary stages the channel is dry and "creek" is a misnomer. Manuscript map of San Joaquin Valley (Fisk and Johnson).

**Cottonwood Creek (R);** Madera County; rises in the eastern part of T. 8 S., R. 19 E., Mount Diablo base and meridian, at altitude 1,300 feet above sea level;

flows west of south 10 miles to its junction with Fresno River (tributary to San Joaquin River); fall, 800 feet. Mariposa sheet.

**Cottonwood Creek (R);** Tuolumne County; Yosemite National Park; rises in the eastern part of T. 1 N., R. 20 E., Mount Diablo base and meridian, in Smith Meadow south of Smith Peak (altitude 7,835 feet); flows westward 2 miles, then southwestward 3 miles into Middle Fork of Tuolumne River (tributary through South Fork to Tuolumne River and thus to the San Joaquin); fall, 900 feet. Yosemite National Park map.

**Cow Creek (L);** Tulare County; Sequoia National Park; rises in the western part of T. 15 S., R. 29 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; flows southward 1 mile, then southwestward  $1\frac{1}{2}$  miles into North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 2,200 feet. Tehipite sheet.

**Cow Creek (R);** Tulare County; Sequoia National Park; rises in the northern part of T. 18 S., R. 31 E., Mount Diablo base and meridian, at altitude 10,500 feet above sea level; flows westward 4 miles into Horse Creek (tributary through East Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 2,800 feet. Kaweah sheet.

**Cow Creek (L);** Tuolumne County; Stanislaus National Forest; rises 4 miles northeast of Parsons, at altitude 7,100 feet above sea level; flows south of west 5 miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 3,200 feet, of which 1,100 feet is made in the last half mile. Dardanelles and Big Trees sheets.

**Cowell Creek (L);** Kern County; Sierra National Forest; rises in the northern part of T. 25 S., R. 34 E., Mount Diablo base and meridian, at altitude 7,100 feet above sea level; flows, in general, southwestward 7 miles into Kern River, which it enters about 2 miles above Kernville; fall, 4,350 feet. Kernville sheet.

**Coy Creek (L);** Tulare County; Sequoia National Forest; rises in the east-central part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 7,000 feet above sea level; flows northwestward  $2\frac{1}{2}$  miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule River to Tule River and thus to the Tulare Lake basin); fall, 2,800 feet. Kaweah sheet.

**Coyote Creek (R);** Calaveras County; rises in the southeastern part of T. 4 N., R. 14 E., Mount Diablo base and meridian, 3 miles north of east from Murphy, at altitude 2,700 feet above sea level; flows, in general, southwestward 12 miles to its junction with Stanislaus River at Melones; fall, 1,900 feet. Big Trees sheet.

**Coyote Creek (R);** Tulare County; Sequoia National Forest; rises in the east-central part of T. 18 S., R. 32 E., Mount Diablo base and meridian, on the eastern slope of the Great Western Divide, in a small lake, at altitude 10,900 feet above sea level; flows southeastward 1 mile, then eastward 4 miles into Kern River, 2 miles above Kern Lake; fall, 4,000 feet. Olancha sheet.

**Coyote Lake;** Fresno County; in the northeastern part of T. 9 S., R. 26 E.; three inflowing streams; outlet, a stream 3 miles long, flowing northward to Big Creek (tributary to San Joaquin River); altitude, 8,950 feet; fall of outlet, 750 feet. Kaiser sheet.

**Crabtree Creek (L);** Tulare County; Sequoia National Forest; rises in a small lake in a glacial cirque, southwest of Whitney Pass, at altitude 12,550 feet above sea level; flows south of west 2 miles, then northwest  $2\frac{1}{2}$  miles into Whitney Creek (tributary to Kern River Pass through several small lakes); fall, 2,200 feet. Mount Whitney sheet.

**Crane Creek (R);** Mariposa County; Yosemite National Park, rises in the central part of T. 2 S., R. 20 E., at altitude 6,700 feet; flows irregularly southward  $6\frac{1}{2}$  miles to its junction with Merced River (tributary to San Joaquin River) at El Portal; fall, 4,700 feet; principal tributary, Little Crane Creek. Yosemite National Park map.

**Crane Creek, Little (R);** Mariposa County; rises in the western part of T. 2 S., R. 20 E., at altitude 6,400 feet; flows southeastward 4 miles to its junction with Crane

Creek (tributary through Merced River to San Joaquin River) near McCauley; fall, 3,400 feet. Yosemite National Park map.

**Crane Creek, North (L);** Tuolumne County; Yosemite National Park; rises in the western part of T. 2 S., R. 20 E., Mount Diablo base and meridian, near Crane Flat in the Tuolumne grove of big trees, at altitude 6,300 feet above sea level; flows northwestward 4 miles into South Fork Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 1,800 feet. Yosemite National Park map.

**Crater Creek (L);** Madera County; rises in the eastern part of the Sierra National Forest, on the western slope of Mammoth Crest, at altitude 9,600 feet above sea level; flows southwestward 4 miles to junction with Middle Fork of San Joaquin River; fall, 3,600 feet; tributaries, small and unnamed; between Crater Creek and the San Joaquin south of Rainbow Falls is a small unnamed lake with one inlet and no outlet. Mount Lyell sheet.

**Crazy Mule Gulch Creek (R);** Tuolumne County; Yosemite National Park, rises in the southern part of T. 3 N., R. 23 E., Mount Diablo base and meridian, on the south slope of Suicide Ridge at altitude 10,000 feet above sea level; flows southwestward 2 miles into Piute Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,600 feet; principal tributary Rock Canyon Creek from Rock Island Lake. Yosemite National Park map.

**Crescent Lake;** Madera County; Yosemite National Park; eastern part of T. 4 S., R. 22 E., 1 mile west of Johnson Lake; outlet, a stream 2 miles long flowing southward to South Fork of Merced River (tributary through Merced River to the San Joaquin); altitude, 8,550 feet; fall of outlet, 2,800 feet. Yosemite National Park map.

**Crevis Creek (L);** Sacramento County; rises in the eastern part of T. 8 N., R. 8 E., Mount Diablo base and meridian, at altitude 400 feet above sea level; flows southwestward 6 miles into Deer Creek (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 250 feet. Sacramento sheet.

**Crook Creek (R);** Mariposa and Madera counties; rises in the northeastern part of T. 6 S., R. 20 E., on the south slope of Miami Mountain, at altitude 3,500 feet above sea level; flows southward about 4 miles to its junction with Fresno River (tributary to San Joaquin River) near Windy Gap; fall 1,500 feet. Mariposa sheet.

**Cross Creek (L);** Tulare County; rises in the northern part of T. 14 S., R. 32 E., on the southeast slope of Cross Mountain; flows northeastward  $2\frac{1}{2}$  miles into Bubbs Creek (tributary to South Fork of Kings River); fall, 3,900 feet. Mount Whitney sheet.

**Crow Creek (L);** Stanislaus County; rises in the northern part of T. 7 S., R. 6 E.; flows, in general, north of east into San Joaquin Valley; carries water only during the rainy season; sinks below the foothills. Orestimba-Panoche-Cantua special map.

**Crown Creek (R);** Fresno County; Sierra National Forest; rises in the eastern part of T. 10 S., R. 29 E., Mount Diablo base and meridian, in a group of glacial lakelets on the west slope of Kettle Ridge (altitude 11,490 feet); flows, in general, southwestward  $8\frac{1}{2}$  miles, then southeastward 2 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin, which it enters near the center of Tehipite Valley); tributaries, numerous, but only two—Scepter and Rodgers creeks—are named on the map; fall, 6,500 feet, of which 1,700 feet is made in the last mile. Mount Goddard and Tehipite sheets.

**Crystal Creek (L);** Fresno County; Sierra National Forest; rises in the northwestern part of T. 12 S., R. 30 E., Mount Diablo base and meridian, at altitude 9,000 feet above sea level; flows northwestward 2 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin), at the upper end of Tehipite Valley; fall, 4,500 feet. Tehipite sheet.

**Crystal Lake;** Tulare County; Sequoia National Forest; eastern part of T. 17 S., R. 31 E., Mount Diablo base and meridian, 2 miles north of the head of East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); no outlet mapped. Kaweah sheet.

**Cuddy Canyon Creek** (R); Kern County; rises in the northern part of T. 8 N., R. 20 W., at altitude 7,000 feet above sea level; flows northwestward 3 miles, then eastward 9 miles to Castac Lake at the head of Grapevine Creek (tributary to San Joaquin Valley); carries little water during the summer season; flood discharge may amount to 30 second-feet. The stream sinks into the sands about 5 miles southwest of Castac Lake; a well-marked drainage line extends to the lake, but the stream has seldom, even in flood, been seen to flow into the lake. The waters of the stream are fresh and sweet; those of the lake are salty. Mount Pinos and Tejon sheets.

**Curtis Creek** (L); Tuolumne County; rises in the western part of T. 2 N., R. 16 E., Mount Diablo base and meridian, 2 miles northeast of Soulsbyville, 3,300 feet above sea level; flows southwest 12 miles into Sullivan Creek (tributary through Woods Creek to the Tuolumne and thus to the San Joaquin); fall, 1,900 feet. Sonora sheet.

**Dalton Creek** (R); Fresno County; rises in the southwestern part of T. 7 S., R. 25 E., Mount Diablo base and meridian, at the west end of Kaiser Crest, at altitude 8,300 feet above sea level; flows northwestward 4 miles, then southwestward 1 mile into San Joaquin River, in the east-central part of T. 7 S., R. 24 E., 1 mile below the mouth of Chiquito Creek; fall, 5,400 feet. Kaiser sheet.

**Dana Fork, Tuolumne River.** See Tuolumne River, Dana Fork.

**Dardanelles Creek** (R); Alpine and Tuolumne counties; Stanislaus National Forest; rises in Alpine County on the northwestern slope of the Dardanelles, at altitude 7,100 feet above sea level; flows southwestward  $1\frac{1}{2}$  miles, then somewhat east of south  $2\frac{1}{2}$  miles into Middle Fork Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 1,850 feet, of which 850 feet occurs in last  $6\frac{1}{2}$  miles just above the mouth. Dardanelles sheet.

**Dead Man Creek** (R); Alpine and Tuolumne counties; rises in the southeastern part of T. 6 N., R. 21 E., Mount Diablo base and meridian, on the north side of Sonora Pass at altitude 9,600 feet above sea level; flows northwestward 1 mile, southwestward 2 miles, then takes a general westerly course to the northern part of T. 5 N., R. 20 E., where it unites with Relief Creek to form the Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 3,300 feet; for about 5 miles forms the boundary between Alpine and Tuolumne counties. Dardanelles sheet.

**Deadman Creek** (L); Tulare County; Sequoia National Forest; rises in the northwestern part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 6,200 feet above sea level; flows northeastward 3 miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule to Tule River and thus to Tulare Lake basin); fall, 2,400 feet. Kaweah sheet.

**Dead Man Fork** (R); Amador County; rises in the southern part of T. 8 N., R. 12 E., Mount Diablo base and meridian, at altitude 2,600 feet above sea level; flows southwestward 5 miles into Dry Creek (tributary through Mokelumne River to the San Joaquin). Jackson sheet.

**Deadmans Creek** (L); Mariposa and Merced counties; rises in the northwestern part of T. 8 S., R. 17 E.; flows southwest and then west into San Joaquin Valley; carries no water after the rainy season; at flood stages is connected with Mariposa Creek by several interlacing channels. Fisk and Johnson map.

**Deadwood Gulch Creek** (R); Madera County; rises in the western part of T. 7 S., R. 21 E., Mount Diablo base and meridian, west of Deadwood Peak, at altitude 3,700 feet above sea level; flows southward 3 miles into Coarse Gold Creek (tributary through Fresno River to San Joaquin River); fall, 1,500 feet. Mariposa sheet.

**Deep Canyon Creek** (L); Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 2 N., R. 22 E., Mount Diablo base and meridian, at altitude 8,900 feet above sea level; flows southwestward  $4\frac{1}{2}$  miles into Rancheria Creek (tributary through Tuolumne River to the San Joaquin); fall, 2,700 feet; principal tributary, Breeze Creek. Yosemite National Park map.

**Deep Creek (L);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 19 S., R. 32 E., Mount Diablo base and meridian, on the western slope of the Great Western Divide, at altitude 7,500 feet above sea level; flows southward 4 miles into Little Kern River (tributary to Kern River); fall, 1,800 feet. Olancha sheet.

**Deep Hollow Creek (L);** rises in the western part of T. 8 S., R. 19 E., at altitude 1,200 feet above sea level; flows northeastward 2 miles into Willow Creek (tributary through Chowchilla River to the San Joaquin); fall, 400 feet. Mariposa sheet.

**Deer Canyon Creek (R);** Fresno County; Sierra National Forest; rises in the northeastern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, on the south slope of Spanish Peak, at altitude 7,700 feet above sea level; flows, in general, southeastward  $4\frac{1}{2}$  miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,400 feet, of which 1,300 feet is made in the last half mile. Tehipite sheet.

**Deer Creek (L);** rises near Groveland, in the western part of T. 1 S., R. 16 E., Mount Diablo base and meridian, at altitude 3,000 feet above sea level; flows northeastward  $1\frac{1}{2}$  miles, then northwestward  $3\frac{1}{2}$  miles into Tuolumne River (tributary to San Joaquin River); fall, 1,800 feet. Sonora sheet.

**Deer Creek (R);** Alpine County; rises in Blue Lakes, at altitude 8,000 feet above sea level; flows southeastward through Clover Valley, then southwestward through Deer Valley to its junction with North Fork Mokelumne River (tributary through Mokelumne River to the San Joaquin); length, 5 miles; fall, 1,200 feet. Markleeville sheet.

**Deer Creek (R);** Eldorado and Sacramento counties; rises in the southwestern part of T. 10 N., R. 9 E., Mount Diablo base and meridian, at altitude 1,300 feet above sea level; flows very irregularly southwestward to its junction with Cosumnes River (tributary through Mokelumne River to the San Joaquin); length, 30 miles; fall, 1,250 feet; many short branching tributaries, of which Marble, Carson, and Crevis are named on the maps; sloughlike in lower course. Placerville, Sacramento, and Lodi sheets.

**Deer Creek (L);** Fresno County; Sierra National Forest; rises in the northern part of T. 10 S., R. 27 E., Mount Diablo base and meridian, on the east slope of Nelson Mountain, at altitude 9,400 feet above sea level; takes a general southwesterly course to its junction with Dinkey Creek (tributary through North Fork of Kings River to Kings River and thus to the San Joaquin); principal tributary, East Fork. Kaiser sheet.

**Deer Creek (L);** Tulare County; Sequoia National Forest; rises in the northeastern part of T. 16 S., R. 31 E., Mount Diablo base and meridian, in a lakelet near the summit of the Great Western Divide, at altitude 10,700 feet above sea level; flows northwestward 3 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,800 feet. Tehipite sheet.

**Deer Creek (L);** Tulare County; Sequoia National Forest; rises in the northern part of T. 17 S., R. 31 E., Mount Diablo base and meridian, at altitude 8,600 feet above sea level; flows northwestward 2 miles into Cliff Creek (tributary through Middle Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 1,600 feet; intermittent. Kaweah sheet.

**Deer Creek (R);** Tulare County; rises in the northern part of T. 23 S., R. 31 E., Mount Diablo base and meridian, southeast of the Tule Indian Reservation; flows very irregularly westward into San Joaquin Valley; discharges flood waters into Tulare Lake basin; the summer flow of the creek does not reach the San Joaquin Valley lands; ordinarily the water sinks within 10 or 12 miles of the foothills; the entire low-water flow of the creek is held for irrigation. Gaging station at base of foothills (1878-1884), near Hot Springs (1910-1912). Land Office map of California, 1907.

**Deer Creek (R);** Tuolumne County; rises in the northeastern part of T. 3 N., R. 16 E., Mount Diablo base and meridian; at altitude 4,700 feet above sea level; flows south-

westward 6 miles into South Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 2,400 feet. Big Trees sheet.

**Deer Creek, East Fork** (R); Fresno County; Sierra National Forest; rises in the south-central part of T. 10 S., R. 27 E., Mount Diablo base and meridian, at altitude 8,100 feet above sea level; flows southwestward 3 miles into Deer Creek (tributary to North Fork of Kings River and thus through Kings River to the San Joaquin). Kaiser sheet.

**Delaney Creek** (R); Tuolumne County; Yosemite National Park, rises in the eastern part of T. 1 N., R. 24 E., Mount Diablo base and meridian, at altitude 11,100 feet above sea level; flows southwestward 6 miles into Tuolumne River (tributary to San Joaquin River) in Tuolumne Meadows; fall, 2,500 feet. Yosemite National Park map.

**De Long Creek** (R); rises in the northwestern part of T. 5 S., R. 20 E., at altitude 3,400 feet above sea level; flows southeastward 6 miles into the East Fork of Chowchilla River (tributary through Chowchilla River to the San Joaquin); fall, about 1,400 feet; principal tributary Oliver Creek. Mariposa sheet.

**Desolation Lake**; Fresno County; Sierra National Forest, 2 miles west of Mount Humphreys, in the Humphrey Basin; inlets, several streams draining small lakes; outlet, a stream 2 miles long flowing southward to Piute Creek (tributary to South Fork of San Joaquin River); elevation 11,362 feet; fall of outlet, 662 feet; length, 1 mile; maximum width, one-half mile. Mount Goddard sheet.

**Devil Gulch Creek** (L); Mariposa County; Sierra National Forest, rises in the northeastern part of T. 5 S., R. 20 E., Mount Diablo base and meridian, on the south slope of Devil Peak (altitude 7,079 feet); flows northwestward 9 miles into South Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 5,000 feet. Yosemite sheet.

**Devils Bath Tub** (L); Fresno County; Sierra National Forest, south of Silver Divide; outlet, a stream 1 mile long flowing southward to Cold Creek, a branch of Mono Creek (tributary to South Fork of San Joaquin River); elevation, 9,172 feet; fall of outlet, about 1,000 feet. Mount Goddard sheet.

**Devils Canyon Creek** (L); Tulare County; Sequoia National Forest; rises in the southwestern part of T. 18 S., R. 30 E., Mount Diablo base and meridian, on the western slope of Dennison Mountain, at altitude 7,500 feet above sea level; flows northwestward 4 miles into South Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 4,100 feet; intermittent. Kaweah sheet.

**Dike Creek** (L); Madera County; rises in the northern part of the Sierra National Forest on the southern slope of Ritter Mountain, at altitude 12,000 feet above sea level; flows southwestward  $3\frac{1}{2}$  miles into North Fork of San Joaquin River (tributary to Middle Fork of San Joaquin); fall, 4,000 feet. Mount Lyell sheet.

**Dingley Creek** (R); Tuolumne County; Yosemite National Park, rises in the central part of T. 1 N., R. 24 E., on the south slope of Ragged Peak at altitude 10,500 feet above sea level; flows southwestward 4 miles into Tuolumne River (tributary to San Joaquin River); fall, 2,100 feet; intermittent. Yosemite National Park map.

**Dinkey Creek** (R); Fresno County; Sierra National Forest; rises in the northwestern part of T. 9 S., R. 27 E., Mount Diablo base and meridian, in Dinkey Lake, at altitude 9,150 feet above sea level; flows southwestward 6 miles, southward 4 miles, then, in general, east of south 15 miles to its junction with North Fork of Kings River (tributary through Kings River to the San Joaquin); principal tributaries, West Fork, Rock, Bear, and Deer creeks. Gaging station near Ockenden (1910-1912). Kaiser sheet; Le Conte's map of portion of the Sierra Nevada, Kings-Kern sheet (March, 1903).

**Dinkey Creek, West Fork** (R); Fresno County; Sierra National Forest; rises in the central part of T. 9 S., R. 26 E., Mount Diablo base and meridian, at altitude 8,700 feet above sea level; flows, in general, west of south, 4 miles into Dinkey Creek (tributary to North Fork of Kings River and thus through Kings River to the San Joaquin); fall, 1,850 feet. Kaiser sheet.

**Dinke Lake;** Fresno County; Sierra National Forest; northwestern part of T. 9 S., R. 27 E., Mount Diablo base and meridian; two small inlets; outlet, Dinkey Creek to North Fork of Kings River (tributary through Kings River to the San Joaquin); altitude, 9,150 feet. Kaiser sheet.

**Disappearing Creek (L);** Fresno County; Sierra National Forest; rises in glacial lakelets, south of the Goddard Divide, at altitude 12,000 feet above sea level; flows southeastward 5 miles and southwestward 2 miles into Goddard Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); fall, 5,000 feet. Mount Goddard sheet.

**Disaster Creek (R);** Alpine County; Stanislaus National Forest; rises  $1\frac{1}{2}$  miles south of the south line of T. 8 N., R. 20 E., Mount Diablo base and meridian,  $2\frac{1}{2}$  miles southeast of Highland Lake, on the northwest slope of Arnot Peak (altitude, 10,036 feet); flows southwestward one-half mile, then east of south 4 miles into Clark Fork (tributary through Middle Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); fall, 3,000 feet. Dardanelles sheet.

**Doe Lake;** Tuolumne County; Yosemite National Park, northwestern part of T. 2 N., R. 23 E., Mount Diablo base and meridian; inlet, an intermittent stream flowing from Tallulah Lake; outlet, a stream half a mile long, flowing westward to Piute Creek (tributary through Tuolumne River to the San Joaquin); altitude, 9,250 feet; fall of outlet, 900 feet. Yosemite National Park map.

**Dog Creek (R);** Fresno County; Sierra National Forest; rises in the northern part of T. 11 S., R. 30 E., Mount Diablo base and meridian, on the south slope of Tunemah Peak at altitude 10,800 feet above sea level; flows southward 3 miles, passing through Bunch Grass Flat into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,700 feet, of which 3,000 feet is made in the last  $1\frac{1}{2}$  miles. Tehipite sheet.

**Dog Lake;** Tuolumne County; Yosemite National Park, southern part of T. 1 N., R. 24 E., Mount Diablo base and meridian; outlet, a stream 1 mile long flowing southwestward to Tuolumne River (tributary to San Joaquin River) in Tuolumne Meadows; altitude, 9,240 feet; fall of outlet, 640 feet. Yosemite National Park map.

**Dollar Lake;** Tulare County, in the north-central part of T. 15 S., R. 31 E., 2 miles west of Glacier Ridge; one inlet, draining two small lakes; outlet, through Copper Canyon<sup>1</sup> to Roaring River (tributary to South Fork Kings River); altitude, 10,050 feet; very small. Tehipite sheet.

**Dorothy Lake;** Tuolumne County; Yosemite National Park, west-central part of T. 4 N., R. 22 E., Mount Diablo base and meridian; outlet, Falls Creek to Tuolumne River (tributary to San Joaquin River); altitude, 9,550 feet; length, three-fourths mile; maximum width, one-third mile. Yosemite National Park map.

**Dorst Creek (L);** Tulare County; Sequoia National Forest; rises in the southwestern part of T. 14 S., R. 30 E., Mount Diablo base and meridian, in J. Q. Pass, at altitude 9,000 feet above sea level; flows, in general, southwestward 6 miles to the northwestern part of T. 15 S., R. 29 E., where it unites with Stony Creek to form the North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,300 feet. Tehipite sheet.

**Dougherty Creek (L);** Fresno County; Sierra National Forest, formed by the junction of East and Middle forks; East Fork, which drains the larger area and is considered the continuation of the main stream, rises 2 miles north of Goat Mountain, at altitude 10,600 feet above sea level; flows northward 2 miles, then westward 2 miles to the point at which it receives the Middle Fork; below the forks the creek flows west of north 3 miles to its junction with Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall from head of East Fork to Kings River, 4,600

<sup>1</sup> The eastern branch of this canyon is said to be incorrectly named on the Tehipite sheet. The name "Dead Man Canyon" is properly applied, as on Le Conte's map, to the western branch; the eastern branch is Copper Canyon. Bull. Sierra Club, vol. 6, No. 3, June, 1907, p. 158.

feet; basin contains many small lakes, of which State Lakes, tributary to the East Fork, and Volcanic Lakes, at the head of the West Fork, are the most important. Tehipite sheet.

**Dougherty Creek, Middle Fork (L);** Fresno County; Sierra National Forest; rises on the west slope of Goat Crest, at altitude 11,200 feet above sea level; flows westward 1 mile, then northward 3 miles to its junction with East Fork, with which it forms Dougherty Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); fall above junction with East Fork, 3,000 feet. Tehipite sheet.

**Dougherty Creek, West Fork (L);** Fresno County; Sierra National Forest; rises in Volcanic Lakes on the east slope of Comb Spur at altitude 10,200 feet above sea level; flows east of north  $2\frac{1}{2}$  miles into Middle Fork of Dougherty Creek (tributary through Dougherty Creek to Middle Fork of Kings River and thus through Kings River to the San Joaquin); fall, above junction with Middle Fork, 2,200 feet. Tehipite sheet.

**Dry Creek (R);** Amador and Sacramento counties; rises in the northeastern part of T. 7 N., R. 12 E., Mount Diablo base and meridian, near Lockwood, at altitude 3,200 feet above sea level; takes a general southwesterly course to its junction with Mokelumne River (tributary to San Joaquin River); length, 50 miles; fall, 2,950 feet; crosses the valley in several interlocking channels, which are sloughlike as they approach the river; principal tributaries, Rancheria, Sutter, and Jackson creeks. Gaging station at base of foothills (1878-1884); near Ione (1911-12). Jackson and Lodi sheets.

**Dry Creek (L);** Fresno County; rises in the western part of T. 17 S., R. 13 W.; flows northeastward into San Joaquin Valley; length, 12 miles; carries water only during the rainy season. Land Office map of California, 1907.

**Dry Creek (R);** Tulare County; Sequoia National Forest; rises in the southwestern part of T. 21 S., R. 32 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows southeastward  $7\frac{1}{2}$  miles into Kern River; fall, 4,000 feet. Kaweah and Kernville sheets.

**Dry Creek (R);** Tuolumne County; rises in the central part of T. 3 N., R. 16 E., Mount Diablo base and meridian, at altitude 3,600 feet above sea level; flows southwestward 1 mile into Deer Creek (tributary through South Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin). Big Trees sheet.

**Dry Creek, Little (L);** Fresno County; rises in the southern part of T. 10 S., R. 23 E., Mount Diablo base and meridian; flows southwestward 13 miles into San Joaquin River. Land Office map, 1907.

**Dry Meadow Creek.** See Meadow Creek, Dry.

**Duck Creek (R);** Alpine County; Stanislaus National Forest; rises in Duck Lake in the northern part of T. 7 N., R. 18 E., Mount Diablo base and meridian, at altitude 7,250 feet; flows eastward one-half mile, then southwestward  $2\frac{1}{2}$  miles into North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus River and thus to the San Joaquin); fall, 400 feet. Dardanelles and Tehipite sheets.

**Duck Lake;** Alpine County; Stanislaus National Forest, northern part of T. 7 N., R. 18 E., Mount Diablo base and meridian; outlet, Duck Creek to North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); altitude, 7,250 feet. Dardanelles sheet.

**Dumbbell Lakes;** Fresno County; Sierra National Forest; 2 miles north of Lake Basin; group of small connected lakes, discharging by a stream 3 miles long, flowing southwestward to Cartridge Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); Mount Goddard sheet.

**Durrwood Creek (L);** Tulare County, Kern National Forest; rises in the northeastern part of T. 22 S., R. 33 E., Mount Diablo base and meridian, at altitude 8,800 feet above sea level; flows, in general, northwestward 6 miles into Kern River; fall, 4,700 feet. Olancho sheet.

**Dusy Branch** (L); Fresno County; Sierra National Forest; rises on the west slope of Mount Winchell (altitude 13,749 feet); flows south of west passing through several small lakes to its junction with Middle Fork of Kings River (tributary through Kings River to the San Joaquin); length, 4 miles; fall, 3,000 feet. Mount Goddard sheet.

**Dutch Creek** (R); Mariposa County; rises in the northwestern part of T. 3 S., R. 17 E., Mount Diablo base and meridian, at altitude 3,200 feet above sea level; flows north-eastward 3 miles into Bean Creek (tributary through Smith Creek to North Fork of Merced River and thus through Merced River to the San Joaquin); fall, 500 feet; intermittent. Sonora sheet.

**Dutch Lake**; Fresno County; Sierra National Forest, 2 miles southwest of the southeast corner of T. 7 S., R. 27 E., Mount Diablo base and meridian; no inlet mapped; outlet, a stream flowing north 1 mile, then directly east 1 mile, into South Fork of San Joaquin River (head of San Joaquin); elevation, 9,150 feet; fall of outlet, 1,850 feet; very small. Mount Goddard sheet.

**Eagle Creek** (L); Tuolumne County; rises in the southern part of T. 5 N., R. 20 E., Mount Diablo base and meridian,  $1\frac{1}{2}$  miles east of East Flange Rock, at altitude 8,000 feet above sea level; flows northwestward 5 miles, then, in general, northward 3 miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin) at Brightman Flat; fall, 2,200 feet; principal tributary, a stream flowing northward along the east base of Eagle Peak and through Eagle Meadow. Dardanelles sheet.

**Eagle Creek** (R); Tuolumne County; rises in the northwestern part of T. 3 N., R. 16 E., Mount Diablo base and meridian; at altitude 3,200 feet above sea level; flows southwestward 5 miles into Rose Creek (tributary through Stanislaus River to the San Joaquin); fall, 1,300 feet. Big Trees sheet.

**Eagle Lake**; Tulare County; Sequoia National Forest; southern part of T. 17 S., R. 31 E., Mount Diablo base and meridian; outlet, an intermittent stream  $1\frac{1}{2}$  miles long, flowing northward to East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); altitude, 9,900 feet; fall of outlet, 2,000 feet. Kaweah sheet.

**East Creek** (L); Tulare County; rises in Sierra National Forest, on the north slope of the Kings-Kern Divide, at altitude 12,100 feet above sea level; flows northward, passing through Lake Reflection and East Lake, to its junction with Bubbs Creek (tributary to South Fork of Kings River) in the southeastern part of Fresno County; length, 6 miles; fall, 3,600 feet. Mount Whitney sheet.

**East Fork or Branch.** See name of main stream.

**East Lake**; Tulare County; Sierra National Forest; northeastern part of T. 14 S., R. 32 E., Mount Diablo base and meridian; inlets, Ousel Creek and East Creek; outlet, East Creek to Bubbs Creek (tributary to South Fork of Kings River); altitude, 9,609 feet; below Lake Reflection, 559 feet; fall of outlet, 1,200 feet. Mount Whitney sheet.

**Echo Creek** (R); Mariposa County; Yosemite National Park; rises on the north slope of Rafferty Peak (altitude, 11,178 feet); flows southwestward  $7\frac{1}{2}$  miles into Merced River (tributary to San Joaquin River) 1 mile below Merced Lake; fall, 3,400 feet. Yosemite National Park map.

**Edith Lake**; Tuolumne County; Yosemite National Park; northeastern part of T. 2 N., R. 20 E., Mount Diablo base and meridian; inlet, East Fork of Eleanor Creek; outlet, Eleanor Creek to Cherry Creek (tributary through Tuolumne River to the San Joaquin); altitude 6,603 feet; fall of Eleanor Creek in the 7 miles between Edith Lake and Lake Eleanor, 1,900 feet. Yosemite National Park map.

**Edna Lake**; Madera County; at north base of Merced and east base of Ottoway Peaks; outlet, Merced Peak Fork to Merced River (tributary to the San Joaquin); altitude, 10,500 feet. Mount Lyell sheet.

**Eldorado Creek (L);** Mariposa County; rises in the southeastern part of T. 4 S., R. 16 E.; flows southwestward to Burns Creek. Sonora sheet; Land Office map of California, 1907.

**Eleanor Creek (L);** Tuolumne County, Yosemite National Park; formed in the western part of T. 2 N., R. 20 E., Mount Diablo base and meridian, by the junction of East and West forks; the East Fork, which drains the larger area and is here considered the continuation of the main stream, rises on the south slope of Bigelow Peak (altitude 10,510 feet), and the north slope of Kendrick Peak (altitude 10,346 feet), each of which sends a stream to upper Twin Lake; the East Fork flows southwestward 13 miles to its junction with the West Fork; below the forks Eleanor Creek continues its southwesterly course 5 miles, passing through Lake Eleanor then flows almost directly south  $2\frac{1}{2}$  miles, then southwestward again 1 mile to its junction with Cherry Creek; fall in the 9 miles below the forks, 1,500 feet; principal tributaries below the forks, Frog and Kibbie creeks, which enter Lake Eleanor, and McGill Creek, which comes in 3 miles below Lake Eleanor. The basin contains many glacial lakelets, some of which are mapped as without outlet. Gaging stations at Eleanor trail crossing (1901), below Eleanor Lake (1910-1912). Yosemite National Park map.

**Eleanor Creek, East Fork.** See Eleanor Creek.

**Eleanor Creek, West Fork (R);** Tuolumne County; Yosemite National Park; rises on the south slope of Bartlett Peak, at altitude 7,700 feet above sea level; flows, in general, southwestward about 5 miles to its junction with Eleanor Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); fall, 2,100 feet; intermittent in upper part. Yosemite National Park map.

**Eleanor Lake;** Tuolumne County; Yosemite National Park; southeastern part of T. 2 N., R. 19 E., Mount Diablo base and meridian; inlets, Frog and Kibbie creeks and Eleanor Creek, which flows through the lake to its junction with Cherry Creek (tributary through Tuolumne River to the San Joaquin); altitude, 4,694 feet; fall of Eleanor Creek in the 4 miles below Lake Eleanor, 550 feet; length,  $1\frac{1}{4}$  miles; maximum width, three-fourths mile. Yosemite National Park map.

**Elizabeth Lake;** Tuolumne County; Yosemite National Park, central part of T. 1 S., R. 24 E., Mount Diablo base and meridian; outlet, Unicorn Creek to Tuolumne River (tributary to San Joaquin River); altitude, 9,550 feet. Yosemite National Park map.

**El Paso Creek (R);** Kern County; rises in the western part of T. 10 N., R. 16 W., San Bernardino base and meridian, on the northern slope of the Tehachapi Mountains, at altitude 6,000 feet above sea level; flows northwestward toward Buena Vista Lake Reservoir. Land Office map, 1907. Tejon sheet.

**El Puerto Creek (L);** Stanislaus County; rises in the northwestern part of T. 6 S., R. 6 E.; flows northeastward 7 miles; discharges into San Joaquin Valley; carries water only during the rainy season; tributary, Washington Gulch Creek. Orestimba-Panoche-Cantua special sheet.

**Emeric Creek (R);** Mariposa County; rises in the southern part of T. 1 S., R. 24 E., Mount Diablo base and meridian, at altitude 10,000 feet above sea level; flows southwestward 3 miles, passing through Emeric Lake to its junction with Fletcher Creek (tributary through McClure Fork to Merced River and thus to the San Joaquin); fall, 1,000 feet. Mount Lyell sheet.

**Emeric Lake;** Mariposa County; northwestern part of T. 2 S., R. 24 E., Mount Diablo base and meridian; inlet, Emeric Creek; outlet, Emeric Creek to Fletcher Creek (tributary through McClure Fork to Merced River and thus to the San Joaquin); altitude, 9,300 feet. Mount Lyell sheet.

**Emigrant Lake;** Tuolumne County; Stanislaus National Forest, southwestern part of T. 4 N., R. 21 E., Mount Diablo base and meridian; two inlets, the longer of which drains a number of small lakes in and above Emigrant Meadow; outlet, a

stream 3 miles long flowing southwestward to the North Fork of Cherry Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); altitude, 8,708 feet; length, 2 miles; width, about one-fourth mile. Yosemite National Park map.

**Erskine Creek** (L); Kern County; Sierra National Forest; rises in the northeastern part of T. 28 S., R. 33 E., at altitude 6,000 feet above sea level; flows northwestward to its junction with Kern River, in Hot Spring Valley; length, 13 miles; fall, 3,600 feet. Gaging station near Isabella (1911-12). Kernville sheet.

**Eshom Creek** (R); Tulare County; Sequoia National Forest; rises in the north central part of T. 14 S., R. 28 E., Mount Diablo base and meridian, on the northwest slope of Redwood Mountain, at altitude 6,000 feet above sea level; flows, in general, west of south 6 miles, then southeastward 3 miles into North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,400 feet. Tehipite sheet.

**Esperanza Creek** (L); Calaveras County; rises in the northwestern part of T. 5 N., R. 14 E., Mount Diablo base and meridian, at altitude 3,300 feet above sea level; flows westward 9 miles, then northwestward 2 miles into North Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 1,000 feet. Big Trees and Jackson sheets.

**Evelyn Lake**; Tulare County; Sequoia National Park; northeastern part of T. 18 S., R. 30 E., Mount Diablo base and meridian; outlet, a stream  $2\frac{1}{2}$  miles long flowing, in general, northwestward into Horse Creek (tributary through East Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); altitude, 8,700 feet; fall of outlet, 3,400 feet. Kaweah sheet.

**Evelyn Lake**; Tuolumne County; Yosemite National Park; southeastern part of T. 1 S., R. 24 E., Mount Diablo base and meridian; one inlet; outlet, a stream 2 miles long flowing northward to Rafferty Creek (tributary through Lyell Fork of Tuolumne River to Tuolumne River and thus to the San Joaquin); altitude, 10,350 feet; fall of outlet, 1,650 feet. Yosemite National Park map.

**Evolution Creek** (R); Fresno County; rises in Sierra National Forest, in Wanda Lake, on the north slope of Goddard Divide, between Mount Huxley and Mount Goddard, at altitude 11,452 feet above sea level; flows northward to Evolution Lake, then northwestward 6 miles to its junction with the South Fork of San Joaquin River (head of San Joaquin); in the  $2\frac{1}{2}$  miles between Wanda Lake and Evolution Lake Evolution Creek falls 462 feet; in the 6 miles below Evolution Lake the fall is about 2,600 feet; this creek receives the drainage from numerous lakes lying high up on the slopes of Goddard and Glacier divides. Mount Goddard sheet.

**Evolution Lake**; Fresno County; Sierra National Forest, 1 mile west of Mount Darwin; elevation, 13,841 feet; inlet, Evolution Creek from Wanda Lake; outlet, Evolution Creek to South Fork of San Joaquin River (head of San Joaquin); elevation, 10,990 feet. Mount Goddard sheet.

**Falls Creek** (R); Tuolumne County; Yosemite National Park; rises in the west central part of T. 4 N., R. 22 E., Mount Diablo base and meridian, in Dorothy Lake, at altitude 9,550 feet above sea level; flows southwestward 20 miles to its junction with Tuolumne River (tributary to the San Joaquin), in Hetch Hetchy Valley; fall, 5,900 feet, of which 1,700 feet is made in about half a mile in entering Hetch Hetchy Valley; the drainage basin is long and narrow, the maximum width being about 5 miles at the upper end; lakes are numerous and some of them are of good size; the most important are Dorothy, Mary, Tilden, Wilmer, Branigan, and Vernon lakes. Yosemite National Park map.

**Fanny Creek** (L); Eldorado County; rises in the northern part of T. 8 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows, in general, northwestward 2 miles into Slate Creek (tributary through Big Canyon Creek to

Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 900 feet. Placerville sheet.

**Fay Creek (R);** Tulare and Kern counties; Sierra National Forest; rises in the western part of T. 24 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,200 feet above sea level; flows somewhat east of south 12 miles; discharges into the valley of the South Fork of Kern River, 2 miles north of Weldon; sinks before reaching the river; fall, 5,200 feet. Kernville sheet.

**Feliciana Creek (L);** Mariposa County; Sierra National Forest; rises in the western part of T. 4 S., R. 19 E., Mount Diablo base and meridian, on the east slope of Feliciana Mountain, at altitude 3,700 feet above sea level; flows northwestward  $3\frac{1}{2}$  miles into Merced River (tributary to San Joaquin River); fall, 2,400 feet. Yosemite sheet.

**Fine Gold Creek (R);** Madera County; rises in the northeastern part of T. 8 S., R. 21 E., on the south slope of Thornberry Mountain, at altitude 4,000 feet above sea level; flows, in general, somewhat west of south, about 18 miles, to its junction with San Joaquin River, in the eastern part of T. 10 S., R. 21 E.; fall below the forks, 3,600 feet; principal tributaries, Little Fine Gold Creek and North Fork. Mariposa sheet.

**Fine Gold Creek, Little (L);** Madera County; rises in the southern part of T. 7 S., R. 22 E., on the western slope of Goat Mountain, at altitude 4,000 feet above sea level; flows southeastward 4 miles, southward 2 miles, then southwestward about 4 miles into Fine Gold Creek (tributary to San Joaquin River) at the junction of North Fork, near Mountain View School; fall 2,700 feet. Mariposa sheet.

**Fine Gold Creek, North Fork (R);** Madera County; rises in the northern part of T. 8 S., R. 21 E., west of Thornberry Mountain, at altitude 3,000 feet above sea level; flows, in general, southeastward 6 miles into Fine Gold Creek (tributary to San Joaquin River), near the junction with Little Fine Gold; fall 1,700 feet. Mariposa sheet.

**Fish Creek (L);** Fresno County; rises in the Sierra National Forest, in a group of small lakes, north of the Silver Divide, at altitude about 11,500 feet; flows in a general northwesterly course about 16 miles to its junction with Middle Fork of San Joaquin (tributary to South Fork San Joaquin, head of San Joaquin); fall, 6,200 feet; principal tributaries, Minnow and Silver creeks; many small lakes in the upper part of this basin. Mount Goddard, Kaiser, and Mount Lyell sheets.

**Fish Creek (R);** Madera County; rises in the northern part of T. 9 S., R. 22 E., at altitude 2,200 feet above sea level; flows, in general, southeastward 4 miles to its junction with San Joaquin River, in the eastern part of same township; fall, 1,300 feet. Mariposa sheet.

**Fish Creek (R);** Tulare County; Sierra National Forest; rises in the east-central part of T. 20 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,700 feet above sea level; flows, in general, southeastward to its junction with South Fork of Kern River (tributary to Kern River); length, 17 miles; fall, 3,000 feet; principal tributaries, Jackson and Mahogany creeks. Olancha and Kernville sheets.

**Fish Creek (R);** Tulare County; Sequoia National Forest; rises in the western part of T. 20 S., R. 32 E., Mount Diablo base and meridian, at altitude 7,700 feet above sea level; flows north of east 5 miles into Little Kern River (tributary to Kern River); fall, 1,900 feet. Kaweah and Olancha sheets.

**Fisher Creek (L);** Tuolumne County; rises in the east central part of T. 5 N., R. 17 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southwestward 3 miles, then north of west 3 miles into Skull Creek (tributary through Griswold Creek to North Fork of Stanislaus River and thus through Middle Fork of Stanislaus and Stanislaus River to the San Joaquin). Big Trees sheet.

**Five Lakes;** Tulare County; Sequoia National Forest; northwestern part of T. 17 S., R. 32 E., on the Great Western Divide; lakes are connected and discharge by a stream 1 mile long flowing northeastward into Big Arroyo. The highest of the lakes is 10,200 feet above sea level, the lowest is 9,800 feet; the lakes are all small, the largest being half a mile long. Kaweah sheet.

**Fivemile Creek** (L); Tuolumne County; rises in the northern part of T. 2 N., R. 16 E., Mount Diablo base and meridian, 1 mile west of Mount Elizabeth, at altitude 3,800 feet above sea level; flows westward 5 miles into South Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 2,300 feet. Big Trees sheet.

**Flat Creek** (L); Eldorado County; rises in the northwestern part of T. 8 N., R. 12 E., Mount Diablo base and meridian, at altitude 2,800 feet above sea level; flows westward  $3\frac{1}{2}$  miles, then northwestward 1 mile into Spanish Creek (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 1,200 feet. Placerville sheet.

**Flat Creek**, Tulare County. See Deer Creek.

**Fletcher Creek** (R); Mariposa County; rises in the southern part of T. 1 S., R. 24 E., in Fletcher Lake (altitude 10,300 feet above sea level); flows southwestward 6 miles passing through Babcock Lake into McClure Fork (tributary through Merced River to the San Joaquin); fall, 2,300 feet; principal tributary, Emeric Creek. Mount Lyell sheet.

**Fletcher Lake**; Mariposa County; on line between Tps. 1 and 2 S., R. 24 E.,  $1\frac{1}{2}$  miles northwest of Parsons Peak; two small inlets, one of which may be considered the head of Fletcher Creek; outlet, Fletcher Creek to McClure Fork (tributary through Merced River to the San Joaquin); altitude, 10,300 feet. Mount Lyell sheet.

**Flora Lake**; Tuolumne County; Yosemite National Park; northwestern part of T. 2 N., R. 20 E., Mount Diablo base and meridian; inlet, West Fork of Eleanor Creek; outlet, West Fork Eleanor Creek to Eleanor Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); altitude, 6,950 feet; fall of West Fork in the 3 miles below Flora Lake, 1,350 feet. Yosemite National Park map.

**Florence Creek** (L); Madera County; rises in the eastern part of T. 2 S., R. 24 E., north of Florence Mountain, at altitude 11,500 feet; flows westward 3 miles passing through several small lakes to its junction with McClure Fork (tributary through Merced River to the San Joaquin); in Mariposa County, in the central part of T. 2 S., R. 24 E.; fall, 2,300 feet. Mount Lyell sheet.

**Florence Lake**; Fresno County; Sierra National Forest; 2 miles southeast of the southeast corner of T 7 S., R. 27 E.; neither inlet nor outlet is shown on the map, but a pass is indicated opening westward to South Fork, San Joaquin River (head of San Joaquin); altitude, 7,300 feet above sea level; length and width, each about one-fourth mile; immediately north of this lake is a very small unnamed lake, mapped without outlet. Mount Goddard sheet.

**Foerster Creek** (R); Madera County; rises in the west slope of Foerster Peak, altitude 12,060 feet; flows westward 2 miles into Triple Peak Fork, Merced River (tributary through Merced River to the San Joaquin); fall, 2,600 feet, of which 700 feet occurs in the last one-fourth mile; tributary from Harriet Lake. Mount Lyell sheet.

**Fortymile Creek** (L); Eldorado County; rises in the northwestern part of T. 9 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles into French Creek (tributary through Big Canyon Creek to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 500 feet. Placerville sheet.

**Four Forks Creek** (R); Fresno County; rises in Sierra National Forest, on the west slope of Saddle Mountain (altitude 11,200 feet); flows southwestward 5 miles into South Fork of San Joaquin River (head of San Joaquin); principal tributary, Rock Creek; fall, 4,000 feet. Kaiser sheet.

**Freeman Creek** (R); Tulare County; Sequoia National Forest; rises in the southwestern part of T. 20 S., R. 32 E., Mount Diablo base and meridian, at altitude 7,000 feet above sea level; flows north of east 3 miles, then southeastward  $3\frac{1}{2}$  miles into Kern River; fall, 2,800 feet. Kaweah and Olancha sheets.

**French Creek (R);** Eldorado County; rises in the northwestern part of T. 9 N., R. 10 E., Mount Diablo base and meridian, at Shingle Springs, at altitude 1,450 feet above sea level; flows irregularly southward 6 miles into Big Canyon Creek (tributary to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 650 feet; principal tributary, Shingle Creek. Placerville sheet.

**French Camp Creek (R);** Stanislaus and San Joaquin counties; rises in the northwestern part of T. 1 S., R. 11 E., Mount Diablo base and meridian, near Knights Ferry; flows northwestward into San Joaquin Valley discharging its flood waters through several distributary channels; fed by seepage from irrigation above Knights Ferry; principal tributary, Rock Creek. Land Office map of California, 1907.

**French Canyon Creek (R);** Fresno County; rises in the Sierra National Forest, in a lake one-half mile northwest of Four Gables, at altitude 11,254 feet; flows southwestward 5 miles to junction with Piute Creek (tributary to South Fork San Joaquin River); fall, 1,700 feet; basin contains many glacial lakes, more than 40 being shown on the map. The largest of these lakes is nearly a mile long and possibly one-fourth mile wide. Mount Goddard sheet.

**French Gulch Creek (L);** Calaveras County; rises in the northeastern part of T. 3 N., R. 13 E., Mount Diablo base and meridian, at altitude 2,300 feet above sea level; flows southwestward 2 miles, then northwestward 3 miles into San Domingo Creek (tributary through South Fork of Calaveras to Calaveras River and thus to the San Joaquin); fall, 700 feet. Jackson sheet.

**Fresno River (R);** Madera County; formed in the southeastern part of T. 6 S., R. 21 E., Mount Diablo base and meridian, by the union of Nelder Creek and Lewis Fork; flows, in general, southwestward to its junction with the San Joaquin. Lewis Fork, the headwater stream draining the larger area, rises in the southeastern part of T. 5 S., R. 21 E., at altitude about 5,000 feet above sea level; flows southward about 8 miles to its junction with Nelder Creek; fall above the junction, about 2,000 feet.

The Fresno may be classed between streams that flow from the high mountains covered with perpetual snow and those of the foothills whose periods of flood depend on rain alone. The area of the basin is 272 square miles. At a point about 2 miles above Madera the channel usually dries up in June and remains dry until the fall rains. Between this point and the place where the river leaves bedrock in the canyon, there is about 10 miles of sandy bed.

A canal, well up in the mountains, takes water from Big Creek, one of the tributaries of Merced River, and another canal takes water from the North Fork of the San Joaquin; both canals discharge continuously into Fresno River, the flow of which is, of course, increased to the extent of the delivery by the canals.

The water of the river is utilized for irrigation, chiefly of areas in fruits and vines.

Gaging stations at base of foothills (1878-1884), near Knowles (1911-12). Mariposa sheet. See also Bull. U. S. Geol. Survey No. 140, 1896, pp. 294-295.

**Fresno River, Lewis Fork.** See Lewis Fork.

**Fresno River, North Fork (R);** Mariposa County; rises in the central part of T. 5 S., R. 21 E., Mount Diablo base and meridian, on the south slope of Hogan Mountain, at altitude 5,800 feet above sea level; flows somewhat east of south 6 miles, then southwestward 6 miles to its junction with Fresno River (tributary to San Joaquin River) near Wassamma; fall, 2,500 feet; principal tributary, Peterson Creek; gaging station near Sugar pine (1910-12). Mariposa sheet.

**Frog Creek (R);** Kern County; Sierra National Forest; rises in the western part of T. 28 S., R. 36 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows westward 4 miles into Kelso Creek (tributary to South Fork of Kern River); fall, 1,100 feet; intermittent. Kernville sheet.

**Frog Creek (L);** Tuolumne County; Yosemite National Park; rises on the south slope of Schofield Peak (altitude, 9,913 feet) and the east slope of Richardson Peak

(altitude, 9,845 feet); flows southwestward 13 miles into Lake Eleanor on Eleanor Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); fall, 4,100 feet; basin is very narrow and tributaries are few and unimportant; of the lakes only two are named on the map, Bearup and Laurel. Yosemite National Park map.

**Funston Creek (R);** Tulare County; Sequoia National Forest; rises in the northeastern part of T. 17 S., R. 32 E., Mount Diablo base and meridian, in Moraine Lake, at altitude 9,440 feet above sea level; flows eastward 2 miles, then southeastward one-half mile into Kern River near Funston Camp; fall, 2,700 feet; principal tributary, Chagoopa Creek; intermittent. Olancho sheet.

**Gardner Creek (L);** Fresno County; rises in Sierra National Forest, in a lake on the northeastern slope of Mount Gardner (altitude 12,903 feet); flows northwestward  $2\frac{1}{2}$  miles, then south of west 4 miles into South Fork of Kings River (tributary to San Joaquin River) at Mist Falls; fall, 5,600 feet; basin contains many small lakes. Mount Whitney and Tehipite sheets.

**Garlic Meadow Creek (R);** Fresno County; rises in the northwestern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, on the south slope of Rodgers Ridge, at altitude 8,500 feet above sea level; flows southwestward  $1\frac{1}{2}$  miles, then southeastward 3 miles into Kings River (tributary to San Joaquin River); fall, 6,800 feet. Tehipite sheet.

**Garnet Lake;** Madera County; northern part of the Sierra National Forest, 1 mile southeast of Thousand Island Lake; three small inflowing streams, the longest of which drains a portion of the northern slope of Banner Peak; outlet, a stream one-half mile long flowing northeastward into Middle Fork of San Joaquin River; elevation, 9,704 feet; fall of outlet, 700 feet. Mount Lyell sheet.

**Garzos Creek (L);** Stanislaus and Merced counties; rises in the northern part of T. 9 S., R. 6 E.; flows northward 6 miles, then, in general, eastward to San Joaquin Valley, into which it discharges south of Newman; carries water only during the rainy season; tributaries, Mule Gulch and Oak Gulch creeks. Orestimba-Panoche-Cantua special map.

**Givens Creek (R);** Madera County; Yosemite National Park; rises in the western part of T. 4 S., R. 23 E., on the south slope of Buena Vista Crest, at altitude 9,200 feet; flows irregularly southward 4 miles into South Fork of Merced River; fall, 2,100 feet. Yosemite National Park map.

**Glacier Creek (L);** Fresno County; rises in Sierra National Forest, 2 miles northeast of Glacier Monument, at altitude 10,500 feet above sea level; flows westward  $2\frac{1}{2}$  miles into South Fork of Kings River, near the upper end of Kings River canyon; fall, 5,000 feet. Tehipite sheet.

**Glacier Creek (R);** Fresno County; Sierra National Forest; rises on the western slope of the Palisades in a glacial lake at altitude 11,600 feet above sea level; flows southwestward 2 miles into Palisade Creek (tributary to Middle Fork of Kings River and thus through Kings River to the San Joaquin); fall, 2,800 feet. Mount Goddard sheet.

**Glacier Lake;** Tulare County; southwestern part of T. 15 S., R. 32 E., north of Triple Divide Peak; outlet, Roaring Fork River to South Fork Kings River; altitude, 11,700 feet; very small. Tehipite sheet.

**Goddard Creek (R);** Fresno County; Sierra National Forest; rises on the south slope of Mount Goddard (altitude 13,555 feet); flows southeastward 10 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 6,000 feet; principal tributary, Disappearing Creek; many very small tributaries, fed by glacial lakes, of which more than 50 are shown on the map. Mount Goddard and Tehipite sheets.

**Goddard Creek, North (R);** Fresno County; rises on the north slope of Goddard Divide, in the Sierra National Forest, one-half mile southwest of Wanda Lake, at

altitude 12,100 feet above sea level; flows very irregularly northwestward about 5 miles to junction with South Fork of San Joaquin; passes through several lakes of which the largest is 1 mile long and nearly half a mile wide; the elevation of this lake is 11,090 feet above sea level; in the 3 miles below the lake North Goddard falls about 2,000 feet. Mount Goddard sheet.

**Gold Creek.** See Fine Gold Creek; Coarse Gold Creek.

**Golden Gate Creek (R);** Amador County; rises in the northern part of T. 7 N., R. 13 E., Mount Diablo base and meridian, at altitude 2,750 feet above sea level; flows southwestward  $1\frac{1}{2}$  miles, then southward  $1\frac{1}{2}$  miles into Sutter Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin); fall, 1,200 feet. Jackson sheet.

**Golden Trout Creek (L);** Tulare County; rises in the northeastern part of T. 17 S., R. 34 E., Mount Diablo base and meridian, 1 mile southwest of Cirque Peak, at altitude 11,100 feet above sea level; flows west of south 8 miles, then very irregularly westward 7 miles to its junction with Kern River; fall, 4,600 feet; principal tributary, stream from Rocky Basin Lakes. In the central part of T. 18 S., R. 34 E., the natural course of the South Fork of the Kern carries it very close to Golden Trout Creek, and water has been diverted from the head of the South Fork to Golden Trout Creek and thus to Kern River by means of "The Tunnel." Olancha sheet.

**Gopher Creek (R);** Calaveras and Stanislaus counties; rises in the northeastern part of T. 1 N., R. 11 E., Mount Diablo base and meridian; flows southwestward 6 miles into Shirley Creek (tributary through Rock Creek to French Camp Creek, which discharges into San Joaquin Valley). Land Office map of California, 1907.

**Granite Creek (R);** Fresno County; Sierra National Forest; rises in a number of lakes in Granite basin, south of Granite Pass, at altitude about 10,500 feet above sea level; flows, in general, southward 6 miles into South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,500 feet, of which 1,000 feet is made in the last half mile. Tehipite sheet.

**Granite Creek (R);** Madera County; formed by the junction of East and West forks in Little Jackass Meadow, in the southern part of the Sierra National Forest; the West Fork, which drains the larger area and is, therefore, considered the continuation of the main stream, rises in the south slope of Triple Divide Peak (altitude 11,613 feet) and flows southeastward; length, 8 miles; fall above junction with East Fork, about 3,500 feet; this fork has many branches, of which three—Post, Timber, and Black Peak creeks—are named on the map; below the forks Granite Creek flows somewhat east of south 5 miles to its junction with Middle Fork San Joaquin River in the southern part of T. 5 S., R. 25 E., Mount Diablo base and meridian; fall below forks, about 3,000 feet. Mount Lyell and Kaiser sheets.

**Granite Creek (L);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 16 S., R. 31 E., Mount Diablo base and meridian, well up toward the crest of the Great Divide, at altitude 11,200 feet above sea level; flows northwestward 5 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 6,000 feet; principal tributary, North Fork. Tehipite sheet.

**Granite Creek, East Fork (L);** rises in the western part of the Sierra National Forest, in a number of branching tributaries that drain the southern slope of Long Mountain and the eastern slope of Isberg Peak, at altitude 10,500 feet above sea level; flows somewhat east of south about 8 miles to its junction with West Fork of Granite Creek (tributary to Middle Fork of San Joaquin River) in Little Jackass Meadow; fall, above junction with West Fork, about 4,000 feet; tributaries small and unimportant; a number of small lakes in the upper part of the basin. Mount Lyell sheet.

**Granite Creek, North Fork (R);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 16 S., R. 31 E., Mount Diablo base and meridian, on the western slope of the Great Western Divide, at altitude 11,000 feet above sea level; flows, in

general, westward 4 miles to its junction with Granite Creek (tributary through Middle Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 4,700 feet. Tehipite sheet.

**Granite Creek, West Fork.** *See* Granite Creek.

**Grant Lakes;** Mariposa County; Yosemite National Park, northern part of T. 1 S., R. 22 E., Mount Diablo base and meridian; outlet, westward to Yosemite Creek (tributary through Merced River to San Joaquin River); two small lakes connected by a channel one-third mile long; altitude of the upper lake, 9,650 feet; of the lower lake, 9,150 feet. Yosemite National Park map.

**Grapevine Creek (R);** Kern County; rises on the southwestern slope of the Tehachapi Mountains, at altitude 4,000 feet above sea level; flows northwest and north toward Buena Vista Reservoir in San Joaquin Valley. At the head of this basin is Castac Lake (q. v.); about 1 mile below the lake are strong springs of sweet, soft water, which forms the source of Grapevine Creek. Tejon sheet. Called Fort Tejon Creek in Bull. U. S. Geol. Survey No. 140, 1896, pp. 256-257.

**Gray Creek;** Mariposa County; Yosemite National Park; rises on the northwestern slope of Gray Peak (altitude 11,581 feet); flows westward 3 miles into Clark Fork (tributary through Ottoway Creek to Illilouette Creek and thus through Merced River to the San Joaquin); fall, 2,700 feet. Yosemite National Park map.

**Gray Peak Fork (L);** Madera County; rises on the southern slope of Gray Peak, at altitude 11,000 feet above sea level; flows northward  $4\frac{1}{2}$  miles into Merced River (tributary to the San Joaquin); in Mariposa County, in the southwestern part of T. 2 S., R. 24 E.; fall, 3,500 feet. Mount Lyell sheet.

**Greasy Creek (R);** Tulare County; Sequoia National Forest; rises in the northern part of T. 17 S., R. 28 E., Mount Diablo base and meridian, at altitude 2,200 feet above sea level; flows southwestward 5 miles into Kaweah River (tributary to Tulare Lake basin); fall, 1,700 feet; intermittent. Kaweah sheet.

**Griswold Creek (L);** Tuolumne County; rises in the southern part of T. 6 N., R. 17 E., Mount Diablo base and meridian, at altitude 6,800 feet above sea level; flows southwestward 17 miles into North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus River and thus to the San Joaquin); fall, 5,100 feet; principal tributaries, Skull, Soap, and McCormick creeks; the south grove of the Calaveras big trees lies on the divide between Griswold and Beaver creeks. Big Trees sheet.

**Grizzly Creek (R);** Eldorado County; rises in the northern part of T. 9 N., R. 13 E., Mount Diablo base and meridian, at altitude 4,150 feet; flows southwestward  $1\frac{1}{2}$  miles into Steeley Fork of North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 600 feet. Placerville sheet.

**Grizzly Creek (R);** Fresno County; Sierra National Forest; rises in the central part of T. 12 S., R. 30 E., at altitude 10,500 feet above sea level, on the southern slope of Monarch Divide; flows southeastward 2 miles, then southwestward  $3\frac{1}{2}$  miles into the South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 6,400 feet; principal tributary, West Fork. Tehipite sheet.

**Grizzly Creek, Big (L);** Mariposa County; rises in the northwestern part of T. 3 S., R. 19 E., Mount Diablo base and meridian, at altitude 4,900 feet above sea level; flows southeastward 1 mile, then southwestward 2 miles into Merced River (tributary to San Joaquin River); fall, 2,400 feet, of which 1,000 feet occurs in half a mile above the mouth. Yosemite sheet.

**Grizzly Creek, Little (L);** Mariposa County; rises in the southern part of T. 2 S., R. 19 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows southeastward 2 miles into Ned Gulch Creek (tributary through Merced River to the San Joaquin); fall, 3,000 feet. Yosemite sheet.

**Grizzly Creek, West Fork (R);** Fresno County; Sierra National Forest; rises in the western part of T. 12 S., R. 30 E., on the eastern slope of Mount Harrington (altitude, 11,001 feet); flows southward 3 miles into Grizzly Creek (tributary to South Fork of Kings River and thus through Kings River to the San Joaquin); fall, 4,500 feet. Tehipite sheet.

**Grizzly Gulch Creek (R);** Eldorado County; rises in the southern part of T. 9 N., R. 11 E., Mount Diablo base and meridian, at altitude 1,900 feet above sea level; flows southwestward 1 mile into Spanish Creek (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 400 feet. Placerville sheet.

**Grouse Creek (L);** Mariposa County; Yosemite National Park; rises in the central part of T. 3 S., R. 21 E., Mount Diablo base and meridian, at altitude 7,300 feet above sea level; flows westward 4 miles into Merced River (tributary to San Joaquin River); fall, 4,200 feet, of which 1,000 feet occurs in the last one-third mile. Yosemite National Park map.

**Grouse Creek (L);** Tulare County; Sequoia National Park; rises in the northern part of T. 19 S., R. 29 E., Mount Diablo base and meridian, in upper Grouse Valley, at altitude 4,700 feet above sea level; flows, in general, northwestward 7 miles into South Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,000 feet; intermittent. Kaweah sheet.

**Grouse Creek (R);** Tuolumne County; rises in the southwestern part of T. 5 N., R. 21 E., Mount Diablo base and meridian, on the north slope of Relief Peak, altitude 10,788 feet; flows northwestward 3 miles into Relief Creek (tributary through Middle Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); fall, 2,800 feet. Dardanelles sheet.

**Grouse Lake;** Fresno County; Sierra National Forest; southwestern slope of Goat Mountain (altitude, 12,203 feet); one inlet; outlet, Copper Creek to South Fork of Kings River (tributary through Kings River to the San Joaquin); altitude, 10,550 feet; fall of outlet, 5,500 feet. Tehipite sheet.

**Grouse Lake;** Madera County; Yosemite National Park; central part of T. 4 S., R. 22 E., Mount Diablo base and meridian; outlet, a stream  $2\frac{1}{2}$  miles long flowing westward to Chilnualna Creek (tributary through South Fork of Merced River to Merced River and thus to the San Joaquin); altitude, 8,350 feet; fall of outlet, 1,050 feet; very small. Yosemite National Park map.

**Guard Creek, North (L);** Tulare County; rises in the northern part of T. 14 S., R. 32 E., Mount Diablo base and meridian, on North Guard Mountain (altitude, 13,304 feet); flows northward  $3\frac{1}{2}$  miles into Bubbs Creek (tributary to South Fork of Kings River); fall, 3,600 feet; passes through two small lakes. Mount Whitney sheet.

**Guyot Creek (R);** Tulare County; Sequoia National Forest; rises  $1\frac{1}{2}$  miles northeast of Mount Guyot, at altitude 11,300 feet above sea level; flows west of south  $2\frac{1}{2}$  miles into Rock Creek (tributary to Kern River); fall, 1,800 feet. Mount Whitney and Olancha sheets.

**Hallock Creek (R);** Madera County; rises in the eastern part of T. 8 S., R. 23 E., at altitude 5,300 feet above sea level; flows southward 4 miles into San Joaquin River; fall, 4,000 feet, of which 1,600 feet occurs in the last half mile of course. Kaiser sheet.

**Harden Lake;** Tuolumne County; Yosemite National Park; southern part of T. 1 N., R. 21 E., Mount Diablo base and meridian; no outlet shown on map, the contours indicate a pass northward to Tuolumne River (tributary to San Joaquin River). Yosemite National Park map.

**Harriet Lake;** Madera County; 1 mile southwest of Foerster Peak; several small inlets; outlet, a stream one-half mile long flowing northward to Foerster Creek (tributary through Triple Peak Fork to Merced River and thus to the San Joaquin); altitude, 10,250 feet; fall of outlet, 200 feet. Mount Lyell sheet.

**Hazel Green Creek** (L); Tuolumne County; Stanislaus National Forest; rises in the northwestern part of T. 2 S., R. 19 E., Mount Diablo base and meridian, on the south slope of Crocker Ridge, at altitude 5,500 feet above sea level; flows north-westward 4 miles into South Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 1,950 feet. Yosemite National Park map.

**Heart Lake**; Fresno County; Sierra National Forest; 1 mile southwest of Mount Senger; one inlet; outlet, a stream 3 miles long flowing southward into Senger Creek (tributary to South Fork of San Joaquin River); altitude, 10,200 feet; fall of outlet, 2,500 feet. Mount Goddard sheet.

**Helen Lake**; Fresno County; Sierra National Forest; east of Goddard Divide, one-half mile northeast of Muir Pass; several small inflowing streams draining tiny lakes; outlet, a stream 1 mile long flowing north of east into a small lake on the Middle Fork of Kings River (tributary through Kings River to the San Joaquin); altitude, 11,612 feet; fall of outlet, 1,300 feet. Mount Goddard sheet.

**Helen Lake**; Mariposa County; Yosemite National Park; no outlet mapped; near-by streams flow northward to Merced River. Yosemite National Park map.

**Helen Lake**; Tuolumne County; Stanislaus National Forest; southern part of T. 4 N., R. 21 E., Mount Diablo base and meridian; one inlet; outlet, East Fork of Cherry Creek through Huckleberry Lake to Cherry Creek (tributary through Tuolumne River to the San Joaquin); altitude, 8,700 feet; fall of outlet in the  $1\frac{1}{2}$  miles above Huckleberry Lake, 1,000 feet; length, 1 mile; width, one-fourth mile. Yosemite National Park map.

**Helen Lake**; Tuolumne County; Yosemite National Park, east of Kuna Crest; outlet, South Fork of Dana Fork to Tuolumne River (tributary through Tuolumne River to San Joaquin River); altitude, 10,896 feet. Yosemite National Park map.

**Helms Creek** (R); rises in the northwestern part of T. 9 S., R. 28 E., at altitude 9,000 feet above sea level; flows southward 10 miles into North Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 2,300 feet. The eastern branch of this creek passes through Dusey Meadows. A western branch of the creek, to which the name North Fork of Kings River is applied on the Kaiser sheet of the United States Geological Survey, drains Helms Meadow. On Le Conte's map of a portion of the Sierra Nevada of California (No. 8, San Joaquin sheet), January, 1899, this stream is marked West Branch of North Fork of Kings River. Mount Goddard and Kaiser sheets.

**Henley Canyon Creek** (R); Amador County; Stanislaus National Forest; rises in the central part of T. 8 N., R. 15 E., Mount Diablo base and meridian, at altitude 6,300 feet; flows southeastward  $2\frac{1}{2}$  miles into Bear River (tributary through North Fork of Mokelumne River to Mokelumne River and thus to the San Joaquin); fall, 1,300 feet. Pyramid Peak sheet.

**Herring Creek** (R); Tuolumne County; Stanislaus National Forest; rises on the western slope of Eagle Peak at altitude 9,000 feet above sea level; flows, in general, southwestward to its junction with the South Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); length, 10 miles; fall, 3,600 feet. Dardanelles and Big Trees sheets.

**Hidden Lake**; Mariposa County; Yosemite National Park map, southwestern part of T. 1 S., R. 23 E., Mount Diablo base and meridian; a tiny lake which at times sends a small stream southward  $1\frac{1}{2}$  miles to Tenaya Creek (tributary through Merced River to San Joaquin River) in Tenaya Canyon; altitude, 8,350 feet above sea level; fall of outlet, 2,400 feet, of which 1,700 feet is made at its entrance to the canyon. Yosemite National Park map.

**Highland Creek** (L); Alpine County; Stanislaus National Forest; rises in a small lake one-half mile southwest of Highland Lake and 1 mile southeast of Folger Peak, at altitude 8,650 feet above sea level; flows southwestward 12 miles, westward 4 miles, then north of west 1 mile into North Fork of Stanislaus River (tributary through Middle

Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); fall, 3,200 feet; many small tributaries, some of which drain high, marshy meadows. Dardanelles and Big Trees sheets.

**Highland Lake**; Alpine County; Stanislaus National Forest; southwestern part of T. 8 N., R. 20 E., Mount Diablo base and meridian; 1 mile east of Folger Peak; outlet, North Fork of Mokelumne River to San Joaquin River; altitude, 8,650 feet. Dardanelles sheet.

**Highland Reservoir**; Alpine County; just north of Tuolumne County line; two inlets; outlet, a stream 1 mile long flowing from the southwestern end, west and then north to North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus and thus to the San Joaquin); altitude, 6,816 feet; length, about 1 mile; width, one-half mile. Dardanelles sheet.

**Hilgard Branch** (R); Fresno County; rises in Sierra National Forest, in the triangle formed by the southern slopes of Mount Gabb, Mount Abbott, and Mount Dade, at altitude 12,300 feet above sea level; flows southward 1 mile to the head of Lake Italy, then very irregularly westward to its junction with Bear Creek (tributary to South Fork of San Joaquin River); length, 6 miles; fall, 3,400 feet; basin contains a number of small lakes. Mount Goddard sheet.

**Hoffman Creek** (L); Fresno County; rises in Sierra National Forest, one-half mile north of Mount Tom, at altitude 7,000 feet above sea level; flows somewhat east of north to its junction with South Fork of San Joaquin River (head of San Joaquin); length, 3 miles; fall, 2,000 feet, of which 1,500 feet occurs in less than a mile at the mouth. Kaiser sheet.

**Home Camp Creek** (R); Fresno County; rises in the southern part of T. 7 S., R. 25 E., in Nellie Lake, at altitude 8,850 feet above sea level; flows southward 2 miles, then southeastward 3 miles into Big Creek (tributary to San Joaquin River); fall, 2,000 feet. Kaiser sheet.

**Hookers Creek** (R); Madera County; rises in the southwestern part of T. 8 S., R. 24 E., at altitude 4,000 feet above sea level; flows southeastward 3 miles to its junction with the San Joaquin; fall, 2,000 feet, of which 1,000 feet occurs in the last half mile. Kaiser sheet.

**Hooper Creek** (R); Fresno County; rises in Sierra National Forest, in small lakes on the north slope of Mount Hooper (altitude 12,322 feet); flows somewhat north of west to its junction with the South Fork of San Joaquin River (head of San Joaquin) in the eastern part of T. 7 S., R. 27 E., Mount Diablo base and meridian; fall, 3,500 feet. Mount Goddard sheet.

**Hopkins Creek** (R); Fresno County; rises in the Sierra National Forest, 1 mile southwest of Mount Crocker, at altitude 11,100 feet above sea level; flows, in general, east of south to its junction with Mono Creek (tributary to South Fork of San Joaquin River); length, 3 miles; fall, 1,900 feet. Mount Goddard sheet.

**Hornitos Creek** (R); Mariposa County; rises in the central part of T. 4 S., R. 16 E.; flows west of south 8 miles to its junction with Burns Creek (tributary through Bear Creek to the San Joaquin); intermittent. Sonora sheet; Fisk and Johnson map (on which it is not named).

**Horse Creek** (L); Amador County; rises in northern part of T. 6 N., R. 10 E., Mount Diablo base and meridian; at altitude 900 feet; flows westward 2 miles and northward 1 mile into Dry Creek (tributary through Mokelumne River to the San Joaquin); fall, 400 feet. Jackson sheet.

**Horse Creek** (L); Mariposa County; rises in the west-central part of T. 6 S., R. 19 E., on Striped Rock, at altitude 2,000 feet above sea level; flows southward  $2\frac{1}{2}$  miles into Striped Rock Creek (tributary through Chowchilla River to the San Joaquin); fall, 800 feet. Mariposa sheet.

**Horse Creek** (R); Tulare County; Sequoia National Park; rises in the northeastern part of T. 15 S., R. 30 E., Mount Diablo base and meridian; at altitude 10,600 feet

above sea level; flows southwestward 3 miles into Marble Fork of Kaweah River (tributary through Middle Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 3,400 feet. Tehipite sheet.

**Horse Creek (L);** Tulare County; Sequoia National Forest; rises in the southern part of T. 18 S., R. 28 E., Mount Diablo base and meridian, at altitude 1,700 feet above sea level; flows irregularly northward 7 miles into Kaweah River (tributary to Tulare Lake basin); fall, 1,100 feet; tributary, Jim Gray Creek; intermittent. Kaweah sheet.

**Horse Creek (L);** Tulare County; Sequoia National Park; rises in the central part of T. 18 S., R. 31 E., Mount Diablo base and meridian, at altitude 9,500 feet above sea level; flows westward 2 miles, then northwestward 6 miles into East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 5,500 feet; principal tributary, Cow Creek. Kaweah sheet.

**Horseshoe Creek (L);** Fresno County; Sierra National Forest; rises in Horseshoe Lakes west of Cirque Crest, at altitude 11,500 feet above sea level; flows northwestward 5 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,400 feet. Tehipite sheet.

**Horseshoe Lakes;** Fresno County; Sierra National Forest; west of Cirque Crest, a group of small glacial lakes discharging through Horseshoe Creek to Middle Fork of Kings River (tributary through Kings River to the San Joaquin); the highest of these lakelets is 11,100 feet above sea level, the lowest is 10,100 feet. Tehipite sheet.

**Hospital Creek (L);** San Joaquin County; rises in the northern part of T. 5 S., R. 5 E.; flows, in general, northeastward into San Joaquin Valley; carries water only during the rainy season; length, about 12 miles. Orestimba-Panoche-Cantua special map.

**Hossack Creek (L);** Tulare County; Sequoia National Forest; rises in the central part of T. 20 S., R. 31 E., Mount Diablo base and meridian, at altitude 7,300 feet above sea level; flows northwestward 3 miles into North Fork of Middle Fork of Tule River (tributary through Tule River to Tulare Lake basin); fall, 3,400 feet. Kaweah sheet.

**Hotel Creek (R);** Fresno County; Sierra National Forest; rises in the northwestern part of T. 13 S., R. 31 E., at altitude 8,500 feet above sea level; flows southwestward 3 miles into South Fork of Kings River (tributary through Kings River to the San Joaquin) at Cedar Grove Hotel; fall, 3,800 feet. Tehipite sheet.

**Huckleberry Lake;** Tuolumne County; Stanislaus National Forest,  $1\frac{1}{2}$  miles southwest of Helen Lake and  $1\frac{1}{4}$  miles west of Twin Lakes; inlet, East Fork of Cherry Creek from Helen Lake; outlet, East Fork of Cherry Creek to Cherry Creek and thus through Tuolumne River to the San Joaquin; altitude, 7,700 feet; fall of the East Fork in the 3 miles between Huckleberry Lake and the mouth of the North Fork, 1,000 feet. Yosemite National Park map.

**Hull Creek (R);** Tuolumne County; Stanislaus National Forest; rises in the western part of T. 3 N., R. 18 E., at altitude 6,200 feet above sea level; flows southwestward 5 miles, then southeastward 3 miles into Clavey River (tributary through Tuolumne River to the San Joaquin); fall, 2,300 feet; principal tributary, Rush Creek. Big Trees sheet.

**Humbag Creek (R);** Mariposa County; rises in the northwestern part of T. 6 S., R. 19 E., on Bar Hill, at altitude 2,200 feet above sea level; flows southeastward 3 miles into West Fork of Chowchilla River (tributary through Chowchilla River to the San Joaquin); fall, 500 feet. Mariposa sheet.

**Humbag Creek, Big (L);** Tuolumne County; Stanislaus National Forest; rises in the eastern part of T. 1 S., R. 16 E., 4 miles northeast of Groveland, at altitude 2,750 feet above sea level; flows northwestward 4 miles into Tuolumne River (tributary to San Joaquin River); fall, 1,450 feet, of which 1,200 feet occurs in the last three-fourths mile; intermittent. Sonora sheet.

**Hungry Hollow Creek (L);** Eldorado County; rises in the northeastern part of T. 8 N., R. 9 E., Mount Diablo base and meridian, at altitude 1,000 feet above sea level;

flows southeastward 2 miles into Indian Creek (tributary through Big Canyon Creek to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 500 feet. Placerville sheet.

**Hunter Creek** (L); Tuolumne County; rises in the central part of T. 1 N., R. 17 E., Mount Diablo base and meridian, at altitude 4,000 feet above sea level; flows, in general, south of west into North Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin). Gaging station near Tuolumne (1910-1912). Sonora sheet.

**Hunter Creek** (R); Calaveras County; rises in the western part of T. 7 N., R. 15 E., Mount Diablo base and meridian, at altitude 4,400 feet above sea level; flows south of west 3 miles, then southward one-half mile into North Fork of Middle Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 1,200 feet. Big Trees sheet

**Hyatt Lake**; Tuolumne County; Stanislaus National Forest; east of the north end of Cherry Ridge; one inlet; outlet, a stream 1 mile long flowing southwestward to Cherry Creek (tributary through Tuolumne River to the San Joaquin); altitude, 7,350 feet; fall of outlet, 1,000 feet. Yosemite National Park map.

**Illilouette Creek** (L); Madera and Mariposa counties; Yosemite National Park; rises on the north slope of Buena Vista Crest (altitude, 9,000 feet); flows northwestward 12 miles to its junction with Merced River (tributary to San Joaquin River) at the upper end of Yosemite Valley, just below Vernal Falls; fall, 5,000 feet, of which about 1,800 feet is made at the Illilouette Falls at the entrance to the valley; principal tributaries, Ottoway and Buena Vista creeks. Yosemite National Park map.

**Indian Creek** (L); Amador County; rises in the northeastern part of T. 7 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,400 feet above sea level; flows somewhat north of west 12 miles into Cosumnes River (tributary through Mokelumne River to the San Joaquin); one-half mile below the mouth of another Indian Creek which enters from the north; fall, 1,000 feet. Jackson and Lodi sheets.

**Indian Creek** (L); Calaveras County; rises in the eastern part of T. 3 N., R. 13 E., Mount Diablo base and meridian, at altitude 2,000 feet above sea level,  $1\frac{1}{2}$  miles southwest of Vallecito; flows southwestward 2 miles, then northwestward one-half mile into Sixmile Creek (tributary through Angels Creek to Stanislaus River and thus to the San Joaquin); fall, 650 feet. Jackson sheet.

**Indian Creek** (L); Calaveras County; rises in the eastern part of T. 4 N., R. 14 E., Mount Diablo base and meridian, at altitude 3,000 feet above sea level; flows southwest 10 miles to San Antonio Creek (tributary to South Fork of Calaveras River and thus through Calaveras River to the San Joaquin). Big Tree and Jackson sheets.

**Indian Creek** (R); Eldorado County; rises in the central part of T. 8 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,400 feet above sea level; flows southwestward 2 miles into South Fork of Cosumnes River (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 800 feet. Placerville sheet.

**Indian Creek** (R); Eldorado County; rises in the southeastern part of T. 9 N., R. 9 E., Mount Diablo base and meridian, at altitude 1,400 feet above sea level; flows somewhat east of south 4 miles into Big Canyon Creek (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,000 feet; principal tributaries, Little Indian and Hungry Hollow creeks. Placerville sheet.

**Indian Creek** (R); Eldorado County; rises in the western part of T. 8 N., R. 9 E., Mount Diablo base and meridian, at altitude 500 feet above sea level; flows southeastward  $3\frac{1}{2}$  miles into Cosumnes River (tributary through Mokelumne River to the San Joaquin); fall, 300 feet. Sacramento sheet.

**Indian Creek** (L); Fresno County; Sequoia National Forest; rises in the west-central part of T. 13 S., R. 28 E., Mount Diablo base and meridian, 2 miles southeast

of Converse basin, at altitude 6,500 feet above sea level; flows northeastward  $4\frac{1}{2}$  miles into Tenmile Creek (tributary through Kings River to the San Joaquin); fall, 2,800 feet. Tehipite sheet.

**Indian Creek (L);** Mariposa County; Yosemite National Park; rises in the west central part of T. 3 S., R. 21 E., at altitude 7,300 feet above sea level; flows southwestward 2 miles, then northwestward 4 miles into Merced River (tributary to San Joaquin River); fall, 5,300 feet. Gaging station near Tuolumne (1910-1912). Yosemite National Park map.

**Indian Creek (R);** Tuolumne County; a short stream unnamed on the map (Sonora sheet) which enters Clavey River (tributary through Tuolumne River to the San Joaquin) half a mile below the mouth of Reed Creek and 1 mile above the mouth of a short unnamed stream (Quilty Creek) which also enters from the right; Indian Creek, which has also been called Bear Creek, is about  $1\frac{1}{2}$  miles long and falls 1,500 feet. Gaging station near Tuolumne (1910-11). See Water-Supply Paper U. S. Geol. Survey No. 291, 1912, p. 99.

**Indian Creek, Big (L);** Amador County; rises in the eastern part of T. 8 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,800 feet above sea level; flows north of west 6 miles, southwest 3 miles, irregularly westward 2 miles, then almost directly north 5 miles to its junction with Cosumnes River at Huse bridge; fall, 1,000 feet; principal tributary, Pigeon Creek. Placerville and Jackson sheets.

**Indian Creek, Little (R);** Eldorado County; rises in the east central part of T. 9 N., R. 9 E., Mount Diablo base and meridian, near Dugans, at altitude 1,300 feet above sea level; flows southeastward  $2\frac{1}{2}$  miles into Indian Creek (tributary through Big Canyon Creek to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 600 feet. Placerville sheet.

**Ingram Creek (L);** rises in the western part of T. 5 S., R. 6 E.; flows northeastward to San Joaquin Valley; length, 5 miles; carries water only during the rainy season; tributary, Cedar Creek. Orestimba-Panoche-Cantua special map.

**Ireland Creek (L);** Tuolumne County; Yosemite National Park; rises in the northeastern part of T. 2 S., R. 24 E., Mount Diablo base and meridian, in Ireland Lake, at altitude 10,650 feet; flows northeastward 3 miles into Lyell Fork of Tuolumne River; fall, 1,850 feet, of which 1,300 feet is made in the last mile of its course, in which it descends to Lyell Canyon. Yosemite National Park map.

**Ireland Lake (L);** Tuolumne County; Yosemite National Park; northeastern part of T. 2 S., R. 24 E., Mount Diablo base and meridian; one inlet; outlet, Ireland Creek to Lyell Fork of Tuolumne River (tributary through Tuolumne River to San Joaquin River); altitude, 10,650 feet. Yosemite National Park map.

**Iron Creek (L);** Madera County; rises in the northern part of the Sierra National Forest, on the south slope of the Minarets at altitude 10,000 feet above sea level; flows, in general, southwestward to junction of North Fork of San Joaquin River, tributary to Middle Fork of San Joaquin; length, 3 miles; fall, 3,000 feet; the most important tributary is a stream  $1\frac{1}{2}$  miles long flowing northwestward from a tiny lake on the west slope of Iron Mountain. Mount Lyell sheet.

**Iron Creek (L);** Madera County; Sierra National Forest; rises in the eastern part of T. 5 S., R. 22 E., at altitude 7,500 feet above sea level; flows north of west  $2\frac{1}{2}$  miles into South Fork of Merced River (tributary through Merced River to San Joaquin River); fall, 1,500 feet. Yosemite National Park map.

**Italian Creek (L);** Fresno County; rises in the southeastern part of T. 9 S., R. 23 E., at altitude 4,000 feet above sea level; flows east of north  $2\frac{1}{2}$  miles into San Joaquin River; fall, 2,500 feet. Kaiser sheet.

**Italy Lake;** Fresno County; Sierra National Forest; three-fourths mile east of Mount Hilgard; inlet, Hilgard Branch, which flows through the lake to its junction with Bear Creek (tributary to South Fork of San Joaquin River); elevation, 11,135 feet; length, 1 mile; maximum width, one-fourth mile. Mount Goddard sheet.

**Jacalitos Creek (R);** Fresno County; rises in the northeastern part of T. 22 S., R. 13 E.; flows, in general, northeastward 18 miles to Los Gatos Creek, with which it unites in Coalinga Valley. Fisk and Johnson map; Land Office map of California. 1907.

**Jackass Canyon Creek (L);** Eldorado County; rises in the eastern part of T. 9 N., R. 12 E., Mount Diablo base and meridian, at altitude 3,000 feet above sea level; flows northwestward 3 miles into North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,000 feet. Placerville sheet.

**Jackass Creek (L);** Amador County; rises in the southern part of T. 6 N., R. 11 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows westward 2 miles into Jackson Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin); fall, 600 feet. Jackson sheet.

**Jackass Creek (R);** Madera County; rises in the northern part of T. 5 S., R. 24 E., Mount Diablo base and meridian, at altitude 8,300 feet above sea level; flows southward 16 miles to its junction with San Joaquin River, in the southeastern part of T. 6 S., R. 24 E.; fall, 5,100 feet, of which 2,300 feet occurs in the last 5 miles; in its upper course the creek flows through a broad, open meadow; principal tributary, West Fork. Mount Lyell and Kaiser sheets.

**Jackass Creek, West Fork (R);** Madera County, Sierra National Forest; rises in the northern part of T. 6 S., R. 24 E., at altitude 6,300 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles, then southeastward  $2\frac{1}{2}$  miles into Jackass Creek, through which it is tributary to San Joaquin River; fall, 3,000 feet. Kaiser sheet.

**Jackson Creek (L);** Amador County; rises in the southern part of T. 7 N., R. 12 E., Mount Diablo base and meridian, just south of Pine Grove, at altitude 2,500 feet above sea level; flows, in general, southwestward 16 miles to a point just south of Buena Vista, where it turns and flows northwestward 5 miles to its junction with Dry Creek (tributary through Mokelumne River to the San Joaquin); fall, 2,100 feet; principal tributaries, South Fork and Jackass creeks. Jackson sheet.

**Jackson Creek (L);** Tulare County; Sierra National Forest; rises in the northern part of T. 21 S., R. 35 E., Mount Diablo base and meridian, on Smith Mountain, at altitude about 8,700 feet above sea level; flows southward 5 miles into Fish Creek (tributary through South Fork of Kern River to Kern River); fall, 1,300 feet. Olancho sheet.

**Jackson Creek, South Fork (L);** Amador County; rises south of Pine Grove, at altitude 2,800 feet above sea level; flows southwestward 3 miles, then westward 5 miles to its junction with Jackson Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin) at Jackson; fall, 1,600 feet. Jackson sheet.

**Jawbone Creek (L);** Tuolumne County; Stanislaus National Forest; rises in the east-central part of T. 2 N., R. 18 E., at altitude 5,900 feet above sea level; flows southwestward 4 miles into Reed Creek (tributary through Clavey River to Tuolumne River and thus to the San Joaquin); fall 1,900 feet; upper stretch intermittent. Dardanelles and Sonora sheets.

**Jawbone Creek (R);** Tuolumne County; Stanislaus National Forest; rises in the eastern part of T. 2 N., R. 18 E., Mount Diablo base and meridian, at altitude 5,900 feet above sea level; takes a general course west of south to its junction with Tuolumne River (tributary to the San Joaquin); length, 12 miles; fall, 3,700 feet, of which 1,000 feet occurs in the last half mile of the course. Gaging station near Tuolumne (1910-1912). Dardanelles, Yosemite, and Sonora sheets.

**Jennie Lake;** Tulare County; Sequoia National Forest; southwestern part of T. 14 S., R. 30 E., Mount Diablo base and meridian; outlet, Boulder Creek to South Fork of Kings River (tributary through Kings River to the San Joaquin); altitude 9,050 feet above sea level. Tehipite sheet.

**Jesus Maria Creek** (L); Calaveras County; rises in the eastern part of T. 5 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,000 feet above sea level; flows south of west 12 miles, then northwestward 5 miles into North Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 3,000 feet. Big Trees and Jackson sheets.

**Jim Gray Creek** (R); Tulare County; Sequoia National Forest; rises in the eastern part of T. 18 S., R. 28 E., Mount Diablo base and meridian, at altitude 2,300 feet above sea level; flows southwestward 4 miles, then northwestward 1 mile into Horse Creek (tributary through Kaweah River to Tulare Lake basin); fall, 900 feet; intermittent; tributary, Wells Creek. Kaweah sheet.

**Johns Creek, Little** (R); Calaveras County; rises in the northern part of T. 1 N., R. 12 E., Mount Diablo base and meridian; flows east of south into Stanislaus River (tributary to San Joaquin River) 3 miles northeast of Knights Ferry; length, 6 miles. Land Office map of California, 1907.

**Johnson Lake**; Madera County; Yosemite National Park, eastern part of T. 4 S., R. 22 E.; one inflowing stream; outlet, a stream 2 miles long, flowing southward to South Fork of Merced River (tributary through Merced River to the San Joaquin); altitude, 8,550 feet; fall of outlet, 2,500 feet. Yosemite National Park map.

**Jordan Creek** (R); Mariposa County; rises in the northern part of T. 2 S., R. 17 E., Mount Diablo base and meridian, 2 miles east of Hobron Mill, at altitude 3,100 feet above sea level; flows southeastward 5 miles into North Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 600 feet. Sonora sheet.

**Jose Creek** (L); Fresno County; rises in the northern part of T. 10 S., R. 24 E., near Pine Ridge, at altitude 4,000 feet above sea level; flows northward  $4\frac{1}{2}$  miles into Mill Creek (tributary to San Joaquin River); fall, 2,500 feet. Kaiser sheet.

**Josephine Lake**; Tulare County; extreme southern corner of T. 14 S., R. 31 E., just north of Glacier Ridge; one inlet, draining two small lakes; outlet, a stream 1 mile long, flowing north of east into Roaring River (tributary to South Fork of Kings River); altitude 10,500 feet; fall of outlet, 2,100 feet. Tehipite sheet.

**Kaiser Creek** (R); Fresno County; rises in the southern part of T. 7 S., R. 26 E., Mount Diablo base and meridian, on the northern slope of Kaiser Ridge near Kaiser Pass, at altitude 9,700 feet above sea level; flows northwestward 7 miles, then westward 7 miles to its junction with San Joaquin River in the northeastern part of T. 7 S., R. 24 E.; fall, 4,600 feet; many small, branching tributaries, most of which drain the northern slope of Kaiser Crest and ridge. Kaiser sheet.

**Kaweah River** (R); Tulare County; formed in the northern part of T. 17 S., R. 29 E., Mount Diablo base and meridian, in the Sequoia National Forest, by the confluence of its Middle and East forks; the Middle Fork, which drains the larger area and is therefore considered the continuation of the main stream, rises in the southwestern part of T. 15 S., R. 32 E., in Lion Lake, at altitude 10,900 feet above sea level, and takes a general southwesterly course which is continued by the main stream from the junction of the East Fork to its entrance to San Joaquin Valley; emerging from the foothills, the stream is carried across the delta fan through several distributaries which enter Tulare Lake near Corcoran; length above the delta, about 45 miles; drainage area, about 715 square miles.

The topography of the basin is varied, altitudes ranging from a few hundred feet at the foothills to more than 12,000 feet at the eastern border; the upper parts of the basin contain many domes and ridges, interspersed between upland meadows and glacial lakelets; most of the streams have fairly well developed canyons and moderately steep slope.

Mean annual precipitation ranges from 10 inches in the valley to 20 inches on the lower elevations, and probably 40 inches in the mountains. On probably half the area it occurs chiefly as snow.

The Sequoia National Park, situated almost entirely in the Kaweah basin, contains the largest growth of big trees (*Sequoia gigantea*) in the Sierra. Practically all the area outside the park is included in the national forest.

The total flow at moderate and low stages is diverted for irrigating land in Tulare County; only the flood flow reaches the lake.

Streams gradients in this basin are comparatively heavy and the minimum flow is sufficient to generate about 30,000 horsepower without storage. For at least six months of the year more than 100,000 horsepower could be obtained.

Gaging station at Wachumna Hill (1878-1884), below Three Rivers (1903-1912).

Surveys and data: Tehipite and Kaweah sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 181-182.

**Kaweah River, East Fork (L);** Tulare County; Sequoia National Park; rises in the southwestern part of T. 17 S., R. 32 E., Mount Diablo base and meridian, on the western slope of the Great Western Divide, in Silver Lakes, at altitude 10,250 feet above sea level; flows, in general, somewhat north of west to the northern part of T. 17 S., R. 29 E., where it unites with the Middle Fork to form Kaweah River (tributary to Tulare Lake basin); length, including the major windings, 20 miles; fall, 9,000 feet; principal tributary, Horse Creek; the upper part of the basin contains many glacial lakelets, some of which are mapped as without outlet. Kaweah sheet.

**Kaweah River, Middle Fork.** See Kaweah River.

**Kaweah River, North Fork (R);** Tulare County; Sequoia National Forest; formed in the northwestern part of T. 15 S., R. 29 E., Mount Diablo base and meridian, by the union of Stony and Dorst creeks (q. v.); flows southwestward 5 miles and very irregularly southward 12 miles to its junction with Kaweah River (tributary to Tulare Lake basin) two miles north of Three Rivers; fall from the head of Dorst Creek to Kaweah River, 8,100 feet; fall below the junction of Stony and Dorst creeks, 4,700 feet; principal tributaries, below the forks, Redwood, Pierce, Eshom, Cow, Cactus, and Sheep creeks. Gaging station at Kaweah (1910-1912). Tehipite and Kaweah sheets.

**Kaweah River, South Fork (L);** Tulare County; Sequoia National Park; rises in the northeastern part of T. 18 S., R. 31 E., Mount Diablo base and meridian, in a group of glacial lakelets, the highest of which lies 10,650 feet above sea level; flows southwestward 4 miles, then takes a general course north of west to its junction with Kaweah River (tributary to Tulare Lake basin) one-half mile west of Three Rivers; length, 23 miles; fall, 9,900 feet; drainage basin narrow; tributaries all short, intermittent streams. Gaging station near Three Rivers (1911-1912). Kaweah sheet.

**Kearsarge Lakes;** Fresno County; Sierra National Forest;  $1\frac{1}{2}$  miles north of the Fresno-Tulare County line, at the east base of Kearsarge Pinnacles; several small connected lakes, the highest at altitude 12,009 feet above sea level; outlet, through Bullfrog Lake to Bubbs Creek (tributary to South Fork of Kings River). Mount Whitney sheet.

**Kelso Creek (L);** Kern County; Sierra National Forest; rises in the southeastern part of T. 28 S., R. 35 E., Mount Diablo base and meridian; flows north of west 16 miles; discharges into the valley of the South Fork of Kern River (tributary to Kern River) 2 miles east of Weldon; sinks before reaching the river; intermittent; principal tributaries, Frog, Pinyon, Staff, and Canebrake creeks. Kernville sheet.

**Kennedy Canyon Creek (R);** Fresno County; Sierra National Forest; rises on Kennedy Mountain in the eastern part of T. 12 S., R. 30 E., Mount Diablo base and meridian, at altitude 10,400 feet above sea level; flows northward 2 miles, then northwestward 2 miles into Slide Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); fall, 2,500 feet. Tehipite sheet.

**Kennedy Lake;** Tuolumne County; south-central part of T. 5 N., R. 21 E., Mount Diablo base and meridian, at north base of Kennedy Peak; inlet, East Fork of Relief Creek; outlet, East Fork of Relief Creek through Relief Creek to Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); altitude, 7,820 feet. Dardanelles sheet.

**Kern Lake,** Kern County. *See* Buena Vista reservoir.

**Kern Lake;** Tulare County; Sequoia National Forest; southern part of T. 18 S., R. 33 E., Mount Diablo base and meridian; an expansion of Kern River; outlet, lower end of Kern River canyon; altitude, 6,233 feet. Olancha sheet.

**Kern River (R);** rises in glacial lakelets among the high peaks of the Sierra divide, and on the Kings-Kern and Great Western divides; flows directly southward about 70 miles, then southwestward to the mouth of its canyon a few miles northeast of Bakersfield, where it enters the southern end of San Joaquin Valley; total length from the source of the river to Bakersfield, about 140 miles; drainage area above the valley rim, 2,570 square miles.

The basin is the largest and most southerly of all the areas tributary to the San Joaquin Valley from the Sierra; it extends farther to the east than any of the other basins, from which it differs also in that its main axis is north and south instead of east and west; it is long and comparatively narrow, and lies west of the main High Sierra divide, but east of the secondary parallel crest, called the Great Western Divide, which separates it from the basins of Kaweah and Tule rivers and the southern foothill streams at the west. At the north it is separated from Kings River basin by a cross range about 15 miles long, known as the Kings-Kern divide.

Altitudes in the Kern River basin range from a few hundred feet at the mouth of the river's lower canyon to more than 14,000 feet at the headwaters. More than 50 of the peaks exceed 13,000 feet in altitude, and many of the lakes which feed the upper stream are at an altitude of 11,000 feet or more.

Mount Whitney, the highest mountain in the United States proper, towering 14,501 feet above sea level, overlooks the northern part of the Kern basin from the east.

The principal tributary of Kern River is its South Fork (q. v.); above the point of confluence, the two streams are about equal in length and drainage area and flow parallel to each other and to the marginal rims.

The basin is divided into two lesser basins by a ridge which extends northward from the junction of the South Fork with the main stream to an intersection with the Sierra divide near Trail Peak about 12 miles south of Mount Whitney. The two basins differ greatly in topography. The eastern basin is characterized by comparatively low, flat, and irregular hills, separated by many intervening meadows, large and small; it is drained by the South Fork. The western basin is characterized by high glaciated peaks and ridges and by deep canyons; it is drained by the main stream, which flows for a great part of its length through a narrow canyon. Kern River canyon proper is about 20 miles long, 1 mile wide at the top, and 1,500 to 2,000 feet deep. It begins at Junction Meadow 7 miles west of Mount Whitney at an altitude of 8,000 feet above sea level and runs due south to Kern Lake. The bottom of the canyon is several hundred feet wide and the average gradient is 100 feet to the mile. The main canyon is intersected by short cross canyons, chiefly from the west. Above the junction of Kern River and South Fork, the canyons broaden out into valleys of considerable size, especially on the South Fork; below the valleys, however, the main stream again enters a rough canyon, which it follows to its entrance into San Joaquin Valley.

The mean annual precipitation in Kern basin as a whole is small, partly because of the position of the basin in the southern region of the Sierra, which receives less rainfall than the central and northern regions, and partly because it lies east of the Great Western Divide, which intercepts the moisture-laden winds. In the southern part of the

basin the precipitation is probably less than 10 inches annually; in the central part it may range from 10 to 17 inches. Fully 80 per cent of the total summer flow of the river at the mouth of its canyon is derived from the rainfall of the mountain area which lies within 15 miles of the source of the river.

In the foothills region of the Kern basin, the natural vegetation consists of grass and brush. At altitudes between 3,000 and 10,000 feet, the soil supports timber and underbrush; at altitudes above 10,000 feet, however, the area is practically devoid of timber. The entire basin is included in national forests.

Below the mouth of the lower canyon, the total low-water flow is diverted for irrigation around Bakersfield.

The minimum flow of the stream is sufficient to afford about 125,000 horsepower without storage.

Gaging stations near Bakersfield (1893-1912); at Isabella (1910-1912), at Rio Bravo ranch (1893-1912).

Surveys and data: Mount Whitney, Olancho, Tehipite, Kaweah, Kernville and Bakersfield sheets; Water-Supply Paper U. S. Geol. Survey No. 171, 1911, pp. 174-176.

**Kern River, East Fork (R);** Tulare County; Sequoia National Forest; rises in glacial lakelets on the west slope of the Sierra between Mount Tyndall and Mount Barnard, at altitude 11,900 feet above sea level; flows southwestward 7 miles into Kern River at Junction Meadow; fall, 3,900 feet; a south branch of this stream also drains numerous glacial lakes, two of which lie at altitudes exceeding 11,000 feet; half a mile east of the head of this south branch is Tulainyo Lake (q. v.). Mount Whitney sheet.

**Kern River, South Fork (L);** Tulare and Kern counties; rises on the western slope of the Sierra in the western part of T. 17 S., R. 35 E., Mount Diablo base and meridian, 15 to 20 miles south of the headwaters of the main stream, at an altitude of 10,500 feet above sea level; flows southward about 50 miles, then westward about 20 miles to its junction with the main stream at Isabella; fall, 8,000 feet. The basin is characterized by comparatively low, flat, and irregular hills, separated by many intervening meadows; the run-off from this part of the Kern basin is much smaller than that of the main branch; the basin of the South Fork affords many excellent reservoir sites; principal tributaries, Mulkey, Monache, Soda, Fish, Smith, Chimney, Kelso, and Fay creeks. Gaging stations near Onyx (1911-12), near Isabella (1910-1912). Olancho and Kernville sheets.

**Kern River, Little (R);** Tulare County, Sequoia National Forest; rises in the northeastern part of T. 18 S., R. 31 E., Mount Diablo base and meridian, on the southern slope of Vandever Mountain, at altitude 10,500 feet above sea level; flows, in general, east of south to its junction with Kern River in the southwestern part of T. 20 S., R. 33 E.; length, about 22 miles; fall, 6,000 feet; principal tributaries, Shotgun, Rifle, Soda, Alpine, Clicks, and Fish creeks. The basin is long and narrow, and lies on the western slope of the Great Western Divide; it contains a number of small lakes, which feed the smaller tributaries; altitudes range from 4,000 feet at the point of junction with the Kern to over 12,000 feet on the crest of the divide above; the river and its tributaries drain a number of open meadows. Kaweah and Olancho sheets.

**Kern-Kaweah River (R);** Tulare County; Sierra National Forest; rises in the northern part of T. 16 S., R. 32 E., Mount Diablo base and meridian, on the north slope of Kaweah Peaks, at altitude 11,500 feet above sea level; flows northwestward  $1\frac{1}{2}$  miles, northeastward 2 miles, then southeastward 5 miles into Kern River at Junction Meadow; fall, 3,300 feet. Tehipite and Mount Whitney sheets.

**Kibbie Creek (R);** Tuolumne County; Yosemite National Park; rises on the south slope of Mercur Peak (altitude, 8,072 feet); flows southwestward  $3\frac{1}{2}$  miles to Kibbie Lake, then, in general, west of south 5 miles to the lower end of Lake Eleanor;

outlet, through Lake Eleanor to Cherry Creek and thus through Tuolumne River to the San Joaquin; fall below Kibbie Lake, 1,691 feet; no important tributaries. Yosemite National Park map.

**Kibbie Lake;** Tuolumne County; Yosemite National Park; northeastern part of T. 2 N., R. 19 E., Mount Diablo base and meridian; inlet, Kibbie Creek which flows through the lake to its junction with Lake Eleanor on Eleanor Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); altitude, 6,385 feet; fall of Kibbie Creek below the lake, 1,691 feet; about three-fourths mile long and one-half mile in maximum width. Yosemite National Park map.

**Kid Creek (R);** Fresno County; rises in Sierra National Forest, 2 miles east of Granite Pass, at altitude 10,900 feet above sea level; flows northeastward  $2\frac{1}{2}$  miles into South Fork of Kings River (tributary to San Joaquin River); fall, 3,000 feet. Tehipite sheet.

**King Creek (R);** Madera County; rises in the eastern part of the Sierra National Forest, in Beck Lakes, on the southeastern slope of the Minarets at altitude 10,600 feet above sea level; flows very irregularly southeastward 5 miles to junction with Middle Fork of San Joaquin River; fall below Beck Lakes, about 3,000 feet; tributaries, numerous but unnamed; the basin contains a number of small lakes, the largest of which lie north of Iron Mountain. Mount Lyell sheet.

**Kings River (R);** formed in Fresno County in the southeastern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, by the junction of the Middle and South forks; the South Fork, which drains the larger area and is therefore here considered the continuation of the main stream, has its source in numerous glacial lakelets that lie on the west slope of the Sierra well up toward the summit, flows, in general, southwestward about 20 miles, then north of west 20 miles to its junction with the Middle Fork, then in a general southwesterly course to the trough of San Joaquin about 6 miles west of Lemoore; from this point most of the low water flow passes northwestward through Kings Slough to San Joaquin River, about 3 miles north of Mendota, but most of the flood flow passes southward to Tulare Lake.

The basin touches the crest of the Sierra, which separates it from the central part of the Owens River divide at the east for a distance of about 50 miles, and it contains many of the highest peaks in the Sierra. Many of the peaks are perpetually snow-capped, others are sharp, bare, and precipitous. Nearly all the tributaries run in deep canyons cut through solid granite. The canyons of the three main forks and of the main stream below their junction are long and narrow and 2,000 to 3,000 feet deep; in places they broaden out into narrow valleys with precipitous walls like Kings River canyon on the South Fork and Tehipite Valley on the Middle Fork, which rival the famous Yosemite Valley in scenic grandeur.

The greater part of the Kings River basin is well forested; at altitudes above 10,000 feet vegetation is scanty; below 10,000 feet there is a heavy growth of timber and underbrush; extensive groves of big trees grow at many places in this basin; almost the entire basin above the valley rim lies in a national forest.

The mean annual precipitation varies with altitude; on the higher areas it is 50 to 60 inches and nearly all in the form of snow which never entirely disappears from the highest peaks; in the foothill region it is 20 to 30 inches and in the San Joaquin Valley 8 to 10 inches.

Numerous canals with a combined capacity of 4,000 to 5,000 second-feet divert water from the river below the mouth of the canyon for use on the valley lands in Fresno, Kings, and Tulare counties; during low water these canals take the total flow of the river.

Stream gradients are very heavy in this basin and the minimum flow is sufficient to generate at least 125,000 horsepower without storage. Middle and South forks afford the greatest opportunities for power development.

Gaging stations at Slate Point (1878-1884), at Suspension Bridge (1895), at Kingsburg (1895-1904), near Sanger (1895-1911).

Surveys and data: Mount Whitney, Tehipite, and Mount Goddard sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 184-186.

**Kings River, Middle Fork (R);** Fresno County; Sierra National Forest; rises on the southern slope of Mount Fiske (altitude, 13,328 feet), east of the Goddard Divide; flows, in general, east of south 10 miles, then southwestward 20 miles to the southeastern part of T. 12 S., R. 28 E., where it unites with the South Fork to form Kings River (tributary to San Joaquin River); total fall above junction with South Fork, 8,500 feet; principal tributaries, Palisade, Cartridge, Goddard, Dougherty and Crown creeks, all of which have many branches; upper part of the basin contains many glacial lakes; throughout practically its entire course this fork of the Kings River flows in a canyon, 2,000 to 3,000 feet deep. The basin contains many high peaks, more than 20 exceeding 12,000 feet in altitude; the highest of the peaks are Mount Sill (14,254 feet), Mount Winchell (13,749 feet), Mount Goode (13,312 feet), Mount Fiske (13,328 feet), Mount Thompson (13,494 feet), and Mount Gilbert (13,232 feet). Mount Goddard and Tehipite sheets.

**Kings River, North Fork (R);** Fresno County, Sierra National Forest; rises in glacial lakes lying on the west slope of the White Divide (altitude, 12,401 to 12,495 feet); flows northwestward to the northeastern corner of T. 10 S., R. 28 E., Mount Diablo base and meridian, from which point it takes a general southwesterly course to its junction with Kings River in the southeastern part of T. 12 N., R. 26 E.; length, about 30 miles; principal tributaries, West Branch of North Fork, and Woodchuck, Rancheria, and Dinkey creeks; the headwater streams are fed by numerous glacial lakes; the highest peak in the basin is Mount Reinstein (altitude, 12,995 feet), at the head of White Divide. Gaging station at Ockenden (1910-1912). Mount Goddard, Tehipite, and Kaiser sheets; Land Office map, 1907; Le Conte's map of portion of the Sierra Nevada of California, No. 3, Kings-Kern sheet, March, 1903.

**Kings River, South Fork.** See Kings River.

**Knight Creek (R);** Tuolumne County; rises in the southern part of T. 4 N., R. 16 E., Mount Diablo base and meridian, at altitude 3,900 feet above sea level; flows southwestward 10 miles into Rose Creek (tributary through Stanislaus River to the San Joaquin); fall, 2,900 feet. Gaging stations near Jupiter (1910-1912). Big Trees sheet.

**Kuna Creek (R);** Tuolumne County; Yosemite National Park; rises on the southern slope of Kuna Peak (altitude, 12,951 feet); flows southwestward 1 mile, then almost directly west  $2\frac{1}{2}$  miles into Lyell Fork of Tuolumne River (tributary through Tuolumne River to San Joaquin River); fall, 2,800 feet. Yosemite National Park map.

**Laurel Creek (R);** Fresno County; Sierra National Forest; rises in the northeastern part of T. 10 S., R. 26 E., Mount Diablo base and meridian, at altitude 8,300 feet above sea level; flows southwestward  $3\frac{1}{2}$  miles into Bear Creek (tributary through Dinkey Creek to North Fork of Kings River and thus through Kings River to the San Joaquin); fall, 2,100 feet. Kaiser sheet.

**Laurel Creek (R);** Tulare County; Sequoia National Forest; rises in the northeastern part of T. 18 S., R. 32 E., Mount Diablo base and meridian, at altitude 10,000 feet above sea level; flows north of east 4 miles into Kern River 1 mile below lower Funston Meadow; fall, 3,500 feet. Olancho sheet.

**Laurel Lake;** Tuolumne County; Yosemite National Park; southwestern part of T. 2 N., R. 20 E., Mount Diablo base and meridian; one inlet; outlet, a stream 1 mile long flowing southeastward to Frog Creek (tributary through Eleanor Creek to Cherry Creek and thus through Tuolumne River to the San Joaquin); altitude, 6,650 feet; fall of outlet, 300 feet; length and width, about one-half mile. Yosemite National Park map.

**Leland Gulch Creek** (L); Madera County; rises in the southwestern part of T. 7 S., R. 20 E., at altitude 1,500 feet above sea level; flows northwestward  $1\frac{1}{2}$  miles into Chowchilla River (tributary to the San Joaquin); fall, 600 feet. Mariposa sheet.

**Lewis Creek** (R); Fresno County; Sierra National Forest; rises in the eastern part of T. 12 S., R. 30 E., on the west slope of Kennedy Mountain (altitude, 11,424 feet); flows southward 6 miles into South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,300 feet; principal tributaries, East Fork and Comb Creek. Tehipite sheet.

**Lewis Creek** (L); Tulare County; rises in the northwestern part of T. 20 S., R. 29 E., Mount Diablo base and meridian, at altitude 2,400 feet above sea level; flows westward into Tulare Lake basin; sinks near Lindsay between the delta fans of Tule and Kaweah rivers. Kaweah sheet; Land Office map of California, 1907.

**Lewis Creek, East Fork** (L); Fresno County; Sierra National Forest; rises in the eastern part of T. 12 S., R. 30 E., on the northern slope of Comb Spur, at altitude 10,700 feet above sea level; flows southwestward 3 miles into Lewis Creek (tributary to South Fork of Kings River and thus through Kings River to the San Joaquin); fall, 4,000 feet. Tehipite sheet.

**Lewis Fork** (R); Madera County; rises in the southeastern part of T. 5 S., R. 21 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows southward about 8 miles to its junction with Fresno River, in the southeastern part of T. 6 S., R. 21 E.; fall, about 2,000 feet. Mariposa sheet.

**Licking Fork** (R); Calaveras County; rises in the western part of T. 6 N., R. 15 E., at altitude 5,300 feet above sea level; flows, in general, southwestward  $5\frac{1}{2}$  miles, then northwestward 6 miles into South Fork of Mokelumne River (tributary to Middle Fork of Mokelumne River to Mokelumne River and thus to the San Joaquin); fall, 3,000 feet. Gaging station near Railroad Flat (1912). Big Trees sheet.

**Lightning Creek** (L); Fresno County; Sequoia National Forest; rises in the southern part of T. 13 S., R. 30 E., Mount Diablo base and meridian, at altitude 8,300 feet above sea level; flows, in general, northward into South Fork of Kings River (tributary through Kings River to the San Joaquin); length,  $3\frac{1}{2}$  miles; fall, 4,000 feet. Tehipite sheet.

**Lillian Lake**; Madera County; Sierra National Forest; 1 mile east of Gale Peak; one inlet; outlet, a stream somewhat less than a mile long, flowing southeastward to Black Peak Fork (tributary through West Fork to Granite Creek and thus to Middle Fork of San Joaquin River); elevation, 8,880 feet; fall of outlet, about 500 feet. Mount Lyell sheet.

**Lily Creek** (L); Tuolumne County; Stanislaus National Forest; rises 2 miles south of the southwest corner of T. 5 N., R. 20 E., at altitude 8,800 feet above sea level; flows southwestward 13 miles into Clavey River (tributary through Tuolumne River to the San Joaquin); fall, 3,600 feet; flows through Lily Lake; tributaries few and unimportant. Dardanelles and Big Trees sheets.

**Lily Creek** (L); Tuolumne County; Stanislaus National Forest; rises  $3\frac{1}{2}$  miles southwest of the head of Cascade Creek, at altitude 6,000 feet above sea level; flows north of west 2 miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 2,400 feet, of which 1,400 feet is made in the last half mile. Dardanelles and Big Trees sheets.

**Lily Lake**; Tuolumne County; Stanislaus National Forest; 2 miles east of northeast corner T. 3 N., R. 18 E.; inlet Lily Creek; outlet Lily Creek to Clavey River (tributary through Tuolumne River to the San Joaquin); altitude 6,900 feet; fall of Lily Creek below Lily Lake 1,700 feet. Dardanelles sheet.

**Limekiln Creek** (R); Tulare County; rises in the western part of T. 14 S., R. 28 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southward 11 miles into Kaweah River (tributary to Tulare Lake basin) which it enters 2 miles north of Lemoncove. Land Office map of California, 1907.

**Line Creek** (R); Fresno County; rises in the southern part of T. 7 S., R. 25 E., on the south slope of Kaiser Ridge, at altitude 9,700 feet above sea level; flows irregularly southward 4 miles into Big Creek (tributary to San Joaquin River); fall, 3,000 feet. Kaiser sheet.

**Lion Creek** (R); Calaveras County; rises in the southeastern part of T. 7 N., R. 14 E., Mount Diablo base and meridian, at altitude 3,900 feet above sea level; flows westward 2 miles into North Fork of Middle Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 1,000 feet. Big Trees sheet.

**Lion Lake**; Tulare County; Sequoia National Forest; southwestern part of T. 15 S., R. 32 E., Mount Diablo base and meridian, south of Triple Divide Peak; outlet, Middle Fork of Kaweah River through Kaweah River to Tulare Lake; altitude, 10,900 feet. Tehipite sheet.

**Little.** *See name of main stream.*

**Little Lake**; Tulare County; Sequoia National Forest; northern part of T. 19 S., R. 33 E., Mount Diablo base and meridian, 1 mile below Kern Lake; connected by two very short streams with Kern River; altitude 6,100 feet. Olancho sheet.

**Lockwood Creek** (L); Fresno County; Sequoia National Forest; rises in the northwestern part of T. 13 S., R. 29 E., on the northern slope of Sequoia Ridge, at altitude 6,000 feet above sea level; flows northwestward 2 miles into South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 3,200 feet. Tehipite sheet.

**Lone Indian, Lake of**; Fresno County; Sierra National Forest, north of the Silver Divide, near Silver Pass; one inlet draining 3 small lakes; outlet, a stream 1 mile long, flowing northward to Fish Creek (tributary through Middle Fork of San Joaquin to South Fork of San Joaquin, head of San Joaquin River); altitude, 10,250 feet; fall of outlet, 1,250 feet. Mount Goddard sheet.

**Lone Tree Creek** (L); San Joaquin County; rises in the southwestern part of T. 4 S., R. 5 E.; flows northeastward into San Joaquin Valley; length, 6 miles; carries water only during the rainy season. Orestimba-Panoche-Cantua special map.

**Long Creek** (R); Madera County; rises in the northwestern part of the Sierra National Forest, on the eastern slope of Long Mountain (altitude 11,468 feet); flows southeast 3 miles, then northeastward 1 mile into North Fork of San Joaquin River (tributary to Middle Fork San Joaquin); fall, 2,600 feet; flows through several small lakes. Mount Lyell sheet.

**Long Gulch Creek** (R); Tuolumne County; Yosemite National Park; rises in the eastern part of T. 1 S., R. 20 E., Mount Diablo base and meridian, at altitude 6,900 feet above sea level; flows southwestward 2 miles, then southward 2 miles, into South Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 1,100 feet. Yosemite National Park map.

**Longhollow Creek** (R); Madera County; rises in the southern part of T. 8 S., R. 20 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows southward  $2\frac{1}{2}$  miles into Coarse Gold Creek (tributary through Fresno River to San Joaquin River); fall, 400 feet. Mariposa sheet.

**Los Agitos Creek** (L); San Benito County; rises in the southeastern part of T. 14 S., R. 9 E.; flows southeastward 8 miles to its junction with Panoche Creek 2 miles east of Llanada; carries water only during the rainy season. Land Office map of California, 1907.

**Los Banos Creek** (L); San Benito and Merced counties; rises in the northern part of T. 14 S., R. 8 E., flows northward 18 miles and northeastward 15 miles to San Joaquin Valley; sinks below the foothills. Land Office map of California, 1907; Fisk and Johnson map.

**Los Gatos Creek** (L); Fresno County; rises in the northwestern part of T. 19 S., R. 13 E.; flows southeastward to a point near Coalinga, then turns and flows eastward, then northeastward into San Joaquin Valley; length, about 40 miles; principal tributaries, White, Waltham, and Jacalitos creeks. Fisk and Johnson map of San Joaquin Valley; Land Office map of California, 1907.

**Lost Canyon Creek (L);** Fresno County; Sierra National Forest; rises in the central part of T. 12 S., R. 30 E., Mount Diablo base and meridian, north of Monarch Divide, at altitude 10,400 feet above sea level; flows northward 4 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,500 feet, of which 2,500 feet is made in the last mile. Tehipite sheet.

**Lost Canyon Creek (R);** Fresno County; rises in the eastern part of T. 10 S., R. 27 E., Mount Diablo base and meridian, in a small lake at altitude 8,800 feet above sea level; flows northeastward 1 mile, then, in general, southward 3 miles into North Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 2,800 feet. Mount Goddard sheet.

**Lost Canyon Creek (R);** Tulare County; Sequoia National Forest; rises in the northwestern part of T. 17 S., R. 32 E., Mount Diablo base and meridian, on the eastern slope of the Great Western Divide, at altitude 10,300 feet above sea level; flows eastward 4 miles into Big Arroyo (tributary to Kern River); fall, 2,700 feet. Kaweah and Olancho sheets.

**Lost Creek (R);** Fresno County; Sierra National Forest; rises in the southwestern part of T. 10 S., R. 26 E., Mount Diablo base and meridian, in Lost Meadow, at altitude 5,800 feet above sea level; flows, in general, east of south to its junction with Dinkey Creek (tributary through North Fork of Kings River to Kings River and thus to the San Joaquin). Kaiser sheet.

**Lost Creek (R);** Tulare County; Sierra National Forest; rises in the north-central part of T. 21 S., R. 35 E., Mount Diablo base and meridian, in Albanita Meadows, at altitude 8,350 feet above sea level; flows, in general, southeastward  $5\frac{1}{2}$  miles into South Fork of Kern River (tributary to Kern River); fall, 2,200 feet. Olancho sheet.

**Love Creek (L);** Calaveras County; rises in the southern part of T. 5 N., R. 15 E., Mount Diablo base and meridian, 1 mile southeast of Big Trees, at altitude 4,400 feet above sea level; flows, in general, southwestward  $4\frac{1}{2}$  miles into Moran Creek (tributary through Mill Creek to North Fork of Stanislaus River and thus through Middle Fork of Stanislaus and Stanislaus River to the San Joaquin); fall, 1,000 feet. Big Trees sheet.

**Lukens Lake;** Tuolumne County; Yosemite National Park; eastern part of T. 1 S., R. 21 E., Mount Diablo base and meridian; outlet, a stream 1 mile long flowing northward to Middle Fork of Tuolumne River (tributary through South Fork of Tuolumne River to Tuolumne River and thus to the San Joaquin); altitude, 8,450 feet; fall of outlet, 300 feet; very small. Yosemite National Park map.

**Lyell Fork.** See Tuolumne River, Lyell Fork.

**Lyell Fork (R);** Madera County; rises on the southern slope of Mount Lyell (altitude, 13,090 feet); flows southwestward 2 miles, then westward 3 miles to its junction with Merced Peak Fork, with which it forms Merced River; flows through several small glacial lakes; fall, 4,000 feet. Mount Lyell sheet.

**Lyell Fork, Merced River, North Fork of (R);** Madera County; rises on the north slope of Mount Lyell (altitude 13,090 feet); flows southwestward 3 miles into Lyell Fork (tributary through Merced River to the San Joaquin); fall, 2,800 feet. Mount Lyell sheet.

**Mahogany Creek (R);** Tulare County; Sierra National Forest; rises in the southeastern part of T. 21 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows northeastward 1 mile, then southeastward  $1\frac{1}{2}$  miles into Fish Creek (tributary through South Fork of Kern River to Kern River); fall, 650 feet. Olancho sheet.

**Manikin Creek (R);** Tulare County; Sequoia National Park; rises in the northern part of T. 17 S., R. 28 E., at altitude 2,200 feet above sea level; flows southeastward 2 miles; sinks before reaching North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 1,200 feet; intermittent. Kaweah sheet.

**Manter Creek** (R); Tulare County; Sierra National Forest; rises in the southern part of T. 23 S., R. 34 E., Mount Diablo base and meridian, at altitude 7,500 feet above sea level; flows eastward  $3\frac{1}{2}$  miles, then southeastward 3 miles into South Fork of Kern River (tributary to Kern River); fall, 2,500 feet. Kernville sheet.

**Maple Creek** (L); Tulare County; Sequoia National Forest; rises in the western part of T. 16 S., R. 29 E., Mount Diablo base and meridian, on the north slope of Ash Peaks, at altitude 3,000 feet above sea level; flows northward  $1\frac{1}{2}$  miles into Cactus Creek (tributary to North Fork of Kaweah River and thus through Kaweah River to Tulare Lake basin); fall, 1,000 feet. Tehipite sheet.

**Marble Creek** (R); Eldorado County; rises in the northwestern part of T. 9 N., R. 9 E., Mount Diablo base and meridian, 2 miles east of Clarksville, at altitude 1,200 feet above sea level; flows southeastward 3 miles into Deer Creek (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 500 feet. Sacramento sheet.

**Marble Fork of Kaweah River**; Tulare County; Sequoia National Park; rises in Table Meadows, in the northeastern part of the park, just east of the northeastern boundary of the park; at altitude 10,700 feet above sea level; takes a general southwesterly course to its junction with Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); length, 16 miles; fall, 8,700 feet; enters the middle fork through a deep canyon; principal tributaries, Silliman, Clover, and Wolverton creeks. Tehipite sheet.

**Margaret Lakes**; Fresno County; Sierra National Forest; west of Silver Peak and north of Saddle Mountain; two lakes connected by a channel one-half mile long; outlet, Silver Creek to Fish Creek (tributary through Middle Fork of San Joaquin to South Fork of San Joaquin, head of San Joaquin River); altitude of upper lake, 9,950 feet; the northern lake is 300 feet lower; each lake is about half a mile long and less than half a mile wide. Kaiser sheet.

**Marie Lake**; Fresno County; Sierra National Forest, one-half mile northwest of Mount Senger; several small inflowing streams; outlet, a stream 2 miles long, flowing first west to a small lake and then northward to Bear Creek (tributary to South Fork San Joaquin River) near the junction of the East and South forks; elevation 10,695 feet; fall of outlet, 800 feet; the outlet of this lake receives also the overflow from Rose Lake. Mount Goddard sheet.

**Marion Lake**; Fresno County; Sierra National Forest; 1 mile north of Marion Peak; outlet, Cartridge Creek to Middle Fork of Kings River (tributary through Kings River to the San Joaquin); altitude 10,350 feet above sea level. Tehipite sheet.

**Mariposa Creek** (R); Mariposa and Merced counties; rises in the foothills in the northern part of Las Mariposas at altitude 2,300 feet above sea level; flows southeastward 4 miles, passing through the town of Mariposa, southward 2 miles, then in general southwestward into Mariposa Slough, through which it is connected with the San Joaquin; drainage area about 122 square miles (W. Ham. Hall); a small stream characterized by sudden rises after heavy rains; carries no water after the rainy season; enters the valley through several interlocking channels. Gaging station at base of foothills (1878-1884). Mariposa sheet; Fisk and Johnson map; Bull. U. S. Geol. Survey No. 140, 1895, pp. 295-296.

**Martha Lake**; Fresno County; 1 mile southwest of Mount Goddard (elevation 13,555 feet), one-half mile east of the northeast corner of T. 10 S., R. 29 E., Mount Diablo base and meridian; inlets, two small streams flowing from the south slope of Mount Goddard; outlet, South Fork of San Joaquin River (head of San Joaquin); elevation, 11,007 feet. Mount Goddard sheet.

**Martinez Creek** (R); Eldorado County; rises in the southwestern part of T. 10 N., R. 11 E., Mount Diablo base and meridian, near Diamond Springs, at altitude 1,900 feet above sea level; flows southward 5 miles into North Fork of Cosumnes River

(tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 900 feet; principal tributary, Squaw Hollow Creek. Placerville sheet.

**Mary Lake;** Tuolumne County; Yosemite National Park, southern part of T. 4 N., R. 22 E., Mount Diablo base and meridian, 1 mile west of Tower Peak; outlet, a stream  $2\frac{1}{2}$  miles long, flowing southwestward through Tilden Lake to Falls Creek (tributary through Tuolumne River to the San Joaquin); altitude, 9,650 feet; fall, of outlet stream above Tilden Lake, 800 feet. Yosemite National Park map.

**Matterhorn Canyon Creek (L);** Tuolumne County; Yosemite National Park; rises in the western part of T. 3 N., R. 24 E., Mount Diablo base and meridian, at altitude 10,800 feet above sea level; flows southwestward 10 miles to its junction with West Fork of Return Creek (tributary through Tuolumne River to San Joaquin River); fall, 3,300 feet. This stream is much longer than the West Fork of Return Creek and should more properly be considered the main stream to which the West Fork is a tributary. Yosemite National Park map.

**Mattie Lake;** Tuolumne County; Yosemite National Park; central part of T. 1 N., R. 23 E., Mount Diablo base and meridian; outlet, a stream 1 mile long, flowing southward toward Tuolumne River (tributary to San Joaquin River); the outlet stream sinks before reaching the river; altitude of lake, 9,300 feet. Yosemite National Park map.

**Maxwell Creek (R);** Mariposa County; rises in the central part of T. 2 S., R. 16 E., Mount Diablo base and meridian, at altitude 3,200 feet; flows southward 5 miles, northwestward 2 miles, then again southward 2 miles into Merced River (tributary to the San Joaquin River) at Horseshoe Bend; fall, 2,500 feet; principal tributary, Blacks Creek; intermittent. Sonora sheet.

**May Lake;** Mariposa County; Yosemite National Park; western part of T. 1 S., R. 23 E., Mount Diablo base and meridian; outlet, Snow Creek to Tenaya Creek (tributary through Merced River to San Joaquin River); length and width each nearly half a mile. Yosemite National Park map.

**McCabe Lakes;** Tuolumne County; Yosemite National Park; southern part of T. 2 N., R. 24 E., Mount Diablo base and meridian; five small lakes, two of which have no visible outlet; three of them are connected and discharge by a stream one-half mile long, flowing northwestward to Return Creek (tributary through Tuolumne River to San Joaquin River); the altitude of the lowest lake is 9,900 feet above sea level, the highest is 10,480 feet; the highest lake is about one-half mile long, one-eighth mile wide, is not connected with the other lakes, and has no outlet. Yosemite National Park map.

**McClure Fork (R);** Mariposa County; rises in the northeastern part of T. 2 S., R. 24 E., on the north slope of McClure Mountain, at altitude 11,800 feet above sea level; flows northward along the base of Simmons Peak, then very irregularly southwestward to its junction with Merced River (tributary to San Joaquin River) just above Merced Lake; length, 8 miles; fall, 4,500 feet; principal tributaries, Florence and Fletcher creeks; basin contains many small glacial lakes. Mount Lyell sheet.

**McClure Fork (L);** Tuolumne County; Yosemite National Park; rises in a glacier on the eastern slope of McClure Mountain, at altitude 12,000 feet above sea level; flows northeastward 2 miles into Lyell Fork of Tuolumne River (tributary through Tuolumne River to San Joaquin River); fall, 2,400 feet. Yosemite National Park map.

**McClure Lake;** Madera County; Sierra National Forest; 1 mile south of Isberg Peak; inlet, a stream from the north slope of Post Peak; outlet, a stream one-half mile long, flowing eastward to Sadlier Lake on East Fork of Granite Creek (tributary through Granite Creek to Middle Fork of San Joaquin River); elevation, 9,550 feet; fall of outlet, 200 feet. Mount Lyell sheet.

**McCormick Creek (L);** Tuolumne County; rises in the eastern part of T. 4 N., R. 15 E., Mount Diablo base and meridian, at altitude 3,800 feet above sea level;

flows, in general, south of west  $2\frac{1}{2}$  miles into Griswold Creek (tributary through North Fork of Stanislaus to Middle Fork of Stanislaus and thus through Stanislaus River to the San Joaquin); fall, 1,800 feet. Big Trees sheet.

**McCormick Creek** (R); Alpine and Tuolumne counties; Stanislaus National Forest; rises in the southern part of T. 7 N., R. 19 E., Mount Diablo base and meridian, on the south slope of the Dardanelles, at altitude 8,400 feet above sea level; flows southwestward 2 miles, then southward  $2\frac{1}{2}$  miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 3,000 feet, of which 1,200 feet occurs in about half a mile as it enters the Stanislaus. Dardanelles sheet.

**McGee Lake**; Tuolumne County; Yosemite National Park, southeastern part of T. 1 N., R. 23 E., Mount Diablo base and meridian; outlet, a stream one-half mile long flowing southeastward to Tuolumne River (tributary to San Joaquin River) 1 mile below Tuolumne Falls; altitude, 8,200 feet; very small. Yosemite National Park map.

**McGill Creek** (L); Tuolumne County; Yosemite National Park; rises in the northwestern part of T. 1 N., R. 20 E., Mount Diablo base and meridian, in McGill Meadow, at altitude 5,500 feet above sea level; flows west and southwest 6 miles to its junction with Cherry Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,000 feet. Yosemite National Park map.

**McIntire Creek** (R); Tulare County; Sequoia National Forest; rises in the southwestern part of T. 20 S., R. 32 E., Mount Diablo base and meridian, at altitude 7,800 feet above sea level; flows southwestward 3 miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule to Tule River and thus to Tulare Lake basin); fall, 2,400 feet. Kaweah sheet.

**McKinneys Creek** (R); Calaveras County; rises in the southeastern part of T. 5 N., R. 13 E., Mount Diablo base and meridian, at altitude 2,700 feet above sea level; flows very irregularly southwestward to the central part of T. 4 N., R. 13 E., where it unites with O'Neil Creek to form Calaveritas Creek (tributary to South Fork of Calaveras River and thus through Calaveras River to the San Joaquin); fall, 1,200 feet. Jackson sheet.

**Meadow Brook** (R); Fresno County; Sierra National Forest; rises  $2\frac{1}{2}$  miles southwest of Red Mountain, at altitude 9,900 feet above sea level; flows southwestward 3 miles into North Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 1,700 feet. Mount Goddard sheet.

**Meadow Creek, Big** (R); Calaveras County; Stanislaus National Forest; rises in the central part of T. 7 N., R. 17 E., Mount Diablo base and meridian, at altitude 7,700 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles, and southeastward 2 miles into North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus River and thus to the San Joaquin); fall, 2,400 feet, of which 1,000 feet occurs in the last three-fourths mile; drains two high marshy meadows. Big Trees sheet.

**Meadow Creek, Big** (L); Tulare County; Sequoia National Forest; rises in the western part of T. 14 S., R. 29 E., in Big Meadow, at altitude 7,700 feet above sea level; flows, in general, northeastward to its junction with Boulder Creek through which it is tributary to the South Fork of Kings River (tributary through Kings River to the San Joaquin); length, 5 miles; fall, 1,200 feet; principal tributary, stream from Weaver Lake. Tehipite sheet.

**Meadow Creek, Big** (L); Tuolumne County; Yosemite National Park; rises in the southeastern part of T. 3 N., R. 23 E., Mount Diablo base and meridian, at altitude 10,500 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles into Piute Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,700 feet. Yosemite National Park map.

**Meadow Creek, Dry (R);** Tuolumne County; Stanislaus National Forest; rises in the northern part of T. 4 N., R. 17 E., Mount Diablo base and meridian, at altitude 5,500 feet above sea level; takes a general southwesterly course to its junction with Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 2,900 feet, of which 1,400 feet occurs in the last half mile; intermittent. Big Trees sheet.

**Meadow Lake;** Alpine County; Stanislaus National Forest; two lakes, southwest of East Blue Lake; three inflowing streams, one of which drains Twin Lake; outlet, a stream 2 miles long flowing southwestward to North Fork of Mokelumne River (tributary through Mokelumne River to North Fork of San Joaquin); altitude, 7,750 feet. Markleeville sheet.

**Merced Lake;** Mariposa County; Yosemite National Park; inlet, Merced River; outlet, Merced River to San Joaquin River; altitude, 7,150 feet. Yosemite National Park map.

**Merced Peak Fork.** See Merced River.

**Merced River, Lyell Fork.** See Lyell Fork.

**Merced River (R);** rises in numerous small glacial lakes in the region about Mount Lyell (altitude, 13,090 feet); the fork which carries the name of the river—Merced Peak Fork—flows northeastward from Edna Lake (altitude, 10,500 feet), and unites with the fork from Mount Lyell,  $3\frac{1}{2}$  miles above Merced Lake. From this lake the river takes a general southwesterly course to its junction with the lower San Joaquin, about 5 miles northeast of Newman. Total length, 135 miles; length through the mountains, about 90 miles; principal tributaries, Tenaya and Yosemite creeks from the north, Illilouette and Bridal Veil creeks and South Fork of Merced River from the south.

The drainage basin lies on the western slope of the Sierra, north of the upper San Joaquin basin and south of the basin of the Tuolumne; it touches the Sierra divide at only one point, Mount Lyell, which is common to the three basins. The basin is about 65 miles long from the rim of the valley to the crest; is 20 to 25 miles wide, and its area above the valley border is about 1,200 square miles.

Within this basin is the famous Yosemite Valley, less than a mile wide and about 7 miles long, margined by cliffs that rise almost vertically 2,000 to 3,000 feet; over these cliffs hung-up streams leap to the lower level in magnificent falls. The country around the valley rim is a rolling glaciated region, 3,000 to 8,000 feet higher than the floor of the valley, the altitude of which is 4,000 feet above sea level. The valley opens westward into Merced Canyon.

The upper reaches of the basin above Yosemite Valley are for the most part devoid of forests, but the middle reaches are timbered; the growth extends well down on the lower elevations to the foothills. In the basin of the South Fork is the Mariposa grove of big trees. All the upper part of the basin, amounting to about 850 square miles, is included in national forests.

Mean annual precipitation ranges from 10 inches in the San Joaquin Valley to about 25 inches in the foothills and probably 60 inches in the higher areas; it occurs almost entirely during the rainy season, November to April; the snowfall is heavy during the winter and early spring and melts most rapidly in May and June, when, except on the higher peaks, the greater part of it disappears. The melting snow produces a regular annual rise in the late spring and early summer, during which period the splendid falls in the Yosemite Valley attain their greatest beauty.

Almost the entire late summer flow of Merced River is utilized for irrigation on the bottom lands of the foothills and in parts of the San Joaquin Valley.

The minimum flow is sufficient to develop about 40,000 horsepower without storage; with storage, this amount could be increased to 160,000 horsepower, continuously.

Gaging stations at Merced Falls (1878-1884), above Merced Falls (1901-1912), near Newman (1912), in Yosemite Valley (1904-1909, 1912).

Surveys and data: Mount Lyell, Yosemite, Sonora, and Mariposa sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 189-190.

**Merced River, North Fork (R);** Mariposa County; Stanislaus National Park; rises in the northeastern part of T. 2 S., R. 18 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; takes a general course west of south to its junction with Merced River (tributary to San Joaquin River); length, 14 miles; fall, 3,500 feet; principal tributaries Moore, Jordan, Smith, and Bull creeks; altitudes range from 1,500 to 6,000 feet above sea level. Yosemite and Sonora sheets.

**Merced River, South Fork;** Madera and Mariposa counties; rises on the south slope of Merced Peak (altitude 11,722 feet); flows southwestward 8 miles, almost directly west 12 miles, then takes a general northwesterly course for 16 miles to its junction with Merced River (tributary to San Joaquin River) at South Fork station on the Yosemite Valley Railroad; it enters the Merced at altitude about 1,500 feet above sea level; for about one-half its course it forms the southern boundary of the Yosemite National Park; its tributaries are all small; the upper part of the basin contains a number of small lakes. Gaging station near Wawona (1910-1912). Yosemite National Park map.

**Mercer Creek (L);** Fresno and San Benito counties; rises in the southwestern part of T. 13 S., R. 9 E.; flows southeastward 8 miles, then northeastward 10 miles to San Joaquin Valley; sinks below the foothills; carries water only during the rainy season; tributaries, Vasquez, Mill, and Salt creeks. Land Office map of California, 1907.

**Merten Creek (R);** rises in the southeastern part of T. 15 S., R. 30 E., Mount Diablo base and meridian, in Merten Meadow, at altitude 9,300 feet above sea level; flows west of south  $3\frac{1}{2}$  miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 5,000 feet. Tehipite sheet.

**Milestone Creek (R);** Tulare County; Sequoia National Forest; rises in the northeastern part of T. 15 S., R. 32 E., Mount Diablo base and meridian, on the eastern slope of the Great Western Divide, at altitude 12,200 feet above sea level; flows eastward 3 miles into Kern River; fall, 1,800 feet. Mount Whitney sheet.

**Mill Creek (R);** Amador County; rises in the south-central part of T. 8 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,700 feet above sea level; flows, in general, southwestward 7 miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 2,300 feet; principal tributary, Antelope Creek. Pyramid Peak, Big Trees and Jackson sheets.

**Mill Creek (R);** Calaveras County; rises in the northwestern part of T. 4 N., R. 15 E., Mount Diablo base and meridian,  $1\frac{1}{2}$  miles northwest of Avery, at altitude 3,500 feet above sea level; flows, in general, southeastward  $3\frac{1}{2}$  miles into North Fork of Stanislaus River (tributary through Middle Fork of Stanislaus to Stanislaus River and thus to the San Joaquin); fall, 1,800 feet, of which 800 feet is made in the last half mile; principal tributary, Moran Creek. Big Trees sheet.

**Mill Creek (L);** Fresno County; rises in the center of T. 9 S., R. 24 E., at altitude 5,000 feet above sea level; flows north of west about 3 miles into San Joaquin River above Italian Bar; fall, 3,500 feet; principal tributary, Jose Creek. Kaiser sheet.

**Mill Creek (L);** Fresno County; rises in the eastern part of T. 14 S., R. 27 E., Mount Diablo base and meridian; flows northwestward 24 miles into Kings River. Land Office map of southern California, 1907; Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Mill Creek (L);** Fresno County; Sequoia National Forest; rises in the northeastern part of T. 14 S., R. 27 E., Mount Diablo base and meridian, in Sequoia Lake, at altitude 5,400 feet above sea level; flows northwestward into Kings River (tributary to San Joaquin River); length, 12 miles; fall, about 4,500 feet. J. N. LeConte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Mill Creek (R);** Fresno County; rises in the central part of T. 6 S., R. 25 E., Mount Diablo base and meridian, at altitude 6,700 feet above sea level; flows southwestward 5 miles into San Joaquin River in the southeastern part of T. 6 S., R. 24 E.; fall, 3,600 feet. Kaiser sheet.

**Mill Creek (L);** Merced and Fresno counties; rises in the eastern part of T. 13 S., R. 9 E.; flows southeastward 7 miles into Mercer Creek (to San Joaquin Valley). Land Office map of California, 1907.

**Mill Creek (L);** Tuolumne County; Stanislaus National Forest; rises 2 miles northwest of Eagle Peak, at altitude 8,000 feet above sea level; flows northwestward  $3\frac{1}{2}$  miles, then south of west 3 miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 4,100 feet, of which 1,100 feet is made in the last mile of course. Dardanelles and Big Trees sheets.

**Miller Lake;** Tuolumne County; Yosemite National Park; southeastern part of T. 2 N., R. 23 E., Mount Diablo base and meridian; outlet, a stream 1 mile long, flowing southward to Return Creek (tributary through Tuolumne River to San Joaquin River); altitude, 9,550 feet; fall of outlet, 1,700 feet, of which 1,100 feet is in one-half mile just above Return Creek. Yosemite National Park map.

**Mills Creek (R);** Eldorado County; rises in the southern part of T. 10 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,700 feet above sea level; flows southwestward 2 miles to Squaw Hollow Creek through which it is tributary to Martinez Creek (tributary through North Fork of Cosumnes River and Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 600 feet. Placerville sheet.

**Minaret Creek (R);** Madera County; rises on the southeast slope of the Minarets and the southwest slope of Volcanic Ridge at altitude 10,050 feet above sea level; flows somewhat south of east about 4 miles to its junction with Middle Fork of San Joaquin River; fall, 2,300 feet; tributaries, numerous but unnamed; basin contains several unnamed lakes. Mount Lyell sheet.

**Misery Creek (L);** Amador County; rises in the northern part of T. 7 N., R. 13 E., Mount Diablo base and meridian, on the north slope of Mount Crossman, at altitude 3,700 feet above sea level; flows southwestward  $5\frac{1}{2}$  miles into Sutter Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin); fall, 1,400 feet; principal tributary, Pioneer Creek. Jackson sheet.

**Moccasin Creek (L);** Tuolumne County; rises in the central part of T. 2 S., R. 16 E., Mount Diablo base and meridian, at altitude 2,500 feet above sea level; flows northwestward 10 miles into Tuolumne River (tributary to San Joaquin River); fall, 1,600 feet; principal tributaries, Cobbs and Rattlesnake creeks. Sonora sheet.

**Moco Canyon Creek (L);** Eldorado County; rises in the southeastern part of T. 9 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,100 feet above sea level; flows northwestward  $2\frac{1}{2}$  miles into Middle Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 600 feet. Placerville sheet.

**Mokelumne River (R);** formed by the union of its North and South Forks, in the eastern part of T. 6 N., R. 12 E., Mount Diablo base and meridian; the North Fork, which drains the larger area and is here considered the continuation of the main stream, rises in Alpine County in the Stanislaus National Forest, in Highland Lake, just southeast of Folger Peak, at altitude 8,600 feet above sea level; flows, in general, northwestward about 14 miles, then southwestward 38 miles to the point at which it receives the South Fork; from this point the general course is southwestward to San Joaquin River, which it joins about 25 miles northwest of Stockton; throughout the greater part of its course it forms the boundary between Amador and Calaveras counties; length, about 140 miles, of which approximately 90 miles are in the mountains; principal tributaries, Middle and South forks, Jackson Creek, and Cosumnes River.

Mokelumne basin touches the Sierra divide, which separates it from the Walker River basin on the east for a distance of about 20 miles. The lower part is a rolling,

hilly region, sloping toward the river from each side and having large areas of cultivated land; farther upstream the slopes increase and the river flows in a broad, shallow canyon that continues to deepen almost to the source of the main stream. Above the forks are many small lakes and valleys surrounded by peaks. Altitudes range from 200 feet in the foothills to 10,000 feet on the crest of the divide.

The middle stretches and higher elevations support a heavy growth of timber; the lower reaches are covered with grass, brush, and scattering oaks; all the upper part of the basin, comprising about 400 square miles, is included in national forests.

The mean annual precipitation ranges from 20 inches in the valley to 50 inches or more on the higher mountains, where most of it occurs as snow.

Attempts to utilize the stream for irrigation on a moderately large scale have, as a rule, been unsuccessful.

The streams have steep gradients and the minimum flow is sufficient to furnish considerable power for storage.

Surveys and data: Pyramid Peak, Markleeville, Big Trees, Jackson, and Lodi sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 216-217.

Gaging stations at Lone Star Mills (1878-1884), near Lodi (1895), at Electra (1901, 1903, 1904), at Clements (1904-1912).

**Mokelumne River, Middle Fork (L);** Calaveras County; rises in the north-eastern part of T. 6 N., R. 16 E., Mount Diablo base and meridian, at altitude 7,000 feet above sea level; flows, in general, westward 26 miles to the North Fork of Mokelumne River, with which it unites to form Mokelumne River (tributary to the San Joaquin); fall, 5,800 feet; principal tributaries, North Fork of Middle Fork of Mokelumne and South Fork of Mokelumne. Gaging station near Westpoint (1911-12). Big Trees and Jackson sheets.

**Mokelumne River, North Fork, Middle Fork of (R);** Calaveras County; rises in the southeastern part of T. 7 N., R. 16 E., Mount Diablo base and meridian, at altitude 6,900 feet above sea level; flows westward 14 miles, then southwestward 4 miles into Middle Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 4,200 feet; principal tributaries, Hunter and Lion Creeks. Big Trees sheet.

**Mokelumne River, South Fork (L);** Calaveras County; rises in the north-central part of T. 6 N., R. 16 E., Mount Diablo base and meridian, at altitude 7,200 feet above sea level; flows southwestward 11 miles, then northwestward 13 miles into Middle Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 6,000 feet; principal tributary, Licking Fork. Gaging station near Railroad Flat (1911-12). Big Trees and Jackson sheets.

**Monache Creek (L);** Tulare County; Kern National Forest; rises on the western slope of the Sierra Nevada,  $1\frac{1}{2}$  miles south of Olancha Peak, at altitude 9,700 feet above sea level; flows southwestward 3 miles into South Fork of Kern River (tributary to Kern River) in Monache Meadows; fall, 1,700 feet. Olancha sheet.

**Monarch Lakes;** Tulare County; Sequoia National Forest; eastern part of T. 17 S., R. 31 E., Mount Diablo base and meridian, on the southwestern slope of Sawtooth Peak; two small, connected lakes, discharging by a stream flowing westward 2 miles to the East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); altitude, 10,500 feet above sea level. Kaweah sheet.

**Mono Creek (R);** Fresno County; rises in Sierra National Forest, on the southern slope of Mount Huntington (altitude, 12,393 feet); flows southwestward 18 miles to its junction with the South Fork of San Joaquin River; fall, 4,800 feet; tributaries, Hopkins Creek, North Fork, and Cold Creek, as well as numerous smaller streams, many of which drain lakes. Mount Goddard and Kaiser sheets.

**Mono Creek, North Fork (R);** Fresno County; rises in Sierra National Forest, on the south slope of Silver Divide, at altitude 11,500 feet above sea level; flows south-

westward 5 miles into Mono Creek (tributary to South Fork of San Joaquin River); fall, 3,000 feet; a number of small lakes near head. Mount Goddard sheet.

**Moody Creek** (R); San Benito County; rises in the eastern part of T. 16 S., R. 9 E.; flows northward 6 miles to its junction with Panoche Creek at Llanada; carries water only during the rainy season. Land Office map of California, 1907.

**Moore Creek** (L); Calaveras County; Stanislaus National Forest; rises in the north-eastern part of T. 7 N., R. 16 E., Mount Diablo base and meridian, at altitude 7,300 feet above sea level; flows north of west  $6\frac{1}{2}$  miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 3,800 feet. Big Trees sheet.

**Moore Creek** (R); Mariposa County; rises in the southern part of T. 1 S., R. 17 E., Mount Diablo base and meridian, at altitude 3,000 feet above sea level; flows south-eastward 6 miles into North Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 500 feet; intermittent. Sonora sheet.

**Moorehouse Creek** (R); Tulare County; Sequoia National Forest; rises in the west-central part of T. 20 S., R. 31 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southwestward 2 miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule to Tule River and thus to the Tulare Lake basin); fall, 1,800 feet. Kaweah sheet.

**Moose Lake**; Tulare County; Sequoia National Forest; western part of T. 15 S., R. 31 E., Mount Diablo base and meridian; outlet, Buck Canyon Creek to Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); altitude, 10,550 feet. Tehipite sheet.

**Moraine Creek** (R); Tulare County; rises in the northwestern part of T. 14 S., R. 32 E., on the western slope of Silliman Crest, at altitude about 10,700 feet above sea level; flows irregularly northwestward 5 miles into Roaring River (tributary to South Fork of Kings River); fall, 3,700 feet. Tehipite sheet.

**Moraine Lake**; Tulare County; Sequoia National Forest; northeastern part of T. 17 S., R. 32 E., Mount Diablo base and meridian; outlet, Funston Creek to Kern River; altitude, 9,440 feet; one-half mile long; one-eighth mile wide. Olancho sheet.

**Moran Creek** (L); Calaveras County; rises in the northern part of T. 5 N., R. 15 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; flows, in general, southwestward 5 miles into Mill Creek (tributary through North Fork of Stanislaus River to Middle Fork of Stanislaus River and thus to the San Joaquin); fall, 1,200 feet; principal tributary, Love Creek. Big Trees sheet.

**Mormon Creek** (L); Tuolumne County; rises in the northeastern part of T. 2 N., R. 14 E., Mount Diablo base and meridian, 1 mile northeast of Columbia, at altitude 2,250 feet above sea level; flows, in general, southwestward 12 miles to its junction with Stanislaus River (tributary to the San Joaquin); fall, about 1,700 feet. Big Trees and Sonora sheets; Land Office map of California, 1907.

**Morrison Creek** (L); Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 1 N., R. 22 E., Mount Diablo base and meridian, on the south slope of Double Rock, at altitude 9,300 feet; takes a circuitous and in general north-westerly course to its junction with Tuolumne River (tributary to the San Joaquin); length,  $4\frac{1}{2}$  miles; fall, 5,100 feet, of which 3,400 feet is made in the last  $1\frac{1}{2}$  miles of its course. Yosemite National Park map.

**Mosquito Lakes**; Tulare County; Sequoia National Forest; central part of T. 17 S., R. 31 E., Mount Diablo base and meridian; a group of five small lakes, connected by short streams and discharging by a stream 2 miles long flowing northward to East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); the highest of these lakes is 9,900 feet above sea level; the lowest, which is 1 mile farther north, is nearly 9,000 feet above. Kaweah sheet.

**Moss Creek (R);** Mariposa County; rises in the eastern part of T. 2 S., R. 19 E., in the Merced Grove of big trees, at altitude 5,500 feet above sea level; flows somewhat east of south 6 miles to its junction with Merced River (tributary to San Joaquin River) at Moss Canyon station on the Yosemite Valley Railroad; fall, 4,200 feet. Yosemite National Park map.

**Mountaineer Creek (R);** Tulare County; Sequoia National Forest; rises in the southeastern part of T. 19 S., R. 31 E., Mount Diablo base and meridian, at 8,000 feet above sea level; flows south of east 3 miles, then somewhat north of east 2 miles into Little Kern River (tributary to Kern River); fall, 1,900 feet. Kaweah sheet.

**Mountain Spring Creek (L);** Amador County; rises in the southeastern part of T. 6 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,200 feet above sea level; flows westward 4 miles into Sutter Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin); fall, 800 feet. Jackson sheet.

**Mud Lakes;** Amador County; Stanislaus National Forest; eastern part of T. 9 N., R. 16 E., Mount Diablo base and meridian; no outlet shown on the map, but the contours indicate possible overflow northward to Tragedy Creek (tributary through Bear River to North Fork of Mokelumne River and thus to the San Joaquin); three small lakes in the marsh 8,000 feet above sea level. Pyramid Peak sheet.

**Muddy Creek (L);** Kern County; rises in the San Emigdio Grant, at altitude 2,500 feet above sea level; flows northward toward Buena Vista Lake Reservoir in San Joaquin Valley; intermittent. Mount Pinos sheet.

**Mugler Creek (R);** Madera County; rises in the central part of T. 5 S., R. 23 E., Mount Diablo base and meridian, at altitude 7,600 feet above sea level; flows southeastward 5 miles, passing through Mugler Meadow to junction with Chiquito Creek (tributary to San Joaquin River), in the northwestern part of T. 6 S., R. 24 E.; fall, 2,600 feet. Kaiser sheet.

**Mule Creek (R);** Amador County; rises in the northwestern part of T. 6 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,100 feet above sea level; flows in general southwestward into Sutter Creek (tributary through Dry Creek to Mokelumne River and thus to the San Joaquin); length,  $9\frac{1}{2}$  miles; fall, 1,200 feet. Jackson sheet.

**Mule Gulch Creek (L);** rises in the central part of T. 8 S., R. 7 E.; flows in general southeastward into Garzos Creek; length, 3 miles; carries water only during the rainy season. Orestimba-Panoche-Cantua special map.

**Mulkey Creek (L);** Tulare County; Kern National Forest; rises in the southeastern part of T. 17 S., R. 35 E., Mount Diablo base and meridian,  $2\frac{1}{4}$  miles southeast of Trail Peak, at altitude 9,500 feet above sea level; flows south of west  $3\frac{1}{2}$  miles, then southward 5 miles into South Fork of Kern River (tributary to Kern River); fall, 900 feet. Olancha sheet.

**Muriel Lake;** Fresno County; Sierra National Forest, 1 mile southwest of Piute Pass (altitude 11,409 feet); inlets, several streams draining glacial lakes; outlet, a stream one-half mile long, flowing northwestward to Piute Creek (tributary to South Fork of San Joaquin River); elevation 11,327 feet; fall of outlet about 300 feet. Mount Goddard sheet.

**Murphy Creek (R);** Mariposa County; Yosemite National Park, rises in a small lake north of Polly Dome at altitude 8,800 feet above sea level; flows southward 2 miles into Tenaya Lake (tributary through Merced River and thus to the San Joaquin); fall, 700 feet. Yosemite National Park map.

**Neall Lake;** Tuolumne County; Yosemite National Park, southeastern part of T. 2 N., R. 22 E., Mount Diablo base and meridian; two small inlets; outlet connected northward by a very short channel with Rodgers Canyon Creek (tributary to Tuolumne River); altitude, 9,250 feet. Yosemite National Park map.

**Ned Gulch Creek (R);** Mariposa County; rises in the central part of T. 2 S., R. 19 E., Mount Diablo base and meridian, at 5,800 feet above sea level; flows southward 3

miles, then southwestward 4 miles into Merced River (tributary to the San Joaquin River); fall, 4,300 feet; principal tributary, Little Grizzly Creek. Yosemite sheet.

**Nelder Creek** (L); rises in the northern part of T. 6 S., R. 22 E., at altitude about 5,500 feet above sea level; flows southwestward about 6 miles to its junction with Lewis Fork of Fresno River (tributary through Fresno River to the San Joaquin); fall, about 2,500 feet; principal tributary Alder Creek; gaging station near Fresno Flats (1910-1912). Mariposa sheet.

**Nellie Lake**; Fresno County; southern part of T. 7 S., R. 25 E., south of Kaiser Crest; outlet, Home Camp Creek to Big Creek (tributary to San Joaquin River); altitude, 8,850 feet; fall of outlet, 2,000 feet. Kaiser sheet.

**Nelson Creek** (R); Tulare County; Sequoia National Forest; rises in the south central part of T. 20 S., R. 31 E., Mount Diablo base and meridian, at altitude 6,500 feet above sea level; flows southward 2 miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule River to Tule River and thus to Tulare Lake basin); fall, 2,000 feet. Kaweah sheet.

**Niagara Creek** (L); Tuolumne County; Stanislaus National Forest; rises on the north slope of Eagle Peak, 1 mile west of Eagle Meadow, at altitude 8,200 feet above sea level; flows northwestward 6 miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); fall, 3,400 feet, of which 1,300 feet occurs in the last three-fourths mile of its course. Dardanelles sheet.

**Ninemile Creek**; Tulare County; Kern National Forest; rises in the western part of T. 19 S., R. 35 E., Mount Diablo base and meridian, at altitude 9,050 feet above sea level; flows southward in Long Canyon, then very irregularly westward 7 miles into Kern River; fall, 3,700 feet; principal tributary, Redrock Creek. Olancha sheet.

**North Fork or Branch.** See name of main stream.

**North Goddard Creek.** See *Goddard Creek, North.*

**North Guard Creek.** See *Guard Creek, North.*

**Oak Gulch Creek** (L); Stanislaus County; rises in the northwestern part of T. 8 S., R. 7 E.; flows, in general, southeastward into Garzos Creek just below the mouth of Mule Gulch Creek; carries water only during the rainy season. Orestimba-Panoche-Cantua special map.

**Oliver Creek** (L); Mariposa County; rises in the central part of T. 5 S., R. 20 E., at altitude 4,700 feet above sea level; flows southwestward 4 miles into De Long Creek (tributary through East Fork of Chowchilla River to Chowchilla River and thus to the San Joaquin); fall, 2,100 feet. Mariposa sheet.

**O'Neil Creek** (L); Calaveras County; rises in the eastern part of T. 5 N., R. 14 E., Mount Diablo base and meridian, 2 miles north of west of Big Trees, at altitude 4,400 feet above sea level; flows southwestward 12 miles to the central part of T. 4 N., R. 13 E., where it unites with McKinneys Creek to form Calaveritas Creek (tributary to South Fork of Calaveras River and thus through Calaveras River to the San Joaquin); fall, 2,900 feet. Big Trees and Jackson sheets.

**On It Creek** (R); Eldorado County; rises in the central part of T. 8 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,200 feet above sea level; flows, in general, south of west 3 miles into South Fork of Cosumnes River (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 900 feet. Placerville sheet.

**Onion Lake**; Tuolumne County; Yosemite National Park, northern part of T. 2 N., R. 24 E., Mount Diablo base and meridian, three-fourths mile south of Summit Lake and on the opposite side of the Divide; outlet, a stream 1 mile long, flowing southwestward into Return Creek (tributary through Tuolumne River to San Joaquin River); altitude, 10,450 feet; fall of outlet, 1,300 feet. Yosemite National Park map.

**Orestimba Creek** (L); Stanislaus County; rises in the northern part of T. 8 S., R. 5 E.; flows, in general, north of east to San Joaquin Valley into which it sinks west of Newman; carries water only during the rainy season. Orestimba-Panoche-Cantua special map.

**Oriole Lake**; Tulare County; Sequoia National Park; north central part of T. 17 S., R. 30 E., Mount Diablo base and meridian; 1 mile east of head of Squirrel Creek; no outlet; it lies, however, in an area draining to the East Fork of Kaweah River (tributary to Kaweah River and thus to Tulare Lake basin); altitude, 5,600 feet above sea level; very small. Kaweah sheet.

**Ortigalita Creek** (L); Merced County; rises in the central part of T. 13 S., R. 9 E.; on the west slope of Ortigalita Peak; flows northeastward into San Joaquin Valley; sinks below the foothills; tributary, Pietro Azura Creek. Land Office map of California, 1907; Fisk and Johnson map.

**Ostrander Lake**; Mariposa County; Yosemite National Park, southern part of T. 3 S., R. 22 E., north of Horse Ridge; outlet to Bridalveil Creek (tributary through Merced River to San Joaquin River); altitude, 8,650 feet. Yosemite National Park map.

**Ottoway Creek** (R); Madera County; Yosemite National Park; rises on the west slope of Ottoway Peak at altitude 11,000 feet above sea level; flows south of west  $2\frac{1}{2}$  miles, then northwestward 4 miles into Illilouette Creek (tributary through Merced River to San Joaquin River); fall, 3,400 feet. Yosemite National Park map.

**Ousel Creek** (L); Tulare County; rises in the central part of T. 14 S., R. 32 E., on the north slope of Mount Brewer, altitude 13,577 feet; flows northeastward 2 miles to East Lake on East Creek (tributary through Bubbs Creek to South Fork of Kings River); fall, about 2,300 feet. Mount Whitney sheet.

**Owl Creek** (L); Mariposa County; rises in the eastern part of T. 5 S., R. 19 E., on Magoon Hill at altitude 3,000 feet above sea level; flows southwestward into West Fork of Chowchilla River (tributary through Chowchilla River to the San Joaquin); fall, about 1,000 feet. Mariposa sheet.

**Owl Creek** (L); Mariposa County; Sierra National Forest; rises in the northwestern part of T. 5 S., R. 20 E., Mount Diablo base and meridian, at altitude 3,900 feet above sea level; flows northward 2 miles into Devil Gulch Creek (tributary through South Fork of Merced River to Merced River and thus to the San Joaquin); fall, 1,300 feet. Yosemite sheet.

**Pacific Creek** (L); Alpine County; Stanislaus National Forest; rises on the west slope of Henry Peak; altitude 9,309 feet; flows northward 4 miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 1,500 feet. Dardanelles and Markleville sheets.

**Packsaddle Canyon Creek** (L); Tulare County; Sierra National Forest; rises in the western part of T. 23 S., R. 33 E., Mount Diablo base and meridian, at altitude 5,500 feet above sea level; flows westward 2 miles into Kern River; fall, 1,900 feet. Kernville sheet.

**Palisade Creek** (L); Fresno County; Sierra National Forest; rises on the western slope of the Palisades, at altitude about 13,500 feet above sea level; flows, in general, westward to its junction with the Middle Fork of Kings River (tributary through Kings River to the San Joaquin); length, about 7 miles; fall, 6,400 feet; principal tributaries, Glacier and Cataract creeks, and a stream from Palisade basin. Mount Goddard sheet.

**Palo Prieta Creek, East**; rises in the eastern part of T. 28 S., R. 18 E.; flows northwestward 6 miles, then north of east toward Tulare Lake basin, in San Joaquin Valley; intermittent; sinks below the foothills. Manuscript map of San Joaquin Valley, Fisk and Johnson.

**Panoche Creek** (L); San Benito and Fresno counties; rises in the western part of T. 15 S., R. 9 E.; flows irregularly eastward to San Joaquin Valley; sinks below the foothills; carries water only during the rainy season; principal tributaries, Moody, Los Agitos, and Silver creeks. Land Office map of California, 1907; Fisk and Johnson map.

**Panther Creek** (R); Amador County; rises in the western part of T. 8 N., R. 15 E., Mount Diablo base and meridian, at altitude 6,100 feet above sea level; flows south-

westward  $7\frac{1}{2}$  miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 3,300 feet; principal tributary, East Panther Creek. Pyramid Peak and Big Trees sheets.

**Panther Creek (R);** Tulare County; Sequoia National Park; rises in the southern part of T. 15 S., R. 30 E., Mount Diablo base and meridian, on the southeastern slope of Panther Peak, at altitude 7,500 feet above sea level; flows southward 3 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin), fall, 3,700 feet. Tehipite sheet.

**Panther Creek, East (L);** Amador County; rises in the central part of T. 8 N., R. 15 E., Mount Diablo base and meridian, at altitude 6,500 feet above sea level; flows southwestward 7 miles into Panther Creek (tributary through North Fork of Mokelumne River to Mokelumne River, and thus to the San Joaquin); fall, 3,100 feet. Pyramid Peak and Big Trees sheets.

**Paradise Creek (L);** Tulare County; rises in the northern part of T. 17 S., R. 30 E., Mount Diablo base and meridian, at altitude 7,500 feet above sea level; flows northwestward 5 miles into Middle Fork of Kaweah River (tributary through Kaweah River to Tulare Lake Basin); fall, 4,700 feet. Kaweah and Tehipite sheets.

**Pastoria Creek;** Kern County; rises on the northern slope of the Tehachapi Mountains at altitude 5,300 feet above sea level; flows southwestward 7 miles, then northwestward 8 miles toward Buena Vista Reservoir; intermittent; fall above the border of San Joaquin Valley, about 4,000 feet. Tejon sheet.

**Peckinpah Creek (L);** Madera County; rises in the northern part of T. 8 S., R. 23 E., at Peckinpah Mill, at altitude 5,600 feet above sea level; flows southwestward 3 miles into South Fork of Little North Fork of San Joaquin River, one-half mile above South Fork settlement; fall, 3,000 feet. Kaiser sheet.

**Pecks Canyon Creek (L);** Tulare County; Sequoia National Forest; rises in the northern part of T. 19 S., R. 31 E., Mount Diablo base and meridian, south of Sheep Mountain, at 9,500 feet above sea level; flows southeastward 5 miles into Alpine Creek (tributary through Kern River to Little Kern River); fall, 2,700 feet. Kaweah sheet.

**Peppermint Creek (R);** Tulare County; Sequoia National Forest; rises in the western part of T. 21 S., R. 32 E., Mount Diablo base and meridian, at altitude 8,300 feet above sea level; flows, in general, southeastward 7 miles into Kern River; fall, 4,200 feet. Kaweah and Olancha sheets.

**Peppermint Creek (R);** Tuolumne County; rises near Shaws Flat, 2 miles northwest of Sonora, at altitude 2,100 feet; flows, in general, southward to its junction with Woods Creek (tributary through Tuolumne River to San Joaquin River) at Jamestown; fall, 600 feet; intermittent. Sonora sheet.

**Perrin Creek (R);** Tulare County; Sequoia National Forest; rises 2 miles southwest of Whitney Pass at altitude 11,650 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles into Rock Creek (tributary to Kern River); fall, 2,000 feet. Mount Whitney and Olancha sheets.

**Perry Creek (L);** Eldorado County; rises in the northwestern part of T. 8 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,500 feet above sea level; flows westward  $2\frac{1}{2}$  miles, then, in general, northwestward 5 miles into Middle Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,800 feet. Placerville sheet.

**Peterson Creek (R);** Mariposa and Madera counties; rises in the northwestern part of T. 6 S., R. 21 E., on Pilot Peak (altitude 5,260 feet); flows southward  $4\frac{1}{2}$  miles to its junction with North Fork of Fresno River (tributary to Fresno River and thus to the San Joaquin); fall, about 1,300 feet. Mariposa sheet.

**Picayune Creek (L);** Madera County; rises in the central part of T. 8 S., R. 21 E., Mount Diablo base and meridian, at altitude 2,400 feet above sea level; flows south of west  $2\frac{1}{2}$  miles into Coarse Gold Creek (tributary through Fresno River to the San Joaquin); fall, 600 feet. Mariposa sheet.

**Pickett Creek (R);** Tulare County; Sequoia National Forest; rises in the northern part of T. 16 S., R. 32 E., Mount Diablo base and meridian, on the north slope of Kaweah Peaks, at altitude 12,400 feet above sea level; flows north of east 4 miles into Kern-Kaweah River (tributary to Kern River just above Rockslide Lake); fall, 2,700 feet. Tehipite and Mount Whitney sheets.

**Pierce Creek (R);** Tulare County; Sequoia National Forest; rises in the southern part of T. 14 S., R. 28 E., Mount Diablo base and meridian, on the west slope of Redwood Mountain, at altitude 6,000 feet above sea level; flows southward 6 miles into North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,300 feet. Tehipite sheet.

**Pietra Azura Creek (L);** Merced County; rises in the northern part of T. 13 S., R. 9 E.; flows northeastward into Ortigalita Creek (to San Joaquin Valley); length, 7 miles; carries water only in rainy season. Land Office map of California, 1907.

**Pigeon Creek (R);** Amador County; rises in the northern part of T. 8 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,000 feet above sea level; flows irregularly westward 6 miles into Big Indian Creek (tributary through Cosumnes River to the Mokelumne and thus to the San Joaquin); fall, 1,100 feet. Placerville sheet.

**Pigeon Creek (R);** Tulare County; Sequoia National Forest; rises in the western part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 5,500 feet above sea level; flows southwestward 5 miles into South Fork of Tule River (tributary through Tule River to Tulare Lake basin); in the Tule River Indian Reservation; fall, 4,000 feet. Kaweah sheet.

**Piney Creek (R);** Mariposa County; rises in the southwestern part of T. 2 S., R. 15 E., Mount Diablo base and meridian, at altitude 1,200 feet above sea level; flows southward 6 miles into Merced River (tributary to San Joaquin River) in Pleasant Valley; fall, 600 feet; intermittent. Sonora sheet.

**Pinyon Creek (R);** Kern County; Sierra National Forest; rises in the western part of T. 27 S., R. 36 E., Mount Diablo base and meridian, at altitude 5,500 feet above sea level; flows somewhat south of west 4 miles into Kelso Creek (tributary to South Fork of Kern River); fall, 1,500 feet; intermittent. Kernville sheet.

**Pioneer Creek (L);** rises in the central part of T. 7 N., R. 13 E., Mount Diablo base and meridian, on the south slope of Mount Crossman, at altitude 3,500 feet above sea level; flows very irregularly westward 4 miles into Misery Creek (tributary through Sutter Creek to Dry Creek and thus through Mokelumne River to the San Joaquin); fall, 1,000 feet. Jackson sheet.

**Pitman Creek (R);** Fresno County; formed in the southeastern part of T. 8 S., R. 25 E., by the junction of South Fork and Tamarack Creek; flows northwestward 2 miles into Big Creek (tributary to San Joaquin River); fall below mouth of Tamarack Creek, 2,200 feet. Kaiser sheet.

**Piute Creek (R);** Fresno County; rises in Sierra National Forest, in a number of small lakes on the south slope of Mount Humphreys (elevation 13,972 feet); flows southwestward 2 miles, northwestward 5 miles, to the foot of Pilot Knob, then southwestward about 5 miles to its junction with South Fork of San Joaquin River (head of San Joaquin); fall, 3,700 feet; tributaries, numerous short streams flowing from glacial lakes. The largest lake in the area is Desolation Lake, in the Humphreys Basin; the tributaries from the south flow from Glacier Divide and practically all head in living glaciers. Mount Goddard sheet.

**Piute Creek (R);** Tuolumne County; Yosemite National Park; rises in the east-central part of T. 3 N., R. 23 E., Mount Diablo base and meridian, on the south slope of Kettle Peak at altitude 9,900 feet above sea level; flows southwestward 15 miles to its junction with Tuolumne River (tributary to San Joaquin River) in Pate Valley; fall, 5,400 feet; principal tributaries, Big Meadow and Rock Canyon creeks; upper course of the creek is through Slide Canyon; many small lakes in upper part of basin. Yosemite National Park map.

**Pleito Creek (L);** Kern County; rises in the eastern part of T. 9 N., R. 21 W., San Bernardino base and meridian; flows, in general, northward toward Buena Vista reservoir, in San Joaquin Valley; intermittent. Mount Pinos sheet.

**Polvadero Creek (L);** Fresno County; rises in the northern part of T. 24 S., R. 15 E.; flows northeastward 18 miles into San Joaquin Valley; sinks before reaching Los Gatos Creek, to which its basin is topographically tributary; called Zapatos Creek in the upper part of its course. Fisk and Johnson map.

**Poso Creek (R);** rises in the northern part of T. 27 S., R. 31 E., Mount Diablo base and meridian, in the Sierra foothills; flows westward into San Joaquin Valley; carries water for several months each year; drainage area about 289 square miles; water is held for irrigation. Gaging station at base of foothills (1878-1884). Land Office map of California, 1907.

**Post Creek (L);** Madera County; rises in the Sierra National Forest, on the west slope of Post Peak, 2 miles east of Triple Divide Peak, at altitude 10,200 feet above sea level; flows southeasterly 3 miles into West Fork of Granite Creek (tributary through Granite Creek to Middle Fork of San Joaquin River); fall, 1,900 feet. Mount Lyell sheet.

**Post Corral Creek (R);** Fresno County; Sierra National Forest; rises 1 mile north of the north line of T. 9 S., R. 28 E., Mount Diablo base and meridian, at altitude 10,300 feet above sea level; flows southward 8 miles into North Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 2,700 feet; principal tributary, Burnt Corral Creek. Mount Goddard sheet.

**Quartz Creek (L);** Madera County; Sierra National Forest; rises in the northern part of T. 5 S., R. 23 E., at altitude 8,200 feet; flows northwestward 3 miles along the west base of Quartz Mountain into South Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 1,400 feet. Yosemite National Park map.

**Quinto Creek (L);** Stanislaus and Merced counties; rises in the southeastern part of T. 8 S., R. 6 E.; flows south of east to San Joaquin Valley; length, 12 miles. Called Rinto on Land Office map, 1907.

**Rabbit Creek (L);** Amador County; rises in the southeastern part of T. 5 N., R. 9 E., at altitude 400 feet above sea level; flows southwestward 4 miles into Mokelumne River (tributary to the San Joaquin); fall, 250 feet. Jackson sheet.

**Rae Lake;** Fresno County; Sierra National Forest, 1 mile north of Mount Rixford; several inflowing streams draining small lakes; outlet, South Fork of Woods Creek through Woods Creek to South Fork of Kings River (tributary to the San Joaquin) altitude 10,560 feet. Mount Whitney sheet.

**Rafferty Creek (L);** Tuolumne County; Yosemite National Park; rises on the east slope of Rafferty Peak (altitude, 11,178 feet); flows northeastward 2 miles, then northward 2 miles into Lyell Fork of Tuolumne River (tributary through Tuolumne River to San Joaquin River); fall, 1,400 feet; principal tributary, stream from Evelyn Lake. Yosemite National Park map.

**Rambaud Creek (R);** Fresno County; Sierra National Forest; rises in a group of small lakes east of Black Divide at altitude 11,000 feet above sea level; flows eastward 2 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 2,400 feet. Mount Goddard sheet.

**Rancheria Creek (L);** Amador County; rises in the central part of T. 7 N., R. 12 E., Mount Diablo base and meridian, at altitude 2,950 feet above sea level; flows south of west 14 miles into Dry Creek (tributary through Mokelumne River to San Joaquin River); fall, 2,300 feet; principal tributary, Amador Creek. Jackson sheet.

**Rancheria Creek (L);** Fresno County; Sierra National Forest; rises in the eastern part of T. 11 S., R. 28 E., Mount Diablo base and meridian; on the west slope of Crown Mountain, at altitude 9,000 feet above sea level; flows, in general, westward 11 miles into North Fork of Kings River (tributary through Kings River to the San Joaquin); fall, about 6,000 feet; principal tributaries, Statum Creek and North Fork. Tehipite sheet.

**Rancheria Creek (R);** Tulare County; Sequoia National Forest; rises in the south-central part of T. 19 S., R. 30 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows, in general, southwestward 5 miles into Bear Creek (tributary through North Fork of Tule River to Tule River and thus to Tulare Lake basin); fall, 4,000 feet. Kaweah sheet.

**Rancheria Creek (R);** Tuolumne County; Yosemite National Park; rises in the northwestern part of T. 3 N., R. 23 E., Mount Diablo base and meridian, in Kerrick Meadow, at altitude 9,500 feet above sea level; flows southwestward 22 miles to its junction with Tuolumne River (tributary to the San Joaquin) at the upper end of Hetch Hetchy Valley; fall, 3,800 feet; principal tributaries, Stubblefield Canyon, Tilden Canyon, Deep Canyon, and Tiltill creeks; upper course of the creek lies through Kerrick Canyon. Yosemite National Park map.

**Rancheria Creek, North Fork (R);** Fresno County; Sierra National Forest; rises in the northeastern part of T. 11 S., R. 28 E., Mount Diablo base and meridian, at altitude 9,800 feet above sea level; flows, in general, southwestward 5 miles into Rancheria Creek (tributary through North Fork of Kings River to Kings River and thus to the San Joaquin); fall above the junction with Rancheria Creek, 2,500 feet. Tehipite sheet.

**Rattlesnake Creek (R);** Fresno County; Sierra National Forest; rises in the northwestern part of T. 11 S., R. 30 E., Mount Diablo base and meridian, in Grouse Meadow, at altitude 10,000 feet above sea level; flows southward 3 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 4,800 feet, of which 2,800 feet is made in the last mile. Tehipite sheet.

**Rattlesnake Creek (L);** Fresno and Tulare counties; rises in the southern part of T. 14 S., R. 27 E.; takes a general southerly course into San Joaquin Valley; length above the valley, 18 miles; sinks south of Yetttem. Land Office map, 1907.

**Rattlesnake Creek (R);** Tulare County; Sequoia National Forest; rises in the southwestern part of T. 17 S., R. 32 E., Mount Diablo base and meridian, on the eastern slope of the Great Western Divide, at altitude 11,000 feet above sea level; flows eastward 4 miles, then northeastward  $3\frac{1}{2}$  miles into Kern River, 1 mile above lower Funston Meadow; fall, 4,500 feet. Kaweah and Olancho sheets.

**Rattlesnake Creek (L);** Tulare County; Kern National Forest; rises in the central part of T. 22 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,400 feet above sea level; flows, in general, northwestward 12 miles into Kern River; fall, 3,500 feet; principal tributaries, Bonita and Smith creeks. Olancho sheet.

**Rattlesnake Creek (R);** Tuolumne County; rises in the western part of T. 1 S., R. 16 E., Mount Diablo base and meridian, near Bigoak Flat, at altitude 3,100 feet; flows southwestward  $1\frac{1}{2}$  miles, then southward  $2\frac{1}{2}$  miles into Moccasin Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,500 feet; intermittent. Sonora sheet.

**Rattlesnake Lake;** Madera County; Sierra National Forest, in Cassidy Meadow; no inlet mapped; outlet, a stream  $1\frac{1}{2}$  miles long flowing southward to South Fork of San Joaquin River (head of San Joaquin); elevation, 5,583 feet; fall of outlet, 1,383 feet. Kaiser sheet.

**Red Creek (L);** Madera and Mariposa counties; Yosemite National Park; rises on the northern slope of Red Peak (altitude, 11,700 feet); flows northwestward 3 miles into Gray Creek (tributary through Clark Fork and Ottoway Creek to Illilouette Creek and thus through Merced River to the San Joaquin); fall, 2,800 feet. Yosemite National Park map.

**Red Peak Fork (L);** rises in Madera County, on the north slope of Red Peak,  $1\frac{1}{2}$  miles northwest of Merced Peak, at altitude 11,500 feet above sea level; flows northeastward 4 miles into Merced River (tributary to the San Joaquin); one-half mile above Washburn Lake; fall, 3,300 feet, of which 1,000 feet occurs in the first mile and 1,200 feet in the last mile of its course. Mount Lyell sheet.

**Red Spur Creek (R);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 16 S., R. 32 E., Mount Diablo base and meridian, on the south slope of Red Spur, at altitude 11,700 feet above sea level; flows southeastward  $3\frac{1}{2}$  miles into Kern River; fall, 4,500 feet. Mount Whitney sheet.

**Redrock Creek (R);** Tulare County; Kern National Forest; rises in Redrock Meadows, at altitude 8,900 feet above sea level; flows southwestward  $4\frac{1}{2}$  miles into Ninemile Creek (tributary to Kern River) near Jordan Hot Springs; fall, 2,400 feet. Olancha sheet.

**Reds Creek (L);** Madera County; rises in eastern part of the Sierra National Forest, in a small lake near the summit of the divide, at altitude 9,550 feet above sea level; flows southwestward 2 miles, then southward 1 mile through Sotcher Lake, then very irregularly westward to its junction with the Middle Fork of San Joaquin River in Reds Meadows; fall, about 2,000 feet; the basin contains a number of mineral springs, including Soda Springs, one-half mile west of the north end of Sotcher Lake, and Hot Sulphur Spring, one-half mile south of Sotcher Lake. Mount Lyell sheet.

**Redwood Creek (L);** Fresno County; Sequoia National Forest; rises in the northwestern part of T. 13 S., R. 29 E., Mount Diablo base and meridian, on the eastern slope of Sequoia Ridge, at altitude 6,700 feet above sea level; flows northward into South Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 4,000 feet. Tehipite sheet.

**Redwood Creek (R);** Tulare County; Sequoia National Forest; rises in the north central part of T. 14 S., R. 28 E., Mount Diablo base and meridian, on the north slope of Redwood Mountain, at altitude 6,500 feet above sea level; flows east of south 7 miles into North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 2,900 feet; principal tributary, East Fork. Tehipite sheet.

**Redwood Creek (R);** Tulare County; Sequoia National Park; rises in the northeastern part of T. 17 S., R. 30 E., at altitude 7,500 feet above sea level; flows southward  $1\frac{1}{2}$  miles into East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,000 feet; intermittent. Kaweah sheet.

**Redwood Creek, East Fork (L);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 14 S., R. 28 E., Mount Diablo base and meridian, on the north slope of Big Baldy Ridge, at altitude 7,300 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles into Redwood Creek (tributary through North Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 1,900 feet. Tehipite sheet.

**Reed Creek (L);** Tuolumne County; Stanislaus National Forest; rises in the central part of T. 3 N., R. 19 E., at altitude 7,600 feet above sea level; flows southwestward 15 miles into Clavey River (tributary through Tuolumne River to the San Joaquin); fall, 4,500 feet; principal tributaries, Reynolds and Jawbone creeks. Dardanelles, Big Trees, and Sonora sheets.

**Reflection Lake;** Tulare County; Sierra National Forest, north of Kings-Kern divide; principal inlet, East Creek; outlet, East Creek to Bubbs Creek (tributary to South Fork of Kings River); altitude, 10,168 feet; fall of outlet, 1,700 feet. Mount Whitney sheet.

**Register Creek (R);** Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 2 N., R. 23 E., Mount Diablo base and meridian, at altitude 10,200 feet above sea level; flows southward 2 miles, southwestward  $1\frac{1}{2}$  miles, then almost directly south 1 mile to its junction with Tuolumne River (tributary to San Joaquin River); fall, 4,700 feet, of which 3,000 feet occurs in the mile above its entrance to the San Joaquin. Yosemite National Park map.

**Relief Creek (L);** Tuolumne County; rises in the northern part of T. 4 N., R. 21 E., Mount Diablo base and meridian, 2 miles southeast of Relief Peak, at altitude 10,000 feet above sea level; flows, in general, northwestward 10 miles to the northeastern part of T. 5 N., R. 20 E., where it unites with Dead Man Creek to form Middle Fork of Stanislaus River (tributary to San Joaquin River); fall, above junction with Dead

**Man Creek**, 3,700 feet; principal tributaries, Grouse Creek and East Fork; shorter tributaries drain the north slope of Granite Dome and Relief Valley. Dardanelles sheet.

**Relief Creek, East Fork (R)**; Tuolumne County; rises in the southeastern part of T. 5 N., R. 21 E., Mount Diablo base and meridian, at altitude 9,600 feet above sea level; flows northwestward  $7\frac{1}{2}$  miles, passing through Kennedy Lake into Relief Creek (tributary through Middle Fork of Stanislaus River to Stanislaus River and thus to the San Joaquin); fall, 2,600 feet, of which 1,800 feet occurs in the  $2\frac{1}{2}$  miles above Kennedy Lake and 800 feet in the  $3\frac{1}{2}$  miles below the lake. Dardanelles sheet.

**Return Creek (R)**; Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 3 N., R. 24 E., Mount Diablo base and meridian, in a glacial lakelet on the north slope of Red Peak (altitude, 11,959 feet); flows southward 2 miles, then takes a general southwesterly course to its junction with the Tuolumne (tributary to San Joaquin River) in the western part of T. 1 N., R. 23 E.; length, 14 miles; fall, 5,000 feet; enters the Tuolumne through a deep canyon; basin contains many small glacial lakes; principal tributaries, East Fork, Spiller, and Matterhorn Canyon creeks. Yosemite National Park map.

**Return Creek, East Fork (L)**; Tuolumne County; Yosemite National Park; rises in the south central part of T. 2 N., R. 24 E., Mount Diablo base and meridian, on the south slope of Shepherd Crest at altitude 10,100 feet above sea level; flows westward 3 miles into Return Creek (tributary through Tuolumne River to San Joaquin River); fall, 1,600 feet; principal tributary, a stream from McCabe Lake. Yosemite National Park map.

**Return Creek, West Fork (R)**; Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 2 N., R. 23 E., Mount Diablo base and meridian, at altitude 10,000 feet above sea level; flows southeastward 3 miles into Return Creek (tributary through Tuolumne River to San Joaquin River); fall, 2,500 feet; principal tributary, Matterhorn Canyon Creek. Yosemite National Park map.

**Reynolds Creek (L)**; Tuolumne County; Stanislaus National Forest; rises near the central part of T. 3 N., R. 19 E., at altitude 7,200 feet above sea level; flows southwestward  $8\frac{1}{2}$  miles into Reed Creek (tributary through Clavey River to Tuolumne River and thus to the San Joaquin); fall, 2,200 feet. Dardanelles sheet.

**Rifle Creek (L)**; Tulare County; Sequoia National Forest; rises in the central part of T. 18 S., R. 32 E., Mount Diablo base and meridian, at altitude 10,500 feet above sea level; flows west of south 3 miles into Little Kern River (tributary to Kern River); fall, 3,300 feet. Kaweah sheet.

**Roaring River (L)**; rises in Tulare County, in the western part of T. 15 S., R. 32 E., on the northern slope of the Great Western Divide, just north of Triple Divide Peak (altitude, 12,657 feet); flows northward 5 miles, then, in general, northwestward 10 miles to its junction with the South Fork of Kings River in T. 13 S., R. 31 E.; fall, 5,400 feet; many branching tributaries. The basin is about 13 miles long north to south, and 14 miles in maximum width; it contains many broad, high, open meadows; on its eastern rim are many peaks exceeding 13,000 feet in altitude; its western rim is lower, Mount Silliman (11,188 feet) being the highest point. Tehipite sheet.

**Rock Canyon Creek (R)**; Tuolumne County; Yosemite National Park, rises in the southwestern part of T. 3 N., R. 23 E., Mount Diablo base and meridian, on north slope of Suicide Ridge, at altitude 10,500 feet above sea level; flows southwestward through Rock Island Lake to Crazy Mule Gulch, through which it enters Piute Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,300 feet. Yosemite National Park map.

**Rock Creek (R)**; Calaveras, Stanislaus, and San Joaquin counties; rises in the northwestern part of T. 2 N., R. 12 E., Mount Diablo base and meridian, on the western slope of Bear Mountain, at altitude 2,000 feet above sea level; flows southwestward, passing through the reservoir in Salt Spring Valley and discharges into French Camp

Creek (tributary to San Joaquin River) in the southeastern part of T. 1 N., R. 9 E.; length, about 18 miles; fall, about 1,900 feet. Jackson sheet. Land Office map of California, 1907.

**Rock Creek (R);** Fresno County; Sierra National Forest; rises in the western part of T. 9 S., R. 26 E., Mount Diablo base and meridian, in Cuts Meadow, at altitude 7,500 feet above sea level; flows southward 3 miles into Dinkey Creek (tributary to North Fork of Kings River and thus through Kings River to the San Joaquin); fall, 1,100 feet. Kaiser sheet.

**Rock Creek (R);** Fresno County; rises in a small lake 1 mile east of Pincushion Peak, at altitude 9,300 feet above sea level; flows irregularly southward 5 miles into Four Forks Creek (tributary to South Fork San Joaquin River, head of San Joaquin); fall, 3,200 feet. Kaiser sheet.

**Rock Creek (R);** Madera County; rises in the north-central part of T. 7 S., R. 23 E., in Brown Meadow, at altitude 6,500 feet above sea level; flows southeastward about 8 miles to its junction with the San Joaquin, in the southern part of T. 7 S., R. 24 E.; fall, 3,800 feet. Kaiser sheet.

**Rock Creek (L);** Tulare County; Sequoia National Forest; rises in small lakes in glacial cirques south of Whitney Pass and west of Mount Le Conte; flows southwestward 3 miles, then irregularly westward 7 miles to its junction with Kern River; fall from the highest of the lakes to a point at which the creek enters Kern River 5,200 feet; principal tributaries, Perrin and Guiot creeks and South Fork of Rock Creek. Mount Whitney and Olancha sheets.

**Rock Creek, South Fork (L);** rises in the northern part of T. 17 S., R. 34 E., Mount Diablo base and meridian, 2 miles north of Whitney Meadows, at altitude 10,900 feet above sea level; flows west and northwest  $4\frac{1}{2}$  miles into Rock Creek (tributary to Kern River); fall, 14,000 feet. Olancha sheet.

**Rock Island Lake;** Tuolumne County; Yosemite National Park, southwestern part of T. 3 N., R. 23 E., Mount Diablo base and meridian; inlet and outlet, Rock Canyon Creek (tributary through Crazy Mule Gulch to Piute Creek, and thus through Tuolumne River to the San Joaquin); altitude, 9,850 feet; the lake is nearly a mile long and one-eighth mile in maximum width; marshy at upper end. Yosemite National Park map.

**Rockslide Lake;** Tulare County; Sequoia National Forest; southeastern part of T. 15 S., R. 32 E., on Kern-Kaweah River (tributary to Kern River) 1 mile above Junction Meadow; altitude, 9,100 feet. Mount Whitney sheet.

**Rocky Basin Lakes;** Tulare County; Sequoia National Forest; western part of T. 17 S., R. 34 E., Mount Diablo base and meridian; a group of four lakes, three without outlet and one discharging by a stream  $3\frac{1}{2}$  miles long flowing southeastward to Golden Trout Creek (tributary to Kern River); altitude of the highest lake, 10,850 feet; altitude of the lake discharging to Golden Trout Creek, 10,750 feet. Olancha sheet.

**Rocky Creek (R);** Tulare County; Sequoia National Forest; rises in the western part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows southwestward 6 miles into South Fork of Tule River (tributary through Tule River to Tulare Lake basin) in the Tule Indian Reservation; fall, 4,600 feet. Kaweah sheet.

**Rodgers Canyon Creek (R);** Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 2 N., R. 23 E., in Rodgers Lake, at altitude 9,500 feet above sea level; flows southwestward 5 miles into Tuolumne River (tributary to San Joaquin River); fall, 2,500 feet. Yosemite National Park map.

**Rodgers Creek (R);** Fresno County; Sierra National Forest; rises in the northeastern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, on Spanish Mountain (altitude 10,044 feet); flows northeastward 2 miles, then southeastward 2 miles into Crown Creek (tributary to Middle Fork of Kings River and thus through Kings River to the San Joaquin); fall, 3,000 feet. Tehipite sheet.

**Rodgers Lake**; Tuolumne County; Yosemite National Park; southwestern part of T. 2 N., R. 23 E., Mount Diablo base and meridian; outlet, Rodgers Canyon Creek to Tuolumne River (tributary to San Joaquin River); altitude 9,500 feet. Yosemite National Park map.

**Roger Creek** (L); Tuolumne County; rises in the southern part of T. 3 S., R. 15 E., Mount Diablo base and meridian, at altitude 1,200 feet above sea level; flows northwestward  $4\frac{1}{2}$  miles, then somewhat north of west 2 miles into the pond formed on Tuolumne River (tributary to the San Joaquin River) by the Lagrange dam; fall, about 800 feet; intermittent. Sonora sheet.

**Romero Creek** (L); Merced County; rises in the western part of T. 9 S., R. 7 E.; flows eastward to San Joaquin Valley; length, 12 miles; sinks below the foothills; carries water only during the rainy season. Land Office map of California, 1907; Fisk and Johnson map.

**Rose Creek** (L); Tuolumne County; rises in the southwestern part of T. 4 N., R. 17 E., Mount Diablo base and meridian, at altitude 4,900 feet above sea level; flows, in general, southwestward 7 miles and westward 7 miles into Stanislaus River (tributary to San Joaquin River); fall, 3,900 feet; principal tributaries, Knight and Eagle creeks. Gaging station near Jupiter (1910-1912). Big Trees sheet.

**Rose Lake**; Fresno County; Sierra National Forest, just northeast of Mount Hooper and 2 miles east of the east line of T. 7 S., R. 27 E., two small inlets; outlet, a stream three-fourths mile long, flowing northward to the stream connecting Marie Lake with the South Fork of Bear Creek (tributary to South Fork San Joaquin River); elevation, 10,672 feet; fall of outlet, 800 feet. Mount Goddard sheet.

**Ross Creek** (R); Madera County; rises in the southeastern corner of T. 7 S., R. 23 E., on the east slope of Whiskey Ridge, at altitude 6,000 feet above sea level; flows south-eastward 5 miles to its junction with San Joaquin River, in the central part of T. 8 S., R. 24 E.; fall, 3,500 feet, of which 1,000 feet occurs in one-half mile at the mouth. Kaiser sheet.

**Rough and Ready Creek** (R); Tuolumne County; rises in the central part of T. 1 N., R. 15 E., Mount Diablo base and meridian, at altitude 2,700 feet above sea level; flows southwestward 4 miles, then southeastward 1 mile into Tuolumne Creek; fall, 1,700 feet; principal tributary, Blanket Creek; intermittent. Sonora sheet.

**Rough Creek** (R); Fresno County; Sierra National Forest; rises in the northern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, on the northwest slope of Spanish Mountain, at altitude 9,500 feet, above sea level; flows, in general, southwestward  $5\frac{1}{2}$  miles into Kings River (tributary to San Joaquin River); fall, 7,700 feet. Tehipite sheet.

**Rube Creek** (R); Fresno County; rises in the Sierra National Forest, in Rube Meadow, at altitude 7,200 feet above sea level; flows west of south 3 miles into South Fork San Joaquin River (head of San Joaquin); fall, 3,200 feet, of which 1,500 feet occurs in less than a quarter of a mile at the mouth. Kaiser sheet.

**Rush Creek** (R); Fresno County; Sierra National Forest; rises in the northwestern part of T. 10 S., R. 25 E., Mount Diablo base and meridian; flows, in general, southeastward to its junction with Big Creek (tributary to Kings River and thus to the San Joaquin); length, 10 miles; principal tributary, Taylor Creek. Gaging station near Ockenden (1910-1912). Kaisersheet; Land Office map of California, 1907; Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Rush Creek** (L); Mariposa County; Sierra National Forest; rises in the northeastern part of T. 5 S., R. 20 E., on the east slope of Devil Peak; altitude, 7,079 feet; flows eastward 2 miles, then northeastward 1 mile into South Fork of Merced River (tributary through Merced River to the San Joaquin); fall, 2,500 feet. Yosemite sheet.

**Rush Creek** (L); Tuolumne County; Stanislaus National Forest; rises in the north-central part of T. 3 N., R. 18 E., at altitude 6,000 feet above sea level; flows southwest-

ward 6 miles into Hull Creek (tributary through Clavey River to Tuolumne River and thus to the San Joaquin); fall, 700 feet; middle course marshy. Big Trees sheet.

**Rutherford Lake;** Madera County; Sierra National Forest, 1 mile northeast of Fernandez Pass; outlet, a stream about 1 mile long, flowing, in general, eastward to the west fork of Granite Creek (tributary through Granite Creek to Middle Fork of San Joaquin River); elevation, 9,700 feet; fall of outlet, about 300 feet. Mount Lyell sheet.

**Sadlier Lake;** Madera County; Sierra National Forest, 1 mile southeast of Isberg Peak and one-half mile east of McClure Lake; inlet, East Fork Granite Creek, which flows through it to its junction with West Fork Granite Creek (tributary to Middle Fork of San Joaquin) and streams from McClure and several smaller lakes; elevation, 9,350 feet. Mount Lyell sheet.

**Salado Creek (L);** Stanislaus County; rises in the southern part of T. 6 S., R. 6 E.; flows northeastward 5 miles, then eastward 5 miles, discharges into San Joaquin Valley; carries water only during the rainy season. Orestimba-Panoche-Cantua special map.

**Salado Creek, Little (L);** Stanislaus County; rises in the western part of T. 6 S., R. 7 E.; flows eastward into San Joaquin Valley; carries water only during the rainy season. Orestimba-Panoche-Cantua special map.

**Salmon Creek (L);** Tulare County; Sierra National Forest; rises in the west-central part of T. 24 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows, in general, northwestward 8 miles, then southwestward 2 miles into Kern River, passes through Big and Horse meadows; in Big Meadow receives a branch coming from the eastern slope of Sirretta Peak; fall, 4,600 feet, of which 1,000 feet is made at Salmon Falls 2 miles above the mouth. Kernville sheet.

**Salt Creek (R);** Fresno County; rises in the southwestern part of T. 18 S., R. 14 E.; flows northeastward 12 miles to its junction with Cantua Creek, near the center of T. 17 S., R. 15 E.; carries water only during the rainy season. Fisk and Johnson map.

**Salt Creek (L);** Kern County; rises in the western part of T. 9 N., R. 20 W., at altitude 5,500 feet above sea level; flows, in general, east of north toward Buena Vista Lake Reservoir in San Joaquin Valley; length, about 10 miles; intermittent. Mount Pinos and Tejon sheets.

**Salt Creek (L);** Merced and Fresno counties; rises in the northern part of T. 13 S., R. 10 E.; flows southeastward 6 miles to Mercer Creek (to San Joaquin Valley). Land Office map of California, 1907.

**Salt Creek (L);** Tulare County; Sequoia National Park; rises in the southeastern part of T. 17 S., R. 29 E., Mount Diablo base and meridian, on the north slope of Case Mountain, at altitude 5,500 feet above sea level; flows northwestward 5 miles into Kaweah River (tributary to Tulare Lake basin); fall, 4,500 feet; intermittent. Kaweah sheet.

**Salt Gulch Creek (L);** Calaveras County; rises in the southern part of T. 4 N., R. 11 E., Mount Diablo base and meridian, at altitude 800 feet above sea level; flows northwestward 3 miles into Mokelumne River (tributary to San Joaquin River); fall, 400 feet. Jackson sheets.

**San Antonio Creek (R);** Calaveras County; rises in the northeastern part of T. 5 N., R. 15 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows southwestward 30 miles into South Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 4,100 feet; principal tributary, Indian Creek. Big Trees and Jackson sheets.

**San Domingo Creek (R);** Calaveras County; rises in the eastern part of T. 4 N., R. 14 E., Mount Diablo base and meridian, at altitude 3,300 feet above sea level; flows, in general, southwestward 18 miles into South Fork of Calaveras River (tributary through Calaveras River to the San Joaquin); fall, 2,300 feet; principal tributary, French Gulch Creek. Big Trees and Jackson sheets.

**San Emigdio Creek** (L); Kern County; rises in the southern part of T. 9 N., R. 21 W.; flows, in general, west of north toward Buena Vista reservoir in San Joaquin Valley; intermittent. Gaging station at San Emigdio ranch house (1894-95). Mount Pinos sheet.

**San Joaquin River**; rises in the high Sierra southeast of the Yosemite National Park, where it is formed by the junction of Middle and South forks in the northern part of T. 6 S., R. 25 E., Mount Diablo base and meridian; flows southwestward to the trough of San Joaquin Valley, where it takes a northwesterly course to Suisun Bay, into which it discharges about 50 miles by water from San Francisco; navigable as far as Stockton, about 50 miles above its mouth; total length, approximately 350 miles—125 miles in the mountains and 225 in the valley.

The South Fork, which drains the larger area and is therefore considered the head of the main stream, rises in Martha Lake, southwest of Mount Goddard, at altitude 11,007 feet above sea level; flows northwestward about 40 miles, then turns to the west and southwest to join the main fork; total length, 44 miles; principal tributaries, Evolution, Piute, Bear, and Mono creeks. The basin is bordered on the east by the Sierra Nevada, whose crest it touches for a distance of 40 miles. Elevations range from 4,000 feet at the junction with the main fork to more than 13,000 feet at the highest summits. The tributaries drain innumerable glacial lakelets, of which Wanda, Evolution, Desolation, Italy, and Muriel lakes lie more than 11,000 feet above sea level.

The important tributaries of the San Joaquin below the junction of the South and Middle forks drain parts of the west slope of the Sierra, take a course parallel to the upper San Joaquin—that is, southwest—and enter from the east. In order from south to north these are Fresno, Chowchilla, Merced, Tuolumne, Calaveras, and Mokelumne rivers. The principal streams from the Sierra south of the upper San Joaquin are, in order from north to south, Kings, Kaweah, Tule, and Kern rivers. Kaweah, Tule, and Kern rivers are not directly tributary to the San Joaquin, for they are lost in the Tulare Lake depression, which, under normal conditions, sends no water to the San Joaquin. Kings River discharges directly into the San Joaquin.

The San Joaquin basin is the south lobe of the great central valley of California, and lies southeast of an imaginary line drawn from San Francisco Bay to Lake Tahoe. The rim of the basin is formed by the crest of the Sierra Nevada at the east, the Tehachapi Range at the south, and the Coast Range at the west. The basin is somewhat larger than the Sacramento basin, with which it merges at the north. It is about 280 miles long (northwest to southeast), about 125 miles wide, is roughly rectangular in shape, and about 32,700 square miles in area.

Topographically, the San Joaquin basin comprises three parallel strips of country exhibiting marked physical differences—(1) the eastern slope of the Coast Range, having an average width of about 15 miles and a comparatively gentle slope, incised by the action of short torrential intermittent streams; (2) the western slope of the Sierra, about 65 miles in average width, comprising a long, steep slope, deeply cut by many perennial streams; and (3) the central plain, known as the San Joaquin Valley, having an average width of nearly 45 miles and a very light slope northwestward.

The eastern slope of the Coast Range comprises an area somewhat less than 4,000 square miles in extent and ranging in elevation from a few hundred feet at the edge of the valley to a few thousand feet at the summit of the range. The rocks of this area are chiefly sandstone, shales, and conglomerates. The Sierra slope comprises an area of about 16,000 square miles, ranging in altitude from a few hundred feet in the foothills to more than 14,000 feet at the crest of the Sierra. The highest peak, Mount Whitney, near the south end of the range, rises 14,501 feet above sea level.

The central valley is about 250 miles long, 45 miles wide, and comprises an area of 11,500 square miles. It is divided into an east side and a west side plain by the axial trough or line of lowest depression, which is everywhere much nearer the western

than the eastern foothills. The general slope of the valley is upward from north to south and from the central axis toward the hills on each side. The topography of the valley is the result of a combination of alluvial fan surfaces which have their apexes at the mouths of the canyons of the tributary streams and extend outward into the valley, coalescing laterally and terminally.

About 65 per cent of the Sierra slope is included in the national forests and parks. The foothills of the Sierra are well covered with grass, brush, and timber; above the foothill zone a heavy growth of timber extends to an altitude of about 10,000 feet, above which little timber is found. The famous California big trees (*Sequoia gigantea*) grow on the Sierra slope of this basin. The upper reaches of the Coast Range support a light growth of brush and timber, but the foothills are bare. The main valley is treeless except along water courses or in irrigated areas.

The mean annual precipitation in the San Joaquin basin varies with elevation, latitude, and longitude. The southern part of the central valley is strictly arid, the rainfall there being less than 5 inches annually; northward along the trough of the valley the rainfall gradually increases, and near the north end the average is nearly 20 inches. The west-side slope has light rainfall, which increases with elevation up to about 5,000 feet and then decreases somewhat up to the summit. The same progressive increase from south to north that exists in the valley continues along the summit. This is well shown by the total rainfall from the northern and southern Sierra, which amounts to about 11,500,000 acre-feet annually. Of this amount, about 3,000,000 acre-feet is supplied by the streams south of the upper San Joaquin from about 7,500 square miles, and 8,500,000 acre-feet from about 5,100 square miles drained by the San Joaquin and its tributaries from the more northern Sierra. The precipitation occurs during the "rainy season," which begins in the late fall and ends in early spring. Snowfall is heavy in the higher mountain region, and does not disappear until late in the summer.

Large areas in the north end of San Joaquin Valley are inundated by the spring floods unless protected by artificial levees. The greater part of the flood waters come from the Sacramento system, but the most disastrous effects result from simultaneous floods in the two systems.

The minimum flow of the streams is sufficient to generate about 600,000 horsepower without storage. This amount could be increased by storage to about 1,500,000 horsepower. The most important streams for power development are the upper San Joaquin, Kings, and Kern rivers.

Gaging stations near Friant (Pollasky), (1907-1912); Herndon (1870-1910), near Newman (1912), at Hamptonville (1878-1884), Newman (1912). For list of stations maintained in streams in San Joaquin basin to 1912, inclusive, see pages 100-102.

Surveys and data: Mount Lyell and Kaiser sheets, Water-Supply Paper, U. S. Geol. Survey, No. 271, 1911, pp. 165-168.

**San Joaquin River, Middle Fork (R);** rises in Thousand Island Lake, in the Sierra National Forest, in the northern part of Madera County, about 5 miles east of Mount Lyell, at altitude of 9,850 feet above sea level, flows southeastward about 6 miles, southward 8 miles, then southwest about 11 miles to its junction with the South Fork; fall in the 25 miles below Thousand Island Lake, 5,850 feet; principal tributary, North Fork of San Joaquin, which enters at Junction Butte; many small tributaries. In the upper part of the basin of the Middle Fork lakes are numerous. Mount Lyell and Kaiser sheets.

**San Joaquin River, North Fork [of Middle Fork] (R);** Madera County; rises in northern part of the Sierra National Forest, on the southeastern slope of Mount Lyell (altitude, 13,090 feet); flows irregularly southward 16 miles to junction with Middle Fork of San Joaquin River near Junction Butte; fall, 7,000 feet; tributaries, numerous, but only three are named on the maps—Long, Dike, and Iron creeks. The basin of the North Fork contains fewer lakes than that of the Middle Fork. Mount Lyell sheet.

**San Joaquin River, North Fork (R);** Madera County; rises in the northern part of T. 5 S., R. 22 E., at altitude 8,300 feet above sea level; flows southward to its junction with San Joaquin River, in the central part of T. 9 S., R. 23 E.; length, 24 miles; principal tributaries, Willow, South Fork, and Whiskey creeks, all from the east; fall, about 7,000 feet; Kaiser and Mariposa sheets; map of the Sierra Nevada of central California, publication No. 12 of the Sierra Club, January, 1896.

**San Joaquin River, North Fork, South Fork of (L);** Madera County; rises in the western part of T. 7 S., R. 23 E., where it is formed by the junction of Sand and Browns creeks; flows southward 6 miles into Little North Fork of San Joaquin River, in the western part of T. 8 S., R. 23 E.; fall below junction, 1,500 feet. Kaiser sheet.

**San Joaquin River, South Fork.** See San Joaquin River.

**San Luis Creek (L);** Merced County; rises in the central part of T. 11 S., R. 7 E.; flows irregularly northeastward about 18 miles; enters San Joaquin Valley between Ingomar and Volta; sinks below the foothills. Land Office map of California, 1907. Fisk and Johnson map.

**Sand Creek (L);** Fresno and Tulare counties; rises in the southwestern part of T. 14 S., R. 26 E., Mount Diablo base and meridian; flows southwestward to San Joaquin Valley; sinks below the foothills. Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Sand Creek (R);** Madera County; rises in the southern part of T. 6 S., R. 23 E., on the western slope of Chiquito Ridge, at altitude 7,500 feet above sea level; flows southwestward 7 miles to the South Fork of Little North Fork of San Joaquin River at Browns Creek; fall above junction with Browns Creek, 3,900 feet; principal tributary, West Fork; the upper course of this stream lies through a broad, open meadow. Kaiser sheet.

**Sand Creek, West Fork (R);** Madera County; rises in the southwestern part of T. 6 S., R. 23 E.,  $1\frac{1}{2}$  miles south of Chilkoot Lake, at altitude 7,500 feet above sea level; flows west of south  $3\frac{1}{2}$  miles into Sand Creek (tributary to South Fork of Little North Fork of San Joaquin River); fall above Sand Creek, 2,300 feet. Kaiser sheet.

**Sandy Creek, Big (L);** Fresno County; rises in the southeastern part of T. 10 S., R. 23 E., on the southern slope of Big Sandy Bluffs, at altitude 3,000 feet above sea level; flows southwestward 1 mile, then northward through Big Sandy Valley to its junction with San Joaquin River, in the central part of T. 10 S., R. 22 E.; length, about 10 miles; fall, 2,700 feet, of which 1,000 feet occurs in the first half mile at head; principal tributary, Little Sandy Creek, called Bold Creek on Sierra Club's map of the Sierra Nevada of central California; intermittent. Kaiser and Mariposa sheets.

**Sandy Creek, Little (R);** Fresno County; rises in the extreme southwestern part of T. 9 S., R. 23 E.; on the north slope of Backbone Mountain, at altitude 2,200 feet above sea level; flows, in general, southward to its junction with Big Sandy Creek (tributary to San Joaquin River) in the western part of T. 10 S., R. 23 E.; fall, about 800 feet; intermittent. Kaiser sheet.

**Santiago Creek (L);** Kern County; rises in the northern part of T. 9 N., R. 22 W., at altitude 7,000 feet above sea level; flows, in general, westward 5 miles, then northward toward Buena Vista Lake Reservoir in San Joaquin Valley; intermittent. Mount Pinos sheet.

**Sawmill Creek (L);** Eldorado County; rises in the northwestern part of T. 9 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,500 feet above sea level; flows southward 1 mile into French Creek (tributary through Big Canyon Creek to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 200 feet. Placer-ville sheet.

**Saxon Gulch Creek (L);** Mariposa County; Sierra National Forest; rises in the southeastern part of T. 4 S., R. 13 E., Mount Diablo base and meridian, at altitude 3,300 feet above sea level; flows northwestward 3 miles, then northward  $1\frac{1}{2}$  miles into Merced River (tributary to San Joaquin River); fall, 2,100 feet. Yosemite sheet.

**Scepter Creek** (R); Fresno County; Sierra National Forest; rises in the southwestern part of T. 10 S., R. 29 E., Mount Diablo base and meridian, at altitude 10,000 feet above sea level; flows southeastward 7 miles into Crown Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); fall, 3,000 feet. Mount Goddard and Tehipite sheets.

**Scodie Canyon Creek** (L); Kern County; Sierra National Forest; rises in the southern part of T. 26 S., R. 36 E., Mount Diablo base and meridian, at altitude 6,500 feet above sea level; flows westward 3 miles, then northwestward 6 miles; sinks before reaching South Fork of Kern River (tributary to Kern River); fall, 3,600 feet; intermittent. Kernville sheet.

**Scott Creek** (L); Eldorado County; rises in the western part of T. 8 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,300 feet above sea level; flows westward 2 miles into South Fork of Cosumnes River (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 1,000 feet. Pyramid Peak sheet.

**Senger Creek** (R); Fresno County; rises in the Sierra National Forest, on Mount Senger (altitude, 12,253 feet); flows southwestward 4 miles into South Fork of San Joaquin River (head of San Joaquin); fall, 3,800 feet. Mount Goddard sheet.

**Shadow Creek** (R); Madera County; flows from a small glacier on the south slope of Ritter Mountain (elevation, 13,156 feet); course, somewhat north of east to junction with Middle Fork of San Joaquin River; length, about 5 miles; fall, 3,700 feet; flows through several lakes, of which the largest and lowest is Shadow Lake; tributaries, short, unnamed streams, draining northern slope of Volcanic Ridge and the eastern slope of the Minarets. The basin of this creek contains a dozen or more small glacial lakes and several of the tributaries head in living glaciers. Mount Lyell sheet.

**Shadow Lake**; Madera County; northeastern part of the Sierra National Forest, 1 mile north of eastern end of Volcanic Ridge; inlet, Shadow Creek, which flows through the lake to its junction with Middle Fork of San Joaquin River; elevation, 8,750 feet; fall of Shadow Creek in the half mile between Shadow Lake and the San Joaquin, about 600 feet. Mount Lyell sheet.

**Shamrock Lake**; Tuolumne County; Yosemite National Park; central part of T. 2 N., R. 23 E., Mount Diablo base and meridian, three-fourths mile south of Tallulah Lake and 1 mile south of Doe Lake; no outlet mapped, but contours indicate a pass northward to a stream connecting Tallulah Lake with Piute Creek; very small. Yosemite National Park map.

**Shaver Lake**; Fresno County; T. 9 S., on line between Rs. 24 and 25; inlet, Stevenson Creek and several smaller streams; outlets, Stevenson Creek to San Joaquin River; elevation, 5,271 feet; just below the lake the water of Stevenson Creek is diverted to the flume of the Fresno Flume and Irrigation Co.; the lake is  $1\frac{1}{2}$  miles long and one-half mile in maximum width. Kaiser sheet.

**Sheep Creek** (L); Fresno County; Sequoia National Forest; rises in the southern part of T. 13 S., R. 30 E., Mount Diablo base and meridian, at altitude 9,500 feet above sea level; flows, in general, northeastward 4 miles into South Fork of Kings River (tributary through Kings River to the San Joaquin); near Cedar Grove Hotel; fall, 5,000 feet; many short, branching tributaries. Tehipite sheet.

**Sheep Creek** (R); Tulare County; Sequoia National Forest; rises in the northern part of T. 16 S., R. 28 E., Mount Diablo base and meridian, on the west slope of Sheep Ridge, at altitude 3,000 feet above sea level; flows southeastward 4 miles into North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 1,900 feet. Tehipite sheet.

**Sherlock Gulch Creek** (L); Mariposa County; rises in the southern part of T. 4 S., R. 18 E., Mount Diablo base and meridian, at altitude 3,250 feet above sea level; flows northwestward  $6\frac{1}{2}$  miles into Merced River (tributary to San Joaquin River); fall, 2,250 feet. Yosemite and Sonora sheets.

**Shingle Creek** (R); Eldorado County; rises in the northeastern part of T. 9 N., R. 9 E., Mount Diablo base and meridian, south of Shingle Springs, at altitude 1,400 feet above sea level; flows southward 3 miles into French Creek (tributary through Big Canyon Creek to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 500 feet. Placerville sheet.

**Shirley Creek** (L); Stanislaus County; rises in the southeastern part of T. 1 N., R. 11 E., Mount Diablo base and meridian; flows north of west about 10 miles into Rock Creek (tributary through French Camp Creek to San Joaquin River); Land Office map of California, 1907.

**Shotgun Creek** (L); Tulare County; Sequoia National Forest; rises in the northwestern part of T. 18 S., R. 32 E., Mount Diablo base and meridian, on the western slope of the Great Western Divide, in Silver Lake, at altitude 10,500 feet above sea level; flows southward 3 miles into Little Kern River; fall, 3,000 feet. Kaweah sheet.

**Silliman Creek** (R); Tulare County; Sequoia National Park; rises in the northern part of T. 15 S., R. 30 E., Mount Diablo base and meridian, on Mount Silliman (altitude, 11,188 feet); flows southwestward 4 miles into Marble Fork of Kaweah River (tributary through Middle Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 3,200 feet. Tehipite sheet.

**Silver Creek** (L); Fresno County; rises in the Sierra National Forest in Margaret Lakes, on the west slope of Silver Peak (altitude, 11,883 feet); flows northwestward 6 miles into Fish Creek (tributary through Middle Fork of San Joaquin to South Fork of San Joaquin, head of San Joaquin River); just below Fish Valley; fall below Margaret Lakes, about 4,000 feet; this stream receives the drainage from the west slope of Shark Tooth, Silver Peaks, and the north slope of Saddle Mountain; a number of small lakes near the head of the stream. Kaiser and Mount Lyell sheets.

**Silver Creek** (L); Fresno County; Sierra National Forest; rises in the western part of T. 12 S., R. 30 E., Mount Diablo base and meridian, on the western slope of Mount Harrington, at altitude 8,000 feet above sea level; flows westward  $1\frac{1}{2}$  miles, then northwestward  $1\frac{1}{2}$  miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 4,200 feet. Tehipite sheet.

**Silver Creek** (R); San Benito and Fresno counties; rises in the eastern part of T. 16 S., R. 12 E.; flows northward to Panoche Creek; length, 6 miles; carries water only during the rainy season. Land Office map of California, 1907.

**Silver Lake**; Tulare County; Sequoia National Forest; northwestern part of T. 18 S., R. 32 E., Mount Diablo base and meridian, west slope of the Great Western Divide; outlet, Shotgun Creek to Little Kern River (tributary to Kern River); altitude, 10,500 feet. Kaweah sheet.

**Silver Lakes**; Tulare County; Sequoia National Forest; southwestern part of T. 17 S., R. 32 E., Mount Diablo base and meridian; outlet, East Fork of Kaweah River to Kaweah River (tributary to Tulare Lake basin); two small connected lakes, the lower 10,300 feet above sea level and the higher, 10,600 feet above. Kaweah sheet.

**Sister Lake**; Tuolumne County; Yosemite National Park; western part of T. 2 N., R. 23 E., Mount Diablo base and meridian; outlet, a stream one-half mile long flowing southwestward to Smedberg Lake (tributary to Benson Lake on Piute Creek and thus through Tuolumne River to the San Joaquin); altitude, 9,550 feet; fall of outlet, 336 feet. Yosemite National Park map.

**Sixmile Creek** (L); Calaveras County; rises in the central part of T. 3 N., R. 14 E., Mount Diablo base and meridian, 1 mile south of Murphy, at altitude 2,200 feet above sea level; flows southwestward 6 miles, then northwestward into Angels Creek (tributary through Stanislaus River to the San Joaquin); fall, 1,000 feet; principal tributary, Indian Creek. Big Trees and Jackson sheets.

**Skeleton Creek** (L); Mariposa County; Sierra National Forest; rises in the central part of T. 4 S., R. 19 E., Mount Diablo base and meridian, at altitude 4,400 feet; flows

southeastward 2 miles, then northeastward 2 miles into Devil Gulch Creek; fall, 1,900 feet. Yosemite sheet.

**Skull Creek** (L); Tuolumne County; rises in the central part of T. 5 N., R. 17 E., Mount Diablo base and meridian, at altitude 6,500 feet above sea level; flows southwestward 8 miles into Griswold Creek (tributary through North Fork of Stanislaus River to Middle Fork of Stanislaus and thus through Stanislaus River to the San Joaquin); fall, 2,200 feet; principal tributary, Fisher Creek. Big Trees sheet.

**Slate Creek** (L); Amador County; rises in the east central part of T. 8 N., R. 11 E., Mount Diablo base and meridian, 1 mile southwest of Bridgeport, at altitude 2,100 feet above sea level; flows northwestward 1 mile into South Fork of Cosumnes River (tributary through Middle Fork of Cosumnes River to Cosumnes River and thus through Mokelumne River to the San Joaquin); fall, 300 feet. Placerville sheet.

**Slate Creek** (L); Calaveras County; rises in the southwestern part of T. 3 N., R. 11 E., Mount Diablo base and meridian, at altitude 1,200 feet above sea level; flows northwestward  $4\frac{1}{2}$  miles, then northeastward  $1\frac{1}{2}$  miles into Bear Creek (tributary through Calaveras River to the San Joaquin); fall, 650 feet. Jackson sheet.

**Slate Creek** (L); Eldorado County; rises in the northern part of T. 9 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,700 feet above sea level; flows, in general, west of south 5 miles into Big Canyon Creek (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,000 feet; principal tributary, Fanny Creek. Placerville sheet.

**Slide Creek** (L); Fresno County; Sierra National Forest; rises in the east-central part of T. 12 S., R. 30 E., Mount Diablo base and meridian, on the south slope of Slide Peak, at altitude 10,300 feet above sea level; flows northward 5 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 4,600 feet, of which 2,300 feet is made in the last mile in which the creek plunges over Slide Bluffs; principal tributary Kennedy Canyon Creek. Tehipite sheet.

**Sly Park Creek** (R); Eldorado County; rises in the northern part of T. 10 N., R. 14 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows, in general, westward 7 miles, then southwestward 7 miles into Camp Creek (tributary through North Fork of Cosumnes River and Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,500 feet. Pyramid Peak and Placerville sheets.

**Smedberg Lake**; Tuolumne County; Yosemite National Park, western part of T. 2 N., R. 23 E., Mount Diablo base and meridian; inlet, stream from Sister Lake; outlet, a stream 2 miles long, flowing westward to Benson Lake, on Piute Creek (tributary through Tuolumne River to the San Joaquin); altitude, 9,214 feet; fall of outlet, 1,164 feet. Yosemite National Park map.

**Smith Canyon Creek** (L); Kern County; Sierra National Forest; rises in the southern part of T. 26 S., R. 36 E., Mount Diablo base and meridian, at altitude 6,000 feet above sea level; flows northwestward 8 miles; sinks before reaching South Fork of Kern River (tributary to Kern River); fall, 3,100 feet; intermittent. Kernville sheet.

**Smith Creek** (R); Mariposa County; rises in the northeastern part of T. 2 S., R. 16 E., Mount Diablo base and meridian, at altitude 3,500 feet above sea level; flows southeastward 7 miles into North Fork of Merced River (tributary to San Joaquin River); fall, 1,100 feet; principal tributary, Bean Creek; upper course intermittent. Sonora sheet.

**Smith Creek** (R); Tulare County; Kern National Forest; rises in the southern part of T. 20 S., R. 34 E., Mount Diablo base and meridian, in Horse Meadow, at altitude 8,300 feet above sea level; flows southward 2 miles, then southwestward 3 miles into Rattlesnake Creek (tributary to Kern River); fall, 2,000 feet. Olancho sheet.

**Snake Creek** (R); Tulare County; Kern National Forest; rises in the western part of T. 20 S., R. 35 E., Mount Diablo base and meridian, at altitude 8,500 feet above sea

level; flows irregularly eastward 4 miles into South Fork of Kern River (tributary to Kern River) in Back Meadows; fall, 700 feet. Olancha sheet.

**Snow Creek (R);** Mariposa County; Yosemite National Park, rises in May Lake in the western part of T. 1 S., R. 23 E., at altitude 9,250 feet above sea level; flows southwestward 7 miles into Tenaya Creek (tributary through Merced River to San Joaquin River) at the lower end of Tenaya Canyon, which it enters by a fall of 1,600 feet; total fall below May Lake, 4,550 feet. Yosemite National Park map.

**Snyder Gulch Creek (L);** Mariposa County; Sierra National Forest; rises in the central part of T. 4 S., R. 19 E., Mount Diablo base and meridian, at altitude 4,800 feet above sea level; flows northeastward 3 miles into Devil Gulch Creek (tributary through South Fork of Merced River to Merced River and thus to the San Joaquin); fall, 2,900 feet. Yosemite sheet.

**Soap Creek (L);** Tuolumne County; rises in the northwestern part of T. 4 N., R. 17 E., Mount Diablo base and meridian, at altitude 4,800 feet above sea level; flows westward 6 miles into Griswold Creek (tributary through North Fork of Stanislaus to Middle Fork of Stanislaus River and thus through Stanislaus River to the San Joaquin); fall, 1,200 feet. Big Trees sheet.

**Soda Creek (R);** Tulare County; Kern National Forest; rises in the northwestern part of T. 20 S., R. 35 E., Mount Diablo base and meridian, at altitude 9,100 feet above sea level; flows south of east 3 miles into South Fork of Kern River (tributary to Kern River) at the east base of Monache Mountain; fall, 700 feet. Olancha sheet.

**Soda Creek (R);** Tulare County; Sequoia National Forest; rises in the eastern part of T. 18 S., R. 31 E., Mount Diablo base and meridian, at altitude 9,000 feet above sea level; flows southeastward 8 miles into Little Kern River (tributary to Kern River); fall, 2,800 feet. Kaweah sheet.

**Soda Creek (R);** Tulare County; Sequoia National Forest; rises in the western part of T. 17 S., R. 32 E., Mount Diablo base and meridian, on the eastern slope of the Great Western Divide, in a small lake at altitude 10,350 feet above sea level; flows southeastward  $1\frac{1}{2}$  miles, then northeastward 3 miles into Big Arroyo (tributary to Kern River); fall, 2,400 feet. Kaweah and Olancha sheets.

**Soldier Lake;** Tuolumne County; Yosemite National Park; northern part of T. 2 N., R. 24 E., Mount Diablo base and meridian; outlet, an intermittent stream 1 mile long, flowing southeastward to Return Creek (tributary through Tuolumne River to the San Joaquin); altitude, 10,600 feet; fall of outlet, 1,500 feet. Yosemite National Park map.

**Sonora Creek (L);** Tuolumne County; rises  $2\frac{1}{2}$  miles northeast of Sonora, at altitude 2,500 feet; flows southwestward  $2\frac{1}{2}$  miles into Woods Creek (tributary through Tuolumne River to the San Joaquin); fall, 700 feet; passes through the town of Sonora. Sonora sheet.

**Sopiago Creek (L);** Eldorado County; rises in the eastern part of T. 8 N., R. 14 E., Mount Diablo base and meridian, at altitude 5,300 feet above sea level; flows northwestward 10 miles into Middle Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 2,600 feet. Pyramid Peak and Placerville sheets.

**Sotcher Lake;** Madera County; eastern part of the Sierra National Forest; outlet, Reds Creek, which flows through the lake to its junction with Middle Fork of San Joaquin River; elevation, 8,650 feet; fall of Reds Creek below the lake, about 150 feet in three-fourths mile. Mount Lyell sheet.

**South American Lake;** Tulare County; Sequoia National Forest;  $1\frac{1}{2}$  miles southeast of Mount Ericson and  $1\frac{1}{2}$  miles west of Diamond Mesa; outlet, a stream 1 mile long, flowing westward to a small lake near the head of Kern River; altitude 12,000 feet above sea level; fall of outlet, 700 feet. Mount Whitney sheet.

**Spanish Creek (L);** Eldorado County; rises in the southern part of T. 9 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,500 feet above sea level; flows northwestward 3 miles, then southeastward 3 miles into Middle Fork of Cosumnes River

(tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin). Placerville sheet.

**Spanish Lake;** Fresno County; Sierra National Forest; southern part of T. 11 S., R. 28 E., Mount Diablo base and meridian; outlet, Statum Creek to Rancheria Creek (tributary through North Fork of Kings River to Kings River and thus to the San Joaquin); altitude, 8,600 feet; fall of outlet above Rancheria Creek, 1,100 feet. Tehipite sheet.

**Sphinx Creek (L);** Tulare County; rises in the northwestern part of T. 14 S., R. 32 E., on the north slope of Sphinx Crest at altitude 10,500 feet above sea level; flows west of north about 4 miles into Bubbs Creek (tributary to South Fork of Kings River); fall, 4,000 feet. Tehipite sheet.

**Sphinx Lakes;** Tulare County; northwestern part of T. 14 S., R. 32 E., Mount Diablo base and meridian, north slope of Sphinx Crest; outlet, Sphinx Creek to Bubbs Creek (tributary to South Fork of Kings River and thus through Kings River to the San Joaquin); five connected lakes, all small. Tehipite sheet.

**Spiller Creek (R);** Tuolumne County; Yosemite National Park; rises in the southwestern part of T. 3 N., R. 24 E., Mount Diablo base and meridian, between Twin Peaks and Whorl Mountain, at altitude 10,100 feet; flows west of south  $6\frac{1}{2}$  miles into Return Creek; fall, 1,700 feet; principal tributary, stream from Spiller Lake. Yosemite National Park map.

**Spiller Lake;** Tuolumne County; Yosemite National Park; northwestern part of T. 2 N., R. 24 E., Mount Diablo base and meridian, 1 mile west of Soldier Lake; outlet, a stream 1 mile long, flowing southwestward to Spiller Creek (tributary through Return Creek to Tuolumne River and thus to San Joaquin River); altitude, 10,650 feet; fall of outlet, 1,400 feet; about one-eighth mile long and wide. Yosemite National Park map.

**Split Rock Creek (R);** Mariposa County; rises in the northwestern part of T. 7 S., R. 19 E., on Split Rock, at altitude 1,500 feet above sea level; flows southward 4 miles into Chowchilla River (tributary to San Joaquin River); fall, 800 feet. Mariposa sheet.

**Spring Creek (R);** Fresno County; Sierra National Forest; rises in the northeastern part of T. 12 S., R. 27 E., Mount Diablo base and meridian, on the south slope of Rodgers Ridge, at altitude 6,800 feet above sea level; flows southward  $3\frac{1}{2}$  miles into Kings River (tributary to San Joaquin River); fall, 5,300 feet. Tehipite sheet.

**Spring Gulch Creek (L);** rises in the southern part of T. 5 S., R. 19 E.; flows westward 2 miles into Mariposa Creek; tributary to San Joaquin River. Mariposa sheet.

**Squaw Hollow Creek (L);** Eldorado County; rises in the southeastern part of T. 10 N., R. 11 E., Mount Diablo base and meridian, at altitude 2,900 feet above sea level; flows, in general, southwestward 8 miles into Martinez Creek, through which it is tributary through the North Fork of Cosumnes River (tributary through Cosumnes River to the Mokelumne River and thus to the San Joaquin); fall, 1,700 feet. Placerville sheet.

**Squirrel Creek (R);** Tulare County; Sequoia National Park; rises in the northwestern part of T. 17 S., R. 30 E., Mount Diablo base and meridian, at altitude 4,500 feet above sea level; flows southwestward  $1\frac{1}{2}$  miles into East Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 1,500 feet; intermittent. Kaweah sheet.

**Staff Creek (L);** Kern County; Sierra National Forest; rises in the northern part of T. 28 S., R. 34 E., Mount Diablo base and meridian, at altitude 6,800 feet above sea level; flows northeastward 6 miles into Kelso Creek (tributary to South Fork of Kern River); fall, 3,700 feet; intermittent. Kernville sheet.

**Stafford Creek (R);** Eldorado County; rises in T. 9 N., R. 10 E., Mount Diablo base and meridian, 1 mile east of Frenchtown, at altitude 1,500 feet above sea level;

flows east of south  $1\frac{1}{2}$  miles into Big Canyon Creek (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 500 feet. Placerville sheet.

**Stairway Creek** (R); Madera County; rises in the Sierra National Forest, on the southeast slope of Iron Mountain, at altitude 10,000 feet above sea level; flows southward about 4 miles and unites with Middle Fork of San Joaquin River 2 miles above the junction of the North Fork; fall, about 4,800 feet. Mount Lyell sheet.

**Stanislaus River** (R); formed in the southwestern part of T. 4 N., R. 15 E., by the confluence of its North and Middle forks. The Middle Fork, which drains the larger area and is, therefore, considered the continuation of the main stream, is formed in the northeastern part of T. 5 N., R. 20 E., by the confluence of Relief and Dead Man creeks, Relief being the larger and more important and, therefore, forming the actual head of the Stanislaus. Relief Creek rises in the northern part of T. 4 N., R. 21 E., 2 miles southeast of Relief Peak, and takes a general northwesterly course for 10 miles to its junction with Dead Man Creek, below which the stream takes the name Middle Fork of Stanislaus and continues to flow northwesterly 9 miles to the center of T. 6 N., R. 19 E., where it receives Clark Fork; below the mouth of Clark Fork, the general course of the stream is southwestward to its junction with the San Joaquin, about 15 miles west of Modesto; the Middle Fork receives the North Fork about 20 miles north of Sonora and 30 to 35 miles above the rim of San Joaquin Valley. About 8 miles below the junction of North and Middle forks, the main stream is joined by the South Fork. Total length of the river from the head of the Middle Fork to the San Joaquin, about 120 miles, 80 miles of the course lying in the mountains, and 40 in the valley; the total drainage area above the valley comprises about 950 square miles. North Fork above and the main stream below form a boundary between Calaveras and Tuolumne counties.

The basin lies on the western slope of the Sierra, north of the Tuolumne basin, south of the Calaveras and Mokelumne basins, and west of Walker River basin, from which it is separated for a distance of about 25 miles by the Sierra divide; the length of the basin from the valley rim to the crest of the divide is about 75 miles; its width averages about 12 miles in the foothills and less than 25 miles near the eastern border.

Altitudes within the basin range from a few hundred feet in the foothills to more than 11,000 feet at the crest of the divide. Middle Fork flows through a well-developed canyon 30 or 40 miles long and 1,500 to 2,000 feet deep.

Except near glacial lakelets and on moraines, little timber is found above the 8,000-foot level; middle reaches, however, support a heavy growth of timber. North Fork basin contains a part of the Calaveras grove of big trees (*Sequoia gigantea*), for which the Sierra is famous. The vegetation of the foothill region consists of grass, brush, and scrubby timber. All the upper part of the basin, comprising about 800 square miles, is included in national forests.

The mean annual precipitation ranges from about 15 inches near the border of the valley to 50 or 60 inches at the higher elevations, where it occurs chiefly as snow, which lasts well into the summer. The worst floods in this basin occur in the winter, when prolonged storms are accompanied by comparatively high temperatures.

Water is diverted above Knights Ferry and used for irrigation chiefly in the vicinity of Oakdale.

The Middle and North forks and the main stream below the junction afford excellent opportunities for power development. The minimum flow is sufficient to yield about 80,000 horsepower, and this amount could be increased by storage.

Gaging stations at Oakdale (1895-1900), at Knights Ferry (1904-1912).

Surveys and data: Dardanelles, Big Trees, and Jackson sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 204-205.

**Stanislaus River, Clark Fork** (R); Alpine County; Stanislaus National Forest; rises on the west slope of Sonora Peak (altitude, 11,429 feet); flows west of north 6

miles, westward 3 miles, then southwestward 8 miles into Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin) just west of the Alpine-Tuolumne County boundary line in T. 6 N., R. 19 E.; fall, 4,700 feet; the canyon is deep and the basin includes a number of peaks more than 9,000 feet high, and two, Sonora and Stanislaus peaks, more than 11,000 feet above sea level; principal tributaries, Boulder, Disaster, and Arnot creeks. Dardanelles sheet.

**Stanislaus River, Middle Fork.** See *Stanislaus River*.

**Stanislaus River, North Fork (R);** Alpine, Tuolumne and Calaveras counties; rises in Alpine County, 3 miles northwest of Bull Run Peak, 1 mile west of Pacific Valley, at altitude 8,000 feet above sea level; takes a general southwesterly course to its junction with Middle Fork of Stanislaus River (tributary through Stanislaus River to the San Joaquin); length, 35 miles; fall, 6,600 feet; principal tributaries, Highland and Griswold creeks, both from the east; altitudes range from 1,400 feet at the mouth of the river to 9,750 feet at Iceberg Peak on the divide between Highland and Arnot peaks. Dardanelles and Big Trees sheets.

**Stanislaus River, South Fork (L);** Tuolumne County; Stanislaus National Forest; rises in the southwestern part of T. 5 N., R. 20 E., Mount Diablo base and meridian; at altitude 9,200 feet above sea level; flows southwestward to its junction with Stanislaus River (tributary to the San Joaquin); length, 40 miles; fall, 8,200 feet; drainage basin long and very narrow; tributaries unimportant with the exception of Herring Creek. Gaging station near Columbia (1910-1912); at Confidence (1911-1912). Dardanelles and Big Trees sheets.

**State Lakes;** Fresno County; Sierra National Forest, just west of Dougherty and State peaks; four small lakes fed by the snow banks of Cirque Crest; outlet, a stream 1 mile long, flowing westward through East Fork of Dougherty Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); the highest of the lakes is 11,000 feet above sea level; the lowest and largest is 10,300 feet above. Tehipite sheet.

**Statum Creek (L);** Fresno County; Sierra National Forest; rises in the southern part of T. 11 S., R. 28 E., Mount Diablo base and meridian, in Spanish Lake, at altitude 8,600 feet above sea level; flows northwestward 3 miles into Rancheria Creek (tributary through North Fork of Kings River to Kings River and thus to the San Joaquin); fall, 1,100 feet. Tehipite sheet.

**Steeley Fork (L);** Eldorado County; rises in the central part of T. 9 N., R. 14 E., Mount Diablo base and meridian, at altitude 5,700 feet above sea level; flows irregularly westward into North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); length, 13 miles; fall, 3,200 feet; principal tributaries, Grizzly and Clear creeks. Pyramid Peak and Placerville sheets.

**Stevenson Creek (R);** Fresno County; rises in the eastern part of T. 9 S., R. 25 E., at altitude 7,900 feet above sea level; flows, in general, south of west about 3 miles, then northwestward about 8 miles, passing through Shaver Lake to its junction with the San Joaquin; fall between head of stream and San Joaquin River, 4,700 feet, of which 1,700 feet occurs in the last three-fourths mile; fall above Shaver Lake, 2,100 feet; one-half mile west of Shaver the water of this creek is diverted to the flume of the Fresno Flume & Irrigation Co. Kaiser sheet.

**Stevenson Creek, North Fork (R);** Fresno County; rises in the northeastern part of T. 9 S., R. 25 E., at altitude 6,900 feet above sea level; flows southwestward 5 miles to its junction with Stevenson Creek (tributary to San Joaquin River) one-half mile above Shaver Lake; fall, 2,000 feet. Kaiser sheet.

**Stonebreaker Creek (R);** Eldorado County; rises in the western part of T. 10 N., R. 14 E., Mount Diablo base and meridian, at altitude 4,900 feet above sea level; flows northwestward about 4 miles, then southwestward 3 miles into Camp Creek (tributary through North Fork of Cosumnes River and Cosumnes River to the Mokel-

umne and thus to the San Joaquin); fall, 1,400 feet; called Strawberry Creek on Punnett's map of Eldorado County. Pyramid Peak sheet.

**Stony Creek (R);** Tulare County; Sequoia National Forest; rises in the central part of T. 14 S., R. 29 E., Mount Diablo base and meridian, at altitude 7,900 feet above sea level; flows southwestward  $4\frac{1}{2}$  miles to the northwestern part of T. 15 S., R. 29 E., where it unites with Dorst Creek to form the North Fork of Kaweah River (tributary through Kaweah River to Tulare Lake basin); fall, 3,300 feet; principal tributary, Beartrap Creek. Tehipite sheet.

**Strawberry Creek,** Eldorado County. See *Stone Breaker Creek*.

**String Canyon Creek (L);** Eldorado County; rises in the northern part of T. 9 N., R. 13 E., Mount Diablo base and meridian, 1 mile north of Grizzly Flat, at altitude 4,100 feet above sea level; flows southwestward 3 miles to Cedar Canyon, to which it is tributary through Steeley Fork of North Fork of Cosumnes River (tributary through Cosumnes River to Mokelumne River and thus to the San Joaquin); fall, 1,200 feet. Placerville sheet.

**Striped Rock Creek (R);** Mariposa and Madera counties; rises in the western part of T. 6 S., R. 19 E., on Lookout Mountain, at altitude 2,000 feet above sea level; flows, in general, southeastward to its junction with Chowchilla River (tributary to San Joaquin River); principal tributary, Horse Creek; fall, 1,200 feet; length, 9 miles. Mariposa sheets.

**Stubblefield Canyon Creek (R);** Tuolumne County; Yosemite National Park; rises in the northern part of T. 3 N., R. 22 E., Mount Diablo base and meridian, west of Ehrnbeck Peak, at altitude 10,050 feet above sea level; flows westward 1 mile, then southwestward  $9\frac{1}{4}$  miles into Rancheria Creek (tributary through Tuolumne River to San Joaquin River); fall, 2,350 feet; principal tributary, Thompson Canyon Creek. Yosemite National Park map.

**Sugarloaf Creek (R);** Tulare County; rises in the southern part of T. 14 S., R. 30 E., on the northeast slope of Kettle Peak (altitude 10,038 feet); flows northeastward 8 miles into Roaring River (tributary to South Fork of Kings River); fall, 4,250 feet; principal tributaries, South and East forks and Bog Creek. Tehipite sheet.

**Sugarloaf Creek, East Fork (R);** Tulare County; rises in the extreme northeastern part of T. 15 S., R. 30 E., at altitude 9,700 feet above sea level; flows somewhat west of north  $5\frac{1}{4}$  miles into Sugar Loaf Creek (tributary through Roaring River to South Fork of Kings River); just above Sugar Loaf Meadow; fall, 3,000 feet. Tehipite sheet.

**Sugarloaf Creek, South Fork (R);** Tulare County; rises in the northeastern part of T. 15 S., R. 30 E., on the north slope of Silliman Crest, southeast of Mount Silliman (altitude 10,000 feet above sea level); flows northward 5 miles into Sugar Loaf Creek (tributary through Roaring River to South Fork of Kings River); fall, 2,300 feet. Tehipite sheet.

**Sugarpine Creek (R);** Tuolumne County; rises in the northern part of T. 3 N., R. 17 E., Mount Diablo base and meridian, at altitude 5,300 feet above sea level; flows southwestward 5 miles, then southeastward one-half mile into North Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 1,700 feet. Big Trees sheet.

**Sullivan Creek (L);** Tuolumne County; rises in the northern part of T. 2 N., R. 16 E., Mount Diablo base and meridian, at altitude 4,000 feet above sea level; flows southwestward 17 miles into Woods Creek (tributary through Tuolumne River to the San Joaquin); fall, 3,000 feet; passes through Phoenix reservoir; principal tributary, Curtis Creek. Sonora sheet.

**Summit Creek (R);** Alpine County; Stanislaus National Forest; rises on the western slope of the Sierra, 1 mile northwest of Blue Lake, at altitude 8,700 feet above sea level; flows southwestward 4 miles, then southward  $4\frac{1}{2}$  miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 3,100 feet; flows

throughout in a deep canyon; tributaries few and unimportant. Markleeville and Pyramid Peak sheets.

**Sunrise Creek (R);** Mariposa County; Yosemite National Park; rises on the south slope of Sunrise Mountain, at altitude 9,000 feet above sea level; flows southwestward 4 miles; sinks at the edge of Little Yosemite Valley before reaching Merced River (tributary to San Joaquin River). Yosemite National Park map.

**Surprise Lake;** Tuolumne County; Yosemite National Park; western part of T. 2 N., R. 23 E., Mount Diablo base and meridian; one inlet; outlet, an intermittent stream flowing northwestward toward Piute Creek (tributary through Tuolumne River to the San Joaquin); the outlet stream sinks before reaching the creek; altitude, 9,350 feet. Yosemite National Park map.

**Sutter Creek (L);** Amador County; rises in the southern part of T. 8 N., R. 13 E., Mount Diablo base and meridian, at altitude 3,700 feet above sea level; flows southwestward 27 miles into Dry Creek (tributary through Mokelumne River to the San Joaquin); fall, 3,400 feet; principal tributaries, Golden Gate, Ashland, Pioneer, and Mule creeks. Jackson sheet.

**Suwanee River (R);** Tulare County; Sequoia National Park; rises in the northeastern part of T. 15 S., R. 29 E., Mount Diablo base and meridian, at altitude 7,600 feet above sea level; flows southward  $3\frac{1}{2}$  miles into Marble Fork of Kaweah River (tributary to Middle Fork of Kaweah River and thus through Kaweah River to Tulare Lake basin); fall, 2,200 feet. Tehipite sheet.

**Swamp Creek (L);** Fresno County; Sierra National Forest; rises in the western part of T. 9 S., R. 27 E., Mount Diablo base and meridian, on the southwestern slope of Three Sisters Mountain, at altitude 9,700 feet above sea level; flows southwestward 2 miles into Dinkey Creek (tributary to North Fork of Kings River and thus through Kings River to the San Joaquin); fall, 2,000 feet. Kaiser sheet.

**Swamp Lake;** Madera County; Yosemite National Park; southern part of T. 4 S., R. 23 E.; outlet, a channel one-eighth mile long, discharging eastward to South Fork of Merced River (tributary through Merced River to San Joaquin River); very small; altitude, 7,450 feet. Yosemite National Park map.

**Swamp Lake;** Tuolumne County; Yosemite National Park; eastern part of T. 1 N., R. 19 E., Mount Diablo base and meridian; outlet, a stream 3 miles long flowing, in general, southwestward into McGill Creek (tributary through Cherry Creek to Tuolumne River and thus to the San Joaquin); altitude, 5,150 feet; fall of outlet, 750 feet. Yosemite National Park map.

**Swamp Lakes;** Fresno County; Sierra National Forest; north of Monarch Divide; outlet, northward through Lost Canyon to Middle Fork of Kings River (tributary through Kings River to the San Joaquin); altitude about 9,500 feet above sea level. Tehipite sheet.

**Sweetwater Creek (L);** Mariposa County; rises in the central part of T. 4 S., R. 19 E., Mount Diablo base and meridian, at altitude 4,300 feet above sea level; flows northwestward 6 miles into Merced River (tributary to San Joaquin River) in the southwestern part of T. 3 S., R. 19 E.; fall, 2,900 feet. Yosemite sheet.

**Sycamore Creek (R);** rises in the northern part of T. 32 S., R. 31 E., Mount Diablo base and meridian, in Bear Valley; flows northwestward 6 miles toward Buena Vista Lake Reservoir; sinks on leaving the foothills. Manuscript map of San Joaquin Valley (compiled by A. J. Fisk, jr., and H. R. Johnson).

**Sycamore Creek (R);** Fresno County; rises in the central part of T. 10 S., R. 24 E., at altitude 4,000 feet above sea level; flows, in general, southeastward 12 miles into Kings River (tributary to San Joaquin River); principal tributaries, North Fork and Watts Creek. Kaiser sheet; Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Sycamore Creek (L);** Tulare County; Sequoia National Forest; rises in the southwestern part of T. 19 S., R. 30 E., Mount Diablo base and meridian, at altitude 3,000

feet above sea level; flows southwestward 4 miles into North Fork of Tule River (tributary through Tule River to Tulare Lake basin); fall, 1,500 feet; intermittent. Kaweah sheet.

**Sycamore Creek, North Fork (L);** Fresno County; rises in the eastern part of T. 10 S., R. 24 E., Mount Diablo base and meridian, at altitude 4,200 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles into Sycamore Creek (tributary through Kings River to the San Joaquin); fall, 2,300 feet. Kaiser sheet.

**Table Creek;** rises in Tulare County, in the southern part of T. 14 S., R. 32 E., on the northwestern slope of Table Mountain (altitude, 13,646 feet); flows southwestward  $3\frac{1}{2}$  miles into Deadman Canyon<sup>1</sup> on Roaring River (tributary to South Fork Kings River); fall, 3,500 feet. Mount Whitney and Tehipite sheets.

**Table Lake;** Tuolumne County; Yosemite National Park; southern part of T. 2 N., R. 22 E., Mount Diablo base and meridian; two inlets; outlet, a stream three-fourths mile long, flowing southwestward to Piute Creek (tributary through Tuolumne River to the San Joaquin); altitude, 7,050 feet; fall of outlet, 650 feet. Yosemite National Park map.

**Tallulah Lake;** Tuolumne County; Yosemite National Park; central part of T. 2 N., R. 23 E., Mount Diablo base and meridian; outlet, an intermittent stream about 1 mile long, flowing westward to Doe Lake (tributary through Piute Creek to Tuolumne River and thus to the San Joaquin); altitude, 9,900 feet; very small. Yosemite National Park map.

**Tamarack Creek (R);** Fresno County; rises in the southern part of T. 8 S., R. 26 E., on the south slope of Red Mountain, in Red Lake, at altitude 8,900 feet above sea level; flows southward 1 mile, then north of west nearly 6 miles to its junction with the South Fork to form Pitman Creek (tributary through Big Creek to San Joaquin River); fall below Red Lake, 1,700 feet. Kaiser sheet.

**Tamarack Creek (R);** Mariposa County; Yosemite National Park; rises in the northeastern part of T. 2 S., R. 20 E., at altitude 7,700 feet above sea level; flows southward 3 miles, then southeastward 2 miles into Cascade Creek (tributary through Merced River to San Joaquin River); fall, 2,800 feet, of which 1,100 feet occurs in one-half mile just above the junction with Cascade Creek. Yosemite National Park map.

**Tamarack Creek, South Fork (R);** Fresno County; rises near the center of T. 9 S., R. 26 E., on the north slope of Foster Ridge, at altitude 8,400 feet above sea level; flows westward 2 miles into Tamarack Meadows, then northwestward 3 miles to its junction with Tamarack Creek to form Pitman Creek (tributary through Big Creek to San Joaquin River); fall, about 1,300 feet. Kaiser sheet.

**Taylor Creek (R);** Fresno County; rises in the eastern part of T. 10 S., R. 24 E., Mount Diablo base and meridian, 1 mile southwest of Peteras Mill, at altitude 5,500 feet above sea level; flows south three-fourths mile and east 1 mile into Rush Creek (tributary through Big Creek to Kings River and thus to the San Joaquin); fall, 900 feet. Kaiser sheet.

**Taylor Creek (R);** Tulare County; Sierra National Forest; rises in the north central part of T. 24 S., R. 34 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows southeastward  $3\frac{1}{2}$  miles, then north of east 3 miles into South Fork of Kern River (tributary to Kern River); fall, 3,100 feet. Kernville sheet.

**Tecuya Creek (L);** Kern County; rises in the east central part of T. 9 N., R. 20 W., on the north slope of Tecuya Mountain, at altitude 7,000 feet above sea level; flows northward 10 miles toward Buena Vista Lake Reservoir; intermittent. Tejon sheet.

**Tehachapi Creek (L);** Kern County; rises in the southeastern part of T. 31 S., R. 32 E.; flows northwestward to its junction with Caliente Creek at the town of

<sup>1</sup> The eastern branch of this canyon is said to be incorrectly named on the Tehipite sheet. The name "Deadman Canyon" is properly applied, as on Le Conte's map, to the western branch; the eastern branch is Copper Canyon. Sierra Club Bulletin, vol. 6, No. 3, June, 1907, p. 158.

**Caliente.** The mountains at the head of this creek are detached hills rather than continuous ranges; the rocks are granitic, but disintegrate and form sandy soil, which absorbs much of the run-off; the canyons are narrow, but the slopes are not steep; the hills are covered with a scant growth of oak and some brush. Manuscript map of San Joaquin Valley (compiled by A. J. Fisk, jr., and H. R. Johnson); Bull. U. S. Geol. Survey No. 140, 1896, pp. 264-266.

**Tejon Creek** (R); Kern County; rises in the southern part of T. 11 N., R. 15 W., San Bernardino base and meridian; flows north of west toward Buena Vista Lake Reservoir. The stream flows from steep, rocky mountains; fully 85 per cent of the run-off of this drainage basin passes during the nonirrigating and nongrowing season; during the period when the water is needed for plant life the creeks discharge only about 15 per cent of the average for the year. Gaging station at Tejon ranch house (1895-96). Land Office map of California, 1907; manuscript map of the San Joaquin Valley, compiled by Fisk and Johnson.

**Temperance Creek** (L); Mariposa County; rises in the southwestern part of T. 3 S., R. 16 E., Mount Diablo base and meridian, at altitude 1,800 feet above sea level; flows southwestward 3 miles into Merced River (tributary to San Joaquin River); fall, 1,200 feet; intermittent. Sonora sheet.

**Ten Lakes;** Tuolumne County, Yosemite National Park, southeastern part of T. 1 N., R. 22 E., Mount Diablo base and meridian; four of these lakes are connected and have outlet by northward-flowing stream  $2\frac{1}{2}$  miles long, which discharges into Tuolumne River (tributary to the San Joaquin) just above Muir Gorge; one of the lakes discharges to this same stream by a channel one-half mile long; two of the lakes are connected by a channel one-half mile long and discharge by a stream a mile long flowing northeastward to Cathedral Creek (tributary through Tuolumne River to the San Joaquin); the lowest of these lakes is 9,000 feet above sea level, the highest is nearly 9,500 feet; the stream connecting the four lakes with the Tuolumne falls 4,000 feet. The lakes are all small. Yosemite National Park map.

**Tenaya Creek** (R); Mariposa County; Yosemite National Park; rises in Cathedral Lake, 1 mile west of Cathedral Peak (altitude, 10,933 feet); flows southwestward, passing through Tenaya Lake, Tenaya Canyon, and Mirror Lake to its junction with Merced River (tributary to San Joaquin River) in Yosemite Valley; length, about 12 miles; fall, 5,250 feet; Tenaya Canyon is 2,000 feet deep; fed by many small lakes. Gaging station at Yosemite (1904-1910). Yosemite National Park map.

**Tenaya Lake;** Mariposa County; Yosemite National Park; central part of T. 1 S., R. 23 E., Mount Diablo base and meridian; inlets, Murphy Creek and Tenaya Creek, which flows from Cathedral Lake through Tenaya Lake to its junction with Merced River (tributary to the San Joaquin); altitude, 8,141 feet; length, 1 mile; maximum width, nearly one-half mile. Yosemite National Park map.

**Tenmile Creek** (L); Tulare and Fresno counties; Sequoia National Forest; rises in the northeastern part of T. 14 S., R. 28 E., Mount Diablo base and meridian, on the northeastern slope of Buena Vista Peak, at altitude 7,000 feet above sea level; flows very irregularly northward 10 miles into Kings River (tributary to San Joaquin River); fall, 4,700 feet, of which 1,000 feet occurs in the last mile; principal tributaries, Tornado and Indian creeks. Tehipite sheet.

**Thompson Canyon Creek** (L); Tuolumne County; Yosemite National Park; rises in the northwestern part of T. 3 N., R. 23 E., Mount Diablo base and meridian, at altitude 10,100 feet above sea level; flows southwestward 8 miles into Stubblefield Canyon Creek (tributary through Rancheria Creek to Tuolumne River and thus to the San Joaquin); fall, 1,900 feet. Yosemite National Park map.

**Thousand Island Lake;** Madera County; northern part of the Sierra National Forest; about 5 miles east of Mount Lyell; inlets, two small streams from the eastern slope of Davis Mountain and one from Island Pass; outlet, Middle Fork San Joaquin

River to San Joaquin River; elevation, 9,850 feet; length,  $1\frac{1}{2}$  miles; width, one-half mile. Mount Lyell sheet.

**Tiger Creek** (R); Amador County; rises in the eastern part of T. 8 N., R. 14 E., Mount Diablo base and meridian, at altitude 5,000 feet above sea level; flows southwestward 8 miles into North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); fall, 2,500 feet. Pyramid Peak and Big Trees sheets.

**Tilden Canyon Creek** (R); Tuolumne County; Yosemite National Park; rises in a small lake just south of Tilden Lake at altitude 8,950 feet above sea level; flows southwestward 5 miles, then southeastward 1 mile into Rancheria Creek (tributary through Tuolumne River to the San Joaquin); fall, 1,450 feet. Yosemite National Park map.

**Tilden Lake**; Tuolumne County; Yosemite National Park; just east of Chittenden Peak and west of Macomb Ridge; inlet, from Mary Lake; outlet, a stream one-half mile long flowing from the south end westward to Falls Creek (tributary through Tuolumne River to San Joaquin River); altitude, 9,350 feet; fall of outlet, 750 feet; length,  $2\frac{1}{2}$  miles; maximum width, about one-third mile. Yosemite National Park map.

**Tiltill Creek** (R); Tuolumne County; Yosemite National Park; rises in the west-central part of T. 2 N., R. 21 E., Mount Diablo base and meridian, at altitude 7,450 feet above sea level; flows, in general, southwesterly about  $6\frac{1}{2}$  miles into Rancheria Creek (tributary through Tuolumne River to the San Joaquin) at the upper end of Hetch Hetchy Valley; fall, 3,700 feet. Yosemite National Park map.

**Timber Creek** (L); Madera County; rises in the Sierra National Forest, on the north slope of Timber Knob (altitude, 9,963 feet); flows southward 2 miles into West Fork of Granite Creek (tributary through Granite Creek to Middle Fork of San Joaquin River); fall, 1,700 feet. Mount Lyell sheet.

**Tobias Creek** (R); Tulare County; Sierra National Forest; rises in the northern part of T. 24 S., R. 32 E., Mount Diablo base and meridian; flows northeastward 4 miles into Kern River. Land Office map of California, 1907.

**Tombstone Creek** (R); Fresno County; Sierra National Forest; rises in the northeastern part of T. 12 S., R. 28 E., Mount Diablo base and meridian, at altitude 9,000 feet above sea level; flows southeastward 4 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 6,100 feet, of which 2,100 feet is made in the last mile. Tehipite sheet.

**Toomey Creek** (L); San Benito and Fresno counties; rises in the northeastern part of T. 17 S., R. 13 W.; flows east of north to San Joaquin Valley; no water except during the rainy season. Land Office map of California, 1907.

**Tornado Creek** (R); Fresno County; Sequoia National Forest; rises in the western part of T. 13 S., R. 29 E., Mount Diablo base and meridian, in Tornado Meadows, at altitude 7,500 feet above sea level; flows northwestward  $3\frac{1}{2}$  miles into Tenmile Creek (tributary to Kings River and thus to the San Joaquin); fall, 2,500 feet. Tehipite sheet.

**Tracy Lake**; Sacramento County; 3 miles southwest of Galt, a sloughlike expansion of Mokelumne River, fed by flood waters from Dry Creek or by overflow from Mokelumne River. Lodi sheet.

**Tragedy Creek** (R); Amador County; Stanislaus National Forest; rises in the eastern part of T. 9 N., R. 16 E., Mount Diablo base and meridian, at altitude 8,300 feet above sea level; flows, in general, southwestward into Bear River (tributary through North Fork of Mokelumne River to Mokelumne River and thus to the San Joaquin); length, 5 miles; fall, 2,100 feet. Pyramid Peak sheet.

**Triple Peak Fork, Merced River** (R); Madera County; rises on the north slope of Triple Divide Peak, at altitude 11,000 feet above sea level; flows northward 4 miles and northwestward 1 mile into Merced Peak Fork (tributary through Merced

River to the San Joaquin); fall, 3,100 feet; principal tributary, Foerster Creek. Mount Lyell sheet.

**Trout Creek (R);** Tulare County; Sierra National Forest; rises in the north-eastern part of T. 22 S., R. 33 E., Mount Diablo base and meridian, at altitude 8,700 feet above sea level; flows, in general, southeastward 13 miles, to its junction with South Fork of Kern River (tributary to Kern River); fall, 3,000 feet; principal tributary, Little Trout Creek. Olancha and Kernville sheets.

**Trout Creek (R);** Tuolumne County; Stanislaus National Forest; rises just north of the north line of T. 3 N., R. 18 E., at altitude 6,450 feet above sea level; flows southwestward 6 miles into Clavey River (tributary through Tuolumne River to the San Joaquin) 1 mile below the mouth of Lily Creek; fall, 1,250 feet. Dardanelles and Big Trees sheets.

**Trout Creek, Little (R);** Tulare County; Sierra National Forest; rises in the central part of T. 23 S., R. 34 E., Mount Diablo base and meridian, on the east slope of Sirretta Peak, at altitude 8,700 feet above sea level; flows northeastward 4 miles into Trout Creek (tributary through South Fork of Kern River to Kern River); fall, 2,000 feet. Kernville sheet.

**Tulainyo Lake;** Tulare County; Sequoia National Forest; on the west side of the main Sierra divide, 1 mile east of north of Mount Whitney; the lake lies in a depression without outlet; altitude, 12,865 feet. Mount Whitney sheet.

**Tulare Lake;** Kings County, about 30 miles directly south of Fresno and 40 miles northwest of Bakersfield; a shallow body of water occupying the lowest depression in the Tulare basin; the lake is roughly rectangular in shape, and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had an area of about 274 square miles, a maximum depth of 12.4 feet, an average length of 20 miles, and a width of 13.5 miles; the water's edge was 3 miles from the town of Corcoran and the water surface about 12 feet below; the lake surface reached its greatest height in the summer of 1907, when the lake had a maximum depth of nearly 14 feet.

The lake receives practically all its water from Kings, Kaweah, and Tule rivers, Kings River furnishing the largest quantity; under normal conditions all of the water of Tule River and nearly all that of Kaweah River is diverted for irrigation and only a small quantity of water from these streams reaches the lake.

For 25 years preceding 1898 the lake level was steadily lowered, in part as the result of the development of irrigation in the Tulare basin, but chiefly because of the light precipitation in the drainage basins; during this entire period the precipitation was generally below the normal, and particularly during the several years immediately preceding 1898; in that year the lake bed became practically dry and, after partly refilling in 1901, it became completely dry in 1905; as the water receded, a constantly increasing area of exceedingly fertile land was uncovered; from time to time this land was leveled on the lake side and cultivated, and in the early spring of 1906 the entire lake bed was under cultivation.

On March 15, 1906, the first water reached the lake bed at the mouth of Kings River and began to spread out over a large area of bottom land, on which stood a crop of wheat almost matured; a few days later water from Kaweah and Tule rivers entered the lake bed, rapidly submerging an increasingly large area of wheat fields; on June 1 the water was 7 feet deep and covered about 200 square miles; on June 23 overflow water from Kern River basin cut through the sand ridge to the south and flowed into the lake, which for a few days afterward rose at the rate of 0.2 foot a day; on August 4 the water reached its greatest height for the year 1906 and the lake had an area of about 300 square miles and a maximum depth of 12.7 feet; the total rise of the lake in 1906 was 10.8 feet; on this date the lake level slowly subsided until December 9, after which a rise began which continued until July, 1907, when the lake attained a maximum depth of 14 feet; since this date it has been gradually subsiding.

The lake bed resembles a large flat saucer; the flat, level area in the bottom is approximately 180 feet above mean sea level and covers about 55 square miles; the lowest point of the crest of Kings River delta ridge at the north is about 27 feet higher than the bottom of the lake; the lake basin will not overflow naturally until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles; though classed as a tributary of the San Joaquin, the lake has sent no water to that stream since about 1868.

Gage near Corcoran, Cal. (1906-1912).

Surveys and data: Water-Supply Paper U. S. Geol. Survey Nos. 222, p. 37; 271, pp. 171-174.

**Tule River (R);** Tulare County; formed by the union of North and Middle forks; Middle Fork, which drains the larger area and is therefore considered the continuation of the main stream, is itself formed by the junction of its North and South forks of which the North Fork may be considered the continuation. North Fork of the Middle Fork rises in the Sequoia National Park in the southwestern part of T. 18 S., R. 31 E., Mount Diablo base and meridian, at altitude 9,300 feet above sea level; flows, in general, west of south 14 miles to the southeastern part of T. 20 S., R. 30 E., where it receives the South Fork of the Middle Fork; below the Forks, the Middle Fork of the Tule flows southwestward to the point about 1 mile above Daunt post office, where it unites with the North Fork, and from this point the Tule flows, in general, southwestward to the Tulare Lake basin, which it enters about 5 miles east of Portersville; at low and moderate stages the total flow of the river is diverted for irrigation in the vicinity of Portersville; flood waters pass westward through old channels in the river's alluvial fan to Tulare Lake, south of Corcoran; principal tributary below the upper forks, South Fork.

Altitudes in the Tule basin range from 500 feet in the foothills to 10,000 feet along the eastern border; the western third is a typical foothill region, characterized by large, irregular, moderately high hills, separated by valleys. The eastern two-thirds is an eroded mountain region whose rather steep slopes have been carved by the action of primary and secondary stream systems. The rocks are chiefly granitic.

The mean annual precipitation is about 8 inches in the valley below the foothills, 20 inches in the middle part of the basin, and 30 inches or more on the upper levels where much of it occurs as snow. About two-thirds of the upper part of the basin supports a growth of grass, brush, and scattering timber; the moderate and higher elevations are covered with good timber and underbrush.

Gaging stations at Portersville (1878-1884), near Portersville (1901-1912).

Surveys and data: Kaweah sheet; Water-Supply Paper, U. S. Geol. Survey No. 271, 1911, pp. 178-179.

**Tule River, Middle Fork.** *See* Tule River.

**Tule River, North Fork (R);** Tulare County; Sequoia National Forest; rises in the southeastern part of T. 18 S., R. 30 E., Mount Diablo base and meridian, at altitude 9,000 feet above sea level; flows southwestward 10 miles, then southward 7 miles to the southeastern part of T. 20 S., R. 29 E., about 1 mile above Daunt post office, where it unites with the Middle Fork to form Tule River (tributary to Tulare Lake basin); fall, 8,000 feet, of which 4,000 feet occurs in the first 3 miles and 2,000 feet more in the next  $3\frac{1}{2}$  miles of its course; principal tributaries, Sycamore and Bear creeks. Kaweah sheet.

**Tule River, Middle Fork, North Fork of.** *See* Tule River.

**Tule River, South Branch (L);** the south channel by which flood waters from Tule River may reach Tulare Lake; leaves Tule River below Portersville and extends westward. Land Office map of California, 1907.

**Tule River, South Fork (L);** Tulare County; rises in the eastern part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 8,000 feet above sea level; flows, in general, southwestward 8 miles, westward 8 miles, then northwestward 7

miles to its junction with Tule River (tributary to Tulare Lake basin) in the southeastern part of T. 21 S., R. 28 E.; length, 23 miles; fall, 7,500 feet, of which 7,000 feet occurs in the first 12 miles; principal tributaries, Pigeon and Rocky creeks. Gaging station near Success (1910-1912). Kaweah sheet.

**Tunemah Lake;** Fresno County; Sierra National Forest;  $1\frac{1}{2}$  miles northwest of Tunemah Peak; outlet, a stream 2 miles long, flowing eastward to Goddard Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); altitude, 11,150 feet; fall of outlet, 3,600 feet. Mount Goddard sheet.

**Tunis Creek (R);** Kern County; rises on the northern slope of the Tehachapi Mountains, at altitude 6,000 feet above sea level; flows northwestward toward Buena Vista Lake Reservoir; drains an area composed of granitic mountains. Tejon sheet; Land Office map, 1907.

**Tuolumne River (R);** rises in numerous glacial lakes near the crest of the Sierra divide in Tuolumne County; flows southwestward to its junction with the San Joaquin, 10 miles west of Modesto; total length about 150 miles.

The principal headwater streams come from the glaciers and lakes on the northern slope of Mount Lyell to the north and east of the headwaters of Merced River; the course of the river is through beautiful upland meadows in its upper part, then through a canyon nearly 80 miles long which has been cut out of solid granite; the upper part of this canyon for a distance of about 25 miles is 3,000 to 4,000 feet deep and is known as the Grand Canyon of the Tuolumne. At the lower end of the Grand Canyon is Hetch Hetchy Valley, which is smaller than Yosemite Valley but in every other way resembles it very much. Finally the river passes through the lower canyon into the San Joaquin Valley, which it enters near La Grange. Nearly all the tributaries of Tuolumne River enter from the north. In order from east to west, the principal tributaries are Return, Rancheria, Falls, and Cherry creeks, Clavey River, North Fork of Tuolumne, and Woods Creek. South Fork of Tuolumne River enters the main stream from the south and receives as its principal tributary the Middle Fork.

Altitudes in this basin range from about 300 feet in the foothills to 13,000 feet along the crest of the Sierra divide. The upper part of the basin is practically devoid of forests. The middle reaches support a heavy growth of coniferous timber which becomes less dense with decrease in altitude; in the foothill region vegetation consists of grass, brush, and scattered timber; about 1,200 square miles of the upper part of the basin is included in national parks and forests.

Mean annual precipitation ranges from about 10 inches in the San Joaquin Valley to 30 inches in the foothill region, and probably 60 inches at the higher elevations; on the upper half of the basin precipitation occurs chiefly as snow, the greater part of which disappears in the spring. On the higher peaks much snow lasts until late summer; on the northern slope of Mount Lyell is one of the few glaciers still remaining in the Sierra.

The gradient of the Tuolumne is heavy and opportunities for water-power development are great, but the minimum flow of this stream is sufficient to afford only about 35,000 horsepower continuously without storage. Many of the high glacial lakes afford exceptional opportunities for constructing storage reservoirs and a number of storage sites also exist on the main river.

Water is diverted from the Tuolumne above Lagrange for irrigating large areas in the valley on both sides of the river.

Gaging stations at Lagrange (1895), at Modesto (1878-1897), at Hetch Hetchy Valley dam site (1901).

Surveys and data: Yosemite, Dardanelles, Big Trees, and Sonora sheets; Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 197-198.

**Tuolumne River, Dana Fork (R);** Tuolumne County; Yosemite National Park; rises on the southern slope of Mount Dana (altitude, 13,050 feet); flows westward 7

miles to Tuolumne Meadows, where it unites with Lyell Fork to form Tuolumne River (tributary to San Joaquin River); fall, 2,400 feet; principal tributary, South Fork. Yosemite National Park map.

**Tuolumne River, Dana Fork, South Fork (L);** Tuolumne County; Yosemite National Park, rises in Helen Lake at altitude 10,896 feet above sea level; flows northward 2 miles to its junction with Dana Fork (tributary through Tuolumne River to San Joaquin River); fall, 1,896 feet. Yosemite National Park map.

**Tuolumne River, Lyell Fork (L);** Tuolumne County; Yosemite National Park; rises on the northern slope of Mount Lyell (altitude, 13,090 feet); flows northward and northwestward about 12 miles to its junction with Dana Fork, with which it forms Tuolumne River (tributary to San Joaquin River) in Tuolumne Meadows; fall, 3,000 feet. On the northern slope of Mount Lyell is one of the few glaciers remaining in the Sierras. Yosemite National Park map.

**Tuolumne River, Middle Fork (R);** Tuolumne County; Yosemite National Park; rises in the northwestern part of T. 1 S., R. 22 E., Mount Diablo base and meridian, at altitude 7,800 feet above sea level; flows very irregularly westward to the northwestern part of T. 1 S., R. 19 E., and then southwestward to its junction with the South Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); length, 27 miles; fall, 6,700 feet; principal tributary, Cottonwood Creek. Yosemite National Park map and Sonora sheet.

**Tuolumne River, North Fork (R);** Tuolumne County; Stanislaus National Forest; rises about  $2\frac{1}{2}$  miles north of the north line of T. 3 N., R. 18 E., Mount Diablo base and meridian, at altitude 5,600 feet above sea level; flows, in general, southwesterly 26 miles to its junction with Tuolumne River (tributary to San Joaquin River); fall, 4,100 feet; principal tributaries, Wright, Sugarpine, Basin Slope, and Hunter creeks. Gaging station near Tuolumne (1910-1912). Big Trees and Sonora sheets.

**Tuolumne River, South Fork (L);** Tuolumne County; Yosemite National Park; rises in the southeastern part of T. 1 S., R. 20 E., Mount Diablo base and meridian, at altitude 8,800 feet above sea level; flows very irregularly westward to its junction with Tuolumne River in the eastern part of T. 1 S., R. 17 E.; length, including major windings, 25 miles; fall, 7,000 feet; principal tributary, Middle Fork. The stream is fed by many short, branching tributaries heading well up toward the crests of the divides. The basin contains few lakes, only one being named on the map. Gaging station near Groveland (1910-1912). Yosemite National Park map and Sonora sheet.

**Turnback Creek (R);** Tuolumne County; rises near Sugarpine, in the northeastern part of T. 2 N., R. 16 E., Mount Diablo base and meridian, at altitude 4,300 feet above sea level; flows west of south 12 miles into Tuolumne River (tributary to San Joaquin River); fall, 3,100 feet; upper course, intermittent. Sonora and Big Trees sheets.

**Twin Lake;** Alpine County; Stanislaus National Forest; one-half mile southwest of East Blue Lake; outlet, a stream  $1\frac{1}{4}$  miles long flowing through Meadow Lake to North Fork of Mokelumne River (tributary through Mokelumne River to the San Joaquin); altitude, 8,150 feet. Markleeville sheet.

**Twin Lakes;** Fresno County; southwestern part of T. 7 S., R. 26 E., on the north slope of Kaiser Ridge, 2 miles east of Kaiser Peak; outlet, one of the headwater streams of Kaiser Creek (tributary to San Joaquin River); altitude, about 8,600 feet; 2 small lakes connected by a small channel. Kaiser sheet.

**Twin Lakes;** Tulare County; Sequoia National Forest; at northeastern base of Mount Hitchcock,  $1\frac{1}{2}$  miles southwest of Mount Whitney; outlet, a stream three-fourths mile long, flowing north of west to Whitney Creek (tributary to Kern River); two small lakes connected by a short channel; the lower is 11,573 feet above sea level; the upper lake is 11,750 feet above sea level; fall of the outlet stream above Whitney Creek, 500 feet. Mount Whitney sheet.

**Twin Lakes;** Tuolumne County; Yosemite National Park; 1 mile southwest of Bigelow Peak and 1 mile northwest of Kendrick Peak; two long, narrow lakes connected by a channel one-half mile long; the upper lake receives two inflowing streams, one from Bigelow and one from Kendrick Peak; outlet, East Fork of Eleanor Creek through Eleanor Creek to Cherry Creek (tributary through Tuolumne River to the San Joaquin); altitude of upper lake, 8,850 feet; of lower lake, 8,750 feet; the upper lake is about 1 mile long and the lower,  $1\frac{1}{2}$  miles; each is one-fourth mile in maximum width. Yosemite National Park map.

**Twomile Creek (R);** Tuolumne County; Stanislaus National Forest; rises in the southern part of T. 3 N., R. 18 E., at altitude 5,900 feet above sea level; flows southwestward 4 miles, then southeastward  $1\frac{1}{2}$  miles into Clavey River (tributary through Tuolumne River to the San Joaquin); fall, 1,800 feet. Big Trees sheet.

**Tyndall Creek (L);** Tulare County; Sierra National Forest; rises in the western part of the Sierra Divide, between Junction Peak and Mount Tyndall, at altitude 12,000 feet above sea level; flows southwestward 7 miles into Kern River; fall, 2,500 feet. Mount Whitney sheet.

**Unicorn Creek (L);** Tuolumne County; Yosemite National Park; rises in the central part of T. 1 S., R. 24 E., Mount Diablo base and meridian, in Elizabeth Lake, east of Unicorn Peak (altitude, 10,848 feet); flows northward 2 miles into Tuolumne River (tributary to San Joaquin River); fall, 1,000 feet. Yosemite National Park map.

**Van Gordon Creek (R);** Tulare County; rises in the western part of T. 18 S., R. 29 E., Mount Diablo base and meridian, at altitude 3,000 feet above sea level; flows southwestward 6 miles into Yokohle Creek (tributary through Kaweah River to Tulare Lake basin); fall, 2,000 feet; intermittent. Kaweah sheet.

**Van Horn Creek (R);** Eldorado County; rises in the southern part of T. 10 N., R. 14 E., Mount Diablo base and meridian, at altitude 5,900 feet above sea level; flows southwestward 3 miles into North Fork of Cosumnes River (tributary through Cosumnes River to the Mokelumne and thus to the San Joaquin); fall, 1,200 feet. Pyramid Peak sheet.

**Vasquez Creek (R);** San Benito County; rises in the east central part of T. 14 S., R. 9 E., on Red Peak; flows north of east 6 miles into Mercer Creek (to San Joaquin Valley). Land Office map of California, 1907.

**Vernon Lake;** Tuolumne County; Yosemite National Park, eastern part of T. 2 N., R. 20 E., Mount Diablo base and meridian; inlet, Falls Creek; outlet, Falls Creek to Tuolumne River (tributary to San Joaquin River); altitude, 6,600 feet; fall of Falls Creek in  $4\frac{1}{2}$  miles below Vernon Lake, 2,900 feet; length, about three-fourths mile; maximum width, one-third mile. Yosemite National Park map.

**Viadette Creek (L);** Tulare County; rises in Sierra National Forest, on the north slope of Dehorn Mountain, at altitude 12,000 feet above sea level; flows northward 3 miles between east and west spurs, passing through several lakes to its junction with Bubba Creek (tributary to South Fork of Kings River); fall, 2,100 feet. Mount Whitney sheet.

**Virginia Lake;** Tuolumne County; Yosemite National Park; northeastern part of T. 1 N., R. 23 E., Mount Diablo base and meridian; outlet, a stream one-half mile long, flowing northward to Return Creek (tributary through Tuolumne River to San Joaquin River); altitude, 9,200 feet above sea level; fall of outlet, 1,600 feet. Yosemite National Park map.

**Volcanic Lakes;** Fresno County; Sierra National Forest; northeast slope of Combs Spur, one-half mile southeast of Dead Pine Ridge; six or eight glacial lakelets, which discharge through the West Fork of Dougherty Creek (tributary through Middle Fork of Kings River to Kings River and thus to the San Joaquin); the highest of the

lakes is 10,250 feet above sea level, the lowest is 10,150 feet; four of the lakes form the head of the West Fork, the others discharge to the West Fork by a northward-flowing stream  $1\frac{1}{2}$  miles long. Tehipite sheet.

**Wah-to-ke Creek (L);** rises in the southeastern part of T. 13 S., R. 24 E., Mount Diablo base and meridian; flows southwestward into the reservoir 5 miles northeast of Reedley; only flood waters reach Kings River. Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Waltham Creek (R);** Fresno County; rises in the western part of T. 20 S., R. 13 E.; flows, in general, southeastward 14 miles, then northeastward 10 miles to its junction with Los Gatos Creek at Coalinga. Fisk and Johnson map; called Walthan Creek on the Land Office map of California, 1907.

**Wanda Lake;** Fresno County; Sierra National Forest, north slope of Goddard Divide, 1 mile southwest of Mount Huxley and 2 miles northeast of Mount Goddard; two inlets, one draining two small lakes; outlet, Evolution Creek through Evolution Lake to South Fork of San Joaquin River (head of San Joaquin); elevation above sea level, 11,452 feet; above Evolution Lake, 462 feet. Mount Goddard sheet.

**Warm Creek (R);** Fresno County; rises in Warm Creek Meadow, 4 miles south of Saddle Mountain, at altitude 7,800 feet above sea level; flows southwestward 3 miles into South Fork of San Joaquin River; fall, 1,600 feet. Kaiser sheet.

**Washburn Lake;** Madera County; southern part of T. 2 S., R. 24 E.; inlet, Merced River; outlet, Merced River to the San Joaquin; altitude 7,640 feet. Mount Lyell sheet.

**Washington Gulch Creek (L);** Stanislaus County; rises in the southwestern part of T. 5 S., R. 6 E.; flows southeastward into El Puerto Creek (to San Joaquin Valley); length, 4 miles. Orestimba-Panoche-Cantua special map.

**Water Gulch Creek (L);** Madera County; rises in the eastern part of T. 8 S., R. 20 E., Mount Diablo base and meridian, at altitude 2,300 feet above sea level; flows southwestward 3 miles into Fresno River (tributary to San Joaquin River); fall, 800 feet. Mariposa sheet.

**Watts Creek (R);** Fresno County; rises in the western part of T. 11 S., R. 24 E., Mount Diablo base and meridian; flows southeastward 8 miles into Sycamore Creek (tributary to Kings River and thus to the San Joaquin). Land Office map of California, 1907; Le Conte's map of portion of the Sierra Nevada of central California, No. 3, Kings-Kern sheet, March, 1903.

**Weaver Lake;** Tulare County; Sequoia National Forest; eastern part of T. 14 S., R. 29 E., Mount Diablo base and meridian; outlet, a stream  $1\frac{1}{2}$  miles long flowing northwestward into Big Meadow Creek (tributary through Boulder Creek to South Fork of Kings River and thus through Kings River to the San Joaquin); altitude, 8,700 feet; fall of outlet, 1,200 feet. Tehipite sheet.

**Wells Creek (L);** Tulare County; Sequoia National Forest; rises in the western part of T. 18 S., R. 29 E., Mount Diablo base and meridian, at altitude 2,200 feet above sea level; flows westward  $2\frac{1}{2}$  miles into Jim Gray Creek (tributary through Horse Creek to Kaweah River and thus to Tulare Lake basin); fall, 900 feet. Kaweah sheet.

**West Fork or Branch.** See name of main stream.

**Whiskey Creek (L);** Madera County; rises in the southeastern part of T. 7 S., R. 23 E., in Cold Spring Meadow, on the west slope of Whiskey Ridge, at altitude 6,500 feet above sea level; flows west of south to its junction with North Fork of San Joaquin River; length, 11 miles; fall, 4,850 feet. Kaiser sheet.

**White Creek (R);** Fresno County; rises in the southwestern part of T. 18 S., R. 14 E.; flows southeastward 6 miles into Los Gatos Creek. Gaging station at base of foothills (1878-1884). Land Office map of California, 1907.

**White Fork (R);** Fresno County; rises in Sierra National Forest, 2 miles southwest of Mount Pinchot, at altitude 12,000 feet above sea level; flows southward 3 miles into

Woods Creek (tributary to South Fork of Kings River, a tributary of San Joaquin River); fall, 2,800 feet. Mount Whitney sheet.

**White Mans Ravine Creek** (L); Eldorado County; rises in the eastern part of T. 8 N., R. 9 E., Mount Diablo base and meridian, at altitude 900 feet above sea level; flows southeastward 1 mile into Hungry Hollow Creek (tributary through Indian Creek to Big Canyon Creek and thus through Cosumnes and Mokelumne rivers to the San Joaquin); fall, 500 feet. Placerville sheet.

**White River** (R); Tulare County; rises in the eastern part of T. 24 S., R. 31 E., Mount Diablo base and meridian; flows westward into San Joaquin Valley south of Deer Creek; sinks before reaching Tulare Lake basin. Gaging station near Hot Springs (1911-12). Land Office map of California, 1907.

**Whitney Creek** (L); Tulare County; Sequoia National Forest; rises on the north slope of Mount Whitney (altitude, 14,501 feet); flows, in general, southwestward 7 miles to its junction with Kern River in the Kern River canyon; fall, 4,800 feet, of which 2,300 feet is made in the last  $1\frac{1}{2}$  miles; principal tributary, Crabtree Creek and a stream from Twin Lakes. Mount Whitney sheet.

**Wild Cat Creek** (L); Merced County; rises in the southwestern part of T. 12 S., R. 10 E.; flows northeastward into San Joaquin Valley; length, 6 miles; carries water only during the rainy season. Land Office map of California, 1907.

**Willow Creek** (L); Amador and Sacramento counties; rises in the western part of T. 7 N., R. 10 E., Mount Diablo base and meridian, at altitude 1,000 feet above sea level; flows southwestward and discharges into Cosumnes River (tributary through Mokelumne River to the San Joaquin) through Willow Slough; length to junction of Willow Slough with Cosumnes River, 35 miles; fall, 950 feet, of which 900 feet occurs in the 16 miles above the valley. Jackson and Lodi sheets.

**Willow Creek** (R); Calaveras County; rises in the northwestern part of T. 4 N., R. 13 E., Mount Diablo base and meridian, at altitude 2,200 feet above sea level; flows southwestward 7 miles, then southeastward 1 mile into Calaveritas Creek (tributary through South Fork of Calaveras River to Calaveras River and thus to the San Joaquin); fall, 1,200 feet. Jackson sheet.

**Willow Creek** (L); Madera County; rises in the western part of T. 6 S., R. 23 E., in Chilkoot Lake, at altitude 7,500 feet above sea level; flows southwestward about 5 miles to its junction with North Fork of San Joaquin River in T. 6 S., R. 22 E.; fall, 3,000 feet. Kaiser and Mariposa sheets; map of Sierra Nevada of central California, publication No. 12 of the Sierra Club, January, 1896.

**Willow Creek** (L); Madera County; rises in the southeastern part of T. 6 S., R. 22 E., on the west slope of Graham Mountain, at altitude 5,700 feet above sea level; flows west of south 3 miles into North Fork of San Joaquin River, at the upper end of Crane Reservoir; fall, 2,400 feet. Mariposa sheet.

**Willow Creek** (L); Madera County; rises in the western part of T. 8 S., R. 20 E., at altitude about 1,700 feet above sea level; flows, in general, northwestward 5 miles into Chowchilla River (tributary to the San Joaquin); fall, 1,000 feet. Mariposa sheet.

**Willow Creek** (R); Madera County; rises in the western part of T. 9 S., R. 21 E., on the northeastern slope of Blackhawk Mountain, at altitude 1,800 feet above sea level; flows, in general, southeastward 7 miles to its junction with Fine Gold Creek (tributary to San Joaquin River), in the eastern part of T. 10 S., R. 21 E.; fall, 1,000 feet. Mariposa sheet.

**Willow Creek** (R); Tulare County; Sequoia National Forest; rises in the southeastern part of T. 17 S., R. 32 E., Mount Diablo base and meridian, at altitude 11,500 feet above sea level; flows northeastward 3 miles into Big Arroyo (tributary to Kern River); fall, 3,700 feet. Olancha sheet.

**Willow Slough (L);** Sacramento County; west side of Cosumnes River; the channel through which Willow Creek discharges its flood waters to the Cosumnes and thus through the Mokelumne to the San Joaquin. Lodi sheet.

**Wilmer Lake;** Tuolumne County; Yosemite National Park, just west of south end of Bailey Ridge; inlet, Falls Creek; outlet, Falls Creek to Tuolumne River (tributary to San Joaquin River); length, one-half mile; maximum width, one-fourth mile. Yosemite National Park map.

**Wilson Creek (L);** Tulare County; Sequoia National Forest; rises in the west central part of T. 21 S., R. 31 E., Mount Diablo base and meridian, at altitude 6,500 feet above sea level; flows east of north 3 miles into South Fork of Middle Fork of Tule River (tributary through Middle Fork of Tule River to Tule River and thus to Tulare Lake basin); fall, 2,500 feet. Kaweah sheet.

**Wilson Creek (R);** Tuolumne County; Yosemite National Park; rises in the northeastern part of T. 2 N., R. 23 E., Mount Diablo base and meridian, on Doghead Peak, at altitude 10,500 feet above sea level; flows southwestward  $2\frac{1}{2}$  miles, then southeastward 2 miles into Matterhorn Canyon Creek (tributary through West Fork of Return Creek to Return Creek and thus through Tuolumne River to San Joaquin River); fall, 1,500 feet. Yosemite National Park map.

**Windy Canyon Creek (L);** Fresno County; Sierra National Forest; rises on the north slope of Windy Ridge, at altitude 10,500 feet above sea level; flows, in general, northwestward into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); length, 4 miles; fall, 4,400 feet. Tehipite sheet.

**Wolverton Creek (L);** Tulare County; Sequoia National Park; rises in the southern part of T. 15 S., R. 30 E., Mount Diablo base and meridian, on the northern slope of Panther Peak, at altitude 8,700 feet above sea level; flows northwestward 1 mile, then westward 2 miles into Marble Fork of Kaweah River (tributary through Middle Fork of Kaweah River to Kaweah River and thus to Tulare Lake basin); fall, 2,300 feet. Tehipite sheet.

**Woodchuck Creek (L);** Fresno County; rises in the eastern part of T. 10 S., R. 28 E., at altitude 10,300 feet above sea level; flows, in general, west of south  $2\frac{1}{2}$  miles, then north of west 5 miles; into North Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 3,500 feet; principal tributary, stream from Woodchuck Lake. Mount Goddard sheet.

**Woodchuck Lake;** Fresno County; Sierra National Forest; eastern part of T. 10 S., R. 28 E., Mount Diablo base and meridian; outlet, a stream 3 miles long, flowing very irregularly southwestward into Woodchuck Creek (tributary to North Fork of Kings River and thus through Kings River to the San Joaquin); altitude, 9,850 feet; fall of outlet, 1,700 feet. Mount Goddard sheet.

**Woods Creek (L);** Fresno County; rises in Sierra National Forest, in Woods Lake, at altitude 10,669 feet above sea level; flows northwestward  $1\frac{1}{2}$  miles, then southwestward  $2\frac{1}{2}$  miles, then almost directly west 4 miles to its junction with South Fork of Kings River (tributary to San Joaquin River); fall, about 3,600 feet; principal tributaries, White Fork and South Fork, the latter draining many small lakes; in all, this basin contains nearly 100 glacial lakes. Mount Whitney and Tehipite sheets.

**Woods Creek (R);** Tuolumne County; western part; rises 2 miles northeast of Columbia at altitude 2,000 feet above sea level; flows southward 6 miles, southwestward 4 miles, then southeastward 8 miles to its junction with Tuolumne River (tributary to San Joaquin River) near Jacksonville; fall, 800 feet; principal tributaries, Sonora and Sullivan creeks. Big Trees and Sonora sheets.

**Woods Creek, South Fork (L);** Fresno County; rises in Sierra National Forest, just north of Mount Rixford (altitude, 12,856 feet); flows west of north 7 miles, passing through many lakes to its junction with Woods Creek (tributary through South Fork of Kings River to San Joaquin River); fall, 3,000 feet; principal tributary, Baxter

Creek. The basin of this creek, although less than 8 miles long and only 5 miles in maximum width, contains more than 50 lakes; the western part of it is called Sixty Lake Basin. Mount Whitney sheet.

**Woods Lake**; Fresno County; Sierra National Forest; inlets, several streams draining small glacial lakes; outlet, Woods Creek to South Fork of Kings River (tributary to San Joaquin River); altitude, 10,669 feet; fall of outlet, 3,600 feet. Mount Whitney sheet.

**Wren Creek (L)**; Fresno County; Sierra National Forest; rises in the southeastern part of T. 12 S., R. 29 E., Mount Diablo base and meridian, on the north slope of Wren Peak, at altitude 8,500 feet above sea level; flows northwestward 3 miles into Middle Fork of Kings River (tributary through Kings River to the San Joaquin); fall, 5,000 feet. Tehipite sheet.

**Wright Creek (L)**; rises in the western part of T. 3 N., R. 18 E., Mount Diablo base and meridian, at altitude 5,800 feet above sea level; flows southwestward 5 miles and north of west  $1\frac{1}{2}$  miles into North Fork of Tuolumne River (tributary through Tuolumne River to the San Joaquin); fall, 1,900 feet. Big Trees sheet.

**Yokohle Creek (L)**; Tulare County; rises in the western part of T. 19 S., R. 29 E., Mount Diablo base and meridian, on the western slope of Blue Ridge, at altitude 4,000 feet above sea level; flows westward 10 miles, then northwestward 3 miles; carries water to Kaweah River, to which its basin is topographically tributary, only in times of flood. Kaweah sheet; Land Office map of California, 1907.

**Yosemite Creek (R)**; Mariposa County; Yosemite National Park; rises in the southern part of T. 1 N., R. 22 E., Mount Diablo base and meridian, at altitude 9,500 feet above sea level, close to the summit of the divide separating the Merced from the Tuolumne River basin; flows somewhat west of south 12 miles to its junction with Merced River (tributary to San Joaquin River) in Yosemite Valley; it enters the valley by a precipitous fall, descending 2,700 feet in the last half mile of its course above the valley; of this 2,700 feet, 1,100 feet is made at the famous Yosemite Falls, the upper part of the stream is fed by many small branching tributaries. Gaging station in Yosemite Valley (1904-1909). Yosemite National Park map.

**Young Lake**; Tuolumne County; Yosemite National Park; central part of T. 1 N., R. 24 E., Mount Diablo base and meridian, just north of Ragged Peak; outlet, a stream one-half mile long, flowing northward to a south fork of Conness Creek (tributary through Tuolumne River to San Joaquin River); altitude, 9,850 feet; fall of outlet, 600 feet. Yosemite National Park map.

**Zapatos Creek.** See Polvadero Creek.

## GAGING STATIONS MAINTAINED IN THE SAN JOAQUIN RIVER BASIN FROM 1878 TO JULY 1, 1912.

The following list comprises the gaging stations that have been maintained in the San Joaquin River basin. Stream-flow data for these stations are published in Water-Supply Paper 299. (See p. 3.) The stations are arranged in downstream order, tributaries being indicated by indentation. A dash following the date implies that the station was being maintained July 1, 1912:

San Joaquin River near Friant, 1907-.

San Joaquin River at Hamptonville, 1878-1884.

San Joaquin River at Herndon, 1870-1910.

San Joaquin River near Newman, 1912-.

### Tulare Lake basin:

Tulare Lake in Kings County, 1906-.

Kern River at Isabella, 1910-.

Kern River Power Co.'s canal near Kernville, 1878-1884, 1912-.

Kern River at Rio Bravo ranch, 1893-1911.

Kern River near Bakersfield, 1911-.

South Fork of Kern River near Onyx, 1911-.

South Fork of Kern River near Isabella, 1910-.

Erschine Creek near Isabella, 1911-.

Caliente Creek at base of foothills, 1911.

Basin Creek near Havalah, 1911-.

Tejon House creek at Tejon ranch house, 1895-96.

San Emigdio Creek at San Emigdio ranch house, 1894-95.

Poso Creek at base of foothills, 1878-1884.

White Creek at base of foothills, 1878-1884.

White River near Hot Springs, 1911-.

Deer Creek at base of foothills, 1878-1884.

Deer Creek near Hot Springs, 1910-.

Tyler Creek<sup>1</sup> near Hot Springs, 1911-.

Tule River at Portersville, 1878-1884.

Tule River near Portersville, 1901-.

Bear Creek near Daunt, 1911-.

South Fork of Tule River near Success, 1910-.

Kaweah River at Wachumna Hill, 1878-1884.

Kaweah River below Three Rivers, 1903-.

North Fork of Kaweah River at Kaweah, 1910-.

South Fork of Kaweah River near Three Rivers, 1911-.

Kings River at Suspension Bridge, 1895.

Kings River near Sanger, 1895-.

Kings River at Slate Point, 1878-1884.

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<sup>1</sup> Not named on the map.

## San Joaquin River—Continued.

## Tulare Lake basin—Continued.

Kings River at Kingsburg, 1895-1904.

## North Fork of Kings River:

Dinkey Creek near Ockenden, 1910-.

Big Creek near Tollhouse, 1910-.

Rush Creek near Ockenden, 1910-.

Fresno River at base of foothills, 1878-1884.

Fresno River near Knowles, 1911-

Melder Creek near Fresno Flats, 1910-

North Fork of Fresno River near Sugarpine, 1910-

Chowchilla Creek at base of foothills, 1878-1884.

Mariposa Creek at base of foothills, 1878-1884.

Bear Creek at base of foothills, 1878-1884.

Merced River near Yosemite, 1904-1909, 1912-

Merced River above Merced Falls, 1901-

Merced River near Newman, 1912-

Merced River at Merced Falls, 1878-1884.

Tenaya Creek near Yosemite, 1904-1909, 1912-

Yosemite Creek near Yosemite, 1904-1909, 1912-

South Fork of Merced River near Wawona, 1910-

Big Creek near Wawona, 1910-

Tuolumne River at Hetch Hetchy Valley dam site, 1901.

Tuolumne River near Lagrange, 1895-

Modesto Canal near Lagrange, 1903-

Turlock Canal near Lagrange, 1899-

Lagrange Water &amp; Power Co.'s canal near Lagrange, 1907-

Tuolumne River at Modesto, 1878-1884, 1895-1897.

Cherry Creek at Eleanor trail crossing, 1901.

Eleanor Creek at Eleanor trail crossing, 1901.

Eleanor Creek below Eleanor Lake, 1910-

Jawbone Creek near Tuolumne, 1910-

Corral Creek near Groveland, 1910-

South Fork of Tuolumne River near Groveland, 1910-

Clavey River near Tuolumne, 1910-

Indian Creek near Tuolumne, 1910-

North Fork of Tuolumne River near Tuolumne, 1910-

Hunter Creek near Tuolumne, 1910-

Stanislaus River at Knights Ferry, 1904-

Stanislaus Water Co.'s canal at Knights Ferry, 1904-

Stanislaus River at Oakdale, 1895-1900.

Stanislaus and San Joaquin Water Co.'s canal at Knights Ferry, 1910-

Rose Creek near Jupiter, 1910-

Knight Creek near Jupiter, 1910-

South Fork of Stanislaus River near Confidence, 1911-

South Fork of Stanislaus River near Columbia, 1910-

Calaveras River at Jenny Lind, 1907-

Calaveras River near Bellota, 1878-1884.

Mokelumne River at Electra, 1901, 1903, 1904.

Mokelumne River at Lone Star Mills, 1878-1884.

Mokelumne River near Clements, 1904-

Mokelumne River near Lodi, 1895.

## San Joaquin River—Continued.

## Mokelumne River—Continued.

Middle Fork of Mokelumne River near Westpoint, 1912—

South Fork of Mokelumne River near Railroad Flat, 1912—

Licking Fork near Railroad Flat, 1912—

Dry Creek at base of foothills, 1878-1884.

Dry Creek near Ione, 1911—

North Fork of Cosumnes River (head of Cosumnes River) near Eldorado,  
1911—

Cosumnes River at Michigan Bar, 1907—

Cosumnes River below Michigan Bar, 1878-1884.













