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Department of Water Resources

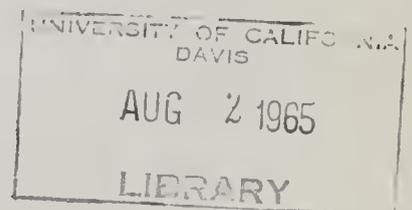
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BULLETIN No. 128

LAKE DAVIS

Advance Planning Report

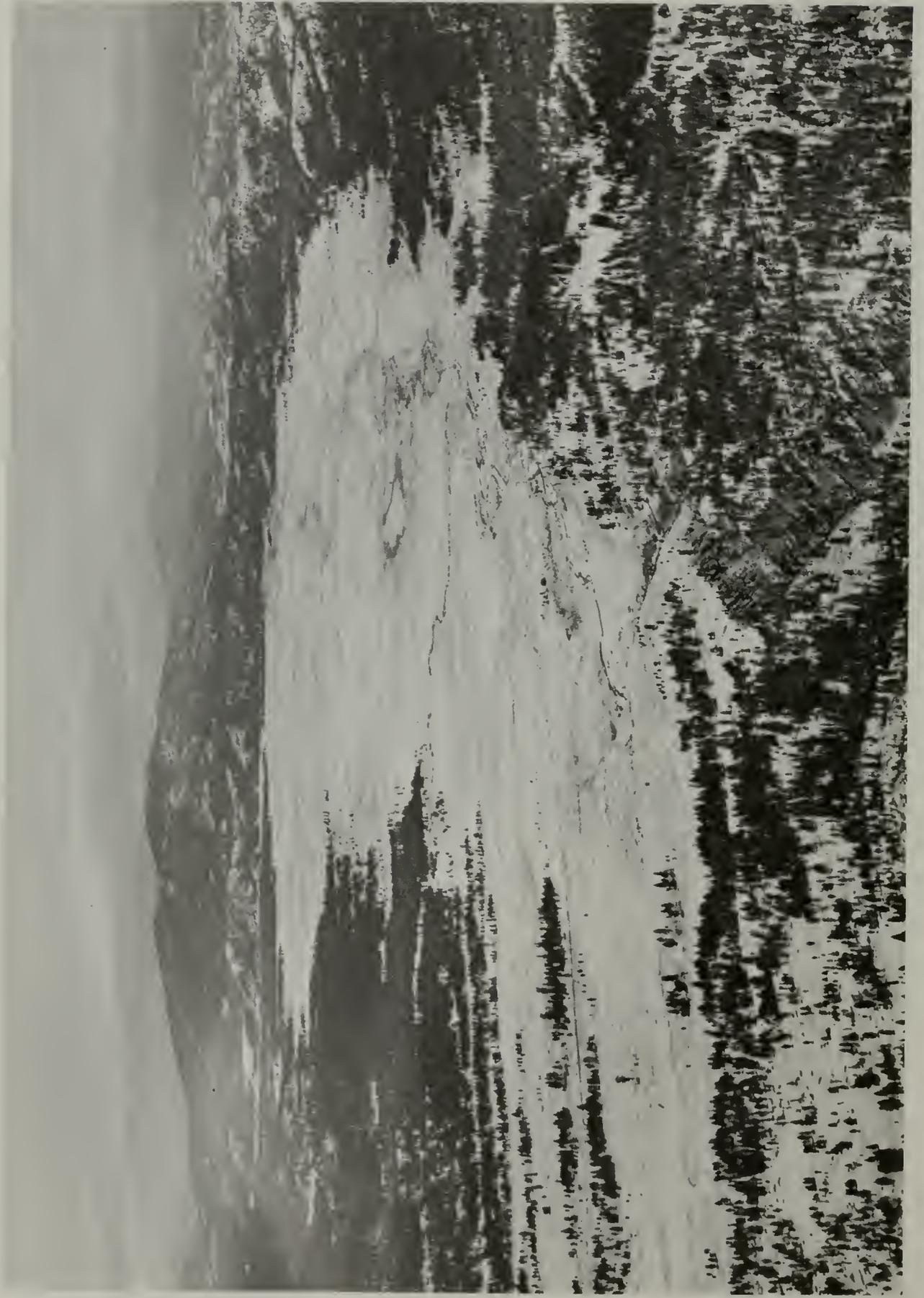
MAY 1965



HUGO FISHER
Administrator
The Resources Agency

EDMUND G. BROWN
Governor
State of California

WILLIAM E. WARNE
Director
Department of Water Resources



GRIZZLY VALLEY, November 1963

State of California
THE RESOURCES AGENCY
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DEPARTMENT OF WATER RESOURCES

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February 19, 1965

Honorable Edmund G. Brown, Governor
and Members of the Legislature
of the State of California

Gentlemen:

Bulletin No. 128, titled "Lake Davis, Advance Planning Report", summarizes the engineering and economic data developed and analyzed in formulating the project which would provide maximum net benefits. Planning related to recreation, fish and wildlife preservation and enhancement, as well as consumptive use of water, was an integral part of the final studies leading to this report.

In transmitting to you this advance planning report, it is my pleasure to advise you that work on this project is proceeding on schedule.

Sincerely yours,

A handwritten signature in cursive script, reading "William E. Warne".

Director

State of California
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Executive Secretary

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AUTHORIZATION

Grizzly Valley Dam and Reservoir (Lake Davis) were expressly authorized by the Legislature by amendment of Water Code Section 11260 in 1956 (Calif. Stats. 1957, Ch. 2359, p. 4088). A dam and reservoir in the vicinity of Grizzly Valley in Plumas County were included in the State Water Facilities authorized for construction with funds made available under the California Water Resources Development Bond Act 1/ (Calif. Stats. 1959, Ch. 1762, p. 4235), approved by the voters November 8, 1960.

1/ Chapter 8 (commencing with Section 12930), Part 6, Division 6, of the Water Code; also known and cited as the Burns-Porter Act.

SUMMARY

Advance planning studies of Grizzly Valley Dam and Lake Davis were made by the Department during the period 1962 to 1964. Two alternative projects were studied. Under the first alternative, the lake would be operated primarily as a recreation project with extensive development of onshore recreational facilities, water for urban use, and controlled streamflow releases for fishery enhancement. Under the second alternative, the lake would be operated primarily as an irrigation project with less extensive development of onshore recreational facilities and no streamflow release for fishery enhancement. The urban water requirement under either alternative would be the same.

A lake with storage capacity of 83,000 acre-feet would provide the greatest excess of benefits over costs of either of the two alternatives. This is due primarily to the greater recreational benefits attributed to a lake of this size. The benefit-cost ratio and net benefits are higher for the recreation project.

Land use and the amount of land required for recreation for the 83,000-acre-foot lake would be essentially the same for either a recreation or an irrigation project.

Annual recreation use at the lake by the year 2010 is estimated to be 476,600 visitor-days for a recreation project and 157,200 visitor-days for an irrigation project.

Construction of the first stage of the onshore recreational facilities would be scheduled to be completed at the time the lake fills.

The dam, lake, appurtenances, and road relocations would be the same for either a recreation or irrigation project.

Lands are being acquired in accordance with the "Recreation Land Use and Acquisition Plan, Grizzly Valley Reservoir", Appendix G (under separate cover) approved by the Director on January 8, 1964.

The Director issued Project Order No. 6, dated January 17, 1964, for the construction of Grizzly Valley Dam and Lake Davis with a capacity of 83,000 acre-feet. The order specifies that the project be operated as a recreation-urban water supply project but that incorporation at a later date of an agricultural water supply purpose is not precluded. A copy of Project Order No. 6 is included in Appendix A.

Water right Applications Nos. 16950 and 21443 were assigned to the Department by the California Water Commission on April 3, 1964, for operation of Grizzly Valley Dam and Lake Davis.

Plumas County Flood Control and Water Conservation District has contracted with the State for a maximum annual entitlement of 2,700 acre-feet of water from the Grizzly Valley Project to meet the estimated demand for urban water supply.

CHAPTER I. INTRODUCTION

California is constructing the State Water Project, a water development program of unprecedented size and scope. This project will provide water to an area extending from the Feather River Basin on the north to the Mexican boundary on the south, a distance of some 700 miles. Five reservoirs in the Upper Feather River Basin will be operated as part of the project to satisfy recreation and local water needs. Lake Davis on Big Grizzly Creek will be one of these reservoirs. Ground breaking ceremonies were held on September 27, 1964, and the future reservoir behind Grizzly Valley Dam was officially named Lake Davis. ^{1/} The contract for construction of Grizzly Valley Dam and Lake Davis was awarded to Pascal and Ludwig on October 2, 1964.

Related Investigations and Reports

The Grizzly Valley Project was proposed as an upstream unit of the State Water Project in reports of the Division of Water Resources in February 1955 and April 1955. ^{2/} In the latter report, the Grizzly Valley Project was said to have a high potential for recreation and streamflow enhancement. An alternative would be a project constructed and operated primarily for irrigation.

- ^{1/} Project Nomenclature Order No. 1, naming the reservoir behind Grizzly Valley Dam, Lake Davis is shown in Appendix A.
- ^{2/} "Program for Financing and Constructing the Feather River Project as the Initial Unit of The California Water Plan", February 1955, and "Report on Upper Feather River Service Area", April 1955.

In February 1957, the Department issued Bulletin No. 59. ^{1/}
Two alternatives for the Grizzly Valley Project were presented; an irrigation project to be operated to serve water to Sierra Valley and to provide for limited recreation enhancement or an alternative project with recreation as its principal purpose. The report stated:

"The Grizzly Valley Project is a proposed reservoir and system of works to regulate the waters of Big Grizzly Creek for irrigation use in Sierra Valley, and to form the basis for enhancement of an outdoor recreation area. Its operation would provide a regulated water supply of about 15,100 acre-feet seasonally, of which 14,900 acre-feet would be new water that is presently unavailable to irrigators in the valley.

"The project would include Grizzly Valley Reservoir, which would enhance the recreational setting and provide an opportunity for the construction of camp sites, boating facilities, and summer homes. Both the area surrounding the reservoir and the canyon downstream would be desirable for this type of development.

"For the alternative Grizzly Valley Recreation Project it is recommended that: Further consideration be given to the project only if it is found that prospective water users in Sierra Valley are unwilling to assume the obligation of repayment of the reimbursable costs of the Grizzly Valley Project."

In a letter to the Department dated March 13, 1957, the City of Portola expressed a desire to have the Department consider the use of water from the Grizzly Valley Project for a municipal supply for the city. This letter is included in Appendix D of Bulletin 59.

^{1/} "Investigation of Upper Feather River Basin Development, Interim Report on Engineering, Economic, and Financial Feasibility of Initial Units."

In October 1960 the Department issued Bulletin No. 59-2 entitled

"Investigation of Upper Feather River Basin Development". This bulletin stated:

"The authorized Grizzly Valley Project would consist of a dam and storage reservoir with a storage capacity of 80,000 acre-feet and a system of works that would regulate the waters of Big Grizzly Creek. The project would provide water for irrigation use, and provide the basis for the enhancement of recreational opportunities."

Bulletin No. 132-64, "The California State Water Project in 1964", dated June 1964, states:

"In January 1964, a plan for Grizzly Valley Dam and Reservoir was completed and the facilities were authorized for construction. ^{2/} The authorizing document specifies an earthfill dam creating a reservoir which will store about 83,000 acre-feet of water for domestic and municipal use, for recreation, and for downstream fisheries enhancement. Incorporation at a later date of an agricultural water supply as a project purposes is not precluded."

^{2/} Department of Water Resources, Project Order No. 6, dated January 17, 1964. (Appendix A)

The history of Grizzly Valley Dam and Lake Davis is briefly summarized in Appendix B.

Objective of Advance Planning Studies

The objective of the advance planning studies of the State Water Project is to review previous studies that led to the authorization of various features and units of the State Water Project for the purpose of updating and supplementing the available engineering and economic data of various reservoir sizes in order to maximize net project benefits. Planning related to fish and wildlife preservation and enhancement and recreation as well as consumptive use of water, is an integral part of the final formulation studies.

The advance planning for Grizzly Valley Dam and Lake Davis included a study of hydrology; sizing of reservoir, spillway, and outlet works; evaluation of project benefits; development of operational criteria; and compilation of information for developing construction designs, specifications, and operations.

Project Area

The project area is located in Plumas County, in the drainage areas of Big Grizzly Creek and the Upper Middle Fork Feather River. The project area includes the north portion of Sierra Valley, wherein irrigable lands are located that could be served with water from Lake Davis. Because of the recreational aspects of the project, most of Plumas County and areas immediately adjacent will be directly affected by the project. Plumas County covers an area of about 2,630 square miles and contains a population of about 14,400. These areas are shown on Plate 1, "Vicinity Map", and Plate 2, "Service Areas".

Plumas County History ^{1/}

Plumas County is an area of scenic beauty which has attracted visitors from the earliest days of the settlement of Northern California. In 1854, the Legislature created Plumas County out of a portion of Butte County. The County derived its name from the Spanish designation for the Feather River, "El Rio de las Plumas", named by Captain Louis Arguello in 1820.

^{1/} History from "The Feather River in '49 and the Fifties", by George C. Mansfield, 1924, reprinted by Margaret Mansfield, 1948; and "Historic Spots in California", by Hoover and Rensch, 1948.

Development of Plumas County began following the discovery of gold in the Gold Lake area in 1850, after which prospectors spread through the county in search of a mythical lake with gold-pebbled shores. Cities sprang up almost overnight wherever prospectors found rich diggings. Rich Bar, one such city, turned out to be the site of one of the most spectacular discoveries of the gold rush. The claims were so fantastically rich that they were limited to 10 feet square. From three to four million dollars in gold were produced from Rich Bar during the first two years after its discovery.

When legal action forced the cessation of hydraulic mining in California, drift mining was undertaken in the richer auriferous gravel deposits and several important quartz mines were opened. The most famous of these was the Eureka Mine at Johnsville, which eventually contained over 100 miles of tunnel and is now a part of the Plumas-Eureka State Park.

Copper mining flourished from 1915 to 1931 with subsequent spurts in production until 1945. By that date copper reserves were depleted and production ceased. Current mining activities in Plumas County are limited to production of sand, gravel, and crushed rock.

With the decline in mining activities, attention was focused on agriculture, production of timber and, particularly in recent years, recreation. Agriculture was developed to its present level prior to World War I and consists mainly of raising beef cattle. Presently, the production of timber is the major industry of Plumas County. Sawmills have operated since the early 1850's, when they were constructed to satisfy demands for lumber for use in the mines and flumes. Approximately

three-fourths of the area of the County, about 1,228,000 acres, is covered with forests utilized for commercial purposes. Of this total, about 911,000 acres are in public ownership.

The heavily timbered mountains, scenic valleys, and spectacular stream-cut canyons have interested visitors since the earliest days. During recent times thousands of people from all parts of the State have traveled to the Feather River Basin to fish, hunt, camp, and enjoy the natural scenic beauty. An excellent system of roads serves the area and affords easy access for visitors. Recreation and the development of summer homes offers the most significant current opportunities for further expansion of the local economy.

Topography

Extensive areas of merchantable timber land, extremely rough and rocky terrain cut by precipitous canyons, and isolated mountain valleys wherein grain and meadow hay are grown, characterize the Upper Feather River Basin. Forests of pine, fir, and cedar are broken by bare granitic peaks. Auriferous gravels occur throughout the basin.

Sierra Valley is a prominent feature located within the project area. This flat valley, an old lake bed with an area of 155 square miles lying at an elevation of about 5,000 feet, is enclosed by mountains except for its drainage outlet, the Middle Fork Feather River. The valley is used extensively for raising meadow hay and as summer livestock range.

Grizzly Valley is an old lakebed northwest of Sierra Valley at an elevation of about 5,700 feet, with an area of about 10 square miles,

and surrounded by timber-covered mountains. Vegetation in the valley consists of grass and sagebrush and a few isolated trees. The valley is currently used for livestock grazing. A sharp demarcation between the open space of the valley and the surrounding forest delineates the shoreline of the future reservoir.

The drainage basin of Big Grizzly Creek extends from an elevation of about 5,000 feet to over 7,000 feet. From Grizzly Valley, Big Grizzly Creek drops about 800 feet, through a steep-walled canyon for a distance of about five miles, to join the Middle Fork Feather River near its outlet from Sierra Valley.

Downstream from Sierra Valley, the Middle Fork descends for a distance of about 20 miles through the beautiful Humbug, Mohawk, and Long Valleys where summer resorts and homes are situated. The privately owned lands of these valleys are becoming increasingly subdivided. Below Long Valley the Middle Fork Feather River descends through a precipitous canyon in an area of rare primitive beauty for a distance of over 30 miles, to flow into Oroville Reservoir, currently under construction.

Climate

The Upper Feather River Basin is a region of large climatic differences. Marked differences in temperature and precipitation occur within short distances, where air movement is substantially affected by the topography. Mean seasonal depths of precipitation range from about 90 inches in the vicinity of Bucks Lake, to about 25 inches in Grizzly Valley, to less than 10 inches in parts of Sierra Valley. Most of the precipitation in the higher elevations occurs as snowfall and is retained in a heavy pack until the spring and summer snowmelt runoff period.

Winter temperatures in the higher mountain valleys are moderately severe, with minimums below freezing from November through March. The summers generally are warm and pleasant during the day but cool during the night. Frosts may occur during any month of the year.

Land Use

Almost all mountain and hill lands of the Upper Middle Fork Basin are owned and managed by the U. S. Forest Service for timber production, wildlife, grazing, recreation and watershed management. The land is largely in its natural state. Almost all valley lands are privately owned and are utilized principally for grazing of livestock and crops of meadow hay. In recent years, however, subdivision of these lands has become more important. It is expected that this activity will increase in the future.

Five communities, Portola, Clio, Graeagle, Blairsden, and Sloat, are located along the Middle Fork Feather River downstream from Sierra Valley. Portola, with a population of about 2,000, is the only incorporated city in Plumas County.

CHAPTER II. WATER SUPPLY

Hydrologic studies of the Grizzly Valley Project were reported previously in Bulletins Nos. 59 and 59-2. These studies were reviewed and updated for the purpose of final project sizing. In addition, information contained in departmental office reports entitled "Water Quality Investigation - Sierra and Mohawk Valleys", 1960, and "Ground Water Geology of Sierra, Mohawk, and Humbug Valleys, Plumas and Sierra Counties, California", 1962, was used in the advance planning for Grizzly Valley Dam and Lake Davis.

Surface Water

Big Grizzly Creek joins the Middle Fork Feather River about two miles downstream from the outlet of Sierra Valley. More than 85 percent of the runoff of the stream occurs between November and May with the average summer flow ranging from 0 to 12 cubic feet per second.

Present Impaired Flow

A U. S. Geological Survey gaging station is located on Big Grizzly Creek about 4.0 miles north of Portola at an elevation of 5,400 feet and about 1.5 miles downstream from the Grizzly Valley damsite. The lake has a drainage area of approximately 45 square miles of valley and mountainous terrain. The large, flat valley above the gaging station has mountains rising to approximately 7,000 feet on either side.

The periods of recorded streamflow are October 1925 to September 1932; October 1950 to September 1953; and July 1954 to date. For the periods when streamflow was not recorded, an estimate was made by correlation of known streamflow of Big Grizzly Creek and streamflow of North Yuba

River near Goodyears Bar and Spanish Creek at Keddie. The recorded and estimated monthly impaired runoff of Big Grizzly Creek for the 50-year period 1911-12 through 1960-61 is shown in Appendix C.

Water Quality

Water samples collected from Big Grizzly Creek at California State Sign Route 70 and near the proposed damsite, show the water to be of good mineral quality for irrigation and domestic use. Analyses of three samples are shown in Table 1.

TABLE 1
SURFACE WATER ANALYSES BIG GRIZZLY CREEK

Location	23N/13E		23N/14E			
	SE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 1		NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 28			
Date of Sample	9/26/57		5/27/55		5/11/60	
Flow, cfs (est.)	2		15		10	
Temperature, in °F.	58		56		69	
ECx10 ⁶ at 25° C.	202		90.3		116	
pH	7.7		7.1		7.5	
Percent Sodium	24		20		20	
Constituents in	epm	ppm	epm	ppm	epm	ppm
Cations: Ca	1.00	20	0.46	9.3	0.60	12
Mg	0.52	6.3	0.29	3.6	0.26	3.2
Na	0.48	11	0.19	4.5	0.23	5.2
K	0.07	2.9	0.33	1.3	0.04	1.4
Anions: CO ₃	0.00	0	0.00	0	0.00	0
HCO ₃	2.00	122	0.88	54	0.98	60
SO ₄	0.08	3.8	0.04	1.9	0.11	5.1
Cl	0.00	0	0.00	0.2	0.00	0.0
NO ₃	0.00	0	0.00	0.5	0.00	0.3
F	0.01	0.2	0.01	0.3	0.00	0.1
Boron		0.01		0.02		0.02
Silica		24		23		24
Total Solids		128		72		81
Hardness						
Total		76		38		43
Noncarbonate		0		0		0

Water Rights

The applications on file with the State Water Rights Board to appropriate water in the Big Grizzly Creek Basin, in excess of three cubic feet per second by direct diversion and 200 acre-feet per annum by storage are shown in Table 2.

Applications Nos. 16950 and 21443 were assigned to the Department of Water Resources by the California Water Commission on April 3, 1964. These applications were submitted on July 27, 1964, to the California Water Commission for its approval as required by Section 10504.5 (b) of the Water Code. Amendments made to these applications were approved by the Commission at its August 7, 1964, meeting.

The Department has submitted to the State Water Rights Board copies of Applications Nos. 16950 and 21443, together with the supporting maps. The Board will probably issue notices of these applications in the early part of 1965, establishing the time within which any holder of a prior vested right may protest the approval of these applications. It is contemplated that protests against Applications Nos. 16950 and 21443 will be settled so that the Board may issue permits approving these applications during 1965.

The Department is aware of existing riparian rights on Big Grizzly Creek and other prior rights downstream from the proposed Grizzly Valley Dam and Lake Davis. Prior rights were recognized by the Department in advance planning studies by assuming an allowance of 100 acre-feet per month, or the natural streamflow, whichever was less, during the months of May through September to satisfy such rights.

TABLE 2

MAJOR APPLICATIONS TO APPROPRIATE WATER
IN BIG GRIZZLY CREEK BASIN 1/

Application:	Date filed	Name of applicant	Amount of water: : in acre-feet : per annum	Purpose	Status
15551	9/25/53	Richvale Irrigation District	40,000	Irrigation	Completed
15552	9/25/53	Richvale Irrigation District	40,000	Power	Completed
16533	8/19/55	City of Portola	1,270	Municipal	Permit No. 12186 <u>3/</u>
16950	3/20/56	Department of Water Resources	49,000	Recreation, stream- flow enhancement, municipal, irrigation, and incidental domestic	Completed
21443	8/23/63	Department of Water Resources	34,000	Recreation, stream- flow enhancement, municipal, irriga- tion, and incidental domestic	Completed

1/ The source of water for each application is Big Grizzly Creek except Application No. 16533 whose source is Freeman and Cow Creeks, tributaries to Big Grizzly Creek.
2/ An application is completed when it is accepted by the State Water Rights Board in form and content.
3/ Extension of time granted by the State Water Rights Board until December 1, 1965.

Ground Water

A comprehensive report on the ground water basin in Sierra Valley is included in Bulletin No. 98, "Northeastern Counties Ground Water Investigation", published by the Department in February 1963. That report provided information on ground water in the northern portion of Sierra Valley that was considered in the advance planning of Grizzly Valley Dam and Lake Davis.

The present use of ground water in northern Sierra Valley is almost entirely for domestic use and stockwatering. It is estimated that less than five percent of the existing wells are used for irrigation.

Information presented in Bulletin No. 98 indicates that in most of the service area properly constructed wells would yield sufficient quantities of ground water for limited irrigation. The mineral quality of ground water is generally good for irrigation although it may be marginal near the southern part of the service area.

CHAPTER III. PROJECT PURPOSES

Project purposes considered in the advance planning studies were recreation, fisheries and wildlife enhancement, and domestic and irrigation water supply. Operation of the project for flood control was not considered as a project purpose, although there will be some flood control provided incidental to the principal project purposes. Each specific project purpose considered in the formulation of this project is discussed in this chapter.

Urban Water Supply

The present local water supply available to the Grizzly Valley service areas is not sufficient to satisfy the future requirements. If an adequate water supply is made available the population and economic growth of the service areas is expected to increase.

Service Area

It is anticipated that there will be essentially three separate service areas (subunits) developed within the overall urban service area of the Grizzly Valley Project. Locations of these subunits are shown on Plate 2.

The largest subunit is the Delleker-Portola area. This is presently the principal urban area, has the greatest potential for urban growth, and consequently will have the greatest water requirement. Until recently, the Delleker area was a ghost town, exhibiting only the remains of an abandoned lumber mill. A local developer has embarked upon a plan

to develop the area into a community of homesites, a recreational area, and a light-commercial area. Several of the abandoned buildings have been renovated and are presently being rented. Upon the recommendation of the County Planning Commission, the County Board of Supervisors authorized the development of the Delleker townsite.

The second subunit within the Grizzly Valley Project urban service area is located along the access road leading to Grizzly Valley from State Route 70. This area has recently been subdivided by local developers and several of the lots have been sold, although no homes have been constructed to date. The development consists of about 1,500 lots and a 9-hole golf course is proposed. Lack of sufficient water has apparently delayed the sale of lots.

The third subunit of the Grizzly Valley Project urban service area is located at the junction of the Grizzly Valley access road and State Route 70. With the creation of a lake in Grizzly Valley, this junction would be a logical place for developments such as gas stations, restaurants, motels, and sporting goods stores. It is anticipated that permanent residences and summer homes will also be located in this area.

There is a potential need for future additional urban water supply in the area downstream from the Delleker-Portola area in the vicinity of Mohawk Valley, and possibly in the northern section of Sierra Valley north of State Route 70. Development of a local water supply appears to be more practicable than supply from Lake Davis; therefore, study of such supply from the Grizzly Valley Project was not pursued. A detailed study of possible urban water supply to these areas from the Grizzly Valley Project may be desirable when a need is demonstrated for additional water in these areas.

Water Requirements

Estimates of the water requirements within the City of Portola range from 200 gallons per capita per day to 450 gallons per capita per day. The latter figure is the estimated summer requirement. In the advance planning studies, an average water requirement of 250 gallons per capita per day was used. During the summer period, from June through September, overall water requirements of the area increase due to summer visitors. The city has experienced a lack of water during the summer because of high use and an inadequate distribution system. The city is endeavoring to rectify this situation by renovation of its distribution system as funds become available.

Plumas County Flood Control and Water Conservation District on December 26, 1963, contracted with the Department for an urban water supply from the Grizzly Valley Project. This contract is for an initial delivery of 250 acre-feet of water about 1968 and a buildup to the maximum amount of 2,700 acre-feet within 50 years. Table 3 shows the estimated urban population and project water delivery. The amount of 2,700 acre-feet was used as the future domestic water requirement in the planning studies.

Effect on Other Project Purposes

The State Department of Public Health regulates the recreational use of domestic water supply reservoirs. That agency, on May 15, 1951, established a policy in regard to recreational use of domestic water supply reservoirs. Part of this policy states:

"Recreation use of both shoreline and water surface should be restricted to an appropriate distance beyond the intake tower. Actual distance (in no case less than 1,500 feet)

will depend on factors of wind, water, current, size and shape of reservoir."

TABLE 3

URBAN POPULATION AND PROJECT WATER DELIVERY

Year	1/ : Population of service areas	2/ : Project water delivery (acre-feet)
1960	2,000	---
1965	2,040	---
1968	2,200	250
1975	2,890	590
1985	3,940	890
1995	5,380	1,300
2005	7,490	1,880
2015	10,430	2,700

1/ Population for service area composed of Portola-Delleker-Ramelli Junction-Welch Estates and vicinity, including seasonal residents expressed as year-around resident equivalent.

2/ The water requirement was computed on 250 gpd per capita. The project water delivery is in addition to the water available from existing water sources.

Accordingly, the Lake Davis Recreation Development Plan was developed on the premise that no recreation would be permitted on the lake within 1,500 feet of the intake tower located near the dam.

Irrigation

One of the major project purposes considered during this investigation was development of water for irrigation in Sierra Valley. Existing agricultural practices in Sierra Valley are oriented predominantly toward production of beef cattle. In some areas of the valley, particularly on the sloping lands around the periphery of the valley, irrigation practices are dependent upon the availability of surface water during the spring, when there is generally an overabundance of water. Following the spring runoff there is a rapid decrease in the amount of water available until there is essentially no water available for irrigation. Controlled releases of water from Lake Davis would permit more efficient irrigation practices by extending the irrigation season and providing water throughout the growing season.

Service Area

For purposes of this report a potential irrigation service area was delineated in the northwestern portion of Sierra Valley extending easterly from Beckwourth a distance of approximately 6 miles as shown on Plate 2. Part of the eastern and southern boundaries are adjacent to the boundary of Last Chance Creek Water District.

The area could be irrigated by gravity flow from a canal diverting water from Big Grizzly Creek at Grizzly Ice Pond. The size of the service area would vary depending on the size of project constructed and amount of water available for irrigation.

Land Use

In general, the area suitable for irrigation with project water is classified as moderately coarse-textured soil. The projected crop pattern used in this report is oriented toward continuation of the livestock economy.

Economic evaluation of the agricultural aspect of the Grizzly Valley Project is based upon the use of crops that would use the amount of water available from the project. These crops include alfalfa, irrigated pasture, small grain (barley) and grain (hay).

Water Requirements

The amount of project water that is available for irrigation and urban water supply will vary depending upon the size of project constructed. The potential service area as shown on Plate 2 would use all of the irrigation water from the largest reservoir.

The amount of water available for irrigation would decrease as the urban water supply increases over the 50-year period. It is estimated that after the project is completed, irrigation water requirements would increase during a buildup period until a maximum is reached about 1975. The amount available for irrigation would then decrease by the amount of increase in the urban water supply requirement.

The amount of irrigation water that is available by decades for each size reservoir is shown in Table 4.

TABLE 4
WATER AVAILABLE FOR IRRIGATION
1975-2015

(In acre-feet)

Lake capacity (acre-feet)	:	1975	:	1985	:	1995	:	2005	:	2015
44,000		12,000		11,700		11,300		10,700		9,900
65,000		14,500		14,200		13,800		13,200		12,400
83,000		16,900		16,600		16,200		15,600		14,800
100,000		17,200		16,900		16,500		15,900		15,100

The estimated average seasonal distribution of water required for irrigation is as follows:

<u>Month</u>	<u>Percent of total</u>
May	16 percent
June	23 percent
July	25 percent
August	27 percent
September	<u>9 percent</u>
Seasonal demand	100 percent

Effect on Other Project Purposes

The use of water from Lake Davis for irrigation would have a detrimental effect on recreation. The water surface would be drawn down greatly during the recreation season exposing large flat areas of the

lake bottom during the summer. This would be esthetically undesirable and would leave the onshore recreation facilities hundreds of feet from the water's edge.

Other than the times when water was released for irrigation or to satisfy existing water rights, the flow in the creek would normally be no greater than 2 cubic feet per second. This flow would be insufficient to maintain a self-sustained fishery in Big Grizzly Creek. Below Grizzly Ice Pond, the proposed point of diversion from the creek, the flow would normally be no greater than 2 cubic feet per second throughout each year. The variable flow during the irrigation season and the consequent fluctuation of the shoreline of the creek would preclude the establishment of desirable native vegetation along the banks, which could be realized if more stable flows existed.

Recreation

Recreation Use Without Project

Without the project, Grizzly Valley will probably never become an appealing recreation area. The surrounding area is mountainous, sparse to well-forested, and pleasantly scenic, but for other than hunting and limited fishing it has little to attract recreationists.

The reach of Big Grizzly Creek between the dam and the confluence of Big Grizzly Creek and Middle Fork Feather River, near State Route 70, could support more intensive angling use than it now receives. Angling use of this reach of the creek without a project was projected on the assumption that more intensive future demands will develop, the trout-stocking program will be augmented to keep pace with the demands, and

adequate angling access will continue to exist. It is estimated that Big Grizzly Creek would have supported an increase from 2,500 angler-days in 1970 to about 8,900 angler-days in 2010 without the Grizzly Valley Project. Tables 5 and 6 show the estimated recreation use with and without the two alternative projects considered in Grizzly Valley.

There is very little, if any, waterfowl hunting in Grizzly Valley at the present time although some waterfowl do nest along Big Grizzly Creek.

TABLE 5
ESTIMATED RECREATION USE
WITH AND WITHOUT THE
RECREATION-URBAN WATER SUPPLY PROJECT
(In visitor-days)

Year	Total use without project	Total use with project* (including downstream use)	Lake size (acre-feet)		
			44,000	65,000	83,000
1970	3,850	61,700	73,000	83,000	83,000
1980	5,150	98,100	117,400	134,000	134,000
1990	7,050	153,500	182,500	208,500	208,500
2000	10,100	234,800	283,500	325,200	325,200
2010	13,750	339,100	413,000	476,600	476,600

*Included in the total use with the project are 2,400 visitor-days of waterfowl hunting at the Freeman Creek Recreation Area.

TABLE 6

ESTIMATED RECREATION USE
WITH AND WITHOUT THE
IRRIGATION-RECREATION-URBAN
WATER SUPPLY PROJECT

(In visitor-days)

Year	Total use without project		Total use with project* (including downstream use)		
	3,850	20,200	65,000	83,000	100,000
1970	3,850	20,200	29,800	37,800	37,800
1980	5,150	31,600	46,500	59,200	59,200
1990	7,050	45,300	67,000	85,700	85,700
2000	10,100	63,100	93,400	119,400	119,400
2010	13,750	83,200	123,000	157,200	157,200

*The irrigation-recreation-urban water supply project's operation is not favorable to the development of waterfowl nesting islands and there will be no waterfowl hunting areas.

Recreation Use with Project

The presence of a lake will enhance the recreation potential and the attractiveness of Grizzly Valley. The lake's irregular shoreline will extend to the edge of the surrounding forested mountains to provide a scenic setting. The southwestern shoreline is composed of numerous scenic peninsular arms that will extend into the lake and offer excellent recreational opportunity.

The 1960 level of recreation use for Lake Davis was determined largely from data supplied by the Department of Fish and Game and the U. S. Forest Service. The initial level of use for the proposed project was

estimated from studies of the recreation use at the U. S. Forest Service's Jackson Creek, Round Valley, and Lakes Basin campgrounds, Plumas-Eureka State Park, and the Pacific Gas and Electric Company's Gold Lake campground.

The 1960 level of day use was estimated on the basis of a percentage of the total population within 50 miles of the reservoir site which could be expected to visit the lake, The estimated day use for 1960 formed the base for projections of future use. Competition of other nearby recreation areas was taken into account in estimating future recreation use.

A successful self-propagating trout fishery can be developed downstream from the lake if relatively stable flows of water of suitable temperature are provided. The flow to be released under the recreation-urban water supply alternative project would meet these conditions, create a well-defined channel, and permit good riparian plant growth, food habitat, and shelter. Under these conditions, the angling use would increase from 4,000 angler-days in 1970 to about 16,800 angler-days in 2010.

The irrigation-recreation-urban water supply project would release highly variable flows during the summer months and flows of about 2 cfs during the remainder of the year. The angling use under this alternative would remain about the same as it would be without a project on Big Grizzly Creek.

Recreation use at Lake Davis will generally vary depending upon the lake size and operation schedule, as shown in Tables 5 and 6. For Lake Davis, the optimum size from a recreational standpoint is 83,000 acre-feet. This will bring the normal water surface near the tree line that surrounds the valley. A larger lake would cost more but would not increase the recreation potential.

Waterfowl nesting islands will be created in the northwestern portion of the lake to replace the existing nesting areas and to enhance the waterfowl population. It is estimated that 2,400 hunter-days annually will be supported by the increase in waterfowl due to the nesting islands.

Increased Recreation Use

Recreation benefits attributed to the project are based on the increase in recreation use over the use under nonproject conditions. The estimated increase for both the recreation and the irrigation alternative projects is shown in Tables 7 and 8.

The increase in angling use on Big Grizzly Creek due to stream-flow enhancement will increase from 1,500 angler-days in 1970 to about 7,900 angler-days in 2010.

TABLE 7

ESTIMATED INCREASE IN RECREATION USE WITH
RECREATION-URBAN WATER SUPPLY PROJECT

(In visitor-days)

Year	Total increased use with project* (including downstream use)			
	Lake size (acre-feet)			
	44,000	65,000	83,000	100,000
1970	57,850	69,150	79,150	79,150
1980	92,950	112,250	128,850	128,850
1990	146,450	175,450	201,450	201,450
2000	224,700	273,400	315,100	315,100
2010	325,350	399,250	462,850	462,850

*Included in the total increased use with the project are 2,400 visitor-days of waterfowl hunting at the Freeman Creek Recreation Area.

TABLE 8

ESTIMATED INCREASE IN RECREATION USE WITH
IRRIGATION-RECREATION-URBAN WATER SUPPLY PROJECT

(In visitor-days)

Year	Total increased use with project* (no increase in downstream use)			
	Lake size (acre-feet)			
	44,000	65,000	83,000	100,000
1970	16,350	25,950	33,950	33,950
1980	26,450	41,350	54,050	54,050
1990	38,250	59,950	78,650	78,650
2000	53,000	83,300	109,300	109,300
2010	69,450	109,250	143,450	143,450

*The irrigation-recreation-urban water supply project's operation is not favorable to the development of waterfowl nesting islands, and there will be no waterfowl hunting areas.

Recreation Water Requirements

There will be only a small consumptive use of water associated with onshore recreation areas. At most, during full development, the amount required would approach 100 acre-feet per year. It is planned to pump water from the lake to storage tanks above the recreation area where it will be treated as required. From the storage tanks, it can be distributed by gravity throughout the campgrounds and picnic areas.

The recreation and fish and wildlife enhancement portions of the project require that a minimum pool of 15,000 acre-feet be established to insure water for fish and wildlife.

Effect on Other Project Purposes

Recreation would have no effect on use of the reservoir for urban water supply.

Irrigation would be affected by recreation as a minimum pool would be established to reserve a sufficient supply of water for fish and wildlife, and recreation. Thus, the amount of water available for irrigation would be limited to the quantity in excess of the 15,000-acre-foot minimum pool.

Flood Control

Within recent years, the City of Portola has sustained damage as a result of high water in the Middle Fork Feather River. Lake Davis, although not specifically operated for flood control, will help reduce the peak flows in the Middle Fork.

The peak recorded flow, measured at the U. S. Geological Survey gaging station on Big Grizzly Creek, was 2,680 cubic feet per second. The Department's estimate of the standard project flood is 9,220 cubic feet per second and the probable maximum flood is 9,700 cubic feet per second. With the 83,000-acre-foot lake, the maximum probable flood outflow would be reduced to about 1,360 cubic feet per second.

Annual flood control benefits to Portola due to the operation of Lake Davis would be incidental to other project purposes and have not been considered in the evaluation of project benefits.

Power

The Lake Davis site has been considered by various agencies for the development of hydroelectric power. One of the agencies, Pacific Gas and Electric Company, is a major landowner in the valley, although it had no present plans for development.

The Lake Davis site was included as a unit of the Middle Fork Feather River Development by the Richvale Irrigation District in its initial filing of Application No. 2134 with the Federal Power Commission. Subsequently, Richvale Irrigation District filed an amended application for license deleting the proposed Lake Davis site from its application. The Federal Power Commission has indicated by letter dated September 28, 1964 that, they will act as expeditiously as possible on the modification of the Richvale application.

Prior feasibility studies by the Department indicated that development of hydroelectric power as a project purpose was not economically justified.

CHAPTER IV. PLANS FOR DEVELOPMENT

Two alternative projects for Grizzly Valley Dam and Lake Davis were considered. One alternative would be primarily for recreation; the other would be primarily for irrigation. Both alternatives would supply water for urban use.

Detailed economic data were developed for each alternative project with lakes having gross storage capacities of 44,000 and 83,000 acre-feet. These data were extrapolated to develop corresponding data for lakes having gross storage capacities of 65,000 and 100,000 acre-feet.

Recreation-Urban Water Supply Project

This project was formulated to best meet the recreational needs of the State by providing for onshore recreational facilities, downstream fisheries enhancement, and urban water supply.

The major features of this project consist of a dam and lake at Grizzly Valley, pipelines for urban water supply from the dam to the urban service areas, onshore recreation facilities staged to satisfy the recreation demand, and public access to Big Grizzly Creek downstream from the dam to the Middle Fork Feather River.

Urban Water Supply Transportation Facilities

Plumas County Flood Control and Water Conservation District has contracted with the Department for a maximum annual delivery of 2,700 acre-feet of urban water. The water will be delivered through a pipeline, with a maximum flow of 8.25 cubic feet per second, from the dam to the

service areas. The approximate location of the pipeline is shown on Plate 2.

Recreation Facilities

The recreation facilities at the lake would be composed of developments providing for camping, picnicking, swimming, and boating. In addition, there would be concession areas and an administration area. The economic evaluation of the recreation development is based upon construction of additional facilities at 10-year intervals.

The initial phase of the recreation development would be completed at the time the dam and lake were completed. The location of these facilities is shown on Plate 3, "Recreation Land Use Plan". They will satisfy the recreation demand for the first 10 years of operation. Additional facilities would be developed depending upon the actual recreation use experienced after the lake is completed and in operation. Access to recreation areas would be from existing and relocated roads around the lake.

The initial and future recreation facilities will be described in more detail in Appendix D, "Lake Davis Recreation Development Plan", to be published under separate cover.

Enhancement of downstream fisheries in Big Grizzly Creek will require acquisition of land in fee or easement to insure public access to the stream. Parking areas and sanitary facilities would be provided along the creek as shown on Plate 4, "Big Grizzly Creek Public Access".

Optimum flows for fisheries enhancement are 18 cubic feet per second (cfs) from March 16 to June 15, and 8 cfs during the remainder of the year. By far the greatest recreation use is anticipated at the lake.

Therefore, consideration was given to reduction of flow below optimum if the lake is not full by midspring. This reduction in flow would permit retention of additional water in the lake to maintain the water level at a higher elevation. Lake releases would not be less than four cfs. The proposed schedule of releases is shown in Table 9.

TABLE 9
STREAMFLOW RELEASES FOR
FISHERIES ENHANCEMENT

Water surface elevation on May 1 (feet)	:	Lake storage on May 1 (acre-feet)	:	Minimum flow release (cubic feet per second)		
				May 1- June 15	June 16- March 15	March 16- April 30
5,775	:	83,000	:	18	8	18
5,773 to 5,775	:	75,500 to 83,000	:	16	6	16
5,770 to 5,773	:	65,000 to 75,500	:	15	5	15
below 5,770	:	below 65,000	:	14	4	14

The creation of waterfowl nesting islands in the Freeman Creek Recreation Area will replace and enhance the waterfowl nesting conditions to the extent of providing an increase of 2,400 hunter-days annually.

Accomplishments

Under this alternative, the water level in the lake will be at or near normal pool in the spring, and will lower only moderately during the summer and early fall recreation season as shown in the water surface hydrograph in Appendix E. This will create favorable conditions for

onshore recreation facilities. It is estimated that about 476,600 visitor-days of use will occur at the lake and downstream in the year 2010 with the 83,000-acre-foot lake.

The Grizzly Valley Project will contribute towards the expansion of residential, commercial, and light-industrial developments within the urban service area. Lands are presently being subdivided in anticipation of development of the project. These subdivisions anticipate permanent as well as seasonal residents. However, development of subdivisions and expansion of the urban service area in general is dependent upon a dependable water supply.

The recreation-urban water supply project will provide the Grizzly Valley service area with a maximum of 2,700 acre-feet of domestic water annually in 2015 to a population of about 10,430.

The effect of the recreation-urban water supply project on the Middle Fork of the Feather River is shown in the chart in Appendix F. This chart shows that during the summer months there would be an increase above natural flows and during the winter months there would be a decrease below natural flows. This would be a result of storage of excess winter flows and the fishery enhancement releases provided by the project.

Costs

To determine the project with the maximum net benefits (benefits less costs), estimates of capital costs, present worth of future costs, and average annual equivalent costs were made for projects with gross storage capacities of 44,000, 65,000, 83,000, and 100,000 acre-feet.

Features of the project for which costs were estimated include:

1. Dam, lake, road relocations, land acquisition, and engineering.
2. Initial and future recreation facilities.
3. Transportation facilities (pipeline) for the urban water supply.

Estimates of capital costs for the various size dams and lakes were prepared in March 1961. These estimates were revised following award of the contract for construction of Grizzly Valley Dam and Lake Davis. It was assumed that the cost of each of the various size dams and lakes would increase proportionately to the increase in cost of the 83,000-acre-foot lake from the 1961 estimate to the actual contract amount. The urban water supply transportation facilities cost estimate was made in October 1964. Initial and future recreation development cost estimates were made by the Department of Parks and Recreation. The total capital costs for the different size projects are shown in Table 10.

For the economic analysis, it was assumed that all initial capital cost would be incurred in 1965 and benefits would begin occurring during 1966.

Annual equivalent costs include capital recovery and operation and maintenance. Capital recovery is based upon a 50-year repayment period with an interest rate of four percent per annum. Summaries of average annual equivalent costs for the different size recreation-urban water supply projects are shown in Table 11.

Estimated costs of recreation development include the cost of onshore facilities at the reservoir and the cost of providing access to Big Grizzly Creek from the dam downstream to the Middle Fork Feather River.

TABLE 10

CAPITAL COSTS
RECREATION-URBAN WATER SUPPLY PROJECT

Item	Gross Lake Storage (acre-feet)			
	44,000	65,000	83,000	100,000
<u>Dam, Lake, Roads, Land, and Engineering</u>				
Capital Cost	\$3,053,000	\$3,275,000	\$3,463,000	\$3,664,000
<u>Recreation Facilities</u>				
Initial Capital Cost	\$ 573,100	641,900	700,500	700,500
Specific Recreation Land	54,000	58,000	70,000	70,000
Stream Access	100,000	100,000	100,000	100,000
Present Worth of Future Costs	<u>733,700</u>	<u>793,500</u>	<u>950,800</u>	<u>950,800</u>
Subtotal	\$1,460,800	\$1,593,400	\$1,821,300	\$1,821,300
<u>Transportation Facilities (Urban Water Supply)</u>				
Capital Costs	<u>\$ 463,000</u>	<u>\$ 463,000</u>	<u>\$ 463,000</u>	<u>\$ 463,000</u>
TOTAL	\$4,976,800	\$5,331,400	\$5,747,300	\$5,948,300

TABLE 11

AVERAGE ANNUAL EQUIVALENT COSTS
RECREATION-URBAN WATER SUPPLY PROJECT

Item	Gross Lake Storage (acre-feet)			
	44,000	65,000	83,000	100,000
<u>Dam, Lake, Roads, Land, and Engineering</u>				
Capital Recovery	\$142,100	\$152,500	\$161,200	\$170,500
Operation and Maintenance	<u>11,400</u>	<u>15,000</u>	<u>18,100</u>	<u>21,000</u>
Subtotal	\$153,500	\$167,500	\$179,300	\$191,500
<u>Recreation Facilities</u>				
Capital Recovery	\$ 60,800	\$ 66,800	\$ 76,900	\$ 76,900
Specific Recreation Land	2,500	2,700	3,300	3,300
Stream Access	4,700	4,700	4,700	4,700
Operation and Maintenance	<u>36,900</u>	<u>44,700</u>	<u>51,500</u>	<u>51,500</u>
Subtotal	\$104,900	\$118,900	\$136,400	\$136,400
<u>Transportation Facilities (Urban Water Supply)</u>				
Capital Recovery	\$ 21,600	\$ 21,600	\$ 21,600	\$ 21,600
Operation and Maintenance	<u>3,500</u>	<u>3,500</u>	<u>3,500</u>	<u>3,500</u>
Subtotal	<u>\$ 25,100</u>	<u>\$ 25,100</u>	<u>\$ 25,100</u>	<u>\$ 25,100</u>
TOTAL, Average Annual Equiv- alent Costs	\$283,500	\$311,500	\$340,800	\$353,000

Cost of construction of onshore recreation facilities is based upon the concept that construction will be staged at 10-year intervals over a 50-year period to accommodate progressive increases in demand for recreation facilities attendant with increased recreation use. Initial recreation facilities will be constructed during construction of the dam and lake so that facilities will be available when storage of water in the lake commences.

Estimated cost of urban water supply includes only the cost of the transportation facilities to an existing terminal reservoir near the Delleker-Portola subunit and a turnout for the other two subunits along Big Grizzly Creek.

Benefits

Recreation benefits are considered as the direct benefits attributed to individuals who visit the facilities at the lake and to anglers downstream. Benefits are based on the increment of use attributed to the project above that which would occur without the project. Indirect benefits, such as those enjoyed by resort owners and shopkeepers, were excluded from the economic analysis.

Cost of travel, origin of trip, number of visitors, and length of stay in the recreation area were considered in the determination of average recreation benefits. The average benefit value was determined by the method described in the Department's economic manual, Section 3345. This method is based on distance traveled and distribution of recreationists. The average benefit per visitor-day was found to be \$2.25.

Urban benefits attributable to water supply result from the increased economic development in urban and suburban areas due to the project.

Benefits from urban use of project water were evaluated on the basis of vendibility of water to residential and commercial customers because the existing supply of water is expected to be inadequate to supply future requirements (and development of new additional water supplies in lieu of Grizzly Valley Project water has been held in abeyance pending the development of the project).

The urban benefit was estimated as \$46.00 per acre-foot, the current cost of water in Portola. This value is considered reasonable for use throughout the service area.

The estimate of urban and suburban population which would be served by project water includes permanent residents, summer residents and part-time summer workers. The water requirement for the seasonal residents and workers is reflected in the total project water requirement.

The present worth of urban benefits for the 50-year period from 1965 to 2015 is \$899,000, and the average annual equivalent is \$41,800. Population growth will be about the same for a recreation-urban water supply project with lake capacity of any of the sizes considered herein.

Total benefits for the various sizes of recreation-urban water supply projects are shown in Table 12.

TABLE 12

AVERAGE ANNUAL BENEFITS
RECREATION-URBAN WATER SUPPLY PROJECT

Purposes	Gross lake storage capacity (acre-feet)			
	44,000	65,000	83,000	100,000
Recreation	\$279,300	\$338,000	\$388,900	\$388,900
Urban	<u>41,800</u>	<u>41,800</u>	<u>41,800</u>	<u>41,800</u>
TOTAL	\$321,100	\$379,800	\$430,700	\$430,700

Optimum Lake Size

Optimum size for Lake Davis was determined by maximizing net benefits. Benefits and costs for each of the four project sizes considered were estimated and the benefit-cost ratio computed to determine economic justification. All of the projects considered are economically justified with the 83,000-acre-foot lake having the highest benefit-cost ratio and the maximum net benefits (benefits less costs), as shown in Table 13.

TABLE 13

BENEFIT-COST RATIO AND NET BENEFITS
RECREATION-URBAN WATER SUPPLY PROJECT

Lake size (acre-feet)	Total average annual equivalent benefits	Total average annual equivalent costs	Benefit-cost ratio	Net annual benefits
44,000	\$321,100	\$283,500	1.13 to 1.0	\$ 37,600
65,000	379,800	311,500	1.22 to 1.0	68,300
83,000	430,700	340,800	1.26 to 1.0	89,900
100,000	430,700	353,000	1.22 to 1.0	77,700

Cost Allocation

The separable cost-remaining benefits method was used to allocate the multiple-purpose project costs for Grizzly Valley Dam and Lake Davis, recreation-urban water supply project.

The costs of transportation facilities are not included in the Grizzly Valley Project Cost Allocation. It is the Department's policy to allocate costs separately for the transportation facilities and conservation facilities of the State Water Project.

The present worth of urban benefits for both the conservation facilities (dam and lake) and transportation facilities for the 50-year period from 1965 to 2015 is \$899,000, and the average annual equivalent is \$41,800. Since transportation facilities costs are not included in the Grizzly Valley Project Cost allocation, the urban water supply benefits must be reduced by the benefits that are attributable to the pipeline. It was determined by a trial cost allocation that the benefit-cost ratio for both the transportation facilities and water supply portion of the conservation facilities is 1.20 to 1. Table 14 shows the urban water supply benefits attributable to the water supply conservation facilities.

TABLE 14

AVERAGE ANNUAL BENEFITS
URBAN WATER SUPPLY
83,000-ACRE-FOOT LAKE

Total Urban Benefits	\$41,800
Transportation Benefits (1.20 x 25,100)	<u>30,100</u>
Conservation Facilities Benefits	\$11,700

To use the separable cost-remaining benefits method of cost allocation, certain necessary estimates of alternative separable and specific costs were required.

A single-purpose alternative recreation project would consist of the same size dam and lake as the multiple-purpose project. The recreation facilities would be the same and the total average annual equivalent cost is identical to the multiple-purpose project cost without the urban water supply pipeline.

The single-purpose alternative urban water supply project would consist of a smaller dam on Big Grizzly Creek with a reservoir capacity of about 4,000 acre-feet. This reservoir would have an average annual yield of 2,700 acre-feet and would provide the same urban benefits as the multiple-purpose project. The capital costs of this project is estimated at \$1,090,000. The estimated average annual equivalent cost of the alternative urban water supply project is shown in Table 15.

TABLE 15

AVERAGE ANNUAL COSTS
ALTERNATIVE SINGLE-PURPOSE
WATER SUPPLY PROJECT
4,000-ACRE-FOOT RESERVOIR

Item	<u>Costs</u>
<u>Dam, Reservoir, Roads, and Land</u>	
Capital Recovery	\$50,800
Operation and Maintenance	<u>10,000</u>
TOTAL	\$60,800

The separable water supply cost is the difference in cost between the cost of the multiple-purpose project and the cost of the project with the water supply purpose omitted. Table 16 shows the procedure of computing the separable water supply costs.

TABLE 16
ESTIMATED SEPARABLE WATER SUPPLY COSTS
(Conservation Facilities)

	: Capital : cost	:Average annual: : equivalent	Average : annual O&M :	: Total : annual
Multiple-Purpose Project	\$5,284,300	\$246,100	\$69,600	\$315,700
Less Project Without Urban Water Supply (single-purpose recreation)	<u>5,284,300</u>	<u>246,100</u>	<u>69,600</u>	<u>315,700</u>
Separable Water Supply Costs	\$ 0	\$ 0	\$ 0	\$ 0

The separable recreation cost is the difference in cost between the cost of the multiple-purpose project and the cost of the project with the recreation purpose omitted. Table 17 shows the procedure of computing the separable recreation costs.

TABLE 17

ESTIMATED SEPARABLE RECREATION COSTS
(Conservation Facilities)

	: Capital : cost	:Average annual: : equivalent	Average : annual O&M	: Total : annual
Multiple-Purpose Project	\$5,284,300	\$246,100	\$69,600	\$315,700
Less Project Without Recreation (single-purpose water supply)	<u>1,090,000</u>	<u>50,800</u>	<u>10,000</u>	<u>60,800</u>
Separable Recreation Cost	\$4,194,300	\$195,300	\$59,600	\$254,900

The specific costs for the water supply phase of the multiple-purpose project are those items that are entirely for water supply. The specific water supply cost is zero for the conservation facilities. The specific water supply costs for the transportation facilities is the cost of the pipeline as shown in Table 18. The cost of the control house is not a specific cost because the control house would be required without the water supply phase of the project.

TABLE 18

ESTIMATED SPECIFIC WATER SUPPLY COSTS
(Transportation Facilities)

Capital Costs

Transportation Facilities \$463,000

Average Annual Equivalent Costs

Transportation Facilities \$ 21,600
Operation and Maintenance 3,500

TOTAL AVERAGE ANNUAL EQUIVALENT COST \$ 25,100

The specific costs for the recreation phase of the multiple-purpose project are those items that are entirely for recreation. Specific recreation costs include the costs of onshore recreation facilities, additional lands required for recreation development, and downstream access to Big Grizzly Creek as shown in Table 19.

TABLE 19
ESTIMATED SPECIFIC RECREATION COSTS

Capital Costs

Initial Capital Costs	\$ 700,500
Specific Recreation Land	70,000
Present Worth of Future Costs	950,800
Stream Access	<u>100,000</u>
	\$1,821,300

Average Annual Equivalent Costs

Onshore Facilities (including Future Facilities)	\$ 76,900
Specific Recreation Land	3,300
Stream Access	<u>4,700</u>
Subtotal	\$ 84,900
Operation and Maintenance	<u>51,500</u>
TOTAL AVERAGE ANNUAL COSTS	\$ 136,400

The cost allocation for the 83,000-acre-foot recreation-urban water supply project is shown in Table 20.

TABLE 20

COST ALLOCATION
RECREATION-URBAN WATER SUPPLY PROJECT
AVERAGE ANNUAL COSTS AND BENEFITS
(83,000 Acre-Feet)

	: Recreation	: Urban Water	: Total
1. Benefits	\$388,900	\$11,700	\$400,600
2. Alternative Costs			
Total	315,700	60,800	376,500
Capital	246,100	50,800	296,900
Operation and Maintenance	69,600	10,000	79,600
3. Justifiable Costs	315,700	11,700	327,400
4. Separable Costs			
Total	254,900	0	254,900
Capital	195,300	0	195,300
Operation and Maintenance	59,600	0	59,600
5. Remaining Justifiable Cost	60,800	11,700	72,500
6. Percent Distribution	83.9%	16.1%	100.0%
7. Remaining Joint Costs			
Total	51,000	9,800	60,800
Capital	42,600	8,200	50,800
Operation and Maintenance	8,400	1,600	10,000
8a. Total Allocated Costs, Conservation Facilities			
Total	305,900	9,800	315,700
Capital	237,900	8,200	246,100
Operation and Maintenance	68,000	1,600	69,600
8b. Total Allocated Costs, Transportation Facilities			
Total	0	25,100	25,100
Capital	0	21,600	21,600
Operation and Maintenance	0	3,500	3,500

TABLE 20 (continued)

COST ALLOCATION
RECREATION-URBAN WATER SUPPLY PROJECT
AVERAGE ANNUAL COSTS AND BENEFITS
(83,000 Acre-Feet)

	: Recreation	: Urban Water	: Total
8c. Total Allocated Project Cost			
Total	\$305,900	\$34,900	\$340,800
Capital	237,900	29,800	267,700
Operation and Maintenance	68,000	5,100	73,100
9. Percent Distribution of Total Project Costs			
Total	89.8%	10.2%	100.0%
Capital	88.9%	11.1%	100.0%
Operation and Maintenance	93.0%	7.0%	100.0%
10. Specific Costs			
Total	136,400	25,100	161,500
Capital	84,900	21,600	106,500
Operation and Maintenance	51,500	3,500	55,000
11. Total Allocated Costs of Features Jointly Used			
Total	169,500	9,800	179,300
Capital	153,000	8,200	161,200
Operation and Maintenance	16,500	1,600	18,100
12. Percent Distribution of Costs of Features Jointly Used			
Total	94.5%	5.5%	100.0%
Capital	94.9%	5.1%	100.0%
Operation and Maintenance	91.2%	8.8%	100.0%

Irrigation-Recreation-Urban Water Supply Project

This project would provide water for irrigation, urban water supply, and recreation. Recreation facilities would be developed at the lake that would be compatible with the other project purposes.

The project would consist of a dam and lake at Grizzly Valley, a conveyance canal to deliver water to Sierra Valley, facilities for recovering water for reuse in Sierra Valley, a pipeline for the urban water supply, and onshore recreation facilities at the lake.

Irrigation Facilities

Water for irrigation in Sierra Valley would be released from the lake into Big Grizzly Creek. The water would be diverted from the creek into an open canal at a diversion structure at Grizzly Ice Pond Dam about 1.3 miles upstream from State Route 70. The diversion at Grizzly Ice Pond would necessitate a breach in the left abutment of the existing slab and buttress dam and installation of an intake structure for diversion into the canal. The approximate location of the canal and potential service area is shown on Plate 2.

The distribution system is based on preliminary plans and is intended only to express a measure of the cost involved. All of the lands to be irrigated would be served by an open gravity system. Water would be diverted from the main canal by means of gravity flow through pipes in the downhill berm of the canal. Each diversion would have a vertical lift control gate. It was considered that the diversions would be located so that the water would be discharged into existing intermittent stream channels. These channels would act as a main distribution system throughout the

irrigated area. Water would then be diverted from these channels into smaller laterals by means of concrete diversion boxes.

Farm turnouts would be provided for each 160 acres or fraction thereof. All turnout structures would be concrete.

In addition to the main canal and the distribution system, consideration was given to a recovery system whereby water which drained from the irrigated lands could be pumped back into the main canal for reuse on the irrigated lands. Plans for the recovery system are based on a maximum flow of eight cfs. The system is composed of a diversion dam and pumping plant located on the Middle Fork Feather River at its outlet from Sierra Valley. Water would be pumped back to the main canal from this diversion point, and would be redistributed throughout the irrigated area.

Urban Water Supply Facilities

The proposed urban water supply facilities would be the same under either the recreation-urban water supply project or the irrigation-recreation-urban water supply project. A description of these facilities was presented in the recreation-urban water supply alternative plan.

Recreation Facilities

The recreation facilities at the lake would consist of developments for camping, picnicking, swimming, and boating. There would be concession areas and an administration area. For purposes of this report, the economic evaluation of the recreation facilities was based upon a staging interval of 10 years, over a 50-year period. The actual development of these facilities would depend upon the use experienced after the project was completed. The initial phase of the recreation development would be

completed by the time the dam and lake were completed. These facilities are expected to satisfy the demand for the first 10 years following completion of the dam and lake. There will be a road completely around the lake. The southern extension of this road would cross from the recreation access road over the dam and join the Delleker road. The initial recreation development at the lake under this alternative would be less than the development under the recreation-urban water supply project. Future recreation developments would also be less under this alternative project as the project operation would not be as desirable for recreation.

Under this alternative, there would be no enhancement to downstream fisheries, and no stream easements for public access would be required. It is estimated that the stream would have about the same fishing as it would have received without the project.

There will be no waterfowl nesting islands under this alternative as the project operation is not suitable for the construction of islands.

Accomplishments

This alternative would provide irrigation water to the northwest section of Sierra Valley, a water supply for an urban service area and recreational use at the lake. No increase in recreational use would occur in Big Grizzly Creek under this alternative project.

It was assumed that the maximum amount of water for irrigation would be available in 1975. Water available for irrigation would progressively decline as shown in Table 3 because of increased urban use of water.

The operation of the lake would be less favorable to the development of onshore recreation facilities than if irrigation were omitted. The estimated use for the 83,000- and 100,000-acre-foot lakes in 2020 is 157,200 visitor-days.

The irrigation-recreation-urban water supply project would provide the Grizzly Valley Service Area with a maximum of 2,700 acre-feet of domestic water annually in 2015 to a population of about 10,430.

Costs

Estimates of capital cost and average annual equivalent costs were made on projects with gross storage capacities of 44,000, 65,000, 83,000 and 100,000 acre-feet.

Features of the project for which costs were estimated include:

1. Dam, lake, road relocation, land acquisition, and engineering.
2. Initial and future recreation facilities.
3. Irrigation conveyance and water recovery system.
4. Transportation facilities (pipeline) for the urban water supply.

The capital costs for the various size dams and lakes are the same as the costs in the recreation-urban water supply alternative project. Capital costs, including the present worth of future costs, are shown in Table 21.

Average annual equivalent costs include capital recovery, operation, and maintenance. Capital recovery is based upon a 50-year repayment period with an interest rate of four percent per annum. Summaries of annual costs for the irrigation-recreation-urban water supply project are shown in Table 22.

TABLE 21

CAPITAL COSTS
IRRIGATION-RECREATION-URBAN
WATER SUPPLY PROJECT

Item	Gross Lake Storage (acre-feet)			
:	44,000	65,000	83,000	100,000
<u>Dam, Lake, Roads, Land, and Engineering</u>				
Capital Cost	\$3,053,000	\$3,275,000	\$3,463,000	\$3,664,000
 <u>Recreation</u>				
Initial Capital Cost	\$ 254,700	\$ 305,700	\$ 350,300	\$ 350,300
Specific Recreation Land	54,000	58,000	70,000	70,000
Stream Access	0	0	0	0
Present Worth of Future Costs	<u>199,300</u>	<u>320,500</u>	<u>424,300</u>	<u>424,300</u>
Subtotal	\$ 508,000	\$ 684,200	\$ 844,600	\$ 844,600
 <u>Transportation Facilities</u>				
Urban Water Supply Capital Costs	\$ 463,000	\$ 463,000	\$ 463,000	\$ 463,000
Irrigation Supply Capital Costs	<u>394,800</u>	<u>535,000</u>	<u>618,300</u>	<u>618,300</u>
TOTAL	\$4,418,800	\$4,957,200	\$5,388,900	\$5,589,900

TABLE 22

AVERAGE ANNUAL EQUIVALENT COSTS
IRRIGATION-RECREATION-URBAN WATER SUPPLY PROJECT

Item	Gross Lake Storage (acre-feet)			
:	44,000	65,000	83,000	100,000
<u>Dam, Lake, Roads, Land, and Engineering</u>				
Capital Recovery	\$142,100	\$152,500	\$161,200	\$170,500
Operation and Maintenance	<u>11,400</u>	<u>15,000</u>	<u>18,100</u>	<u>21,000</u>
Subtotal	\$153,500	\$167,500	\$179,300	\$191,500
<u>Recreation Facilities</u>				
Capital Recovery	\$ 21,100	\$ 29,100	\$ 36,100	\$ 36,100
Specific Recreation Land	2,500	2,700	3,300	3,300
Operation and Maintenance	<u>10,100</u>	<u>15,600</u>	<u>20,200</u>	<u>20,200</u>
Subtotal	\$ 33,700	\$ 47,400	\$ 59,600	\$ 59,600
<u>Transportation Facilities</u>				
Urban Water Supply				
Capital Recovery	\$ 21,600	\$ 21,600	\$ 21,600	\$ 21,600
Operation and Maintenance	<u>3,500</u>	<u>3,500</u>	<u>3,500</u>	<u>3,500</u>
Subtotal	\$ 25,100	\$ 25,100	\$ 25,100	\$ 25,100
Irrigation Supply				
Capital Recovery	\$ 18,400	\$ 24,900	\$ 28,800	\$ 28,800
Operation and Maintenance	<u>5,900</u>	<u>8,000</u>	<u>9,300</u>	<u>9,300</u>
Subtotal	<u>\$ 24,300</u>	<u>\$ 32,900</u>	<u>\$ 38,100</u>	<u>\$ 38,100</u>
TOTAL, Average Annual Equivalent Costs	\$236,600	\$272,900	\$302,100	\$314,300

The estimated cost for recreation development included the cost of onshore facilities at the lake. Initial development cost is less than the development cost for the recreation-urban water supply project. The cost of providing access to Big Grizzly Creek from the dam downstream to the Middle Fork Feather River is not included in this alternative project.

Costs of the irrigation system are based on a preliminary design that includes a diversion structure at Grizzly Ice Pond Dam, the main conveyance canal, and a distribution and recovery system.

Estimated cost of the urban water supply facilities includes the cost of a pipeline to an existing terminal reservoir in the Delleker-Portola subunit and turnouts for service along Big Grizzly Creek.

Benefits

Derivation of recreation benefits is described under "Benefits" for the recreation-urban water supply project.

Average annual equivalent of recreation benefits for the different size projects considered in this evaluation are summarized in Table 23.

The amount of project water available for irrigation varies with the size of project. Table 4 shows the amount of water that would be available under each size project.

The irrigation benefits are defined as the net increase in the returns to land and water with and without the project from the agricultural enterprises to which irrigation water is applied.

The annual benefits by crops were computed by subtracting all farm costs, except land and water costs, from the gross farm income under future "with" and "without" project conditions. The area benefits were

calculated by decades in accordance with the projected crop pattern. Without the project, the agricultural development would be essentially a livestock-oriented economy producing field, grain, and native pasture crops. For the purpose of the study, existing agricultural practices are considered to be without irrigation as the amount of irrigation water presently applied is limited to local stream runoff and some ground water pumping. The return to land and water was determined as the difference between this condition and the land under irrigation.

Criteria for determining the benefits for urban water supply are the same as for the recreation-urban water supply project. Present worth of urban benefits for the 50-year period from 1965 to 2015 is \$899,000 and the average annual equivalent is \$41,800. Population growth, and consequently the project water requirements for urban use, would be the same for an irrigation-recreation-urban water supply project with gross lake storage capacity of any of the four sizes considered herein.

Total average annual equivalent benefits for the irrigation-recreation-urban water supply project are presented in Table 23.

TABLE 23

AVERAGE ANNUAL EQUIVALENT BENEFITS
IRRIGATION-RECREATION-URBAN WATER SUPPLY PROJECT

Items	Gross lake storage (acre-feet)			
	44,000	65,000	83,000	100,000
Irrigation	\$ 89,000	\$107,100	\$126,000	\$128,400
Recreation	71,000	111,600	146,300	146,300
Urban	<u>41,800</u>	<u>41,800</u>	<u>41,800</u>	<u>41,800</u>
TOTAL	\$201,800	\$260,500	\$314,100	\$316,500

Optimum Lake Size

Optimum size for Lake Davis was determined by maximizing net benefits. Benefits and costs for each of the four lake sizes considered were estimated and the benefit-cost ratio computed to determine economic justification. As shown in Table 24, the two smaller project sizes do not have favorable benefit-cost ratios. The 83,000-acre-foot project has the highest benefit-cost ratio of the two justified lake sizes. Table 24 also lists the net annual benefits (benefits less costs) for each lake size and shows the 83,000-acre-foot project to have the maximum net annual benefits.

TABLE 24

BENEFIT-COST RATIO AND NET BENEFITS
IRRIGATION-RECREATION-URBAN WATER SUPPLY PROJECT

Lake size (acre-feet)	: Total average : annual equiv- : alent benefits	: Total average : annual equiv- : alent costs	: Benefit-cost : ratio	: Net : annual : benefits
44,000	\$201,800	\$236,600	0.85 to 1.0	---
65,000	260,500	272,900	0.95 to 1.0	---
83,000	314,100	302,100	1.04 to 1.0	\$12,000
100,000	316,500	314,300	1.01 to 1.0	2,200

Cost Allocation

A cost allocation for the irrigation-recreation-urban water supply project was not made because there has been no contract signed for irrigation water from this project.

Comparison of Alternative Plans

Under each of the alternative plans the project with a gross storage of 83,000 acre-feet is the most favorable of the four sizes based on the total net benefits. The benefit-cost ratio of the 83,000-acre-foot project is also higher than that of the other three sizes.

The net benefits and benefit-cost ratio of the 83,000-acre-foot recreation-urban water supply project are considerably more than those of the irrigation-recreation-urban water supply project.

Recreation land use and land acquisition will be essentially the same for either of the alternatives. However, recreation use of the irrigation project would be considerably less than that of the recreation project, due primarily to the operational characteristics and change in water level during the recreation season caused by irrigation release. Visitor use of the reservoir by the year 2010 is estimated to be 476,600 visitor-days for the recreation project and 157,200 visitor-days for the irrigation project.

Grizzly Valley Dam and appurtenances and road relocations would be the same for either of the alternative projects.

The irrigation project would provide sufficient project water to irrigate up to 9,300 acres of land in Sierra Valley. Within the assumed irrigation service area, water would be served to lands under 13 separate ownerships. Seven of these ownerships constitute over 90 percent of the land within the service area. The number of water users could change with the change in the service area boundaries. There has been no expressed intent by local interests to contract for irrigation water from the Grizzly Valley Project, therefore, the Department is proceeding with the recreation-urban water supply project.

Project Development Features

On January 17, 1964, the Director of the Department of Water Resources signed Project Order No. 6 for Grizzly Valley Dam and Lake Davis. The order authorized construction of an earthfill dam, a reservoir with a capacity of 83,000 acre-feet, and all necessary appurtenances, including a pipeline to the vicinity of Portola. The project will be operated for recreational purposes, to provide a supply of water for domestic and municipal use, and for downstream fisheries enhancement. Incorporation of an agricultural water supply at a later date was not precluded as a project purpose. A copy of Project Order No. 6 is presented in Appendix A.

Dam

The dam as shown on Plate 5, "Dam-Plan, Profile and Section", will be a zoned earthfill embankment with a height of 115 feet above streambed, a crest length of about 850 feet at an elevation of 5,785 feet above sea level, with about 230,000 cubic yards of fill. A concrete-lined chute spillway will be located on the right abutment of the dam. At a maximum water surface elevation of 5,781.4 feet, the discharge capacity of the spillway will be 1,360 second-feet and the surcharge storage capacity will be about 25,000 acre-feet. The spillway will have a concrete ogee control weir with a length of 30 feet and will discharge into Big Grizzly Creek.

Lake

Based on the results of the advance planning studies, a lake with gross storage capacity of 83,000 acre-feet was approved by the Chief Engineer on March 5, 1963. The lake will have a water surface area of

about 4,000 acres and a shoreline of 32 miles at normal pool elevation of 5,775 feet.

Land

An office report entitled "Recreation Land Use and Acquisition Plan, Grizzly Valley Reservoir", Appendix G (under separate cover), was approved by the Director on January 8, 1964. The report, serving as the official document authorizing the Department of Water Resources to purchase lands necessary for recreation at the lake, is based upon a project with recreation as the primary purpose and a lake capacity of 83,000 acre-feet.

The total area within the project boundaries, encompassing the lake and recreation areas, would be 7,663 acres. Of this total, 5,143 acres are privately owned and the remaining 2,520 acres are public lands administered by the U. S. Forest Service. The status of land ownership as of July 1964 is shown on Plate 6, "Property Status Map".

Intake Structure

The intake structure will include a 30-inch valve at elevation 5,760 feet, a 30-inch valve at elevation 5,740 feet, and a 24-inch valve at elevation 5,700 feet. This will place the intake valves at 15, 35, and 75 feet below the normal pool elevation. Each 30-inch valve is designed to supply the total required flow for all project purposes. The multiple-level intake structure will provide flexibility of operation and a means of controlling water quality and temperature for urban water supply and fishery enhancement releases.

Access Roads

The existing road leading from State Route 70 to the lake area is about 7 miles in length, of which about 1.5 miles is partially paved. Local interests have expressed the desire for this road to be improved. For safety reasons, certain portions should be realigned and regraded.

Around the lake area itself, about 5.7 miles of relocated road will be required to replace existing roads to be inundated by the lake. About 12 miles of existing U. S. Forest Service roads will be utilized for complete access to the recreation areas around the lake. All of these existing roads are unpaved.

Stream Access

Under the recreation-urban water supply project, public access to Big Grizzly Creek is necessary to insure that benefits claimed for downstream trout fishery enhancement are realized. This will be accomplished by acquiring a strip of land, including Big Grizzly Creek and about 25 feet on each side of the creek, either in fee or easement from the dam to the confluence with the Middle Fork Feather River. Access to the creek from the existing Grizzly Valley access road can be provided by improvement of existing unpaved roads and construction of parking areas near the creek as shown on Plate 4, "Big Grizzly Creek Public Access".

Waterfowl Areas

Lake Davis will inundate about 4,000 acres of the existing valley floor. Waterfowl nesting presently occurs along Big Grizzly Creek. To provide a replacement area for existing nesting areas and to enhance the waterfowl nesting conditions, three or four peninsulas in the northwest

corner of the lake will be cut off from shore to form nesting islands. These islands would provide safety from ground predators during the nesting period of March, April, and May. A cut about 50 feet wide, down to elevation 5,770 at the locations shown on Plate 3, "Recreation Land Use Plan", would provide the necessary conditions. The estimated volume of these cuts is about 13,000 cubic yards. There is the possibility that borrow material needed for road relocation nearby might be taken from these cuts. The estimated costs of this work are included in the cost estimates.

Urban Water Supply Transportation Facilities

The water supply contract with Plumas County Flood Control and Water Conservation District includes a provision for construction of a pipeline extending from Grizzly Valley Dam to the vicinity of Portola as a transportation facility. The pipeline will protect water quality by eliminating contamination which could occur from the natural stream channel, and will conserve hydraulic head for distribution of the water. Under the terms of the water supply contract, the district may request the State to design and construct the pipeline or the district itself may elect to design and construct it in whole or in part.

It was assumed that the pipeline would be designed and built by the Department. A reconnaissance investigation was made by the Department to determine the approximate alignment and profile, and to prepare a cost estimate. The upper portion of the proposed pipeline would parallel Big Grizzly Creek down to the summer home site area. The lower portion would cross a ridge west of the creek and terminate at the City of Portola

reservoir. The proposed alignment is shown on Plate 2. The estimated capital costs would be in the order of \$463,000. The pipeline would meet the projected water demands until about 2015.

Initial Recreation Development

The initial recreation development has been sized to accommodate the recreation use which is expected to develop within the first decade of project existence, and represents only a part of the total possible development. Plate 3, "Recreation Land Use Plan", shows locations of the initial and future recreation developments on the lake's perimeter as well as their relationship to access roads.

Recreation developments are proposed for two of the seven recreation areas; the initial phase will occur at Grasshopper Flat and Valley Vista Recreation Areas.

Grasshopper Flat Recreation Area. The Grasshopper Flat recreation facilities will include developments for camping, picnicking, swimming, water and sanitary systems, and access roads.

The campground will be developed on land near the left abutment of the dam because of its desirable combination of good access, relatively level topography with pine forest cover, lakeside location, and scenic qualities. This campground will consist of 125 camp units, each unit having a parking spur, stationary wooden table, wood-burning campstove, and a leveled area for a tent, trailer, or pickup camper. Water faucets will be located centrally to groups of four camp units.

Picnic facilities will consist of 25 units, with one stove located adjacent to four picnic units. The completed development will

include a potable water supply, sanitary facilities, central parking areas and an access road.

Sanitary facilities will consist of 7 comfort stations located to best serve the above-named activities. A network of surfaced roads will provide for internal circulation and access to the main public thoroughfares. Swimming will be accommodated by a gently sloping beach area composed of a coarse granite sand. The facilities will accommodate about 500 campers and 150 picnickiers daily. The cost is estimated to be \$577,450.

Valley Vista Recreation Area. The remainder of the initial development will be located on the north shore of the lake designated as the Valley Vista Recreation Area. Facilities to be developed in this area will include boat launching, parking, water and sanitary systems, and access roads. The boat launching ramp and its related parking will be located on one of the many peninsulas of the north shoreline. Sanitary facilities will consist of a centrally located comfort station. A water system and necessary access roads will complete the initial development at this location. The boat ramp will provide for the launching of approximately 300 people in 75 to 100 boats daily. The cost of this initial development is estimated to be \$123,050.

Detailed information on both of the initial recreation areas is presented in Appendix D, "Lake Davis, Recreation Development Plan".

Future Recreation Development

The remainder of the recreation lands that are not needed for initial development have been reserved for future recreation developments

and for scenic value. Future demands will require development of additional campgrounds and concession facilities, as well as additional day-use areas. Ample land has been reserved to accommodate all the predicted recreation use during the 50-year period (1965 to 2015) and to facilitate good recreation management as advocated and mutually agreed upon by the Departments of Water Resources, Parks and Recreation, and Fish and Game, the U. S. Forest Service, and Plumas County. The proposed locations of the future recreation areas and right-of-way to be acquired are shown on Plate 3. The type of developments and estimated costs of the initial and future developments are shown in Table 25.

TABLE 25

LAKE DAVIS PROPOSED STAGED DECADAL RECREATION FACILITIES

Recreation Area	1965-1975	1975-1985	1985-1995	1995-2005	2005-2015
Grasshopper Flat	125 Camp Units 25 Picnic Units 1 Overlook	56 Camp Units			65 Picnic Units
Smith Peak			60 Camp Units		
Cow Creek		1 Group Camp	1 Group Camp	1 Group Camp	50 Camp Units
Valley Vista	1 Boat Ramp		40 Picnic Units Concession Area	25 Picnic Units	
Humbug Creek				25 Picnic Units	
Crocker Mountain	1 Overlook			65 Picnic Units	40 Camp Units
Freeman Creek	Waterfowl nesting islands 1 Overlook				
DECADAL TOTAL COST	\$700,500	\$462,000	\$603,000	\$682,000	\$ 735,500
TOTAL CAPITAL COST RECREATION FACILITIES					
Present Worth of Recreation Facilities	\$700,500	\$312,100	\$275,200	\$210,300	\$ 153,200
					\$1,651,300
					70,000
					<u>100,000</u>
					\$1,821,300
					Present Worth of Capital Cost

CHAPTER V. CONCLUSIONS

The following conclusions are based on the results of the advance planning studies.

1. Grizzly Valley Dam and Lake Davis is engineeringly feasible and economically justified, either as a recreation-urban water supply project or as an irrigation-recreation-urban water supply project.

2. The recreation-urban water supply project with gross lake capacity of 83,000 acre-feet, which is presently under construction, will provide maximum net benefits.

3. The demand for water-associated outdoor recreational opportunities in California is increasing rapidly. Development of recreational facilities at Lake Davis will help meet this demand.

4. There is an increasing demand for mountain residential development which is accompanied by a demand for new domestic water supplies. Lake Davis will supplement existing water supplies and help meet the demand in the Portola area.

5. The present available water supply for irrigation use in northern Sierra Valley is limited. Lake Davis could provide supplemental water to expand agriculture in the area. However, there has been no expressed intent by local interests to contract for irrigation water from the project.

6. The project should proceed with recreation and urban water supply as the project purposes.

CHAPTER VI. RECOMMENDATIONS

As a result of this study, it is recommended that:

1. The Department of Water Resources proceed with construction of the recreation-urban water supply project as authorized by Project Order No. 6.
2. The Department review the project at such future date as the local interests demonstrate a desire to contract with the State for irrigation water supply from the project.
3. The Department proceed with acquisition of necessary rights-of-way to provide access to Big Grizzly Creek downstream from Grizzly Valley Dam as authorized by Project Order No. 6.
4. The Department continue to budget necessary funds for completion of the initial onshore recreation facilities.

APPENDIX A
PROJECT DOCUMENTS

Project Order No. 6	A-1
Project Nomenclature Order No. 1	A-3

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

PROJECT ORDER
NO. 6

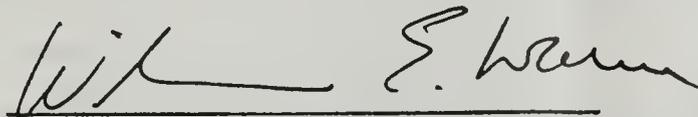
SUBJECT

GRIZZLY VALLEY DAM AND RESERVOIR

DATE

January 17, 1964

The following PROJECT ORDER is issued under the authority vested in me by law as Director of Water Resources of the State of California.



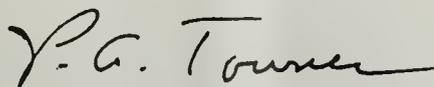
DIRECTOR

IT IS ORDERED:

1. Pursuant to Water Code Section 11260, the upstream features of the Feather River Project authorized by Water Code Section 11260 and modified by Order No. P. 1 of the Director of Water Resources dated October 14, 1958, shall be and hereby are further modified as described in Exhibit "A" attached hereto and by reference made a part hereof.

2. The dam and reservoir in Plumas County in the vicinity of Grizzly Valley defined in Water Code Section 12934(d) are designated Grizzly Valley Dam and Grizzly Valley Reservoir, respectively, and are formulated and authorized for construction as described in said Exhibit "A".

Approved as to legal form
and sufficiency



Chief Counsel
Department of Water Resources

EXHIBIT "A"

Grizzly Valley Dam and Reservoir shall consist of an earth-fill dam, a reservoir, and all appurtenances necessary and convenient therefor including a pipeline extending for a distance of about six miles from Grizzly Valley Dam to the vicinity of the City of Portola. At spillway crest elevation of 5,775 feet above mean sea-level, Grizzly Valley Reservoir will occupy about 4,000 acres and store approximately 83,000 acre-feet of water.

Grizzly Valley Dam and Reservoir shall be operated for recreational purposes, to provide a supply of water for domestic and municipal use, and for downstream fisheries enhancement. Initial onshore recreation development will provide for camping, picnicking, swimming, and boating. Access to Big Grizzly Creek will be provided downstream from Grizzly Valley Dam. Incorporation at a later date of an agricultural water supply as a purpose of Grizzly Valley Dam and Reservoir is not hereby precluded.

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

PROJECT
NOMENCLATURE ORDER
NO. 1

SUBJECT	DESIGNATION OF:	DATE
	1. LAKE DAVIS 2. FRENCHMAN DAM AND FRENCHMAN LAKE 3. ANTELOPE DAM AND ANTELOPE LAKE	November 12, 1964

The following PROJECT NOMENCLATURE ORDER is issued under the authority vested in me by law as Director of Water Resources of the State of California.



DIRECTOR

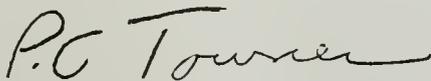
IT IS ORDERED:

1. That the reservoir to be formed by the waters impounded by Grizzly Valley Dam located on Big Grizzly Creek approximately five miles north of Portola, Plumas County, in the vicinity of Grizzly Valley and designated as Grizzly Valley Reservoir in Project Order No. 6, of the Director of Water Resources dated January 17, 1964, shall hereafter be designated as Lake Davis.

2. That the dam and reservoir located on Little Last Chance Creek approximately one mile downstream from its confluence with Frenchman Creek and described in Water Code Section 12934(d) as upstream from Oroville, California, in Plumas County in the vicinity of Frenchman shall hereafter be designated as Frenchman Dam and Frenchman Lake, respectively.

3. That the dam and reservoir located on Indian Creek approximately 25 miles northeast of Crescent Mills and described in Water Code Section 12934(d) as upstream from Oroville, California, in Plumas County in the vicinity of Antelope Valley shall hereafter be designated as Antelope Dam and Antelope Lake, respectively.

Approved as to legal
form and sufficiency:



Chief Counsel
Department of Water Resources

APPENDIX B
HISTORY OF
GRIZZLY VALLEY DAM AND LAKE DAVIS

HISTORY OF GRIZZLY VALLEY DAM AND
LAKE DAVIS

Item:	Document	Project Purpose	: Capacity of :Reservoir(AF)
1.	"Program for Financing and Constructing the Feather River Project as the initial Unit of the California Water Plan", dated February 1955.	Domestic supply for municipalities, resorts, organized or wayside camps, and fishing.	49,000
2.	Application No. 16950 to appropriate water from Big Grizzly Creek, filed with the State Water Rights Board, March 20, 1956.	Recreation, stream maintenance, municipal and industrial use.	49,000
3.	Bull. No. 59: "Investigation of Upper Feather River Basin Development-Interim Report on Engineering, Economic, and Financial Feasibility of Initial Units", dated February 1957.	(a) <u>Grizzly Valley Project - Irrigation and recreation.</u> (b) <u>Alternative Grizzly Valley Recreation and downstream fisheries enhancement.</u>	80,000 44,000
4.	Authorization by Legislature, amendment to Sec. 11260 of the Water Code by California Stats. 1956, 1st Ex. Sess., Ch. 54, p. 429.	Features set forth in the February 1955 Report (Item 1).	49,000
5.	Executive Order No. P. 1, by Director of Water Resources, signed October 14, 1958.	Refers to Items 1 and 3	Not specified
6.	Sec. 12934 of the Water Code (Part of California Water Resources Development Bond Act), added by California Stats. 1959, Ch. 1762, p. 4235.	Not specified	Not specified
7.	Bull. No. 59-2: "Investigation of Upper Feather River Basin Development", dated October 1960.	Irrigation and recreation	80,000

APPENDIX B (continued)
 HISTORY OF GRIZZLY VALLEY DAM AND
 LAKE DAVIS

Item:	Document	Project Purpose	Capacity of Reservoir(AF)
8.	Bull. No. 132-63: "The California Water Project in 1963", dated April 1963.	Recreation and fish and wildlife purposes and possibly irrigation.	80,000
9.	"Recreation Land Use and Acquisition Plan, Grizzly Valley Reservoir" approved by the Director of Water Resources on January 8, 1964.	Recreation, municipal and industrial use, fishery enhancement and possibly irrigation.	83,000
10.	Project Order No. 6, by the Director of Water Resources, signed January 17, 1964.	Recreation, domestic and municipal use, fishery enhancement and possibly irrigation.	83,000
11.	Bull. No. 132-64: "The California Water Project in 1964", dated June 1964.	Recreation, domestic and municipal use, fishery enhancement and possibly irrigation.	83,000
12.	Project Nomenclature Order No. 1, by the Director of Water Resources signed November 12, 1964.	(Officially names the reservoir to be formed behind Grizzly Valley Dam as "Lake Davis".)	

APPENDIX C

RECORDED AND ESTIMATED IMPAIRED
RUNOFF OF BIG GRIZZLY CREEK NEAR PORTOLA

RECORDED AND ESTIMATED IMPAIRED RUNOFF OF
BIG GRIZZLY CREEK NEAR PORTOLA

(In acre-feet)

Season:	Oct.:	Nov.:	Dec.:	Jan.:	Feb.:	March:	April:	May:	June:	July:	August:	Sept.:	Total
1911-12	180	200	160	210	280	2,800	3,390	3,270	870	60	30	60	11,510
-13	60	320	160	150	290	2,610	6,120	4,210	480	60	10	30	14,500
-14	40	190	1,320	830	5,390	10,900	14,360	14,360	2,270	240	40	80	50,020
-15	110	100	120	120	2,400	4,430	10,890	13,220	1,450	110	20	30	33,000
-16	60	130	630	1,060	4,470	12,230	6,810	8,300	2,870	270	60	110	37,000
-17	210	260	600	230	2,010	5,280	12,980	4,710	3,330	290	40	70	30,010
-18	50	90	200	80	270	4,770	6,620	1,410	130	20	30	70	13,740
-19	210	200	190	160	1,770	4,920	9,540	3,740	210	40	10	30	21,020
1919-20	100	110	410	150	240	4,360	7,220	2,110	340	50	80	30	15,200
-21	100	1,810	1,430	2,590	2,850	12,180	10,370	4,150	210	210	30	90	36,020
-22	60	180	410	270	610	4,470	7,600	16,090	5,900	340	20	50	36,000
-23	110	360	940	530	310	3,670	6,700	4,090	2,510	150	30	100	19,500
-24	120	70	90	130	310	1,170	2,020	80	890	10	0	10	4,900
-25	90	220	190	220	2,350	4,280	7,160	2,570	210	40	20	40	17,390
-26	60	130	130	560	1,660	4,800	5,330	1,590	70	20	20	30	14,400
-27	40	1,330	1,330	1,620	6,050	9,280	11,000	6,330	1,390	150	30	40	38,590
-28	100	650	280	310	760	10,600	6,720	1,820	170	60	40	40	21,550
-29	60	90	270	180	140	2,510	2,750	730	210	20	10	20	6,990
1929-30	30	40	3,980	430	2,800	6,700	12,300	3,740	720	80	40	30	30,890
-31	100	250	140	90	500	2,950	1,130	350	50	10	10	10	5,590
-32	20	20	50	120	170	6,400	10,700	4,480	1,030	50	20	20	23,080
-33	40	70	90	70	120	3,230	4,650	1,820	860	40	10	20	11,020
-34	50	60	350	330	410	4,170	3,420	170	30	10	10	10	9,020
-35	20	210	220	300	440	3,540	12,480	8,380	1,300	70	10	20	26,990
-36	90	120	170	1,940	140	8,130	11,780	6,430	1,030	90	20	50	29,990
-37	40	60	70	50	360	4,350	7,160	7,080	580	240	10	20	20,020
-38	60	160	2,540	410	2,280	14,470	12,280	25,430	2,810	280	180	100	61,000
-39	170	170	170	100	150	3,320	4,270	290	30	10	10	10	8,700

RECORDED AND ESTIMATED IMPAIRED RUNOFF OF
BIG GRIZZLY CREEK NEAR PORTOLA (continued)

(In acre-feet)

Season:	Oct. :	Nov. :	Dec. :	Jan. :	Feb. :	March :	April :	May :	June :	July :	August:	Sept. :	Total
1939-40	60	40	90	200	8,410	14,010	10,630	4,160	290	40	20	50	38,000
-41	100	390	2,630	2,060	6,810	10,390	9,560	7,410	1,360	180	40	80	41,010
-42	100	210	2,920	3,930	6,730	5,830	12,790	9,310	3,700	360	30	100	46,010
-43	110	760	1,820	4,640	3,090	13,240	12,140	4,300	700	110	30	70	41,010
-44	90	120	150	150	470	4,080	5,060	3,990	410	50	10	30	14,610
-45	70	510	950	350	3,200	4,600	7,520	5,950	720	80	20	40	24,010
-46	190	570	3,850	1,270	450	5,730	9,470	5,840	510	70	20	40	28,010
-47	70	450	460	170	660	5,360	5,090	580	130	20	10	10	13,010
-48	70	20	100	890	160	3,640	10,330	6,000	1,620	130	20	40	23,020
-49	50	150	150	60	150	3,660	7,250	2,810	180	20	10	20	14,510
1949-50	30	80	720	640	2,480	6,110	10,020	5,820	950	90	20	40	27,000
-51	120	6,670	10,740	2,790	5,840	4,000	4,170	3,430	290	50	30	40	38,170
-52	170	340	800	610	3,530	2,870	29,940	26,890	5,480	830	230	140	71,830
-53	150	220	190	5,050	2,210	4,420	14,120	6,740	2,990	430	100	90	36,710
-54	120	300	260	490	1,890	7,660	9,470	3,070	170	50	20	30	23,530
-55	60	170	200	270	280	1,160	6,330	3,860	340	50	10	20	12,750
-56	50	110	11,520	6,150	1,520	6,530	18,100	11,420	2,090	180	60	60	57,790
-57	210	290	350	200	5,160	7,330	4,620	4,000	520	100	60	80	22,920
-58	230	300	430	310	6,340	3,410	15,670	15,140	1,510	290	150	100	43,880
-59	160	170	180	2,180	1,720	5,000	3,240	1,040	130	30	30	30	13,910
1959-60	70	60	60	140	2,350	8,400	3,730	930	90	10	10	10	15,860
-61	30	100	160	290	770	1,760	1,750	840	210	10	10	10	5,940
50-year average	94	393	1,107	922	2,075	5,834	8,575	5,690	1,127	124	36	47	26,020

APPENDIX D

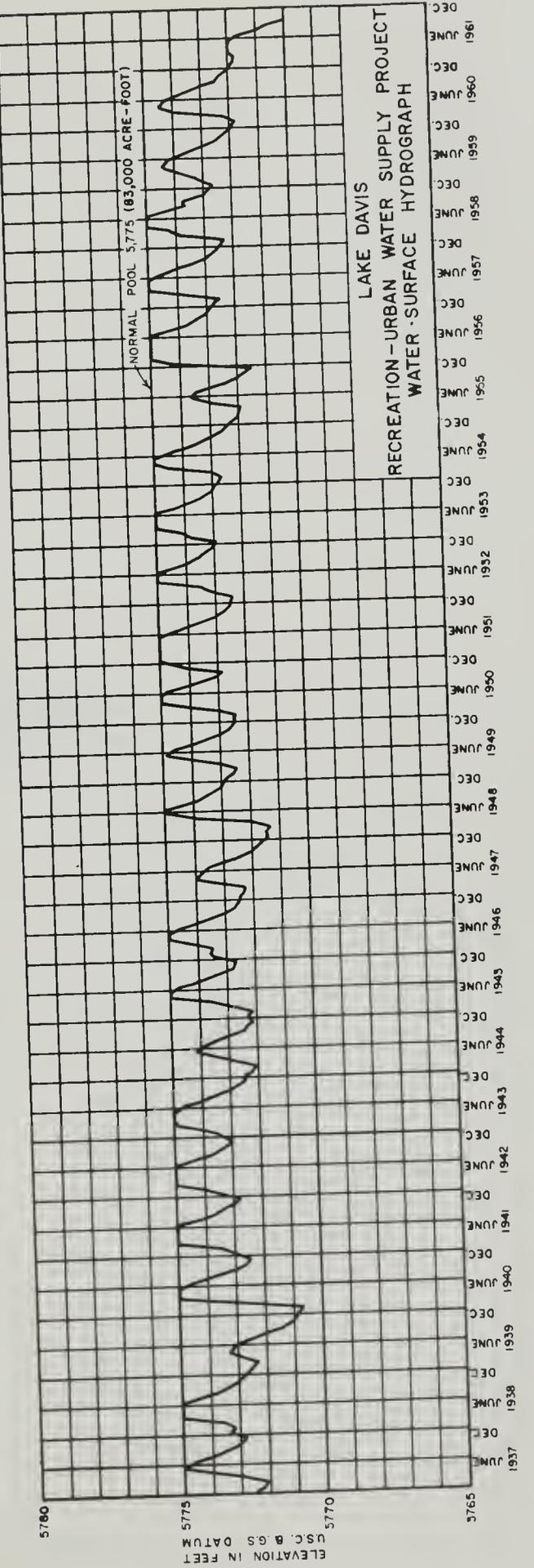
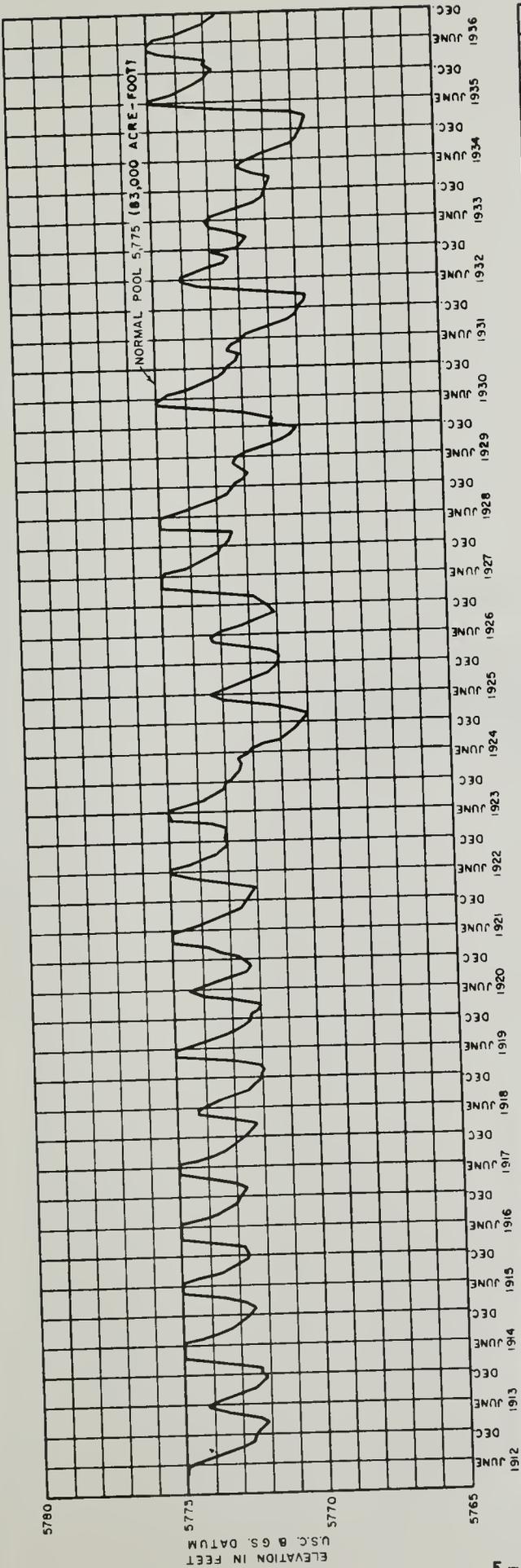
LAKE DAVIS
RECREATION DEVELOPMENT PLAN

(under separate cover)

Appendix D was prepared by the Department of Parks and Recreation under service agreement with the Department of Water Resources and will be published by the Department of Water Resources as Bulletin No. 117-3.

APPENDIX E

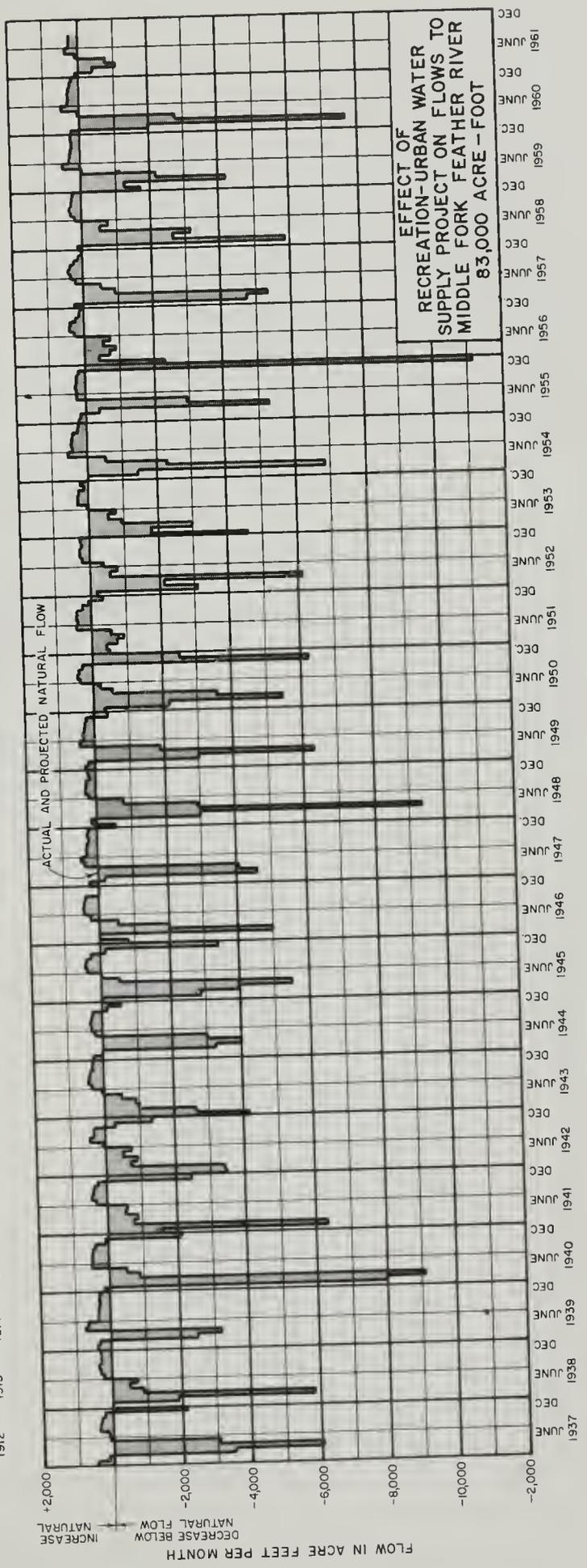
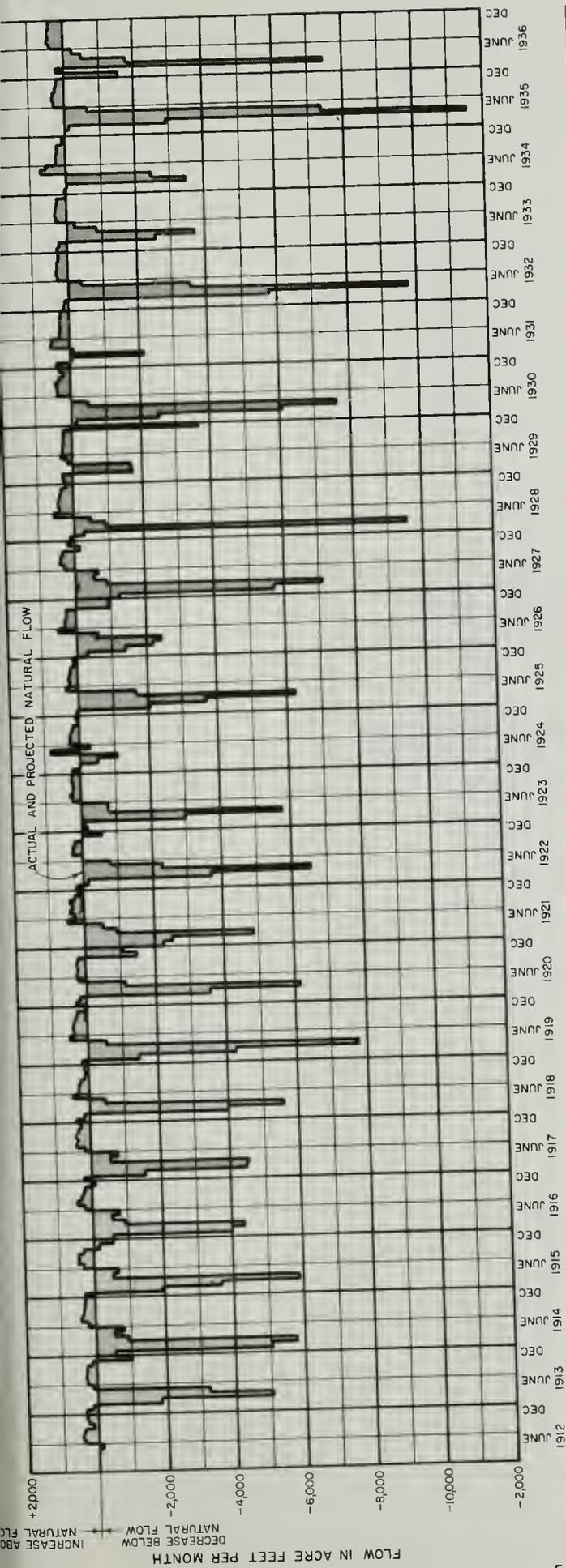
LAKE DAVIS
RECREATION-URBAN WATER SUPPLY PROJECT
WATER SURFACE HYDROGRAPH



LAKE DAVIS
RECREATION-URBAN WATER SUPPLY PROJECT
WATER-SURFACE HYDROGRAPH

APPENDIX F

EFFECT OF
RECREATION-URBAN WATER
SUPPLY PROJECT ON FLOWS TO
MIDDLE FORK FEATHER RIVER

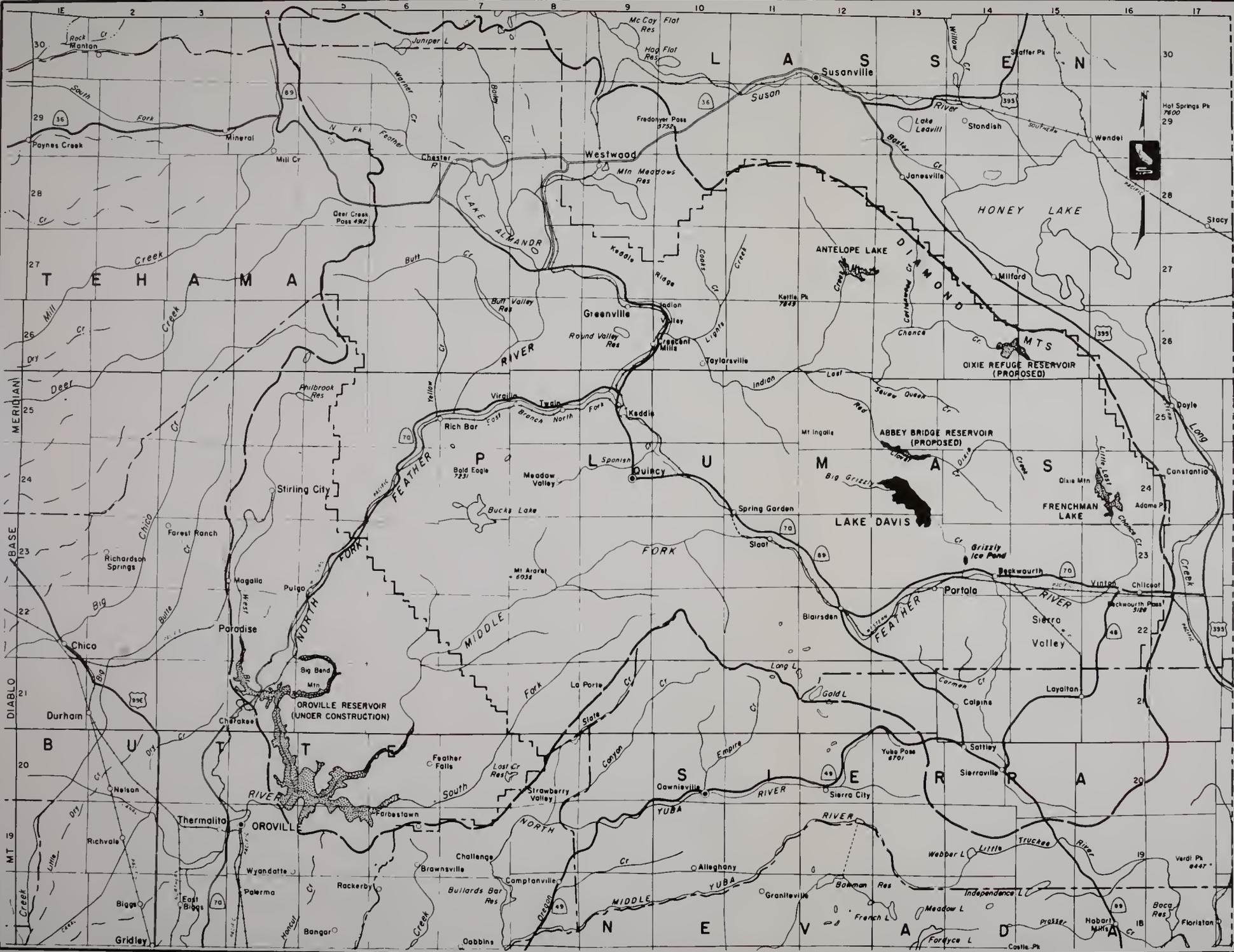


EFFECT OF
RECREATION-URBAN WATER
SUPPLY PROJECT ON FLOWS TO
MIDDLE FORK FEATHER RIVER
83,000 ACRE - FOOT

APPENDIX G

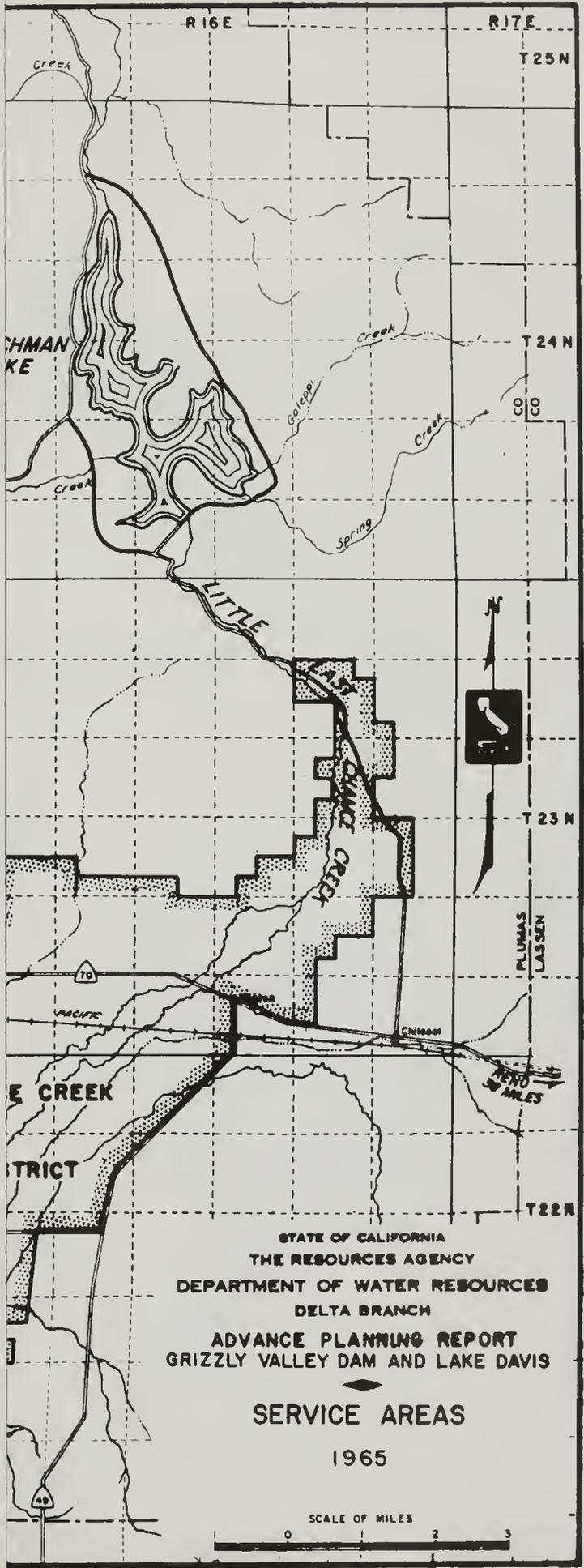
RECREATION LAND USE AND ACQUISITION PLAN,
GRIZZLY VALLEY RESERVOIR,
NOVEMBER 1963
(Under separate cover)

Appendix G was published by
the Department of Water Resources as
an office report



LEGEND
 ———— BASIN BOUNDARY
 OTHER STATE WATER PROJECTS

STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES
 DELTA BRANCH
 ADVANCE PLANNING REPORT
 GRIZZLY VALLEY DAM AND LAKE DAVIS
VICINITY MAP
 1965
 SCALE OF MILES



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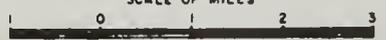
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 DEPARTMENT OF WATER RESOURCES
 DELTA BRANCH

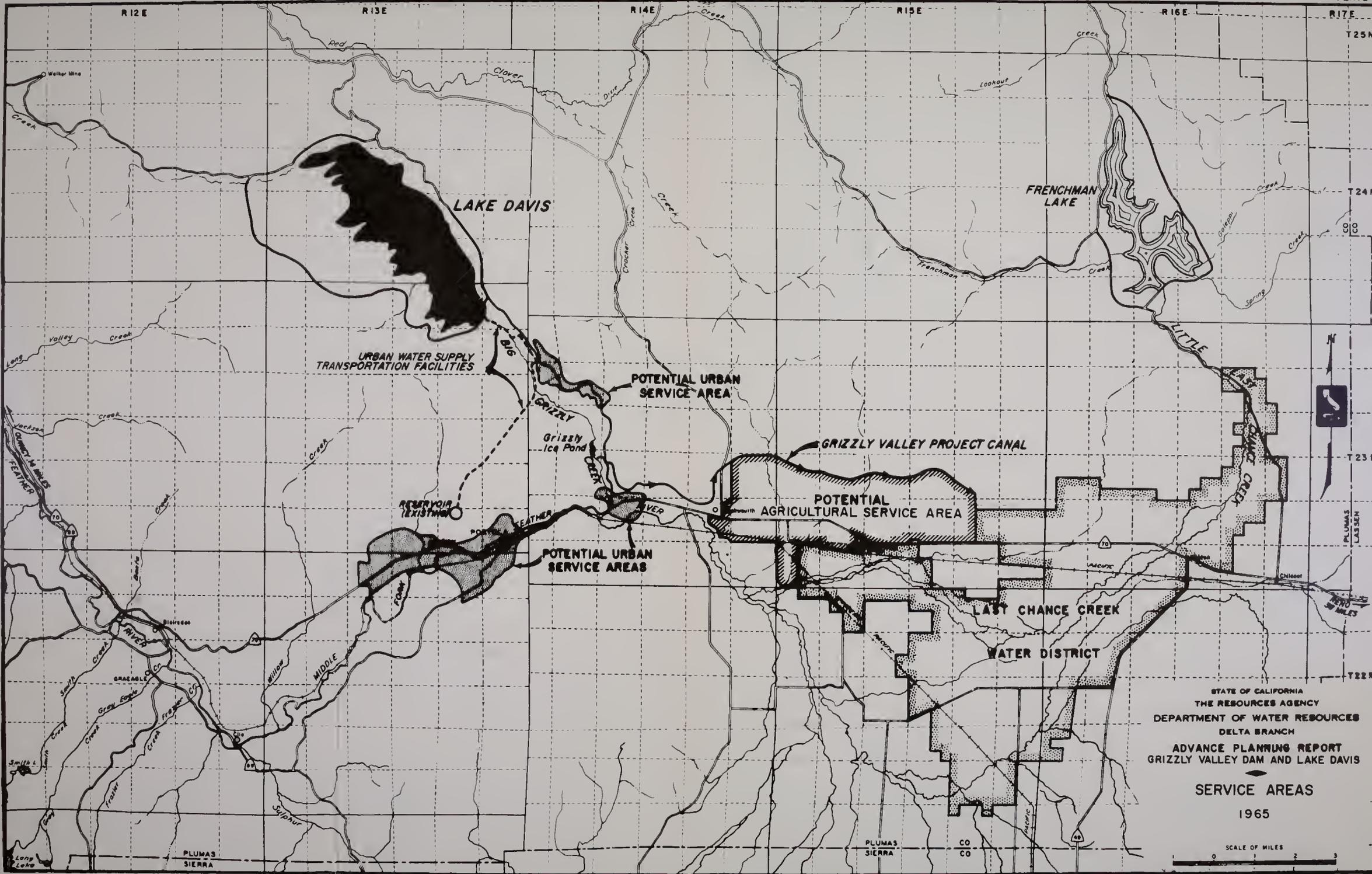
ADVANCE PLANNING REPORT
 GRIZZLY VALLEY DAM AND LAKE DAVIS

SERVICE AREAS

1965

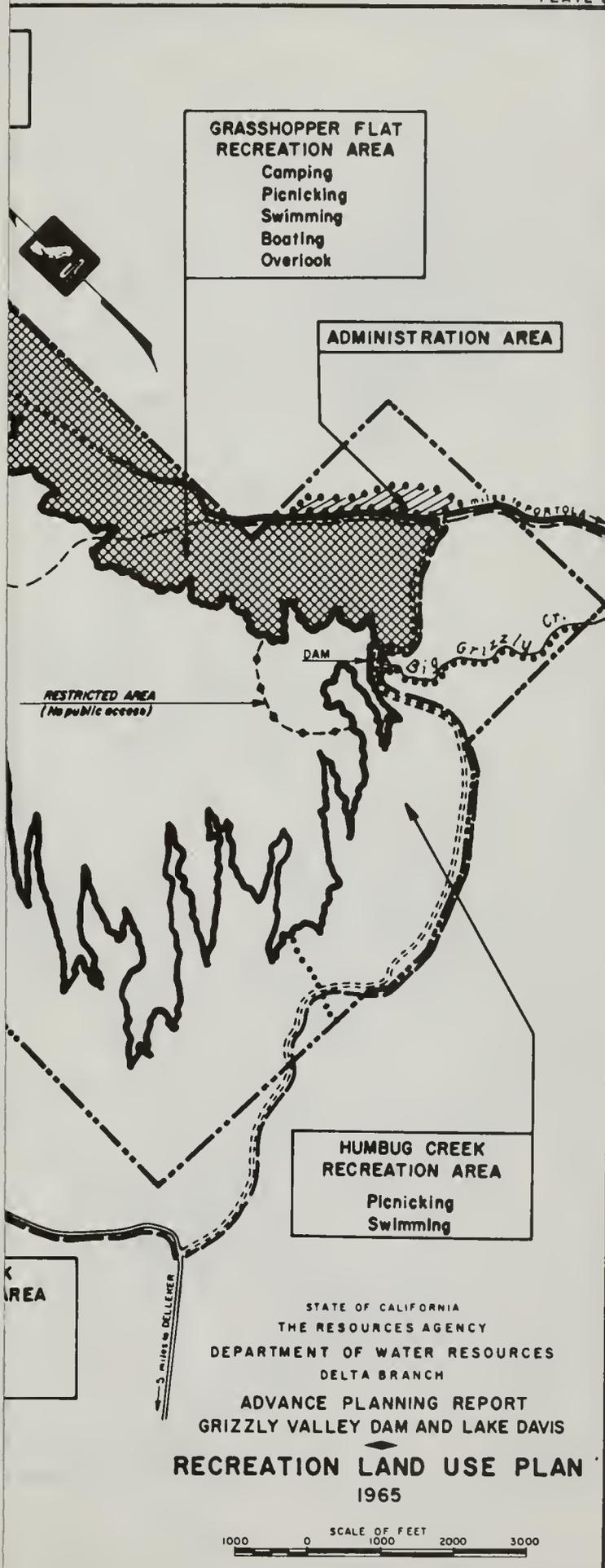
SCALE OF MILES

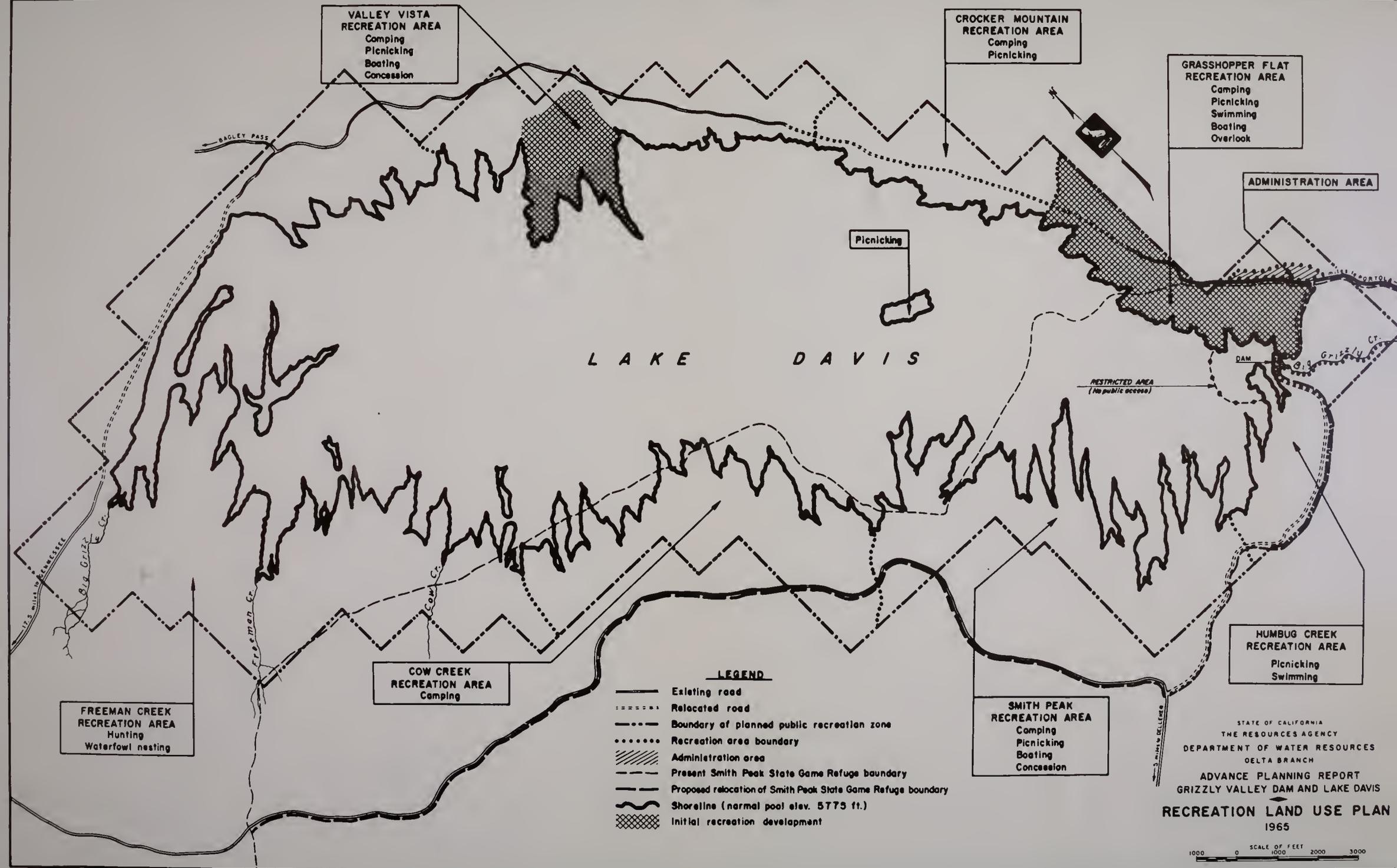




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 GRIZZLY VALLEY DAM AND LAKE DAVIS
 SERVICE AREAS
 1965

SCALE OF MILES
 0 1 2 3





VALLEY VISTA RECREATION AREA
 Camping
 Picnicking
 Boating
 Concession

CROCKER MOUNTAIN RECREATION AREA
 Camping
 Picnicking

GRASSHOPPER FLAT RECREATION AREA
 Camping
 Picnicking
 Swimming
 Boating
 Overlook

ADMINISTRATION AREA

Picnicking

L A K E D A V I S

RESTRICTED AREA
 (no public access)

HUMBUG CREEK RECREATION AREA
 Picnicking
 Swimming

FREEMAN CREEK RECREATION AREA
 Hunting
 Waterfowl nesting

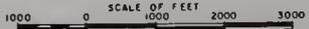
COW CREEK RECREATION AREA
 Camping

SMITH PEAK RECREATION AREA
 Camping
 Picnicking
 Boating
 Concession

LEGEND

- Existing road
- - - - Relocated road
- · - · - Boundary of planned public recreation zone
- · · · · Recreation area boundary
- ▨ Administration area
- - - Present Smith Peak State Game Refuge boundary
- · - · - Proposed relocation of Smith Peak State Game Refuge boundary
- ~ Shoreline (normal pool elev. 5775 ft.)
- ▩ Initial recreation development

STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES
 DELTA BRANCH
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 GRIZZLY VALLEY DAM AND LAKE DAVIS
RECREATION LAND USE PLAN
 1965



PROPOSED STREAM ACCESS SITE

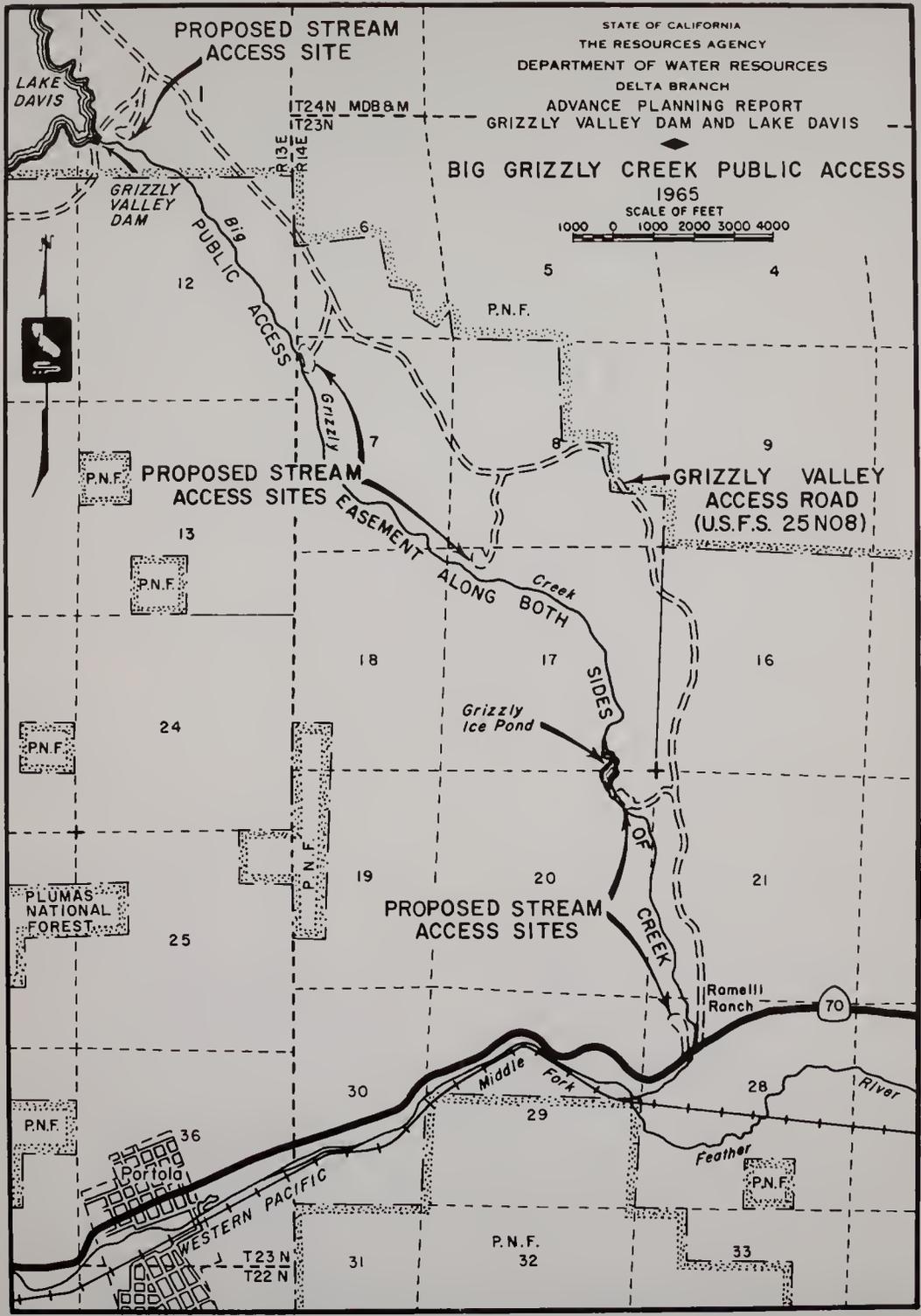
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THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DELTA BRANCH
ADVANCE PLANNING REPORT
GRIZZLY VALLEY DAM AND LAKE DAVIS

BIG GRIZZLY CREEK PUBLIC ACCESS

1965

SCALE OF FEET

1000 0 1000 2000 3000 4000



PROPOSED STREAM ACCESS SITES

Ramelli Ranch



PLUMAS NATIONAL FOREST

Portola
WESTERN PACIFIC

P.N.F.

P.N.F.

P.N.F.

PROPOSED STREAM ACCESS SITES

P.N.F.

P.N.F.

P.N.F.

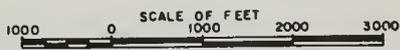
P.N.F.

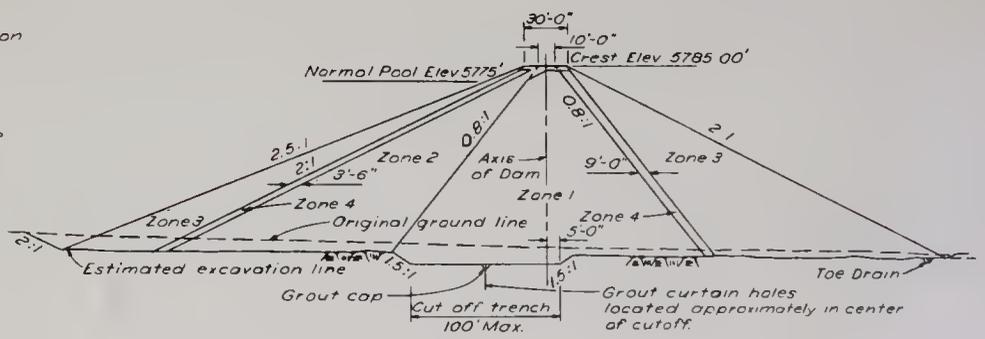
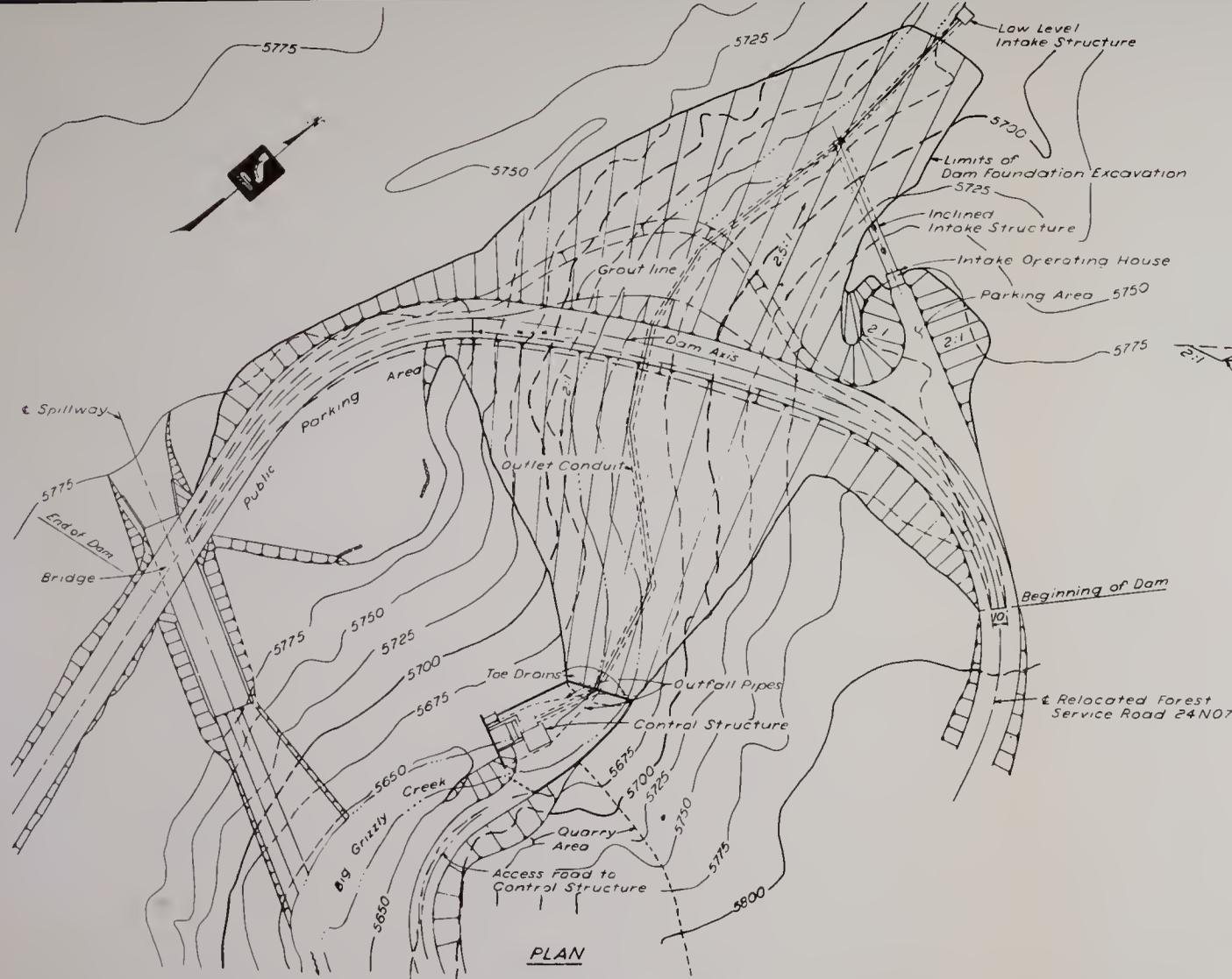


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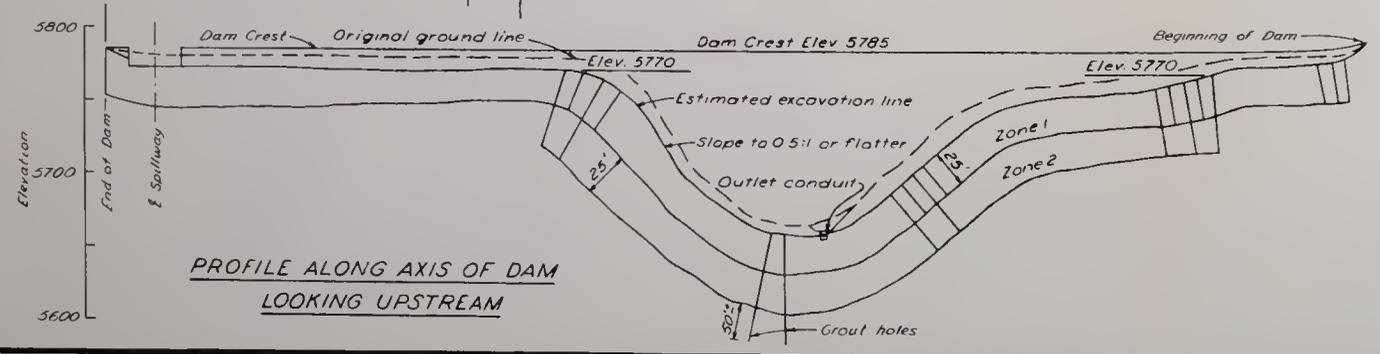


STATE OF CALIFORNIA
 THE RESOURCES AGENCY
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 ADVANCE PLANNING REPORT
 GRIZZLY VALLEY DAM AND LAKE DAVIS
 PROPERTY STATUS MAP
 1965





NOTE:
 ZONE 1 IMPERVIOUS
 ZONE 2 SEMIPERVIOUS
 ZONE 3 PERVIOUS
 ZONE 4 TRANSITION

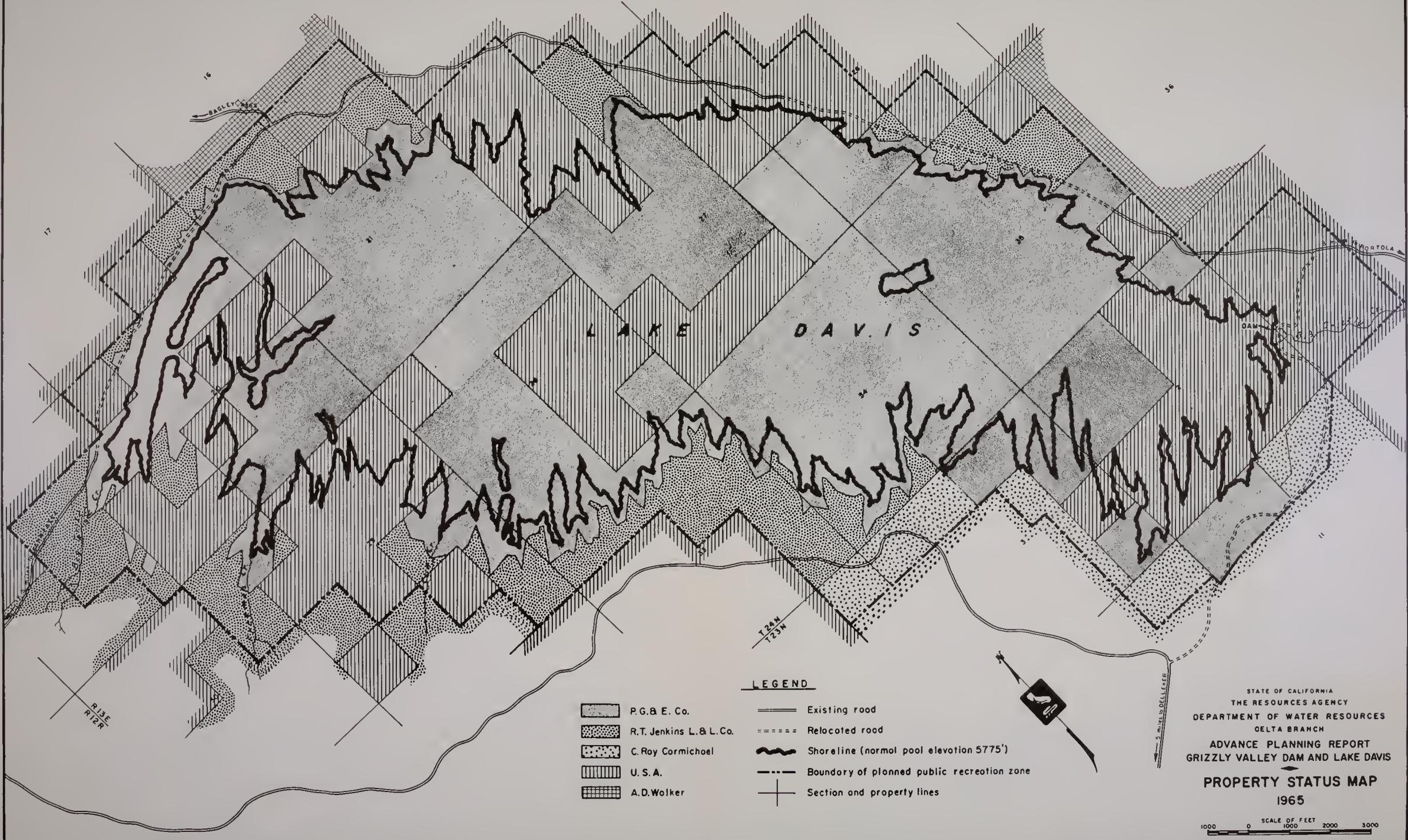


STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES
 DELTA BRANCH

ADVANCE PLANNING REPORT
 GRIZZLY VALLEY DAM AND LAKE DAVIS

DAM
 PLAN, PROFILE AND SECTION
 1965

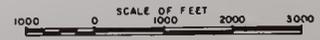
SCALE OF FEET
 0 50 100 150



LEGEND

- | | | | |
|---|--------------------------|---|--|
|  | P.G.B. E. Co. |  | Existing road |
|  | R.T. Jenkins L. & L. Co. |  | Relocated road |
|  | C. Roy Cormichael |  | Shoreline (normal pool elevation 5775') |
|  | U.S.A. |  | Boundary of planned public recreation zone |
|  | A.D. Wolker |  | Section and property lines |

STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 DEPARTMENT OF WATER RESOURCES
 DELTA BRANCH
 ADVANCE PLANNING REPORT
 GRIZZLY VALLEY DAM AND LAKE DAVIS
PROPERTY STATUS MAP
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