

DESIGN  
MEMORANDUM  
NO. 7

# PINE FLAT LAKE

Kings River, California

OCTOBER 1976

# MASTER PLAN



SPDCO-0 (17 Nov 76) 3rd Ind

SUBJECT: Pine Flat Lake, Kings River, California; Design Memorandum No. 7,  
Master Plan

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street,  
Room 1216, San Francisco, CA 94111

29 AUG 1977

TO: District Engineer, Sacramento, ATTN: SPKCO


1. District responses to our comments are considered adequate with the exception of concerns expressed in paragraph 1b of our 1st Indorsement. In view of the fact that this master plan has been approved; it will be necessary to send the final plan to the U.S.F.S. and USF & WS for information, and to EPA and BOR for information and coordination, as per the requirements of ER 1120-2-400. Additionally, your transmittal letter to the U.S. Fish and Wildlife Service should request a determination be made of the effects of this plan, if any, on endangered species (16 USCA 1536).

2. Results of the above coordination will be included in a future update or supplement if appropriate.

3. Coordination of future master plan updates, with the exception of New Hogan which is in an advanced stage, will be done during the draft review, with complete drafts being furnished to all necessary agencies.

FOR THE DIVISION ENGINEER:

4 Incl  
wd

  
WILLIAM E. VANDENBERG  
Colonel, CE  
Deputy Division Engineer



DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
650 CAPITOL MALL  
SACRAMENTO, CALIFORNIA 95814

REPLY TO  
ATTENTION OF  
SPKED-W

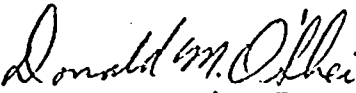
17 November 1976

SUBJECT: Pine Flat Lake, Kings River, California; Design Memorandum No. 7, Master Plan

Division Engineer, South Pacific

1. Submitted for review and approval are ten copies of the subject master plan, prepared in accordance with instructions contained in ER 1120-2-400. Your previous comments on the draft of the master plan have been incorporated.
2. The master plan has been indorsed by Real Estate Division pursuant to requirements of ER 405-2-835.
3. It is recommended that this master plan be approved as a guide for the preservation, development, and administration of recreation and other resources of the Pine Flat Lake area.

1 Incl (10 cys)  
DM No. 7 dtd Oct 76

  
DONALD M. O'SHEI  
Colonel, CE  
District Engineer

SPDPD-R (17 Nov 76) 1st Ind

SUBJECT: Pine Flat Lake, Kings River, California; Design Memorandum No. 7,  
Master Plan

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 1216  
San Francisco, California 94111

4 APR 1977

TO: District Engineer, Sacramento, ATTN: SPKED-W

1. The subject Master Plan is approved contingent on the following comments:

a. Prior to the preparation of plans and specifications, an investigation should be conducted to determine the effect of the plan of development and management as proposed in the Master Plan on cultural resources.

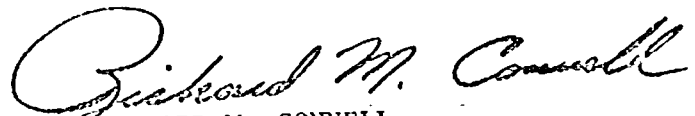
b. The Master Plan should be sent to the State and areawide clearinghouses, to those agencies specified in ER 1105-2-400, and to special interest groups likely to have particular interest in the plan of development and management of the project. Letter replies from the agencies and groups should be made part of the Master Plan. Should substantial comments be received as a result, it may be necessary to revise the Final Master Plan or to submit a Supplemental Master Plan.

c. The proposals in the Master Plan for immediate phase work should, in the absence of a cost sharing agreement, be restricted to those which may be undertaken using O&M funds. This would include the construction of a visitor center and completion of resource investigations. It could also include 100 percent Code 710 funds for bringing sanitary facilities into compliance with current requirements.

d. An environmental assessment should be made following completion of the cultural resource investigation.

2. Inclosed are SPD comments on the Master Plan keyed to specific paragraphs (Inclosure 2). Comments 1, 4 and 5 should be taken into consideration in the preparation of plans and specifications and no additional response is required. Comments 3, 7, 8b, 8c, 8d, 8e, 8f, 10 and 11 should be addressed by return indorsement. Comments 2, 6, 8a, 9 and 12 are for clarification and your future planning guidance and require no response.

3. The draft supplemental memorandum of understanding with the Forest Service is still under review by the Forest Service. Should that draft be significantly changed, a revised Master Plan may be necessary.



RICHARD M. CONNELL  
Brigadier General, U. S. Army  
Division Engineer

- 2 Incl  
1. wd 1 cy  
Added 1 Incl  
2. SPD Comments

SPKED-W (17 Nov 76) 2d Ind  
SUBJECT: Pine Flat Lake, Kings River, California; Design Memorandum No. 7,  
Master Plan

DA, Sacramento District, Corps of Engineers, 650 Capitol Mall, Sacramento,  
California 95814 23 June 1977

TO: Division Engineer, South Pacific

1. We have addressed your major comments in the following subparagraphs which correspond to like-number paragraphs of 1st Indorsement.

a. Sacramento District recognizes the need for a cultural resources survey, particularly at sites of major recreation developments, prior to preparation of plans and specifications. We plan to submit specific cultural resource investigation proposals for the fiscal year 1979 operation and maintenance budget, and we plan to proceed with cultural resources investigations earlier to the extent that funds are available. Results, including appropriate coordination, will be reported in the next master plan update, or in a supplement to this Master Plan if appropriate.

b. A synopsis of this Master Plan was provided both the State and areawide clearinghouses as was indicated in our 25 May 1976 transmittal of the draft Master Plan. A "no comment" response was received from the State clearinghouse. No response was received from the areawide clearinghouse. Chapter VI has been revised to reflect this coordination and is inclosed (Inclosure 4). The response from the State clearinghouse has been added to Appendix I (Inclosure 4). As discussed in the previous paragraph, coordination with cultural resource oriented agencies will be conducted as part of the cultural resources survey.

c. Items identified in the Master Plan as immediate phase work are those items needed to satisfy existing recreation demands and demands anticipated over the next 5-year planning period. Those items identified in the Pine Flat plan as immediate phase only include upgrading the sanitary facilities at Island Park and renovation of the Forest Service's Sycamore Creek camps upon consummation of the supplemental memorandum of understanding with the Forest Service. Sources of funding for this immediate phase work are not identified in the Master Plan because experience has shown that some or all of this work could be accomplished with Code 710, operation and maintenance, special public works appropriations, and specific non-Federal funds as described in paragraph 37 of the Master Plan.

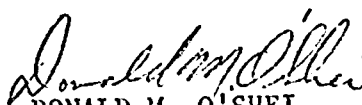
d. We will update the environmental assessment when cultural resources information is available and prior to preparing plans and specifications for significant development.

2. Those actions required by paragraph 2 of the 1st Indorsement have been addressed as described in Inclosure 3. Numbered paragraphs correspond to similarly identified paragraphs of Inclosure 2.

SPKED-W (17 Nov 76) 2d Ind 23 June 1977  
SUBJECT: Pine Flat Lake, Kings River, California; Design Memorandum No. 7,  
Master Plan

3. We believe that the Forest Service is being unreasonably slow in completing this action on the memorandum of understanding and we will address this in separate correspondence.
4. We believe your concerns have been satisfactorily addressed. However, if there are any remaining concerns, it is suggested that a conference be held to resolve them.

- 4 Incl
- Added 2 incl
3. SPK Response to Incl 2
4. Revised Pages (10 cys)

  
DONALD M. O'SHEI  
Colonel, CE  
District Engineer

DESIGN MEMORANDUM NO. 7

PINE FLAT LAKE  
KINGS RIVER, CALIFORNIA

MASTER PLAN

OCTOBER 1976

DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

PINE FLAT LAKE  
KINGS RIVER, CALIFORNIA  
MASTER PLAN

OCTOBER 1976

REVISIONS

Date	New Pages or Drawings
June 1977	Pages 33, 40, 44, 47, 76, 77, and 78 added letter to Appendix I



DESIGN MEMORANDUM NO. 7  
PINE FLAT LAKE  
KINGS RIVER, CALIFORNIA

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of Engineers

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\* Appendices A through E have been approved by SPD and are available in the Sacramento District files.

PINE FLAT LAKE  
KINGS RIVER, CALIFORNIA  
MASTER PLAN

DESIGN MEMORANDA

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NO.	DATE	TITLE	APPROVED
1	5 Mar 53 (rev 14 Apr 53)	Erosion of Sluice Conduits	OCE, 8 May 53
2	3 Aug 53	Interim Management Regulations	OCE, 27 Nov 53
3	20 Apr 59	General Design (Kings River Channel Improvement)	SPD, 20 May 59
4	19 Feb 60	Public-Use Development-Island Park Recreation Area	
5	8 Oct 62	Public-Use Development-Additions to Island Park and Deer Creek Recreation Areas	SPD, 31 Oct 62
	27 Dec 62	Supplement No. 1-Improvement Under Public Works Acceleration Act of 1962	OCE, 25 Feb 63
	27 Jun 63	Supplement No. 2-Recreational Development of Trimmer View and Fresno County Park Areas	OCE, 26 Sep 63

DESIGN MEMORANDUM NO. 7

PINE FLAT LAKE  
KINGS RIVER, CALIFORNIA  
MASTER PLAN

CHAPTER I - INTRODUCTION

1. Authorization. - Pine Flat Lake is the major feature of the Pine Flat Lake and Kings River, California, project. The project was authorized by the Flood Control Act approved 22 December 1944 (Public Law No. 534, 78th Congress, 2nd Session) substantially in accordance with the plans contained in House Document No. 630, 76th Congress, 3rd Session, for flood control, irrigation, and other purposes. The project also provides for downstream channel improvements on the Kings River and its distributaries. At the lake, improvement and management of land and water areas for public purposes have been undertaken as authorized by Section 4 of the Flood Control Act of 1944, as amended.

2. Project purposes. - Pine Flat Dam was authorized primarily for flood control along the Kings River and in the Tulare Lake Basin. The dam is a concrete gravity structure 429 feet high and 1,820 feet long with a center section gated outlet works and spillway. The lake has a storage capacity of 1,000,000 acre-feet all of which is available for flood control when required. The project provides flood protection to about 80,000 acres along the Kings River and, in conjunction with other projects on the Kaweah, Kern, and Tule Rivers, provides protection against floods to 260,000 acres of rich croplands in the Tulare Lake area. The project provides 165,000 acre-feet of irrigation water annually and reregulates upstream hydroelectric power releases. When the dam was constructed, penstocks were installed for possible future power development, but construction of power generating facilities has not been authorized.

Though not specifically authorized as a project purpose, recreation use of the lake has become increasingly significant. Greater public emphasis on recreation and the inherent recreation potential of Pine Flat Lake and surrounding areas are key factors in this increase. Although the project has no established minimum pool, reregulation of power releases and storage for irrigation almost always provides ample water for recreation use.

3. Purpose of master plan. - This master plan has been developed to guide resource use and development over the project life. Comprehensive planning is necessary to protect and to further enhance the scenic, biologic, and recreation resources of the area. Implementation of this Master Plan will allow Pine Flat Lake to realize its greatest potential within the authorized primary project goals. This Master Plan is a program for the protection of existing resources as well as for the development of new ones and is specifically intended to maximize the benefits and enjoyment of Pine Flat Lake.



4. Prior pertinent design memoranda and reports. - A complete list of previously approved design memoranda for the authorized project is shown on page vii. Design Memorandum No. 6, the "Pine Flat Reservoir Public Use Plan," was submitted in June 1969 and was subsequently withdrawn. Reports of other agencies and organizations containing information pertinent to this master plan are referenced or contained in appropriate chapters of this text and/or appendices.

5. Application of Federal laws and regulations.

a. Public Law 78-534, Flood Control Act of 1944, as amended, authorized the Corps of Engineers to construct, operate, and maintain recreation facilities at reservoir areas, and to grant leases of lands (including facilities thereon) to others; and to construct certain public works including Pine Flat Dam.

b. Public Law 84-804, Interchange of lands between Department of Agriculture and Department of Defense, approved 26 July 1956, permits interchange of lands between the agencies whenever such interchange will facilitate land management.

c. Public Law 85-624, Fish and Wildlife Coordination Act, approved 12 August 1958, provides for integration of fish and wildlife conservation with Federal water-resource development programs.

d. Public Law 88-29, Outdoor Recreation--Federal-State Programs, approved, 28 May 1963, promotes the coordination and development of effective programs relating to outdoor recreation.

e. Public Law 89-72, The Federal Water Project Recreation Act, enacted on 9 July 1965 establishes Federal policy for outdoor recreation planning and coordination at Federal water resource projects. Such policy requires non-Federal sharing of not less than one-half the separable costs allocated to recreation, and assumption of all operation, maintenance and replacement costs. An amendment in 1974 provides that fish and wildlife enhancement requires non-Federal assumption of at least 25 percent of the allocated costs and assumption of all operation and maintenance.

f. Public Law 90-483, Flood Control Act of 1968, approved 13 August 1968, as supplemented and amended provides that fair and equitable fees be assessed users of specialized recreation sites provided at substantial Federal expense.

g. Public Law 91-190, National Environmental Policy Act of 1969, approved 1 January 1970. This act establishes a national policy to encourage productive and enjoyable harmony between man and his environment and directs that all Federal agencies shall consider the environmental impact of proposed Federal actions which may have an impact on man's environment.

h. Executive Order 11593, Protection and Enhancement of the Cultural Environment, issued 13 May 1971. Directs Federal agencies to

preserve, restore and maintain the historic and cultural resources on lands in Federal ownership.

i. Public Law 93-291, Historical and Archeological Data Preservation Act approved 24 May 1974 provides for the preservation of historical and archeological data which might be irreparably lost or destroyed as the result of a Federal construction project or Federally licensed activity or program.

6. Scope of report. - This Master Plan supersedes the Master Plan for Reservoir Management and Public Use Development of Pine Flat Reservoir dated September 1956, which was developed concurrently with a Memorandum of Agreement between the Department of the Army and the Department of Agriculture regarding the administration of Pine Flat Lake, dated 1 March 1957.

## CHAPTER II - PROJECT DESCRIPTION

7. Location. - Pine Flat Lake is located in Fresno County on the Kings River in the western foothills of the Sierra Nevada approximately 30 miles east of Fresno, California (plate 1). Substantial portions of the lake area are within the boundaries of the Sierra and Sequoia National Forests. The lake is situated near the entrance to the Kings River Canyon which descends from two nearby national parks: Kings Canyon and Sequoia. Pine Flat Lake is about 215 miles southeast of San Francisco and about 250 miles north of Los Angeles, California. Fresno is the nearest large urban area to the project. Primary project access is provided along an all-weather two-lane bituminous roadway (Trimmer Springs Road) which connects with State Highway 180, the major access route to the upper Kings Canyon area.

### 8. Project data.

a. Basin hydrologic and climate summary. - The climate in the vicinity of the lake is temperate and characterized by warm, dry summers and moderate winters. The average winter and summer temperatures at Pine Flat Lake are 46 and 78 degrees Fahrenheit, respectively. Temperatures measured at Pine Flat or nearby have ranged from a summer high of 114°F to a winter low of 18°F, but no extended periods of below freezing temperatures have been experienced at the lake. There is also a wide variation in precipitation in the watershed varying from a low of about 9 inches at Pine Flat Dam to a maximum of about 70 inches in the mountains of the upper Kings River basin. The lake is somewhat shielded by the surrounding mountains and winds do not materially affect recreation activities at the lake. The climate in the project locale is generally considered excellent during the normal recreation season.

Precipitation in the 1,540<sup>n</sup> square-mile drainage basin of the Kings River above Pine Flat Dam results in an average runoff of 1,675,000 acre-feet of water. Since the area receives the majority of its precipitation during the winter, peak flows into Pine Flat occur both during this period and during the late spring and early summer snowmelt period. Normal flows into the lake are affected somewhat by the operation of upstream hydroelectric developments. This and other operational characteristics of the lake are discussed in paragraph 9.

b. Lake and shoreline characteristics. - The lake has a long, irregular shoreline and lies within a canyon that generally extends in a westerly direction from the high Sierra. The canyon floor descends to about the 500-foot elevation in the vicinity of the dam site and is enclosed by steep sides and narrow, high, rocky ridges that rise to about the 2,800-foot elevation. There are a few peninsulas and other areas along the north side of the lake that have moderate slopes and are suited to recreation use and development; the steeper south side is less accessible and is generally not suitable for development.

Pertinent lake data at gross (full) pool and normal recreation pool, both hypothetical (preproject) and historical (see paragraph 9b), are presented below:

<u>Item</u>	<u>Elevation (feet)</u>	<u>Area (acres)</u>	<u>Storage Capacity (acre-feet)</u>	<u>Length of Shoreline (miles)</u>	<u>Length of Pool (miles)</u>
Gross pool	951.5	5,970	1,000,000	67	20
Normal recreation pool (hypothetical operation)	814.0	3,440	363,000	45	14
Normal recreation pool (historical)	875.5	4,500	606,000	55	16

Total area within the project boundary consists of 13,284 acres of land and water. About 8,300 acres are withdrawn from the Sierra and Sequoia National Forests; about 400 acres are withdrawn from the public domain; and about 4,600 acres were acquired in fee simple.

c. Project structures (operational). - The following data detail the characteristics of the operational project structures that include the dam, spillway, power penstocks, and outlets.

Dam

Type	Concrete gravity
Maximum height	429 feet
Crest length	1,820 feet
Crest width	32 feet
Crest elevation	970 feet

Spillway

Type	Gated
Crest length, gross	292 feet
Crest length, net	252 feet
Sill elevation	916.5 feet
Crest gates (tainter)	6 @ 42 x 38 feet

Power Penstocks (future use)

Type	Steel-lined grated conduit (inoperative)
Number and size	3 @ 13.5 feet diameter
Intake elevation, centerline	645.5 feet
Outlet elevation, centerline	590.26 feet

## Outlets

Type	Concrete-lined conduit
Gates for lower tier	
Service	5 @ 5 x 9 feet
Emergency	5 @ 5 x 9 feet
Gates for upper tier	
Service	5 @ 5 x 9 feet
Emergency	5 @ 5 x 9 feet
Intake elevation, centerline	
Lower tier	570 feet
Upper tier	740 feet

### 9. Lake operation.

a. Principles of operation. - The lake is operated to control floods that may occur from winter rains or from melting snow in the spring and summer months. A maximum of 475,000 acre-feet of storage space is allocated to flood control between 1 December and 1 February. After 1 February, the required flood control space is determined by the predicted inflow to the lake between any given date and 31 July. Depending on the magnitude of predicted inflow, releases may be made for irrigation only, for irrigation plus channel capacity release to Kings River North, or for irrigation plus channel capacity releases to Kings River North and Kings River South. The flood control reservation in Pine Flat can be increased or decreased by the amount of flood control space in upstream PG&E reservoirs but not to a value smaller than the rain-flood reservation of 252,000 acre-feet. After 1 June, the lake is gradually filled subject to available runoff. Releases are made only when necessary or when required for irrigation use until 31 July, the normal end of the snowmelt flood season. The lake is then gradually emptied, as required, to assure space for flood control during the following year.

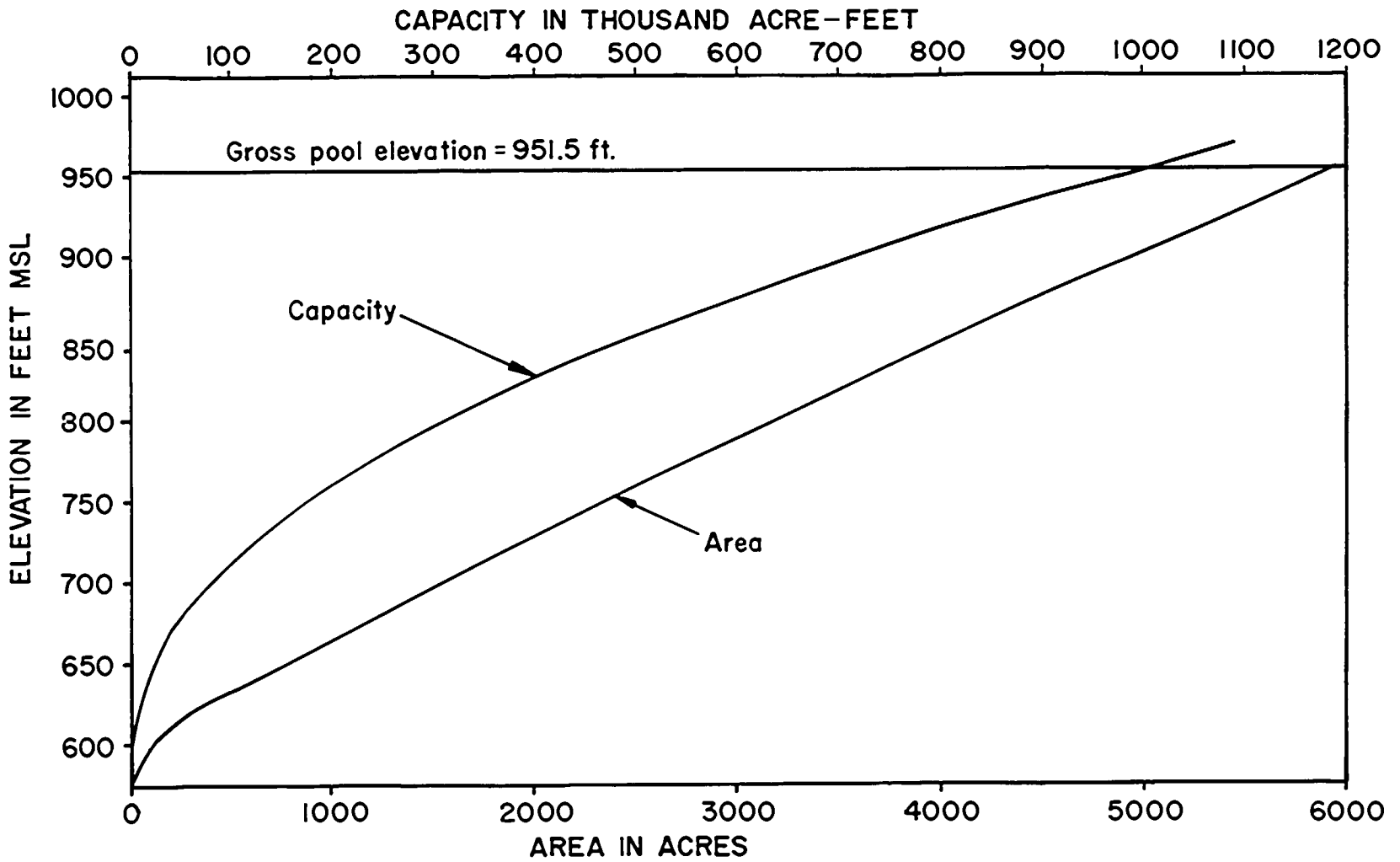
Upstream from Pine Flat Lake, water resource developments have been constructed by others, including the previously mentioned upstream power generation facilities that are served by two major reservoirs: Wishon Reservoir located on the North Fork of Kings River, and Courtright Reservoir on Helms Creek tributary to the North Fork. The four-plant hydroelectric project, licensed by the Federal Power Commission, is owned by the Pacific Gas and Electric Company, a privately owned public utility. These plants have a total of 307,300 kilowatts of installed generating capacity. By agreement between Pacific Gas and Electric Company and the Corps of Engineers, Pine Flat Lake serves as a reregulating reservoir for the upstream power generation flows.

b. Operational data. - The average pool level during the recreation season is referred to as the normal recreation pool.

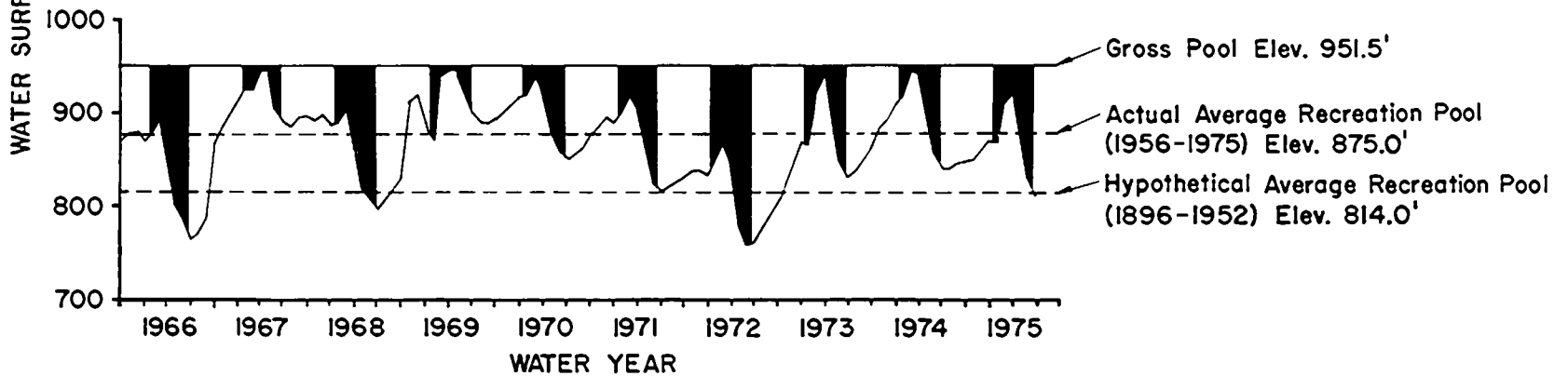
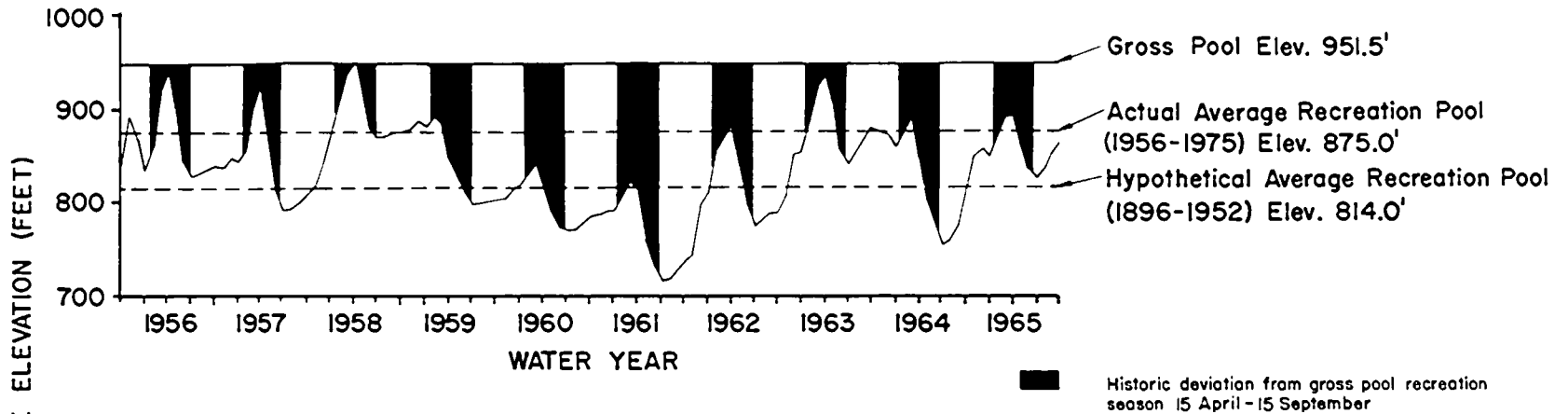
Hypothetical lake operation studies of historic streamflow records (1896 to 1952) indicate that the surface elevation of the normal recreation pool (based on a six month season - April through September) would be about 814 feet. At this elevation, the lake has a storage capacity of 363,000 acre-feet, a surface area of about 3,440 acres, a shoreline of about 45 miles, and a length of 14 miles. Historically the normal recreation pool differs from the hypothetical partially because of the agreement with Pacific Gas and Electric Company. Recreation visitation records have indicated that the recreation season is five months rather than six months (see paragraph 10) which also modifies the hypothetical normal recreation pool. Consequently the historic normal recreation pool (mid-April through mid-September) has a surface elevation of about 875.5 feet and a surface area of about 4,500 acres. The area-capacity curve for Pine Flat Lake is presented on Chart 1. End of month surface elevation between 1956 and 1975 is presented in Chart 2.

c. Lake fluctuations. - Although a lake fluctuation of as much as 300 feet could occur annually during the recreation season of mid-April through mid-September, the maximum fluctuation to date occurred during the first year of storage (from May through September 1954) and was 142.1 feet. High water elevation of the lake during most years would normally be reached in June or July, followed by gradual recession as releases are made for irrigation. The maximum drawdown for a 24-hour period during the recreation season would ordinarily be 2.5 feet. Stage-frequency and operation studies indicate that, on the average, the lake would fill to the gross pool level about in 16 percent of the years. There is no designated minimum pool or dead storage. However, during the recreation season there should, with rare exception, be ample water available. During actual operations of the lake for the past 20 years, the smallest pool actually present during the 5-month recreation season was 110,000 acre-feet of storage with a water surface area of 1,827 acres at elevation 718 feet. By the agreement between the Corps of Engineers and the Pacific Gas and Electric Company for the 30-year period commencing in 1955 and subject to renewal, Pine Flat Lake provides the downstream regulation needed by the electric company to operate the upstream power developments, subject to the prior requirements of flood control and irrigation. As a result of this agreement Pine Flat Lake has been provided with a good recreation pool.

10. Visitation. - Pine Flat Lake became fully operational in 1954, and annual records of recreation use have been compiled since 1955. The total annual recreation use for the period of operation is shown in the following tabulation. Variations in recreation use are not positively correlated with lake fluctuation, although there should be some cause-and-effect relationship that to date is not discernible. Decreases in visitation during 1974 and 1975 are thought to be caused by a combination of the gasoline shortage and enforcement of an operational policy against uncontrolled vehicular access and camping below gross pool.



PINE FLAT LAKE  
 KINGS RIVER CALIFORNIA  
 AREA- CAPACITY CURVES



PINE FLAT LAKE  
END OF MONTH WATER SURFACE ELEVATION 1956-1975



<u>Calendar Year</u>	<u>Recreation Days</u>
1955	270,000
1956	242,000
1957	352,000
1958	342,500
1959	390,300
1960	345,400
1961	412,500
1962	471,200
1963	528,600
1964	663,200
1965	491,000
1966	589,200
1967	592,300
1968	523,800
1969	565,700
1970	609,000
1971	628,200
1972	610,100
1973	610,300
1974	490,900
1975	467,200

Information collected in recreation use surveys between 1964 and 1969 provided data on the existing pattern of recreation activities. This has helped in establishing the type and extent of facility development necessary to achieve the full recreation potential of Pine Flat Lake. Table 1 summarizes the recreation use patterns of visitors to the lake.

Chart 3 illustrates the average monthly distribution of visitation for the years 1970 through 1975 and indicates that 63.6 percent of the visitation occurs between 1 May and 31 August. Assuming that 75 percent of the total annual use represents the major recreation season and knowing that recreation use diminishes rapidly following the Labor Day weekend in September, a five-month recreation season extending from mid-April to mid-September was determined.

The State of California now has a population of over 20,000,000 people, the most populous state in the nation. As indicated by information collected from surveys of outdoor recreation use in California, per capita participation in recreation activities has been increasing. The expanding population in conjunction with greater recreation participation is resulting in a heavy use of all existing recreation facilities. Increased use of recreation facilities at Pine Flat Lake is expected to occur.

Visitation projections made to the year 2010 detail anticipated project attendance. These estimates were derived, in general

**TABLE 1  
PINE FLAT LAKE  
RECREATION USE SUMMARY 1964-1969**

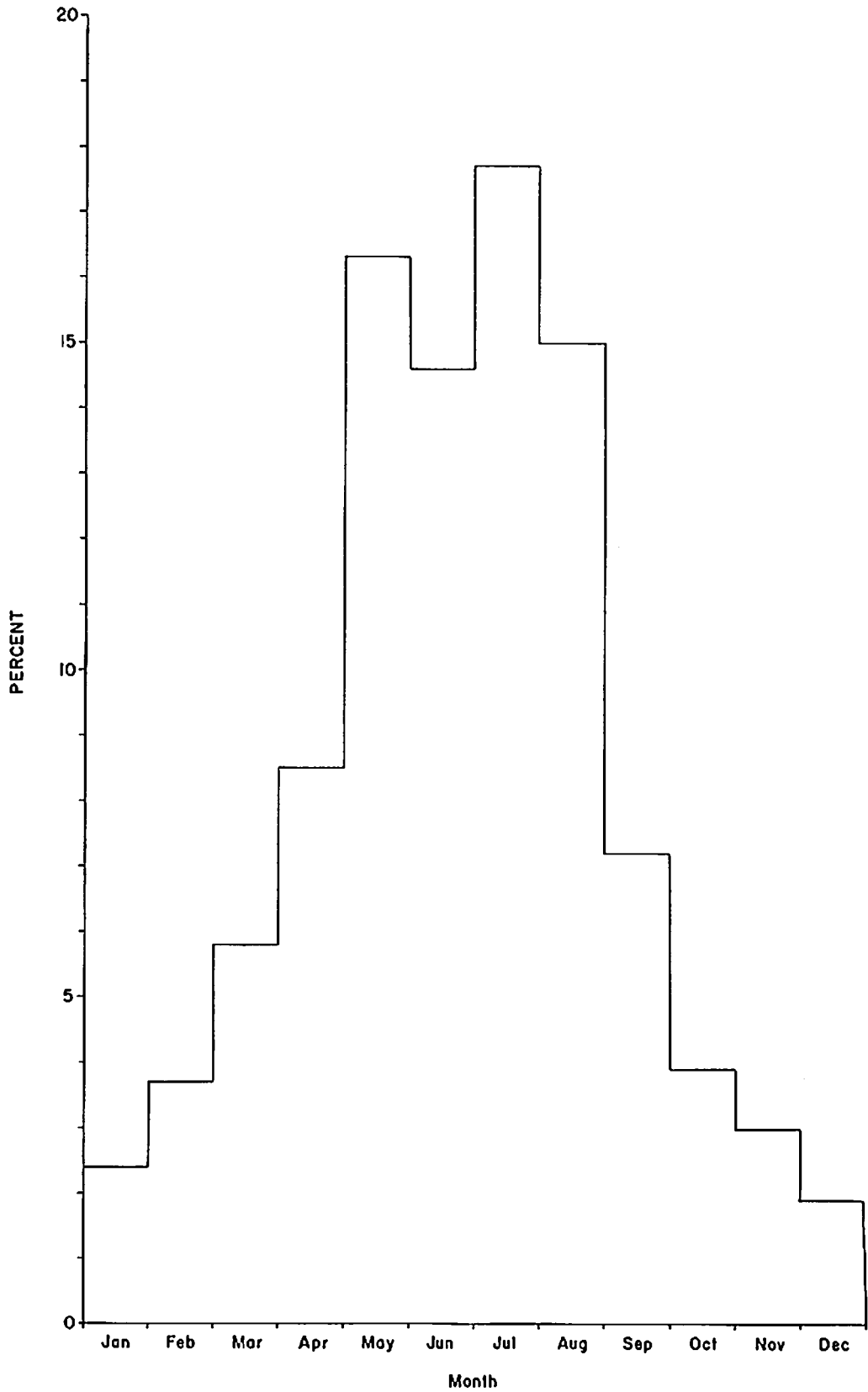
Year	NO. OF PERSONS SURVEYED				% OF VISITORS ON WEEKEND				NO. OF PERSONS PER VEHICLE				% OF VEHICLES WITH BOAT-TRAILER				% OF VEHICLES WITH HOUSE-TRAILER				FISHING (%)			
	SP	SUM	FALL	TOTAL	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG
1964	3960	3271	1324	8555	72	65	63	67	3.2	3.4	2.7	3.2	17	18	16	17	0	2	0	1	35	35	46	37
1965	2080	1517	760	4357	66	62	72	64	3.1	3.3	2.6	3.1	13	35	12	20	0	2	0	1	32	42	48	40
1966	2590	2029	715	5343	79	67	72	74	3.0	3.7	2.7	3.2	22	30	12	23	0	0	0	0	43	19	43	35
1967	724	1354	937	3015	69	49	75	63	2.5	3.6	2.9	3.1	21	30	22	25	1	1	0	1	53	20	45	38
1968	2182	2494	172	4848	66	60	58	63	3.1	3.5	2.5	3.3	13	17	16	15	1	2	1	1	36	25	34	31
1969		2186	28	2214		68	63	68		3.1	1.9	3.1		9	10	9		0	0	0		36	48	36

Year	PICNICKING (%)				SWIMMING (%)				WATER SKIING (%)				PLEASURE BOATING (%)				SIGHTSEEING (%)				OTHERS (%)			
	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG
1964	21	32	11	21	1	7	0	4	3	25	1	14	3	6	6	7	38	22	33	29				
1965	21	32	15	26	0	18	0	10	0	43	2	25	2	4	7	4	59	9	27	26	0	0	0	0
1966	30	26	17	27	7	19	1	10	13	53	4	25	8	10	8	9	21	10	35	19	0	0	2	0
1967	26	24	28	26	0	20	1	8	1	51	15	25	4	8	7	7	39	11	30	25	0	2	1	1
1968	22	29	2	24	5	5	0	5	19	33	0	25	6	4	9	5	23	21	55	24	1	0	3	1
1969		24	0	24		8	0	8		11	0	11		2	0	2		29	23	29		1	29	2

Year	CAMPING ON PROJECT (%)				STAYING IN AREA (%)				CAMPING ON PROJ. AND STAYING IN AREA (%)				AVERAGE DURATION OF VISIT CAMPING ON PROJECT (DAYS)				AVERAGE DURATION OF VISIT STAYING IN AREA (DAYS)				AVERAGE DURATION OF VISIT DAY USE (HOURS)			
	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG	SP	SUM	FALL	WT AVG
1964	1	7	4	4	0	10	1	5	1	17	5	9	8.2	4.5	3.5	5.9	2.4	7.2	18.4	7.3	3.1	4.3	3.2	3.6
1965	2	27	3	16	0	17	1	10	2	44	4	26	3.6	4.1	2.2	3.6	7.0	4.2	2.8	3.6	2.7	5.3	3.3	4.1
1966	3	25	3	10	0	14	3	5	3	39	6	16	2.4	6.8	2.2	3.9	2.7	5.3	2.4	3.5	4.3	5.3	3.3	4.5
1967	3	24	8	13	1	28	4	12	4	52	12	25	2.1	5.1	2.3	3.3	4.0	5.0	2.1	3.8	3.6	5.8	3.8	4.5
1968	16	14	0	14	12	27	5	19	28	41	5	33	5.0	4.2	0.0	4.4	3.0	4.9	2.8	3.9	4.4	5.5	3.0	4.9
1969		12	8	12		10	0	10		22	8	22		3.0	2.0	3.0		4.1	0.0	4.1		3.3	3.1	3.3



PINE FLAT LAKE  
AVERAGE MONTHLY VISITATION 1970-1975

accordance with instructions contained in Engineer Regulation 1120-2-403, by using the projected population and per capita use rates for the project market area. Since Pine Flat Lake has experienced recreation use for 20 years, historic visitation data were used to establish accurate per capita use rates. Annual visitation projections developed from this data and predicated on installation of additional land based facilities are presented below:

<u>Year</u>	<u>Projected Visitation</u> (Recreation days)
1980	672,000
1985	721,000
1990	773,000
1995	830,000

The maximum practical use (MPU) that can be expected upon the lands and waters of the lake is estimated at 830,000 recreation days annually. It is expected that this level of use will be reached by about the year 1995. As discussed in paragraph 30, it is believed that recreation use of Pine Flat has reached a plateau, with further increases in use requiring additional land based facilities, particularly camp sites. The derivation of the MPU figure is detailed in paragraph 53.

### CHAPTER III - PROJECT STATUS

11. Project development and operation chronology. - Construction of Pine Flat Dam was started in January 1950 and completed in June 1954. Impoundment of water commenced in February 1954. Construction of recreation facilities has been accomplished by the Corps of Engineers, the Forest Service, Fresno County and by private concessionaires. To date, recreation facilities have been installed at 8 auto access and 5 boat access recreation areas. Construction of channel improvements in the Kings River downstream of Pine Flat Dam was started in 1968 and was completed in 1975.

12. Expenditures for public use development. - Capital expenditures by the Federal government for public use development at Pine Flat Lake have totalled \$790,535. Of this total, \$13,700 was expended during project construction, \$500,100 has been provided with Code 710 funds, \$239,235 by Accelerated Public Works funds, and \$37,500 by the Forest Service. Fresno County has expended \$88,500 to help develop the Pine Flat Recreation Area. Capital expenditures by the three marina concessionaires is estimated to be \$347,000.

CHAPTER IV - RECREATION AND ENVIRONMENTAL RESOURCES OF  
THE PROJECT AREA

13. Geology and soils. - The geology of the project area is basically the same as that of the rest of the western slope of the Sierra Nevada with Mesozoic granitic rocks and pre-Mesozoic metamorphic and granitic rocks predominating. Locally, the rocks on the south side of the lake include Mesozoic granodiorite, the pre-Cretaceous granitic and metamorphic rocks; and below the dam, pre-Cretaceous metasedimentary and metavolcanic rocks. Small amounts of Quaternary alluvium cover the canyon floor. Large outcroppings of igneous and metamorphic rocks add greatly to the scenic beauty of the project area. Soils are generally shallow and are poorly drained.

The Kings River Canyon in the area of Pine Flat Lake is fairly steep. At gross pool the maximum width of the lake is only about 2 miles. The canyon slopes adjacent to the lake frequently exceed 30 percent. Most of the project area is located on hilly terrain that poses some problems for site development (discussed under paragraph 21).

14. Archeology. - In the spring of 1947, the Smithsonian Institute River Basin Survey examined the area of the project for remains of aboriginal occupation. They reported that this area was within the range of the Choinimni division of the Yokuts Indians who occupied most of the upper San Joaquin Valley in aboriginal times. A historic Indian village site, Tishechu, was located on the south side of the Kings River about 2 miles downstream from Pine Flat Dam. A number of small habitation sites and traces of occupancy were found in the reservoir area. Most of these were located below the gross pool elevation with a complex of several sites located near Trimmer. Organic refuse, chips of obsidian and chert, artifacts and other debris of aboriginal habitation were found at such sites. Associated with most of the sites were foodmilling places that consisted of large boulders with pits ground in them to serve as mortars.

15. History. - The California Department of Parks and Recreation has determined that there are no state historical landmarks, points of historical interest, or sites on the National Register of Historical Places that were affected by the project. There was some placer gold mining along the river during the late 19th century; however, there are no known remains or records of such activities in the immediate vicinity of the lake.

16. Ecology.

a. Ecosystems. - The ecosystems within the project area are typical of the Sonoran Life Zone. Grassland, oak woodland-chaparral, oak woodland-yellow pine, and chaparral are the dominant vegetative types. The biotic environment of the Pine Flat area is generally

compatible with man's activities, with the lake contributing substantially to the environment of the region. As explained in the Environmental Assessment, which is on file in Sacramento District, disruption of the existing ecosystems in the area resulting from project operation is considered minor, since the planned development will not significantly alter the existing environment. (See paragraph 32.) A summary of this Environmental Assessment and Negative Finding of Fact appears in Appendix II.

Future recreation use of project lands and water will be directed to minimize disturbance to existing ecosystems. Special effort will be taken to ensure that maximum practical use for the project is not exceeded and that disruption of the local environment does not occur. Project visitation will be monitored and, if necessary, controlled to prevent overuse.

b. Vegetation. - The plant species represented in the area are typical of most of the foothill regions of the western flank of the Sierra Nevada. During the early spring, flowering plants add substantially to the charm of the area. Digger pine (*Pinus sabiniana*), interior live oak (*Quercus wislizenii*), blue oak (*Q. douglasii*), and California buckeye (*Aesculus californica*) are important tree species that give the characteristic appearance to the mountainsides above the lake. Other trees in the general lake area are willows (*Salix* sp.), California sycamore (*Platanus racemosa*), and poplar (*Populus fremontii*). Dispersed among the trees are understory species including shrubs such as wild lilac (*Ceanothus* sp.) and manzanita (*Arctostaphylos* sp.). Commonly found grasses are pine bluegrass (*Poa sabrella*), wild oats (*Avena* sp.), and needlegrass (*Stipa pulchra*). During low lake stages some of the steep sides of the lake are often covered with annual grasses and weeds. The grasses are the same basic annuals that comprise the ground cover above the high-water level. The weeds include the common cocklebur (*Xanthium strumarium*) and Jimson weed (*Datura stramonium*). In addition, some fast-growing shrubs such as the buttonwillow or buttonbush (*Cephalanthus occidentalis*) grow near the water's edge below gross pool.

c. Wildlife. - A number of mammals live in or are transient through the project area. The largest mammal presently in the area is the mule deer (*Odocoileus hemionus*). The North Kings deer herd winters in the area east of Trimmer and currently numbers more than 5,000 head. Other mammals present include racoon (*Procyon lotor*), skunk (*Mephitis mephitis*), mice (*Mus* sp.), gray fox (*Urocyon cinereoargenteus*), wild pig (*Sus* sp.), bobcat (*Lynx rufus*), and brush rabbit (*Sylvilagus bachmani*).

Resident species of birds frequently observed around the lake include the red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), Anna's hummingbird (*Calypte anna*), common flicker (*Colaptes auratus*), acorn woodpecker (*Melanerpes formicivorus*), scrub jay (*Aphelocoma coerulescens*), plain titmouse (*Parus inornatus*), rock

wren (*Salpinctes obsoletus*), house finch (*Carpodacus mexicanus*), rufous-sided towhee (*Pililo erythrophthalmus*), and brown towhee (*P. fuscus*). Game birds found in the Pine Flat area include California quail (*Lophortyx californicus*), band-tailed pigeon (*Columba fasciata*), wild turkey (*Meleagris gallopavo*), and mourning dove (*Zenaidura macroura*). Many other species are fall migrants, winter residents, or spring migrants.

Although food for aquatic species of birds is not plentiful, some species such as eared grebe (*Podiceps caspicus*), common merganser (*Mergus merganser*), and osprey (*Pandion haliaetus*) frequent the lake. Other species that are seen on the lake (usually in late fall and winter when a lull in man's activity and also the migration season occurs) include coot (*Fulica americana*), pintail (*Anas acuta*), widgeon (*Mareca americana*), redhead (*Aix sponsa*), western grebe (*Aechmophorus occidentalis*), pied-billed grebe (*Podilymbus podiceps*), great blue heron (*Ardea herodias*), and California gull (*Larus californicus*). Most of these waterfowl species do not stay for any length of time.

A few bald eagles (*Haliaeetus leucocephalus*), an endangered species, do winter in the vicinity of the lake. These eagles are found from below the dam to the upper Kings River. Bald eagles are fish eaters and scavengers and need large bodies of water for subsistence. Consequently, the lake has probably improved conditions for these birds.

Few amphibians and reptiles are found near the lake because suitable habitat is lacking due to steep slopes and large water level fluctuations. However, western pond turtles (*Clemmys marmorata*), and several species of frogs, lizards, and snakes do occur.

d. Fish. - Both warm water and cold water fisheries have been established in the area. The 15-mile section of the Kings River immediately downstream from Pine Flat Dam is stocked with catchable rainbow trout (*Salmo gairdneri*) during the angling season. Trout fishing in this section of the river is reported to be good. A special barbless flyfishing season has been established for the section of the river from Piedra Bridge upstream to the dam. This season usually extends from about the middle of November to about the end of April and has a zero trout catch limit. Some spawning of planted trout is occurring, and it is believed angling use of this portion of the river will increase. Above the lake, the Kings River supports a "wild trout fishery" established as a distinct and separate program for selected waters of the State by the California Department of Fish and Game. The fisheries in the lake itself are considered fair but have been declining recently. Principal game fish include rainbow trout, brown trout (*Salmo trutta*), kokanee salmon (*Oncorhynchus nerka*), small-mouth bass (*Micropterus dolomeui*), large-mouth bass (*M. salmoides*), bluegill (*Lepomis macrochirus*), green sunfish (*L. cyanellus*), black crappie (*Promoxis nigromaculatus*), white catfish (*Ictalurus catus*), channel



catfish (*I. punctatus*), and brown bullhead (*I. nebulosus*). Trout and bass make up the bulk of the catch.

The main reason for the decline of game fish in the lake has been the competition from nongame (trash) fish. Hardhead (*Mylopharodon conocephalus*), Sacramento squawfish (*Ptychocheilus grandis*), Sacramento sucker (*Catostomus occidentalis*), and hitch (*Lavinia exilicauda*) are the most common nongame species. The Sacramento squawfish has been particularly troublesome because it moves upstream for spawning and feeds on young trout fingerlings. This has had severe effects on the upstream fishery. The Corps of Engineers has conducted feasibility studies and received approval to construct a physical barrier to prevent passage of squawfish from the lake to upstream spawning waters. After construction of such a barrier, considerable improvement in the upstream trout fishery is expected, and improvement of the lake game fishery should also occur. A more detailed discussion of the Sacramento squawfish problem and recommended solution appears in paragraph 49b and Appendix F.

e. Vector problems. - The principal vector that has been influenced by the project is the mosquito. Two species, *Culex tarsalis* and *Aedes nigromacules*, which are respectively referred to as the encephalitis mosquito and the pasture mosquito are common in the area. These insects breed during most of the year in shallow or still water. Flood control provided by the project has reduced the extent of temporary ponding in the lowlands below the dam resulting in lower mosquito populations. However, a slight population increase in some recreation areas has been experienced. Procedures for permanent mosquito control have been incorporated into the operation and maintenance of the project.

17. Scenic quality. - The configuration of the local topography, the native vegetation, the lake, the dam, and to a lesser extent wildlife present in and around the project all contribute to the overall high scenic quality of the area. Several turnouts have been located at points of special visual significance along the main project access road that skirts the north side of the canyon. An observation area has been constructed near the top of the dam on the southern side of the canyon. A spectacular view of the lake, downstream area, and the dam itself is afforded from this site. A strip of land around the lake, a visual detraction, is a result of the operational characteristics of the lake and is particularly obvious during the latter part of the recreation season, during the winter months and during low water years. This extensive area, for the most part devoid of all but grasslike vegetation, is exposed as the lake is drawn down to satisfy irrigation and flood control requirements. However, this characteristic is common to reservoirs throughout the West and is a phenomenon which is largely accepted by the public.

18. Recreation. - The development of Pine Flat Lake has created a recreation resource of considerable magnitude. Even though recreation

is not one of the primary purposes of the lake, there is currently an average of about one-half million recreation days of use annually. The lake has a capacity to provide a projected 830,000 recreation days of use per year. The recreation resources of Pine Flat will continue to be improved and developed to provide for the increased public use as funding is made available. The major emphasis of recreation at Pine Flat is toward water-oriented activities with swimming, boating, water skiing, fishing, camping, and picnicking being the most pursued activities during the peak summer months. During the fall and winter period, hunting and fishing predominate. Fishing and boating are the primary activities during the springtime.

Recreation facilities currently available at Pine Flat include:

Area	Camp Sites	Picnic Sites	Launch Lanes	Restroom Facilities			Parking	
				Flush	Vault	Portable	Car	Car-Trailer
Deer Creek			3			4		235 <u>1/</u>
Island Park	50		3		6	4		185 <u>1/</u>
Lakeview			3			4		150 <u>1/</u>
Trimmer	25 <u>2/</u>		2		1	4		25 <u>1/</u>
Sycamore Flat	54	12			5			
Kirch Flat	17				2			
Pine Flat	54	30		4		4	60	
Boat Access		5				10		
Observation Area								54

1/ Most inundated at gross pool.

2/ Only 10 above gross pool.

CHAPTER V - FACTORS INFLUENCING AND CONSTRAINING  
RESOURCE DEVELOPMENT AND MANAGEMENT

19. General. - Resource development and management at Pine Flat Lake is influenced by factors such as climate, steep topography, geology, the character of present and future recreation at the project, lake operation policy, and competing recreation developments. None of the influencing factors except for steep topography pose serious constraints on the adequate development and management of the project's resources.

20. Land use.

At present, use of lands in and around the project area includes agricultural (grazing), commercial, and residential. Owners of private lands adjacent to the lake have contributed toward satisfying recreation needs at the lake by providing "off-project" development to supplement the "on-project" development by the Corps of Engineers, the Forest Service, and Fresno County. These private recreation developments, by virtue of the limited access and limited suitable area for development on project lands near the lake water surface, comprise an important segment of the overall recreation development at the lake. Such off-project facilities are located near Pine Flat Recreation Area, Deer Creek, Island Park, Lakeview, and Trimmer. These developments are generally compatible with on-project developments as well as with the overall project surroundings. In some cases, there are concession leases for development of the services on project lands which supplement the similar services provided on adjacent private lands. This private development has provided lodging, camping, picnicking, stores, cafes, and other goods and services required by the recreating public. Most private lands adjacent to Pine Flat Lake have been classified as agricultural preserves by Fresno County. Continued development and expansion of concession facilities and services will be an important means of providing for increasing recreation use.

Although most private development has enhanced the project and its associated recreation facilities, the construction of some permanent additions such as porches, shacks, and outbuildings to camp trailers and mobile homes on private lands are not complementary to the project surroundings and detract from the scenic beauty of the area. Many of these permanent additions have been constructed contrary to county ordinance (see paragraph 77).

21. Topography and geology. - Local topography and geology have had a considerable effect on development at Pine Flat. The steep slopes of project lands, the relatively impermeable substratum, and thin soil horizons have precluded some types of development, particularly sewage treatment facilities (see paragraph 75). Steep slopes surrounding the lake limit the land available for recreation purposes. This problem becomes more severe during periods of high lake levels that normally

overlap with the peak recreation use months. Other specific problems relating to the local topography and geology of the project area are discussed in Chapter IX, "Special Problems".

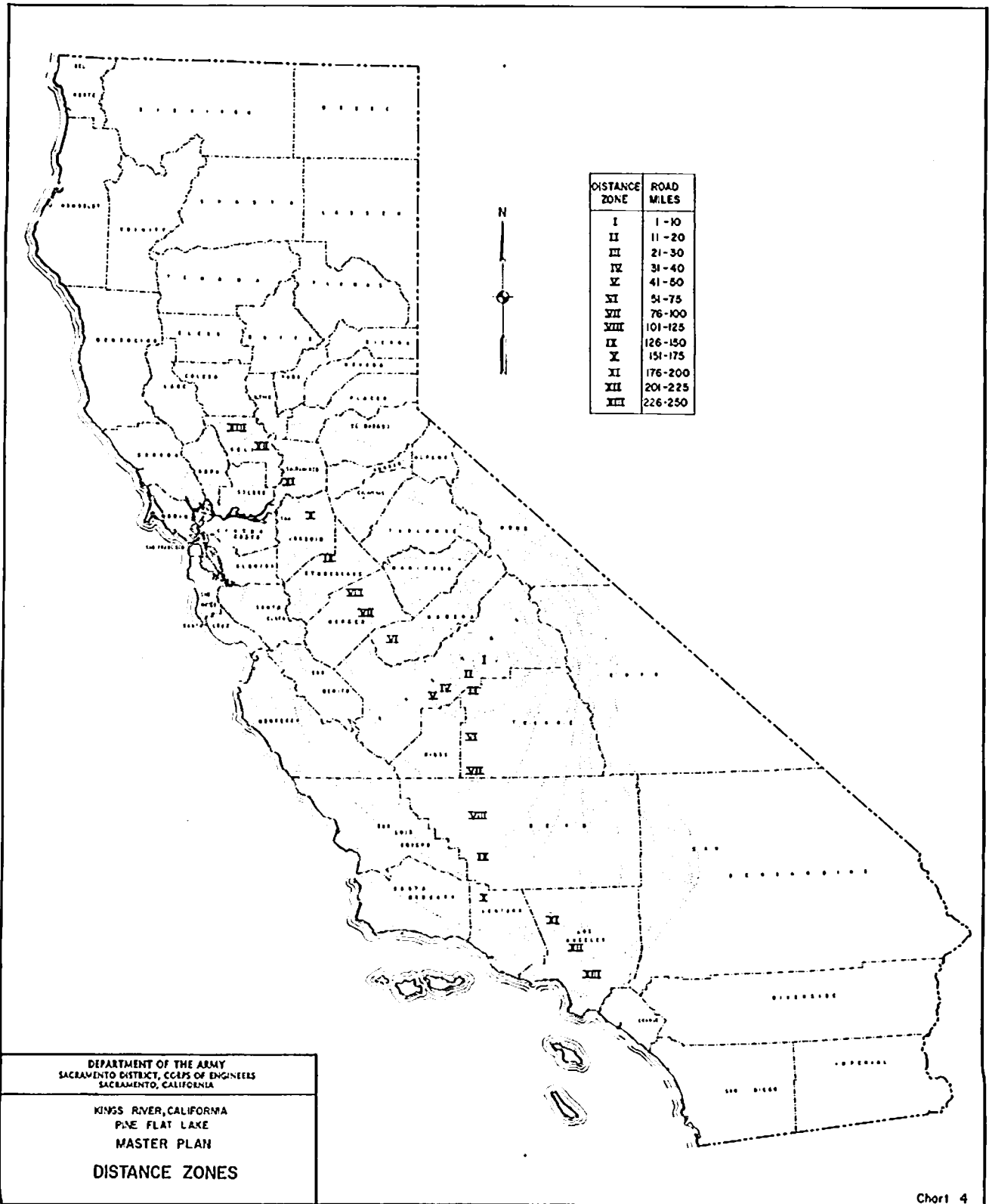
## 22. Accessibility.

Good access to Pine Flat Lake is provided by Federal and state highways and several connecting county roads. Principal access to the lake from the Los Angeles area, the San Francisco Bay area, and other population centers is provided via Highway 99 to Fresno, the largest nearby city; thence easterly on either State Highway 180 or Belmont Avenue to Trimmer Springs Road near Centerville. County Road N88, known as the "Trimmer Springs Road," as shown on Plate 1, traverses the northern shoreline of the lake providing access to most of the existing and planned recreation areas. Travel time from the Deer Creek area near the dam to Kirch Flat, which is the most remote recreation area, is estimated at 50 minutes (a distance of 26 miles). Since travel time along this road to the upper portions of the lakeshore is fairly long, much of the recreation demand and consequently most of the recreation facilities are located on the western portion of the north shore of the lake.

Trimmer Springs Road constitutes the primary access route to the project. It is designated by Fresno County as a "Select Collector" type, all-weather road and presently can handle approximately 6,000 cars per day (two way). According to the Fresno County Planning Department, minor improvement in traffic control which would include the placement of stop signs, clearing of brush along the roadway for visibility improvement, and the redesign of some major intersections, could increase maximum capacity of this road to more than 10,000 vehicles per day. This two-lane, all-weather bituminous roadway is considered adequate to handle traffic generated by the project for at least the next 15 years.

## 23. Area of influence.

a. Distance zone. - Chart 4 shows the respective distance zones comprising the market area from which recreation uses at Pine Flat Lake originate. Zones I through V are each 10 road-miles and Zones VI through XIII are each 25 road-miles wide, covering a distance of 250 road-miles from the project. It has been determined from the survey information collected by the Corps that people coming from Zone I through IV (1 to 40 miles from the project) account for about 65 percent of the current total recreation use at the project. The Fresno metropolitan area with a 1970 census of about 263,000 persons is within this region and contributes most of this total. Slightly less than 15 percent of the total annual recreation uses come from Zones V and VI (41 to 75 road-miles from the reservoir which includes the cities of Chowchilla, Madera, Hanford, Visalia, Tulare, and Corcoran). The third largest group of recreation users reside in Zone



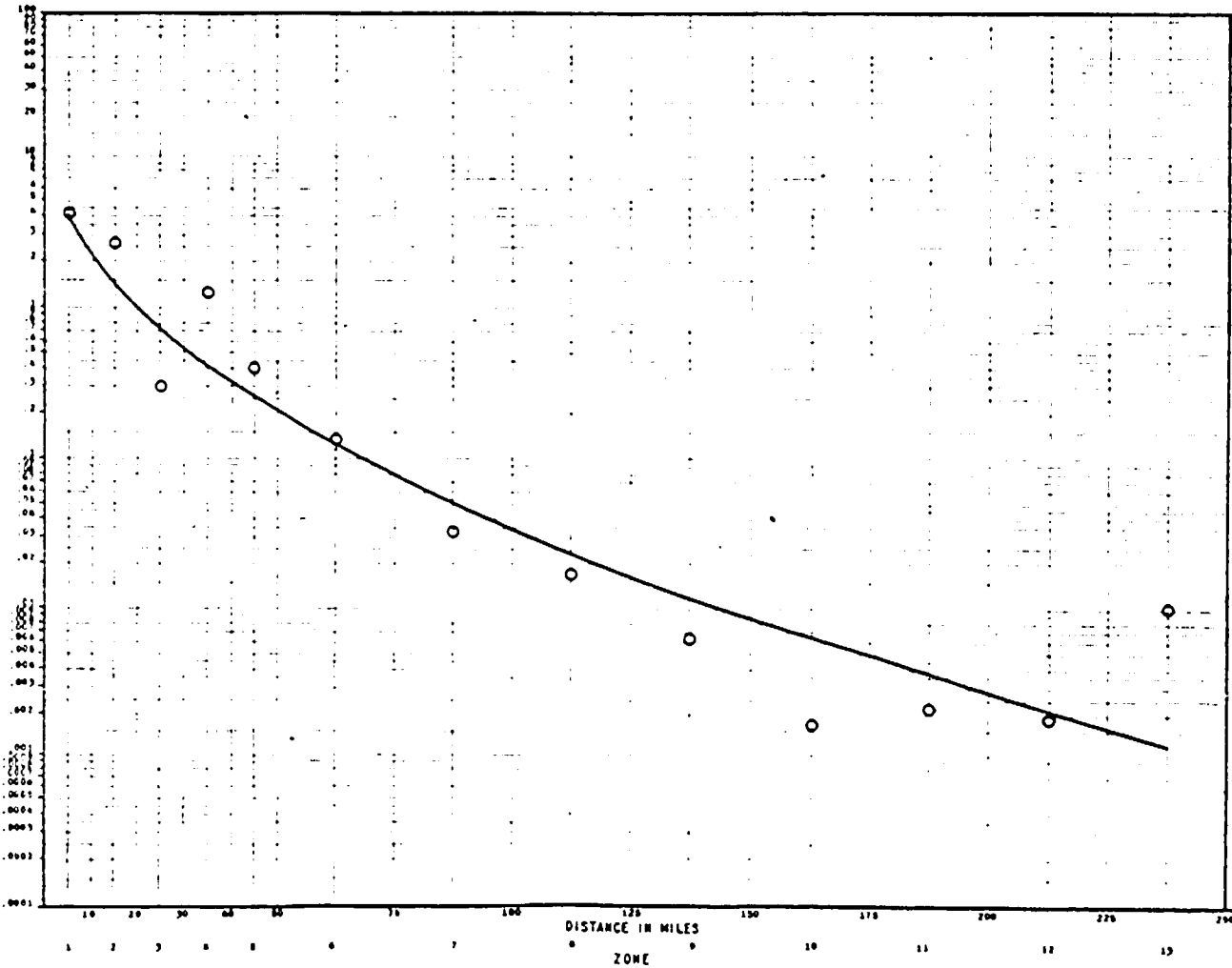
XIII (226 to 250 miles from the project) which includes a major portion of the Los Angeles metropolitan area with a 1970 census of about 7,000,000 people. This area contributes about 10 percent of the total recreation users. People from Zones I through IV account for a much greater per capita day use than people from the more remote zones. Chart 5 indicates per capita use rates for Pine Flat for 1966-1969.

b. Market area. - Approximately 85 (83.3) percent of the project visitors originate from areas within 100 road-miles of the project. Since this area supplies the major portion of the recreation users, it is considered to be the "market area" for Pine Flat Lake. Counties that are within this area along with their projected populations (extracted from annual California Department of Finance D-100 population projections) are shown in the following table:

Population of the Market Area

Counties Within:	:	:	:	:	:	:
100 Road-Miles :	1975	1980	1990	2000	2010	2020
Madera	45,400	49,600	58,400	66,400	74,900	83,700
Fresno	447,200	447,200	550,900	621,300	700,800	785,800
Kings	67,300	69,500	80,000	90,200	101,200	112,700
Tulare	206,900	224,300	267,300	309,500	357,900	409,200
Mariposa	7,900	9,300	12,000	15,200	16,200	17,900
San Benito	19,600	21,000	25,100	29,000	33,300	37,900
Kern	347,100	365,200	406,300	442,000	481,500	521,900
<b>Total</b>	<b>1,141,400</b>	<b>1,216,100</b>	<b>1,400,000</b>	<b>1,572,600</b>	<b>1,765,800</b>	<b>1,969,100</b>

24. Related recreation areas. - Within 50 road-miles of Pine Flat Lake, there are a number of natural and man-made resources which provide water-oriented recreation opportunities, including three reservoirs and portions of two national forests and two national parks. Existing recreation facilities at these areas have not been adequate to serve all those who wish to use the areas, indicating that public demand for outdoor and water-oriented recreation use in this region is greater than can be supplied by those facilities which have been made available. Millerton Lake, formed by Friant Dam on the San Joaquin River, is the only other major nearby reservoir that has water-oriented recreation activities comparable to those available at Pine Flat Lake. Average annual attendance over the last decade at Millerton Lake has exceeded 700,000 visitor days, based on records of the California Department of Parks and Recreation. Huntington and Shaver Lakes, further up the San Joaquin River, are two other reservoirs within 50 road-miles of Pine Flat Lake which provide similar water-oriented recreation opportunities. However these lakes



PLAN FORMULATION STUDIES - RECREATION

ESTIMATING INITIAL PROJECT  
RECREATION USE

PER CAPITA USE RATES  
1966 - 1969

DISTRICT: SACRAMENTO

PROJECT: PINE FLAT

LEGEND

○ SURVEY ESTIMATE

— REGRESSION ESTIMATE

REGRESSION EQUATION:

$$Y = \text{Exp}(2.753375 - .609749 \cdot X)$$

$$R^2 = .88$$

ZONE	PER CAPITA <sup>1/</sup> USE RATE	ZONAL <sup>2/</sup> POPULATION
1	4.0146	1,160
2	2.4797	15,070
3	1.7443	172,450
4	1.4257	284,020
5	1.2626	77,500
6	1.265	177,670
7	.0523	103,000
8	.0244	329,700
9	.0123	298,400
10	.0066	814,600
11	.0037	2,225,500
12	.0022	4,395,200
13	.0013	4,527,000

<sup>1/</sup>REGRESSION ESTIMATE

<sup>2/</sup>ESTIMATED 1969 POPULATION

provide a more mountainous, forested setting than the foothill setting of Pine Flat and Millerton Lakes. H.V. Eastman and Hensley Lakes, and Lake Kaweah are also within 50 miles of Pine Flat and are slightly competitive with Pine Flat Lake since they serve the same population centers. Within 10 miles of Pine Flat Dam, downstream along the Kings River, three recreation areas have been developed by Fresno County as part of a proposed Kings River Greenbelt Recreation Area. The competitive effects of these resources have been evaluated for their influence upon anticipated recreation at the lake. Generally, there is a regional deficit in outdoor recreation opportunities. Most of the similar projects to Pine Flat Lake are currently experiencing heavy visitation. Therefore, Pine Flat will continue to significantly contribute towards the satisfaction of the region's recreation demands.

25. Lake plan of operation. - The designated primary purposes of Pine Flat Lake are flood control and irrigation water supply, and the lake is operated accordingly. Year-round recreation use of Pine Flat Lake is compatible with such operations. The considerable annual fluctuation of the water level in the lake causes some difficulty in facility siting. As a result of arrangements made for control of upstream power generation flows, Pine Flat Lake almost always has a large pool available for recreation use. Future recreation use of the lake and the area downstream of the dam may be influenced and constrained by the addition of a powerplant at the dam, currently being considered by non-Federal interests. Operation of the lake for power production as well as for flood control and irrigation would probably alter the size of the recreation pool and thus affect the calculation of MPU (see paragraph 53). The addition of a powerplant may also require construction of a downstream regulatory reservoir which could affect the existing and future recreation developments within the Pine Flat Recreation Area (paragraph 39 and plate 3). Studies of the feasibility of power development on the Kings River, including Pine Flat Dam and a downstream reregulating dam, are in progress by Kings River Conservation District under a preliminary permit from the Federal Power Commission.

26. Siting of roads and other utilities. - Trimmer Springs Road is the primary access route to the project. The route Trimmer Springs Road takes as it progresses up the canyon follows the north shore of the lake providing good access to the various recreation areas. Access to the south shore of the lake is limited to boats. Consequently, no development has occurred on this shore of the lake. Lack of access to many areas serves to preserve them as natural scenic areas and provides relatively undisturbed habitat for wildlife. Future road and utility siting shall be accomplished in such a manner as to minimize destruction and damage to scenic and natural areas. Siting and design characteristics are given in Chapter VIII.



27. Water quality. - The Pine Flat Lake Water Quality Report of Water Year 1972 (contained in the files of the Sacramento District), concluded that the water entering the lake was extremely good and, to date, the operation of the lake had not generated any water quality problems. Various parameters of water quality are routinely measured, including: temperature, dissolved oxygen content, hardness, dissolved mineral constituents, turbidity and coliform bacteria counts.

a. Temperature. - Water temperatures are monitored above and below the lake and in the lake near the dam to determine the effects on water temperature caused by storage. Generally, the water leaving the lake is slightly warmer than the water entering. Water temperatures at the lake surface range from 41 to 50°F in the winter to 68 to 77°F in the late summer.

b. Dissolved oxygen. - The dissolved oxygen content of Pine Flat Lake is normally high. In the very upper reaches of the lake the water has a higher dissolved oxygen concentration than the rest of the lake, which results from the highly aerated Kings River water inflow. As the water moves into the lake, it warms up and the dissolved oxygen decreases. The lake is thermally stratified and the dissolved oxygen concentrations decrease with increasing depth. During the summer, the dissolved oxygen concentrations are lower due to higher temperatures, lower pool elevation, decreased flow in the Kings River, and increased biological activity. The amount of dissolved oxygen could pose some constraint on the management of Pine Flat Lake as a trout fishery because occasionally the dissolved oxygen content in the lower depths of the lake falls below the minimum range suitable for trout survival. However, the effect this has on available trout habitat is not considered significant and the lake does support a fair to good trout fishery.

c. Dissolved minerals. - Measurement of dissolved mineral constituents has not shown anything of notable importance. This parameter indicates an overall good chemical quality of the water. Further, the dissolved salt content in the water is very low.

d. Coliform content. - Fresno County Public Health Department has sampled well and lake water sources. This biological parameter provides an index of pollution due to animal and human wastes which may be harmful to humans. Possible sources of bacteria are contamination from the wastes of wild animals in the area, domestic animal wastes from nearby grazing land, and recreation at the lake. According to the Pine Flat Lake Water Quality Report of Water Year 1972, coliform contamination is considered low.

e. Turbidity. - The turbidity of the lake is greatest near the inflowing streams and decreases toward the dam. The turbidity is also a function of the rate of inflow with turbidity greatest in the late spring and during a rainflood period. Sediment surveys are made at approximately 5-year intervals. A sediment survey was made in July

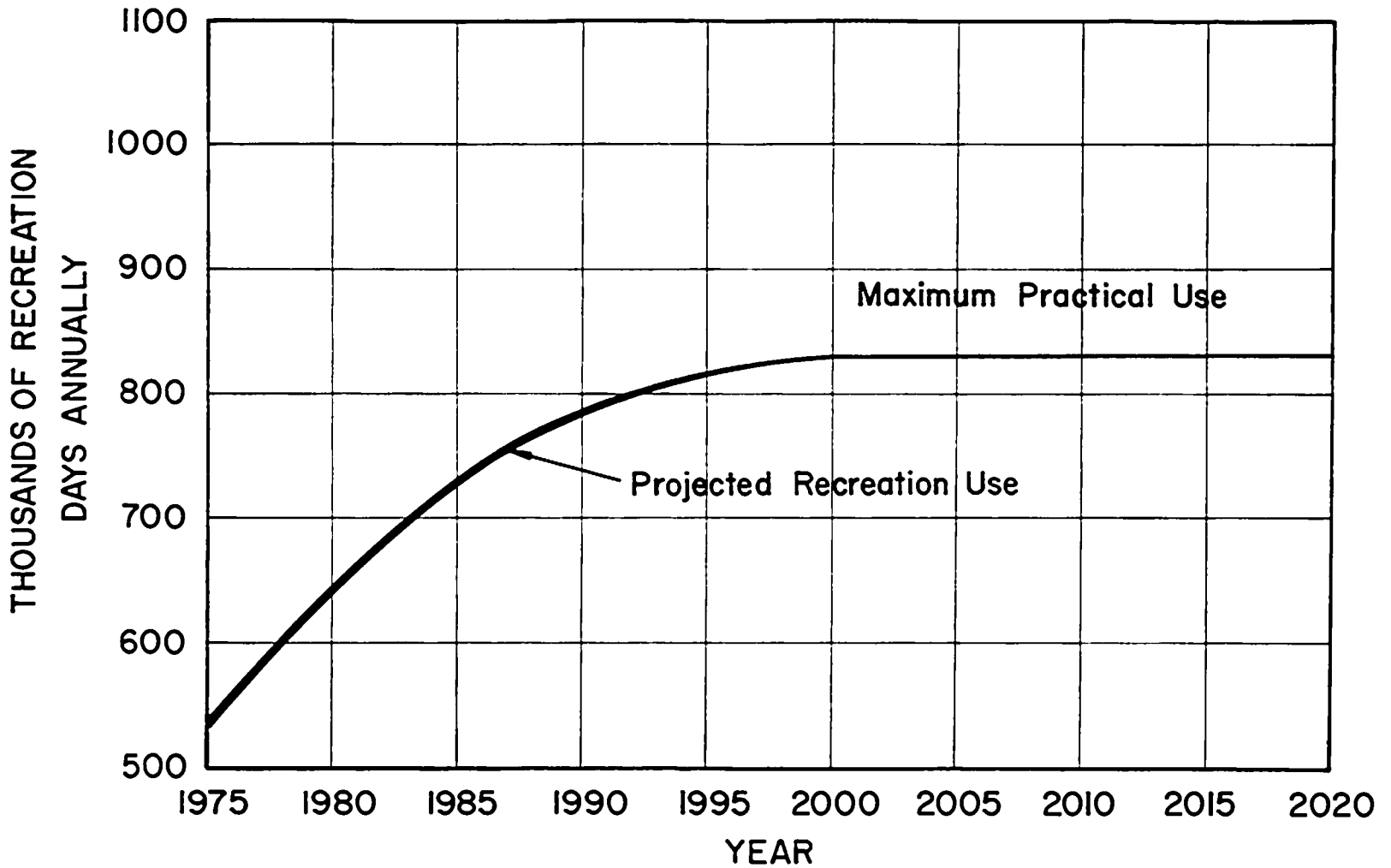
1957, which showed that the accumulation of sediment since 1952 was about 1,450 acre-feet. Analysis indicates that about 33 percent of this sedimentation occurred during the rainflood of December 1955. Most of the sediments deposited in the lake are clayey silts and fine sands.

28. Adaptability of project structures for public use. - Pine Flat Dam is currently used as a scenic overlook area for the portion of the Kings River immediately downstream of the structure and for a portion of the lake itself. Pedestrian traffic is permitted along the top of the dam, with guided tour access to the interior of the structure by special arrangement.

29. Exploitation of resources. - Within the project area there was very little preproject exploitation of resources. Generally, there has been a protective effect on lands which adjoin the project, since much of it is under the jurisdiction of the Forest Service. The major post-project use of resources is grazing of the forage resource on adjacent private and public lands. Further discussion on the forage resource appears in paragraph 82.

30. Anticipated attendance. - Anticipated attendance for Pine Flat Lake was estimated in general accordance with the methodology presented in ER 1120-2-403. Pine Flat Lake has received recreation use for 20 years; consequently, a per capita use rate for the market area was derived from historical visitation and population data. Visitation projections were then made by multiplying market area projected populations by the calculated per capita rate for the area. The projected visitation curve, derived from these computations is presented in Chart 6. The maximum practical use of the project (paragraph 53) is approximately 830,000. In order to provide the maximum sustained public use of the project lands and waters without environmental degradation, ultimate annual visitation, and development to support such a level of use, should not be allowed to exceed this figure. It is expected that maximum practical use will be attained about the year 1995. Presently, the limited land-based recreation development at Pine Flat Lake is constraining growth in recreation use. Insufficient land-based facilities, particularly camp sites and parking for high lake level use is resulting in a lack of growth in attendance. If facilities detailed in paragraphs 38 through 48 are indefinitely delayed, it may be necessary to limit project visitation in order to provide adequate public health and safety, to cope with expected increasing pressure on recreation resources and to prevent permanent damage to the recreation and environmental resources.

Participation in recreation at the project is expected to retain the same basic activity mix in the future as is currently being experienced. However, it is possible that energy shortages may influence future per capita visitation and alter the recreation use patterns of the lake. Specific recreation use mix is detailed in paragraph 10.



PINE FLAT LAKE  
PROJECTED RECREATION USE

31. Application of legislative and administrative requirements for cost-sharing. - By enactment of Public Law 89-72, the Federal Water Projects Recreation Act, on 9 July 1965, the Federal Government established the policy that the cost of recreation development at Federal water projects should be shared between the Federal and non-Federal entities with non-Federal share being not less than 50 percent. In addition, non-Federal public bodies are to assume administration, operation, and maintenance responsibilities and costs of these recreation developments. For projects authorized prior to Public Law 89-72, a similar policy has been adopted by the Office of the Chief of Engineers. Detailed instructions have been provided (ER 1120-2-404) for additional recreation development at areas administered by the Corps of Engineers. Pursuant to administrative policy, revised instructions were issued by the Corps of Engineers in 1976 concerning availability of Federal funds for recreation development at completed projects such as Pine Flat (Code 710 program). These instructions require that all such funding for developing added recreation areas can only be made available on the basis that non-Federal interests provide not less than 50 percent of the development costs and provide operation and maintenance of such areas. Development of fish and wildlife habitat improvement can be funded 75 percent with Federal funds, with 25 percent non-Federal funds and all operation and maintenance by non-Federal interests pursuant to a 1974 amendment (Public Law 93-251) to Public Law 89-72. A limited amount of Federal funds (Code 710 program or operation and maintenance funds) may be made available for improvement of sanitary facilities in existing Corps-managed areas to meet applicable State and Federal laws. At existing projects, provision is made for proceeding with further developments at existing areas with operation and maintenance continued by the Corps. Fresno County was requested to provide an indication of intent to participate with the Corps in development of the recreation potential of Pine Flat Lake. In a letter from the Board of Supervisors dated 18 April 1973 the County stated that they were currently not interested in additional county recreation development in the Pine Flat area on a cost-sharing basis with the Corps.

32. Environmental and ecological features. - An environmental assessment for Pine Flat Lake has been prepared and is available in Sacramento District files. It concludes that the additional development of recreation resources will not result in any significant adverse environmental impact. The assessment concludes that continuing operation of the lake and development and management of recreation facilities will cause no changes in the long-term environmental productivity of the project area. (See Appendix II.) Aside from a small amount of land which will be converted from open space to recreation use, no other impact is expected.

CHAPTER VI - COORDINATION WITH OTHER AGENCIES

33. Federal agencies.

a. Forest Service. - Close coordination is maintained with the Sierra and Sequoia National Forests because of the lake's location partially within their exterior boundaries. Particularly close coordination was maintained during the preparation of this Master Plan both to define mutual responsibilities on Federal land (Chapter X and Appendix G) and to assure that future plans for the existing project lands (plates 1 and 17) were in the best public interest. Letters expressing Forest Service views on this Master Plan are included in Appendix I.

b. Fish and Wildlife Service. - The Service was requested to update their letter dated 31 August 1967 concerning plans for maintenance and improvement of fish and wildlife resources. By letter of 12 March 1976, the Service indicated no changes from their 1967 letter. Both letters are included in Appendix I.

34. State agencies. - Various state agencies were contacted in preparing this Master Plan, particularly the California Department of Fish and Game and the California Division of Forestry. The Joint Fire Protection Plan of the Corps, the Forest Service and the Division of Forestry, dated 1973, appears in Appendix C. The California State Clearinghouse was provided a synopsis of this Master Plan for coordination with interested state agencies. A copy of the "No comment response is included in Appendix I. \*

35. Local agencies. - The views of several Fresno County agencies were solicited during the preparation of this plan, particularly concerning public health aspects and conformance with the County General Plan. As soon as agreement is reached between the Sierra and Sequoia National Forests and the Sacramento District concerning land interchange, representatives of the Forest Service and the Corps will meet with Fresno County to explain both this Master Plan and the proposed interchange of land (Chapter X). The Council of Fresno County Governments, the areawide clearinghouse, was provided a synopsis of this Master Plan for coordination with interested county agencies. No reply was received. \*

## CHAPTER VII - PHYSICAL PLAN OF DEVELOPMENT

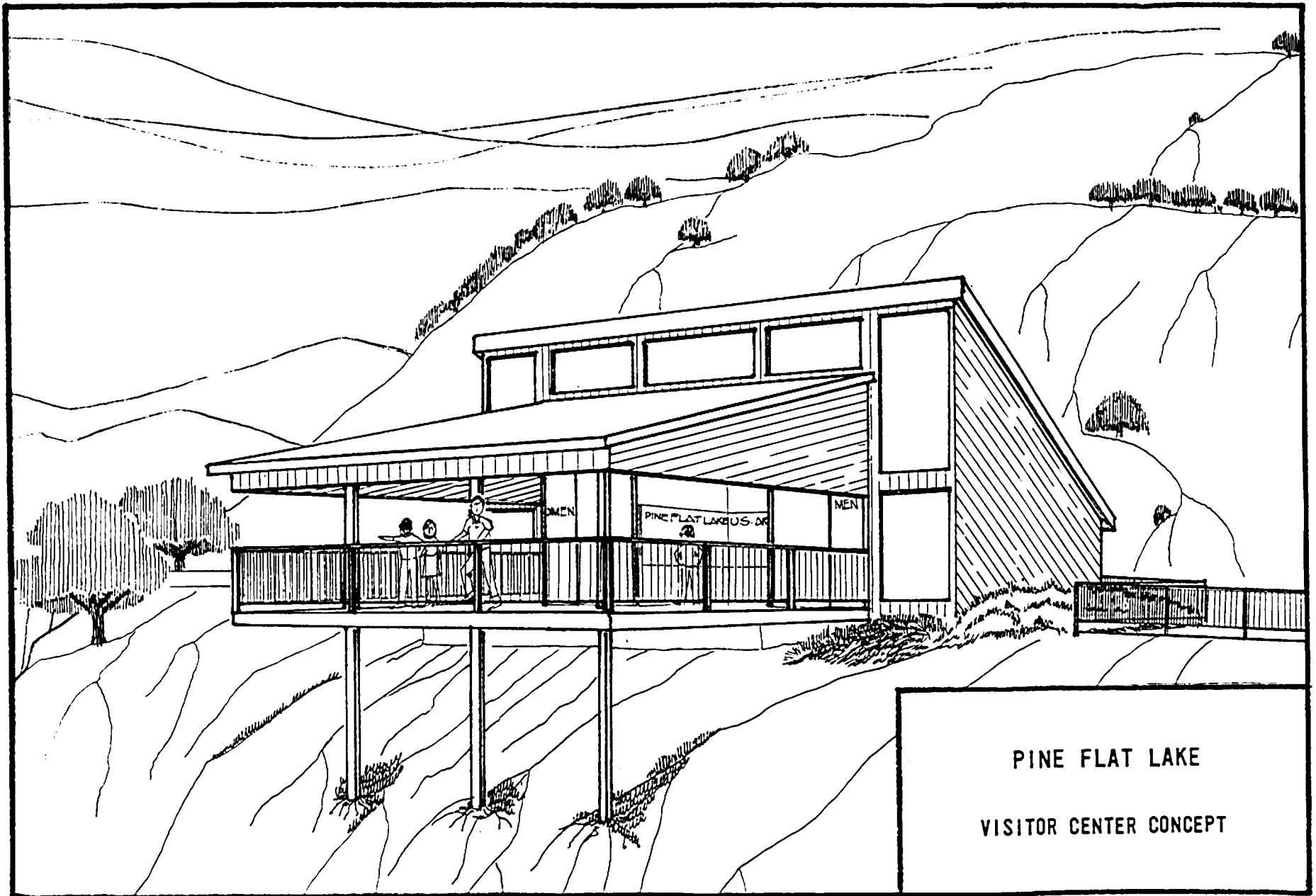
36. Zoning of project lands and waters. - Rights have been obtained by the Corps of Engineers on approximately 13,284 acres for Pine Flat Lake. Of this total about 4,600 acres are owned in fee, about 400 acres are withdrawn from the public domain and about 8,300 acres are withdrawn from the national forests. All of these lands are available for public use except for a small area in the vicinity of the dam restricted from public entry for safety reasons. Narrow arms and bays of the lake are zoned for restricted boating speeds. Project land uses are allocated according to ER 1120-2-400, change 1, paragraph 12a, into the following categories: project operations; operations: recreation-intensive use; operations: recreation-low density use; operations: natural area; and operations: reserve forest land. The categories operations: wildlife management and operations: intensive forest management were considered not applicable for Pine Flat because there are no lands which should be devoted specifically to fish and wildlife areas and because timber present is mainly non-commercial species. No project lands were acquired specifically for recreation or fish and wildlife purposes, however, the 41 acres proposed for acquisition in paragraph 50 would be acquired for recreation purposes and is categorized recreation land. Plates 1 and 2 indicate the zoned areas of project lands and waters. The lands allocated to the operations: reserve forest land category are those project lands proposed for interchange to the Forest Service (see chapter X).

37. Recreation plan of development. - The recreation developments detailed in paragraphs 38 through 48 will be constructed as funds become available. Facilities in the Immediate Phase will be developed either through appropriation of Code 710 funds and possibly supplemented by non-Federal funds, or by operation and maintenance funds. Facilities in the Future Phase are long-range planning, subject to periodic review and possible revisions to meet actual conditions.

### 38. Observation Point.

a. Existing development. - A public observation area exists at the left abutment of the dam. Visitors can walk along the top of the dam and are afforded views of the lake, the Kings River and of releases of water from storage. The observation area contains a paved 54-car parking area on the same level as the top of the dam. Limited bus and car-trailer parking is also available. Drinking water and restroom facilities are available to the public in the control tower of the dam. Guided tours through the dam are arranged upon request.

b. Future development. - This area, with a maximum practical design load of 600 visitors, is proposed to be developed into the major visitor interpretive center for Pine Flat Lake. An overlook and visitor center would be constructed adjacent to the existing parking lot. Chart 7 displays an architect's concept of the visitor interpretive



PINE FLAT LAKE  
VISITOR CENTER CONCEPT

center. The design of the center will be compatible with the interpretive program which is currently being developed. Following approval of this master plan and following development of the interpretive program, a supplement to this plan will be prepared for the visitor center. The overlook building would contain interpretive displays and a 4-fixture flush-type restroom. Landscaping and beautification would be accomplished around the existing parking lot. A water distribution system would be extended from the control tower. Sewage treatment facilities would also be constructed.

39. Pine Flat Recreation Area.

a. Existing development. - This area presently comprises about 85 acres of land and water on the south side of the river immediately downstream of Pine Flat Dam. The area is in a picturesque setting adjacent to the Kings River at the point where the canyon begins to widen and merge into the broad San Joaquin Valley. An excellent view of Pine Flat Dam is provided and recreation use during the warm summer is particularly enhanced by the cooling spray produced by releases from the dam (see photographs 1 and 2). Development of the area has been accomplished jointly with Fresno County, which operates the area under license agreement with the Corps of Engineers (see paragraph 84). Present facilities include a campground and 2 day-use areas (see plate 3). The campground contains 54 camp units, three 6-fixture flush restrooms, a water supply and distribution system, about 0.7 miles of paved circulation road, landscaping and an entrance station. One day-use area, containing 12 picnic units, 0.6 miles of paved circulation road, paved parking for 20 cars, two 2-fixture vault restrooms, portable chemical restrooms, and a water distribution system, extends downstream from the Kings River Bridge between the river and the campground. Upstream of the bridge another day-use area contains 18 family picnic units, a group picnic area, 0.5 miles of paved circulation road, paved parking for 40 cars, one 6-fixture flush restroom, portable chemical restrooms, water distribution system and landscaping. The campground portion of this recreation area won an award of merit for landscape architecture in 1970 in the Distinguished Design Award Program of the Chief of Engineers.

b. Future development. - Maximum practical design load of this area is 2,600 visitors. Acquisition of fee title to approximately 5 acres of project land to which the Corps has a construction easement would permit development of a day-use area on the north bank of the Kings River on the upstream side of the bridge (see plate 3). Twenty picnic units, paved parking for 40 cars, water distribution system, one 6-fixture flush restroom and landscaping would be provided in this area. The County of Fresno has acquired title to approximately 15 acres of construction and spoil easement lands within the project boundary immediately downstream of the Kings River Bridge and plans to develop it into a day use area as part of its Kings River Greenbelt.





Photo 1 - Pine Flat Recreation Area



Photo 2 - Pine Flat Recreation Area

On the south bank of the river, future development in the day use area west of the Kings River Bridge would include 18 additional picnic sites, 0.1 mile of circulation road, 130 paved parking spaces, a 6-fixture flush restroom, a water distribution system and landscaping. In the day use area east of the bridge, a 25 table group picnic area with parking for 25 cars and a 6-fixture flush restroom would be provided. This day use area would also be expanded by 12 additional family picnic units, a 4-fixture flush restroom and parking for 20 cars. Approximately 0.3 mile of circulation road, sewage treatment facilities, and 8 portable restrooms are also required. The overhead electrical service would be placed underground.

#### 40. Deer Creek

a. Existing development. - This area is the most popular boat-launching site on the lake (photograph 3). Facilities include a 3-lane concrete boat launching ramp between gross pool and elevation 760 feet and a 1-lane concrete ramp between elevations 760 feet and 740 feet, 4 stabilized aggregate parking areas at various pool elevations providing parking for 235 cars with boat trailers, and portable chemical restrooms. The Lakeridge Marina with 183 boat mooring slips, boat rentals and fuel and other boating and fishing supplies is operated by a concessionaire adjacent to the Deer Creek ramp. (See plate 4.)



Photo 3 - Deer Creek Recreation Area

b. Future development. - Because of the limited amount of project land and the steepness of the terrain, the maximum practical design load of this area is 1,000 visitors. Additional development of Deer Creek will be limited to expansion of launching facilities. The launch ramp would be widened to consist of 4 lanes between elevation 940 feet and 810 feet and to 3 lanes between elevation 810 feet and 740 feet. Additional portable chemical restrooms and a stabilized aggregate 60 car-trailer parking area would also be provided.

41. Deer Creek Point

a. Existing development. - None

b. Future development. - This area, shown on plate 5, would be developed into a campground with a maximum practical design load of 200 visitors. Access would be by a 0.6 mile 2 lane road from Island Park. \* Development would include 40 campsites, 0.5 mile of circulation road, \* water supply system, two 4-fixture flush restrooms with showers, sewerline force main connection to treatment facilities at Island Park, a 2 mile system of trails and landscaping.

42. Island Park

a. Existing development. - Island Park is a popular boat launching and camping area (photographs 4,5,6, and 7). Facilities include 50 campsites, 0.8 mile of paved access and circulation road, 0.3 mile of unpaved circulation road, a water distribution system, six 4-fixture vault restrooms and a 75-unit primitive camp area below gross pool with portable chemical restrooms. Boat launching features include a single lane between gross pool and elevation 934 feet, 3 lanes between elevation 934 feet and 762 feet, a single lane between elevation 762 feet and 740 feet, 5 stabilized aggregate parking areas at various pool elevations providing parking for 185 cars with boat trailers, and portable chemical restrooms.

b. Immediate phase development. - The existing vault restrooms would be upgraded to flush restrooms with showers and a recreation vehicle dump station would be installed. Treatment facilities would be installed as discussed in paragraph 75 and would be sized to accommodate wastes generated at Deer Creek Point as well.

c. Future development. - Acquisition of approximately 8.5 acres, as shown on plate 6, would permit installation of 30 camp units on that parcel. Ten camp units would also be sited on the small island to the east of the main island. Approximately 0.8 mile of paved circulation \* road is required. Additional improvements in the future development phase include swimming beach, 14 portable change shelters, stabilized aggregate 30 car parking below gross pool near the beach, one 4-fixture and one 6-fixture flush restroom with showers, a recreation vehicle

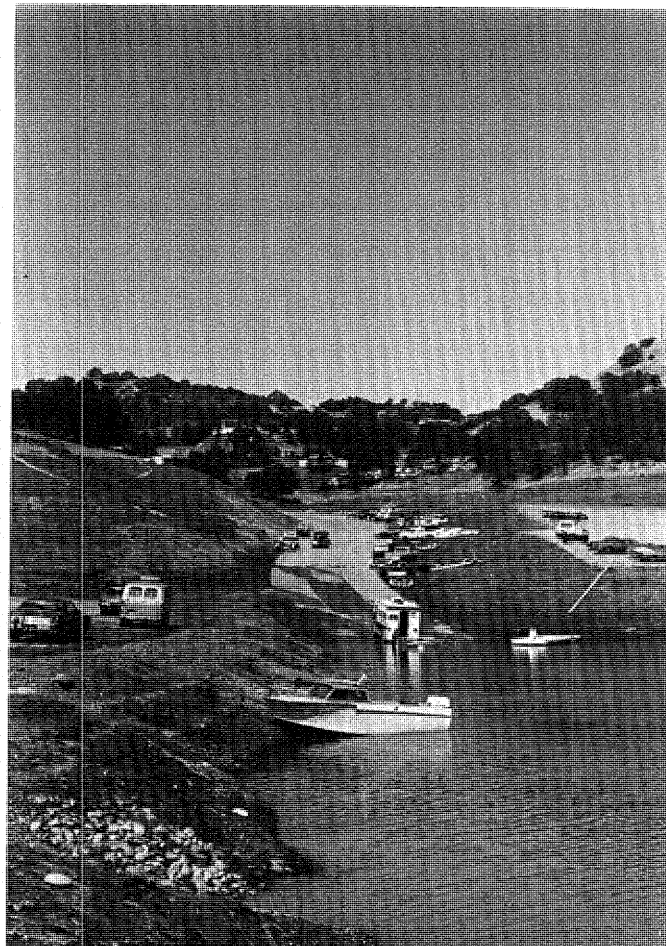


Photo 4 - Island Park Recreation Area

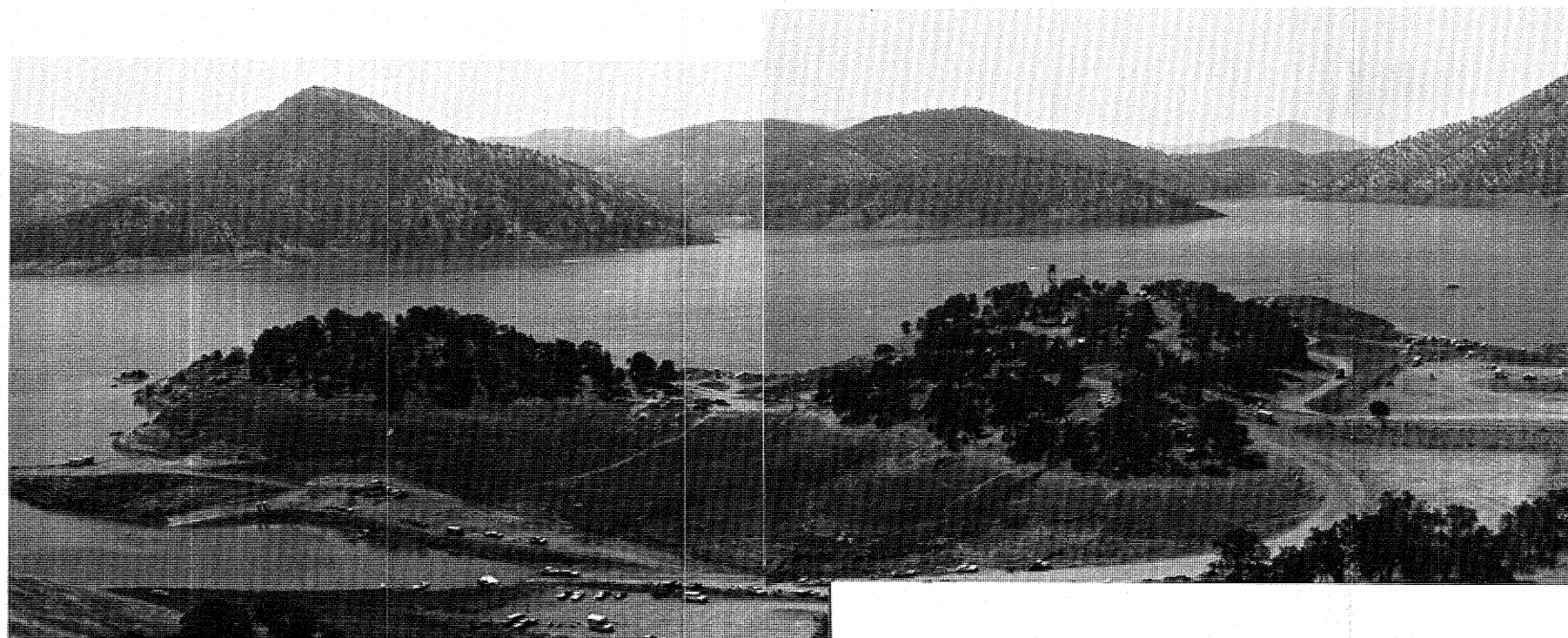


Photo 5 - Island Park Recreation Area



Photo 6 - Island Park Recreation Area



Photo 7 - Island Park Recreation Area

dump station, and 4 portable chemical restrooms. Boat launching facilities would be improved by widening to 4 lanes between elevation 934 feet and 803 feet and widening to 3 lanes between elevation 762 feet and elevation 744 feet. Maximum practical design day load for Island Park is 2,000 visitors.

#### 43. Lakeview

a. Existing development. - This area (photographs 8 and 9) also known locally as Lombardo's, has the largest boat mooring facility on the lake with 242 slips. The marina concessionaire also offers boat rentals, fuel and other boating and fishing supplies. Corps constructed facilities include 0.3 mile of paved access road, a 3 lane launching ramp between gross pool and elevation 862 feet, a 2 lane ramp between elevation 862 feet and 779 feet, 2 stabilized aggregate parking areas at different pool elevations providing parking for 150 cars with boat trailers, and portable chemical restrooms.

b. Future development. - Like Deer Creek, the limited amount of project land and the steepness of the terrain severely limit expansion of public recreation facilities and keeps maximum practical design load to 1,500 visitors. The existing ramp would be widened to 3 lanes below elevation 862 feet and extended to elevation 740 feet. Additional portable restrooms and a stabilized aggregate parking area for 50 cars with boat trailers would be installed.

#### 44. Edison Point

a. Existing facilities. - None

b. Future facilities. - Edison Point would be developed as a hiking area and have a maximum practical design load of 100 visitors. A 7-mile system of trails would be constructed on this rugged peninsula as shown on Plates 7 and 8. A 20-car parking area would also be installed with portable chemical restrooms and 10 picnic sites at the saddle known as Windy Gap.

#### 45. Windy Gap

a. Existing facilities. - Windy Gap is presently utilized as a boat-access camping area. The only facilities are portable chemical restrooms.

b. Future development. - This area would be developed as a camping area as shown on Plate 7. A 50-unit campground and a group \* camping area sized for 50 people would be installed. Approximately 0.5 mile of paved access road, 0.4 mile of paved circulation road, water \* supply and distribution system, three 4-fixture flush restrooms, paved parking for 15 cars, recreation vehicle dump station, sewage treatment facilities, and a fish cleaning station, would also be part of the development. Maximum practical design load would be 200 visitors.



Photo 8 - Lakeview Recreation Area



Photo 9 - Lakeview Recreation Area

46. Trimmer

a. Existing facilities. - Trimmer is a boat launching and camping area (photograph 10). Facilities include 25 camp sites 15 of which are below gross pool, 0.4 mile of paved access and circulation road, 0.4 mile of unpaved circulation road, water supply and distribution system, fish cleaning station, and a 4-fixture vault restroom. A 2-lane concrete boat launching ramp extends from gross pool to elevation 779 feet and is accompanied by a 25 car-trailer stabilized aggregate parking area. A marina concession provides mooring for 124 boats, boat rentals, fuel and other boating and fishing supplies.



Photo 10 - Trimmer Recreation Area

b. Future facilities. - Because of limited project land, this area is completely developed except for installation of two additional 25-car trailer stabilized aggregate parking areas, as shown on Plate 9, for use when lake stages permit. Maximum practical design load would be 600 visitors.



#### 47. Sycamore Creek

a. Existing facilities. - Presently the Sycamore Creek area is administered by the Forest Service (see paragraph 84). The Service has installed 54 camp units, 12 picnic units, a water supply and distribution system and vault restrooms.

b. Immediate phase development. - After completion of the proposed Memorandum of Understanding between the Corps of Engineers and the Forest Service (see paragraph 79), the Corps of Engineers will have the responsibility for operation and maintenance of this area. The existing campgrounds would be expanded and the existing picnic area converted to camping and expanded (see plate 11). The 27 acre parcel of private land shown on plate 10 would be acquired and developed for camping if a non-Federal cost-sharing partner is obtained. A group camping area and a picnic area would also be developed (plates 10 and 11). Maximum practical design load would be 1,000 visitors. A total of 215 family camp units (54 renovated 161 new) in five areas of 80, \* 50, 40, 29 and 16 units; a 2-unit group campground sized to handle one group of up to 50 people or 2 smaller sized groups; and 15 picnic units would be installed. A 2-lane boat launching ramp from gross pool to \* elevation 800 feet, a paved 50-car parking lot, and a stabilized aggregate 50-car parking lot would also be provided. The existing water supply and distribution system would be upgraded and expanded and existing vault restrooms would be converted to flush. A total of one 6-fixture and eleven 4-fixture flush restrooms with showers and six 2-fixture vault restrooms would be installed. Sewage treatment facilities, portable chemical restrooms, 3.5 miles of new paved access and circulation roads, 1.1 miles of renovated existing paved access road, recreation vehicle dump station, fish cleaning station, boarding float, totlot, 2 horseshoe courts, 3.5 miles of hiking trails, and landscaping would also be required. Approximately 3.8 miles of overhead powerline would have to be constructed from Trimmer to extend service to the area. The electrical distribution system within the area would be underground. Although acquisition of the 27 acre parcel and development of an 80 unit campground thereon is identified as needed for the immediate phase, implementation of this portion of the Sycamore Creek development scheme will have to be deferred until cost-sharing is obtained. It is possible, as an alternative to purchase of private lands, that a trade of Federal lands for private lands might be arranged; informal discussions with Forest Service personnel indicates that this agency could provide assistance based on their experience and similar land exchanges.

#### 48. Boat-access areas

a. Existing development. - Presently five boat access areas are scattered along the more remote shoreline of Pine Flat Lake (plate 12). Each area is supplied with portable chemical toilets; some areas are also provided with portable picnic tables. Firebreaks have been provided.

b. Future development. - Five additional boat access sites will be developed resulting in a total of 40 portable picnic tables and 20 portable chemical restrooms at the ten boat access sites. This would increase the maximum practical design load for boat access areas to 400 visitors. These areas would be for day-use only.

#### 49. Fish and wildlife plan of development

a. Existing. - Ongoing fish and wildlife management programs are accomplished with the advice of the Fish and Wildlife Service in cooperation with the California Department of Fish and Game. The Corps operates and maintains the project lands shown on Plate 16 consistent with the overall conservation and management program of the Department of Fish and Game and with the annual hunting and fishing rules and regulations specified by the California Fish and Game Commission. Little beyond regular fish planting is done for fish and wildlife at Pine Flat. However, in the management of the Kings River fishery downstream from the dam, the amount and schedule of releases from the lake are important.

A unique winter fly fishing season (mid-November to the end of April) was established by the California Fish and Game Commission on the Kings River from Piedra Bridge upstream to Pine Flat Dam. Regulations for this special season provide that tackle must be artificial flies with barbless hooks and that all trout must be immediately released. This type of fishing season has been established in several waters of the United States and typifies high-quality sport fishing with maximum maintenance of the fishery resources. In an agreement effected in 1964 between the California Department of Fish and Game and the Kings River Water Association, provision has been made for a minimum release of 25 cubic feet per second for maintenance of fish resources in the downstream channels.

b. Rough fish barrier - Immediate Phase. - Prior to construction of Pine Flat Dam, the Kings River, according to the California Department of Fish and Game, was acclaimed as one of the finest trout fishing streams in California. Since construction of the dam, the trout fishery upstream from the dam has deteriorated due to an increase in the nongame fish population originating from Pine Flat Lake. It was estimated in 1966 that rough fish comprised between 70 and 87 percent of the total fish population in the river above Pine Flat Lake. The most troublesome fish appears to be the Sacramento squawfish. The squawfish migrate upstream from Pine Flat to spawn competing with trout for food and feeding on newly hatched and planted trout. The river above Pine Flat Lake has the potential to be an outstanding wild trout fishery. Construction of a fish barrier upstream of Pine Flat to prevent rough fish migration would enable the establishment of a good trout fishery. By preventing rough fish from spawning upstream, a fish barrier would also cause a decrease in the rough fish population in

Pine Flat Lake. A letter supplement to the 1957 master plan recommending approval for construction of a fish barrier was approved by the Chief of Engineers on 10 December 1975. The letter supplement is attached as Appendix F. It is anticipated that cost-sharing for the project will be provided by the California Department of Fish and Game.

c. Hunting - Immediate Phase. - Hunting is permitted on those lands in the Operations: Reserve Forest category (plate 2). Mule deer quail, dove, pigeon and squirrel are the principal game species found within the area. The lands in the Operations: Reserve Forest category are proposed to be interchanged to the Forest Service as discussed in Chapter X. Following interchange, hunting may be restricted on the remaining narrow band of project land adjacent to the lake if conflicts develop with intensive and non-intensive recreation uses.

d. Fish toxification - Future Phase. - There has been a decline in fishing success in recent years which can be attributed, in part, to a relatively large increase in the competing nongame fish population. Control of nongame fish in the lake is a desirable and necessary part of the management and resource improvement plan. Consequently, the use of fish toxicants or other suitable methods consistent for such control should be carried out when necessary and feasible. Fish toxification is most feasible and least costly when the amount of water to receive treatment is at a minimum. Whenever it becomes known, through streamflow forecasts or other means, that storage will at a low point the California Department of Fish and Game will be notified so that necessary budgeting for this fish management technique may be carried out. Since all fish are usually eliminated in such control operations, the lake would need to be restocked with catchable sized trout and warm water game fishes. Future construction and maintenance will be accomplished so as to avoid unnecessary removal of vegetation along shorelines and periodically submerged areas since this provides useful and needed habitat and food sources for fish.

50. Funding for land acquisition. - Generally, land suited for recreation development and use is in short supply. Three parcels of land have been identified for possible future acquisition (plate 2). These lands are needed to fully develop the recreation potential of the lake and are listed below:

Identi- fication (Plate 2)	Acres	Comment
A	8.5	This land is located west of Island Park and would be accessible across project lands from the Island Park entrance. The land borders the existing project boundary (961-foot elevation contour line) and lies to the north in a small draw which is virtually inaccessible except across project lands. Access to Deer Creek Point would be constructed through this area. The gently sloped terrain and abundant tree cover are adaptable to campground development which would form an integral part of the Island Park development (paragraph 42).
B	27	This parcel is situated along the shoreline adjacent to the Sycamore Creek area. It is directly accessible from Trimmer Springs Road and would be easily developed for camping (paragraph 47).
C	5	This parcel is located north of the Kings River and east of the Kings River bridge. It is within the project boundary but Federal rights are limited to a construction easement. Acquisition in fee would permit installation of additional facilities in an area already heavily utilized for recreation (paragraph 39).

It is possible that construction of the rough fish barrier (paragraph 49b) may also require some additional land depending upon the final design. This has not yet been determined. Authority for acquisition of lands will be requested when assurances for cost-sharing have been received from non-Federal interests to provide at least 50 percent of the development and land costs and all operation and maintenance costs for the facilities to be constructed on these lands.

51. Cost estimates - Immediate Phase Development. - Cost estimates (1 October 1976 price level) of the developments needed for the Immediate Phase proposed in paragraphs 42 and 47 are presented in Chapter XII. Approximately 41 acres of land are proposed for acquisition at a cost of \$120,000. Total recreation development costs, including lands, are estimated at \$6,430,000. The cost of the rough fish barrier presented in paragraph 49b (1 October 1976 price level) is \$675,000.

52. Cost estimates - Future development. - Cost estimates (1 October 1976 price level) of the future developments proposed in paragraphs 38 through 48 are presented in Chapter XII. Total development costs are estimated at \$6,120,000.

## CHAPTER VIII - FACILITY LOAD AND OTHER DESIGN CRITERIA

53. Maximum practical use. - Maximum practical use (MPU) is a planning judgment utilizing current data appropriately modified to account for future conditions in estimating the upper limit of recreation use for which facility development should be planned. Water surface acreage is used as the primary index by which MPU is estimated since the lake is the basic resource for which use will occur and all other resources-lands, developments, etc, are added to support the use of the lake. On the basis of an average recreation pool size of 4,500 acres and the anticipated use patterns that would occur near the end of the project economic life, MPU for Pine Flat Lake is estimated to be about 830,000 recreation days. This value was derived using the following rationale in estimating the number of recreation users on a daily and an annual basis:

a. Between 1956 and 1975 the pool available during the recreation season (mid April to mid September) has averaged 4,500 acres. The average recreation pool is anticipated to continue to be what has been experienced since 1955.

b. About 6 acres of water for each boat on the lake surface is utilized as a planning criterion. Thus, on 4,500 acres there would be 750 boats at one time.

c. During an average weekend day in the peak month of recreation use, it can be expected that a turnover rate of two will occur (i.e., early boaters will go home and late boaters will arrive, and for each boat in active use there will be others on the beach or otherwise not engaged in active use). Thus, there would be a total of 1,500 boats using the lake on an average weekend day during the peak month of recreation use.

d. The average size of boating party at Pine Flat Lake will continue to be about 3.4 during the recreation season. Thus on the basis of 1,500 boats there will be 5,100 boaters.

e. Boating will increase to about 50 percent of all activities at the lake because of limitations on land suitable for recreation development (see paragraph 55). The boating participation already observed is: water skiing at 32 percent, pleasure boating at 6 percent, and fishing at 7 percent. Thus all recreation users at the lake on the average weekend day of the peak month would total 10,200 ( $0.50/5,100 = 1.00/x$ ;  $x = 10,200$ ) which is the design day load (see paragraph 54).

f. There are nine weekend days in the average month. Thus the total use on weekend days of the peak month would be about 91,800 ( $9 \times 10,200 = 91,800$ ).

g. Weekend use has ranged from 49 to 68 percent of total weekly use in the summer and from 63 to 74 percent of total weekly use

yearlong. In the foreseeable future it appears that weekends will continue to be the time when most users will be able to visit areas such as Pine Flat Lake for outdoor recreation. Thus, it is anticipated that the amount of use on weekends will remain at a relatively high 65 percent. At 65 percent, peak month use will account for 141,000 recreation users ( $91,800 \div 0.65 = 141,000$ ).

h. The amount of use that has occurred during July, the peak month of use from 1970 through 1975 is 17.7 percent. Increasing trends in mobility, income, and leisure time, and competition for use of available recreation facilities at Pine Flat Lake should result in a slight decrease in peak month use (i.e., recreation use will become slightly more evenly distributed over the year). Peak month use is estimated at 17 percent in future years. Thus total annual use would be 830,000 ( $141,000 \div 0.17 = 829,000$  or 830,000 rounded).

54. Design day facility planning. - The design day for planning recreation developments is an average weekend day during the peak month of the design year. (Note that this is not the peak weekend day, or holiday, anticipated.) Facilities have been planned to accommodate "design day load," or the expected number of people visiting the project on the design day. As discussed in paragraph 53, the design day load is estimated at 10,200 recreation users. Facilities would be developed to accommodate the many activities in which this number of recreation users are expected to participate (i.e., boat launching ramps for boaters, picnic sites for picnickers, etc.). The estimates for various facilities are discussed in the following paragraphs.

55. Facility design load computations. - Procedures used for estimating values in this paragraph were extracted from "Estimating Recreational Facility Requirements" Volume IV of the Plan Formulation and Evaluation Studies - Recreation. Surveys indicate 20 percent of visitors can be expected to trailer a boat. (Other boat users bring car-top boats, utilize others' boats or utilize marina concession slips, moorings or rentals.) The average number of people per vehicle is about 3.4 and the average number of launchings per boat lane is 40. Therefore,  $(10,200) (0.20) \div (3.4) (40) = 15$  boat lanes will be needed. Boat ramps would provide launching facilities for 600 launches on the design day. Of the total of 1,500 boats utilizing the lake during the Design Day (paragraph 53c) the remaining would originate from rentals (75 boats x turnover of 2 = 150), car-top launching (100 boats x turnover of 2 = 200) and the marinas. The marinas presently have 550 docking and mooring facilities. Currently about 20 percent of visitors camp at the project, consequently,  $(10,200) (0.20) \div 3.4$  or 600 campsites will ultimately be needed. However, lack of sufficient land suitable for campground development near the lake will permit installation of only 462 campsites and three 50-person group camps. This means that only about 16 percent of the visitors on the design day would be able to have facilities to satisfy the desire for camping. According to historical visitation data at Pine Flat, 25 percent of the

visitors will be picnicking, of these, 40 percent desire facilities. The turnover of facilities is estimated at 1.4. Therefore,  $(10,200) (0.25) (40) + (3.4) (1.4) = 214$  or about 215 sites. However, again there is insufficient suitable land near the lake to permit picnic site development. Only 170 picnic sites can be installed which reduces the picnicking participation rate on the design day to about 23 percent. Because of the scarcity of developable terrain along the shoreline proportionately more visitors would be utilizing boats than is now being experienced. However, the lack of shore based facilities will limit total recreation demand at Pine Flat and boating use is not expected to exceed 50 percent. In order to provide a well balanced recreation program for Pine Flat Lake, swimming, sightseeing, shore fishing, hiking, and other recreation facilities are also planned for the project.

56. Siting. - Final site locations for planned camping facilities and structures will be determined in the field to ensure that maximum use is made of natural features for aesthetic and screening purposes. Picnic facilities will also be sited in the field to ensure that the most advantageous views of the lake or other scenic vistas are achieved. All recreation areas will be sited to optimize recreation uses. Recreation uses that depend on or are generally enhanced by the lake will be sited accordingly.

57. Basis of design. - The facilities described in the following paragraphs would provide the ultimate recreation development at Pine Flat Lake. The facilities needed to satisfy the maximum practical annual use of the project (830,000 days) are based on a design load which consists of the number of visitors expected on an average weekend day during the peak use month, estimated at 10,200 (paragraph 53). A distribution of the estimated design load and maximum practical recreation use by areas is contained in Chapter VII - Physical Plan of Development. Layouts and designs of these facilities were prepared in accordance with criteria contained in Engineering Manual 1110-2-400, and Engineering Regulation 1110-2-400. Local and State public health requirements will be adhered to in the design and construction of water supply and sewerage facilities. Particular attention has been given to the design of recreation facilities so as to maximize the multiple-use opportunities of the project. Cost estimates for the work covered by this basis of design are contained in Chapter XII. The basis of design for the proposed facilities is discussed in the paragraphs that follow.

58. Water system. - Design of water supply facilities shall be in accordance with Technical Manuals 5-813-1, 5-813-4, and 5-813-5. It is assumed that wells or springs can be developed in all areas requiring water supply. The sizing for peak flows, storage capacities, and supply and distribution lines will be based on allowances of:

Campers (with flush restrooms)	30 gal/camper/day
Picnickers	10 gal/picnicker/day
Boaters, sightseers, etc.	5 gal/person/day

Also, heavy use of recreation facilities below the dam and at the administration area has dictated a need for installation of an appropriate water filtration system to service those areas. Storage tanks within the project area would be sized to provide a minimum 24-hour supply with reserve capacity to supply water for emergency fire control and for landscape irrigation demands in the area. Field hydrants will be provided at each restroom and a truck-fill stand will be installed at or near the entrance to each recreation area to provide fill points for fire trucks. Hose bibbs would be provided throughout each area on the basis of one for every five camp or picnic sites. In the day-use areas, combination hose bibb/drinking fountains would be provided at regular intervals throughout.

59. Waste collection and treatment systems. - The design of sewerage facilities would be in accordance with Engineer Manual 1110-345-241 and Technical Manual 5-814-3. Sanitation facilities would be provided generally at a rate of one toilet fixture per 20 campers, or one per 75 picnickers at established day use areas, or one per 170 other persons engaged in day use activities. In some cases, additional toilet fixtures (than would normally be installed based on use) are included where restroom plans call for either two, four or six fixtures. The distance from picnic or camp site to restroom buildings was also considered and may have resulted in additional facilities than would normally be installed based on use. Flush-type restrooms would be provided at most recreation areas (see paragraph 75). Treatment plant design would be based on 5 gallons per capita per day per fixture in the day use area and 15 gallons per capita per day per fixture in the campground. The vault restrooms would be pumped out regularly and the sewage material disposed at a commercial offsite facility. Portable chemical restrooms would be placed at the smaller recreation sites and at locations in the larger sites more than 300 feet from other restroom facilities. Pump-out facilities and holding tanks would be constructed at the marinas to accommodate wastes generated aboard watercraft. These tanks and the portable restrooms would also be periodically pumped out and the material disposed at the treatment facilities. Restrooms with waterborne sewage should be sited at least 100 feet from the nearest camp or picnic site with vault and chemical restrooms at least 150 feet. All restrooms should be within 300 feet of the farthest camp or picnic site. A fish cleaning facility would be provided at all boat launching ramps and other areas when fishing use warrants construction of such a facility. A recreation vehicle dump station would be provided at camp areas. Solid wastes are currently collected three times a week during the recreation season and disposed in a sanitary landfill. With the increased use anticipated from implementation of this Master Plan, daily collection may be necessary.

60. Roads. - As needed, two-way access and circulation roads would be constructed with two 10-foot lanes and 4-foot shoulders and one-way access and circulation roads would consist of one 12-foot lane and



2-foot shoulders. Access and circulation roads above gross pool would have a pavement consisting of 1-1/2 inch bituminous surface course and a 6-inch stabilized aggregate base course on a prepared subbase. The shoulders should be oil-treated stabilized aggregate to minimize erosion. Roads below gross pool would consist of a 6-inch stabilized aggregate base course on a prepared subbase. Centerline striping would be provided on all bituminous surfaced two-lane roads. Design and geometrics of the roads would be adequate for the type of vehicular traffic anticipated in the recreation areas. Adequate signs, barriers, and guideposts would be installed throughout each area for traffic control and safety purposes.

61. Parking facilities. - Adequate parking would be provided within each area for the planned design load use of the area. Each campsite would have a parking spur or turnout sized to accommodate a car and camping trailer; selection of spurs or turnouts would depend upon terrain. The flush or vault-type restrooms would be served by a 3- to 5-car capacity paved parking area, depending on terrain. Grouped 3- to 5-car parking spaces would be provided in picnic areas and would be supplemented by mass parking areas. Mass parking areas designated for car-trailer use would be located adjacent to the boat-launching ramps. Mass parking areas for cars would be developed at day-use areas, such as group picnicking and beach areas, and group camping areas. All parking facilities above gross pool would be paved with 1-1/2 inch bituminous surface course on 6 inches of stabilized aggregate. The geometrics of the areas would be in accordance with Engineering Regulation 1130-2-312, and would be properly striped to guide and control traffic. Parking facilities below gross pool would have a 6-inch stabilized aggregate surface. Wooden or concrete wheel stops would be used in parking areas located above gross pool as safety features and to control traffic. In the past, maximum parking below gross pool has not been available due to a random orientation of vehicles in the parking areas. Appropriate parking space marking will be provided to eliminate this problem. This may be accomplished by temporary lime-line marking.

62. Boat-launching ramps. - All ramps would be constructed with a 6-inch thick concrete slab reinforced with wire fabric and using doweled construction joints. Each lane would be 12 feet wide. The surface of the concrete pavement would be serrated transversely to provide a nonskid surface. New ramps will be constructed to slopes of 12 percent $\pm$ . In order to achieve this slope and to obtain maximum coverage of lake water stages, ramps may be constructed in segments. Because of limited suitable boat-launching locations, ramps constructed upstream from Edison Point would be limited to lake stages from gross pool elevation, down to elevation 800 feet. Existing ramps would be extended, water level permitting, to permit use at most stages of the lake. Ramps constructed on fill areas would have a 6-inch concrete curb for safety and riprap protection against wave action.

63. Docks and mooring facilities. - Docks and permanent mooring facilities shall be constructed in a manner conducive to public safety and will be subject to inspection by the District Engineer. Those facilities which are inappropriately constructed will be removed. Normal Corps policy of providing one or two courtesy loading finger docks at each boat-launching ramp will be implemented. The 3 existing marinas presently have 550 docking and mooring facilities and are close to their maximum size considering available parking and safe marina operation. No new marinas are proposed and any expansion of existing marinas will have to be examined on an individual basis.

64. Picnicking facilities. - Picnic sites would be provided with a table and benches of permanent, concrete (or steel) and wood construction, one barbecue grill for every two sites, and one 30-gallon metal trash can for every four sites. Portable shelters would be provided at selected sites as required to supplement the shade provided by natural cover and planted trees. Facilities for group picnicking areas would be essentially the same as above, except that mass parking, masonry barbecues and grouped tables would be provided.

65. Camping facilities. - Each camp site would have a table and benches of permanent, concrete (or steel) and wood construction, barbecue grill and a cleared, leveled tent pad. A 30-gallon metal trash can for each two sites would be provided. In addition, demountable portable shelters (District Standard Design, Drawing File No. 80-25-755) would be provided at selected sites for shade where natural cover and planted trees are insufficient. All sites would have a parking spur or turnout, depending on location and terrain, to accommodate a car with camping trailer. Facilities for group camping would be essentially the same as above, except that mass parking, masonry barbecues and grouped tables would be provided.

66. Swimming beaches. - Beach areas would be cleared and graded to eliminate swimming hazards. Native sand material would be utilized if possible to develop beach areas. Buoy lines with appropriate signs would be provided to mark designated areas and to limit swimming zones to 200 feet from the shoreline. Swim floats would be provided where desired. Combination restroom-change shelters of permanent construction would be provided above gross pool and portable restrooms and change shelters below gross pool. Toilet fixtures would be provided generally at a rate of one per 170 beach users and change shelter stalls at a rate of one per 50 beach users.

67. Electrical distribution. - Commercial electric service for areas not already served would be obtained from the nearest available source. Secondary lines within each area would provide electric service to the restrooms, water treatment building, and pumping equipment. Secondary lines would be placed underground where feasible.

68. Trails. - The Edison Point area would have a 7-mile system and Deer Creek Point would have about 2 miles of hiking trails. Trails

would be 3 feet wide and would be cleared of any brush or obstruction that would hinder travel on foot. Small lookout points at advantageous locations would be cleared to facilitate views and the use of such locations as rest stops. Small wooden foot bridges would be provided where needed.

69. Site improvement and landscaping. - Beautification measures will be provided, in accordance with provisions contained in Engineering Manual 1110-2-38, to complement the natural scenic beauty of the recreation areas and would be accomplished through landscaping and facility design practices. Functional plantings of trees, large shrubs, and groundcover would be provided for shade, screening, and enhancement. Species would be selected to harmonize with nearby native vegetation and existing conditions and to provide for reasonably rapid growth, canopy of shade, drought tolerance, pest resistance, and adaptability to local soil and temperature conditions. A partial list of trees, shrubs, and groundcover considered suitable for planting at Pine Flat Lake is as follows:

<u>Trees</u>	<u>Shrubs</u>	<u>Groundcover</u>
Blue oak	Toyon	Virginia creeper
Valley (white) oak	Japanese privet	Hall's honeysuckle
Digger pine	Ceanothus	Silver lace vine
Aleppo pine	Manzanita	Banksia rose
Black locust	Coffeeberry	Wild grape
Texas umbrella tree	Spanish broom	
Cottonwood		
California sycamore		

Landscape planting procedures will include preparation of planting pits and addition of fertilizers and mulch and replacement of native topsoil to promote establishment and growth of the plants. Subsequent maintenance and care of the plantings will be important in obtaining successful landscape development, and will include adequate watering and pruning where required. The natural beauty of each recreation area would be developed through use of available rocks and boulders as functional and aesthetic dividers and also to control traffic. Other useful and desirable beautification measures appropriate to individual areas and sites would be provided.

70. Visitor safety. - All new buildings would be equipped with ramps and handrails in lieu of steps, wherever possible, to provide safe access for the elderly and handicapped. New restrooms would be provided with special stalls and facilities for the handicapped. Architectural barriers such as curbs and steps would be avoided. Signs and markers on roads within project boundaries would conform with American National Standards Institute Standard D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways. Maximum use would be made of traffic control signs to adequately inform the public of maximum safe speed and road conditions and characteristics. Signs indicating hazards or obstacles would be reflectorized. Service roads, not designed for public access, would be closed by barricades and appropriate warning signs. A caution sign would be installed on the road between 300 and

500 feet of launching areas and a standard boat launching sign installed within 50 to 125 feet on the ramp side of the caution sign indicating the distance to the ramp. All safety and public health measures would conform to paragraph 13 of Engineer Manual 1110-2-400, Appendix A.

OCE standard drawing FE-6 would be used for construction of fencing around certain structures which might be public safety hazards or possibly prone to vandalism. A fence of less costly design would be constructed wherever required for control of livestock or for other purposes along the perimeter of a recreation area. Firebreaks would be provided along the perimeter of the recreation areas whenever natural barriers or roads do not serve the same purpose. Firebreaks consist of at least a 10-foot-wide fire reduction zone cleared of combustible vegetation, including the trimming of tree limbs up to 10 feet above the ground. Where feasible, within this zone, a 12-foot-wide unpaved road would be graded to accommodate a fire truck. Locations of fencing and firebreaks would be compatible with the project fire plan as developed cooperatively between the Corps of Engineers, Forest Service, and the California Division of Forestry.

71. Signs. - All project signs will be of uniform construction and will be either explanatory (word-type) or graphic (picture-type) utilizing the standard pictorial representations established in accordance with the standard International Symbols (Chart 8). Construction of larger signs displaying words primarily will be of wood with routed lettering.

72. Small boat navigation aids. - Floating buoy lines and markers are provided to identify restricted water areas near the swimming beaches and at the dam intake structure and control tower. Floating buoys and markers will be provided in accordance with State standard marking system to identify controlled speed areas and to delineate zones of possible danger. These zones are delineated on Plate 1.

73. Playground facilities. - Playground facilities for children may be constructed in recreation areas if demand warrants. Timber or wood-frame facilities would be utilized to harmonize with the natural setting as much as possible. Included would be swings, horizontal ladders, slides, and other appropriate play apparatus, all located within a sand area contained by a timber retaining curb and sited in the shade as much as possible.

# INTERNATIONAL PARK AND RECREATION SYMBOLS

## GENERAL

Firearms*	RS-001								
Smoking*	RS-002								
Automobiles*	RS-003							RS-039 Picnic Shelter	
								RS-040 Trailer Sites*	
								RS-041 Trailer Sanitary Station	
Trucks*	RS-004							RS-042 Campfires*	
Tunnel	RS-005							RS-043 Trail Shelter	
Lookout Tower	RS-006							RS-044 Picnic Area*	
								RS-045 Kennel	
Lighthouse	RS-007							WINTER RECREATION	
Falling Rocks	RS-008							RS-077 Winter Recreation Area	
Dam	RS-009							RS-046 Cross Country Skiing	
Fish Hatchery	RS-010							RS-047 Downhill Skiing*	
Deer Viewing Area	RS-011							RS-048 Ski Jumping	
Bear Viewing Area	RS-012							RS-049 Sledding*	
Drinking Water*	RS-013							RS-050 Ice Skating*	
Information	RS-014							RS-051 Ski Bobbing*	
Ranger Station	RS-015							RS-052 Snowmobiling*	
								WATER RECREATION	
Pedestrian Crossing*	RS-016							RS-053 Marina	
Pets on Leash*	RS-017							RS-054 Launching Ramp*	
Environmental Study Area	RS-076							RS-055 Motor Boating*	
ACCOMMODATIONS OR SERVICE									
Lodging	RS-018							RS-056 Sailboating*	
Food Service	RS-019							RS-057 Row Boating*	
Grocery Store	RS-020							RS-058 Water Skiing*	
Men's Restroom	RS-021							RS-059 Surfing*	
Restrooms	RS-022							RS-060 Scuba Diving*	
Women's Restroom	RS-023							RS-061 Swimming*	
First Aid	RS-024							RS-062 Diving*	
Telephone	RS-025							RS-063 Fishing*	
Post Office	RS-026							LAND RECREATION	
								RS-064 Horse Trail*	
Mechanic	RS-027							RS-065 Trail Bike Trail*	
Handicapped	RS-028							RS-066 Bicycle Trail*	
Airport	RS-029							RS-067 Recreation Vehicle Trail*	
Lockers	RS-030							RS-068 Hiking Trail	
Bus Stop	RS-031							RS-069 Playground	
Gas Station	RS-032							RS-070 Amphitheater	
Vehicle Ferry	RS-033							RS-071 Tramway	
Parking*	RS-034							RS-072 Hunting*	
Showers	RS-035							RS-073 Stable	
Viewing Area	RS-036							RS-074 Interpretive Trail	
Sleeping Shelter	RS-037							RS-075 Interpretive Auto Road	
Campground*	RS-038							Prohibiting Slash	

\*Symbol available with red slash mark to indicate activity is prohibited

Obtained from "The Park Practice Program" publication dated July 1973, contributed by National Park Service, U.S. Department of the Interior.

## CHAPTER IX - SPECIAL PROBLEMS

74. General. - Special problem areas at Pine Flat are: lack of available land to satisfy all recreation needs; large non-game or trash fish population in the lake which interferes with game fish; divided land management responsibilities between two Federal agencies; inadequate sewage treatment and disposal; lack of parking at high lake levels; and quality of adjacent private development. The lack of available land is discussed in paragraph 55. A solution to the trash fish problem is described in paragraph 49 and appendix F. A proposal to clarify land management responsibility is contained in Chapter X and Appendix G. The remaining special problems are discussed in the following paragraphs.

75. Sewage treatment and disposal. - Vault-type restrooms that require frequent pumping are presently utilized around the lake principally due to geologic and topographic constraints. Flush-type facilities that are more economical to operate than those that have to be pumped out regularly require some means for the disposal of effluent. Normally this is accomplished by either the utilization of leaching fields or evaporation ponds. At Pine Flat Lake, soil horizons are either shallow or absent entirely and the underlying igneous and metamorphic bedrock is relatively impermeable. These factors preclude the use of land application or leaching field effluent disposal systems. Although the bedrock in some areas is sufficiently fractured to permit the use of a leaching field, this method of disposal could alter lake water quality since the gradient to the lake is generally quite steep and would permit gravity flow along fractures into the lake. This problem is compounded by the proximity of the water at gross pool elevations to the recreation areas.

Various means of treatment of the wastewater generated at Pine Flat were investigated. Incinerator toilets, with their limited capacity and impractical operating characteristics, were eliminated from further consideration. Conventional package plants of the extended aeration, activated sludge type, are difficult to operate and maintain and would have low treatment efficiencies under the severe "peaks and lows," and periods of "no usage" under which they would be operating. A physical-chemical plant would more efficiently treat the wastewater as more positive control can be maintained in this type plant, however, it requires experienced operation and maintenance personnel and almost constant inspection. It is also costly to construct, operate and maintain. Septic tank treatment and leach field disposal are not acceptable because studies conducted by the State Department of Public Health revealed a very high percentage of failure in this method of disposal because of design and operation deficiencies. Shallow and poor soil conditions along with relatively impervious sub-soils, steep site topography and the close proximity to the lake make use of this treatment and disposal method infeasible.

Natural, biologic treatment in open ponds was also investigated and appeared to be most adaptable to the existing conditions at Pine Flat.

This method of treatment, utilizing the action of sunlight, produces an effluent of secondary treatment characteristics and requires minimal operation and maintenance. The use of either raw sewage ponds, or evaporative oxidation ponds was considered. Raw sewage ponds accept direct wastewater discharge; evaporative oxidation ponds receive the effluent from a primary treatment facility, usually a septic tank. The raw sewage ponds digest solids whereas the septic tanks of the evaporative oxidation pond system receive a buildup of sludge which must periodically be collected and disposed. For ease in maintenance and because of odor problems connected with raw sewage ponds, evaporative oxidation ponds are being considered for major use areas. The disadvantages of the use of ponds at Pine Flat are the topographic and surface conditions and the requirement for additional land acquisition on which to locate the ponds. On the other hand, the ability of ponds to accept widely varying flows and their evaporative disposal characteristic are definite advantages of this treatment method.

The method of sewage treatment and disposal appearing most feasible for Pine Flat Lake is evaporative oxidation ponds in connection with low flow sanitation facilities at major use areas which would attain a balance between inflow and evaporation and still meet the operating standards for such a treatment facility. The design of the ponds would incorporate features such as compartments, extra storage, etc., which would preclude the need for liquid disposal other than by evaporation, however, the solids will need to be occasionally pumped from the septic tanks. Additional land acquisition may be necessary to facilitate siting of the sewerage facilities.

76. Parking at high lake levels. - At all of the existing boat launching areas at Pine Flat Lake there is a combination of steep terrain and minimal project land which results in a shortage of parking at higher lake levels. Parking control is a major administration problem at the lake with no practical solution available because of private developments on adjacent lands in the areas of greatest need.

77. Adjacent private development. - Extensive private development has occurred adjacent to the Deer Creek, Island Park and Lakeview areas. Some of this development consists of unkempt additions to travel trailers, tent platforms and various structures of questionable function (photo 11). These structures visually detract from the recreation experience. Fresno County is responsible for enforcing building and safety codes to improve the appearance and structural quality of these facilities in the public interest.



Photo 11 - Private recreation development  
adjacent to Government land at Island Park  
Recreation Area



## CHAPTER X - PROJECT LAND MANAGEMENT

78. Existing land management responsibilities. - Approximately 8,300 acres of the 13,284 acres within the project boundary are withdrawn from the Sierra and Sequoia National Forests. The withdrawn land, shown on plate 17, is intermingled with lands acquired by the Corps which has complicated effective land management within the project boundary. Distinction between which agency is responsible for developing recreation areas, enforcing Federal statutes, administering leases, licenses and permits, and disposing of real estate is complex. The lands withdrawn from the National Forests for project purposes remain in the National Forest System and land management authority is the responsibility of the Forest Service. However, the Corps has administrative authority over the lake surface and over Corps-acquired lands which are often intermingled with lands withdrawn from the National Forests. The boundary between Corps acquired and withdrawn Forest Service land has been defined only on maps and plates and not on the ground.

79. Proposed land management responsibilities. - In 1964 the Secretary of the Army and the Secretary of Agriculture entered into a Memorandum of Agreement concerning the management of land and water resources on water development projects of the Corps located within or partly within the National Forest System (see ER 1120-2-400 Appendix A). Pursuant to this Memorandum, the District Engineer and the Sierra and Sequoia Forest Supervisors have agreed upon a supplemental Memorandum of Understanding which is attached as Appendix G. The supplemental Memorandum of Understanding details the land management responsibilities of the Corps and the Forest Service and proposes, pursuant to Public Law 84-804, an interchange of lands as shown on plate 18. In addition to the interchange, the Memorandum specifies that the Corps will be responsible for management of recreation within the project boundary shown on plate 18 (this includes the Sycamore 1 and 2 Campgrounds and the Lakeview Picnic Area of the Sierra National Forest) and the Forest Service will be responsible for managing the forage resource on those project lands within the National Forest Boundary not used for intensive recreation purposes. The Memorandum specifies that after the interchange is effected, all the lands within the existing project boundary (plate 17) would still remain withdrawn from mineral entry.

## CHAPTER XI - PROJECT RESOURCE MANAGEMENT

80. Operational concepts and policies. - The objective of resource management activity at Pine Flat Lake is to assure continued public enjoyment and maximum sustained use of the lands, waters, forests and recreation resources consistent with their carrying capacity and their aesthetic and biological values. Major operational policies include: protection of visitors and employees; protection of project resources; prevention of visual and physical encroachments; preservation and enhancement of aesthetic integrity; prevention or elimination of unauthorized structures and habitation; assurance of compatibility between uses; improvement of the environment by landscape treatment; assurance that management practices and recreation development are consistent with public demand; and control of adjacent private developments which may have detrimental effects upon project lands and waters through encouragement of local zoning. All resources will be considered in management decisions so that optimum public benefits may be obtained. Specific operational concepts and policies are detailed in appendixes A through E. Appendix A, "Project Resource Management Plan" was prepared in August 1972 and approved by the Division Engineer. This appendix details public use facilities, project operation and maintenance facilities, staffing, operation and maintenance procedures and law enforcement. Appendix B, "Forest Management Plan" was prepared in November 1975 and approved by the Division Engineer. No specific forest management program is proposed. Appendix C, "Fire Protection Plan" was prepared in November 1973 and approved by the Division Engineer. This appendix details fire suppression training procedures, location and availability of tools and equipment, and fire prevention activities. Appendix D, "Fish and Wildlife Management Plan" was prepared in December 1975 and approved by the Division Engineer. This appendix details policies and specific long and short range management programs for fish and wildlife. Appendix E, "Project Safety Plan" was prepared in March 1973 and approved by the Division Engineer. This appendix sets forth policy, assigns responsibilities, and prescribes administrative procedures for an accident prevention program for the public and for project personnel.

81. Management of land use zones. - Paragraph 36 and plate 2 delineate land use zones for Pine Flat Lake. Specific management objectives for these zones are as follows:

a. Project operations. - These lands are occupied by or are immediately adjacent to the dam or the maintenance yard. These lands are restricted from public use, except in the case of the dam overlook, to insure safe and efficient operation of the project. Grazing is not permitted.

b. Operations: Recreation - Intensive Use. - These lands were withdrawn or acquired for project operation or are recommended for acquisition for project operations purposes and are allocated for use as

developed public areas for intensive recreation activities. Fences are to be constructed around these areas to exclude cattle, where required. A firebreak, at least 10-feet-wide, will be cleared around each recreation area. All grass, weeds and brush will be removed from the firebreak, all trees pruned of dead branches to a height of 10 feet, and all forest litter and duff will be removed and mineral soil exposed. This system of firebreaks serves as a prevention measure by separating fire sources from fuels and must be maintained annually, preferably in late spring, to retain its effectiveness. Roads and trails may be incorporated into this fuel break to minimize the total land area disturbed.

c. Operations: Recreation - Low Density Use. - These lands were withdrawn or acquired for project operations and are allocated for low density recreation activities. These lands are required for extensive recreation uses (as opposed to intensive recreation uses at the developed sites), for maintenance of resources associated with the lake margin needed for public enjoyment of the lake area, and as open space between intensive recreation developments or between the lake area and adjacent private land to safeguard against incompatible uses which would detract from the quality of the public's recreation enjoyment. Grazing will be permitted.

d. Operations: Natural Area. - These lands were withdrawn or acquired for project operations and are allocated for preservation of ecological and visual values. Limited development is contemplated. Grazing is not permitted except on an interim basis as discussed in paragraph 82.

e. Operations: Reserve Forest Land. - These lands were withdrawn or acquired for project operations and are allocated for vegetation control to support management objectives not compatible with sustained yield based on established harvest rotation. Timber will be harvested only when required to achieve other management objectives. Forest improvement measures may be employed such as tree planting or vegetative manipulation for erosion control or wildlife management. These lands are continuously available for low density recreation and for grazing.

82. Management of the forage resource. - A substantial portion of project lands, primarily those withdrawn from the National Forests, are utilized for cattle grazing. The Corps administers two grazing leases of 35 and 105 acres while the Forest Service has grazing allotments on all withdrawn land above gross pool elevation. Following approval of this Master Plan, the Corps grazing lease within the Forest Boundary will be included in the Forest Service's grazing allotments and will be administered by the Forest Service and receipts credited to the National Forest System. Management of the grazing lease outside the Forest Boundary will remain the responsibility of the Corps. Grazing of the forage resource will be permitted on all the project land shown on plate 18 except the intensive use recreation areas and the Edison Point

Natural Area at the time these areas are fenced to exclude cattle. Grazing is also excluded from those lands zoned for Project Operation on plate 2.

83. Management of the mineral resource. - The withdrawal orders (Public Land Order 586, 1072 and 1198) issued by the Bureau of Land Management on the Forest Service land shown on plate 17 included withdrawal of these lands from mineral and mining entry. Mining is also not permitted on Corps acquired land. Mining on lands interchanged to the Forest Service, as described in Chapter X, would be inconsistent with the operational concepts and policies described in paragraph 80. Therefore mining and mineral entry exclusion would be continued on the new land order for the interchanged lands even though the original withdrawal order would be revoked for these lands.

84. Management of the recreation resource. -

a. Federal. - Upon approval of this Master Plan, and completion of the agreement between the District Engineer and the Forest Service, the Sacramento District will have the responsibility for managing the recreation resource on lands within the project boundary shown on plate 18, including the Forest Service's Sycamore 1 and 2 Campgrounds and Lake view Picnic Area. Administrative responsibility for the recreation resource on those lands on plate 18 designated for interchange to the Forest Service, including the Kirch Flat Campground, will be assigned to the Forest Service. User fees are presently charged at Island Park Campground and will be charged at the Sycamore Creek, Deer Creek Point, and Windy Gap campgrounds upon their development. The current fee schedule for campground use is \$2.00 per night per site with a maximum of two vehicles and eight people per site. Future fee schedules may be adjusted within the framework established by ER 1130-2-404.

b. Non-Federal. - Fresno County is authorized by a Corps license to administer and maintain the downstream Pine Flat Recreation Area. Fresno County charges entrance or user fees and controls concession arrangements, subject to the approval of the District Engineer. All monies obtained are used by the County for the administration, maintenance, and development of the recreation area. Fresno County also provides supervision and administration of public safety and law enforcement at the lake and, in cooperation with the Corps, provides necessary marking of water hazards.

85. Management of the cultural resource. - Pursuant to Executive Order 11593 a cultural resources survey will be made for the project area shown on plate 18 to inventory any historic and archeologic resources and to develop a program of preservation, restoration and maintenance for any cultural resources identified.

## CHAPTER XII - COST ESTIMATES

86. Recreation developments. - Cost estimates for facilities described in Chapter VII - Physical Plan of Development, are included in this Master Plan. Table II consists of a summary of the two development phases. Table III presents the detailed cost estimates for lands and facilities required for the Immediate Phase. Table IV consists of detailed cost estimates for facilities needed to satisfy future recreation demand.

87. Basis of cost estimate. - The cost estimate is based on 1 October 1976 price levels. Unit prices used for water supply systems, sewage facilities, boat-launching ramps, and parking facilities were derived by applying current unit prices to a quantity breakdown. Unit prices for other items were determined by the adjustment of average bid prices received for similar work at nearby areas or a plant, labor, and material breakdown. Due to a lack of detailed studies and limited field surveys and investigations, a contingency allowance of 25 percent was included in the estimate. The possibility of encountering more rock excavation than currently assumed could increase costs materially. Suitable allowances are included for engineering and design, and supervision and administration based on costs experienced on similar work in the Sacramento District.

88. Annual operation, maintenance and replacement costs. - Operation and maintenance of existing recreation facilities will be the responsibility of project personnel. Costs for equipment, personnel, maintenance and repairs for FY 1976 are estimated to be about \$200,000.

PINE FLAT LAKE MASTER PLAN

TABLE 2

COST ESTIMATE - SUMMARY  
(1 October 1976)

Cost Account No.	Item	Estimated total cost	
		Immediate Phase	Future Phase
01	LANDS AND DAMAGES (2 April 1976)	\$ 120,000	
14	RECREATION FACILITIES		
	Observation Area		\$ 180,000
	Pine Flat		815,000
	Deer Creek		815,000
	Deer Creek Point		750,000
	Island Park	590,000	1,120,000
	Lakeview		400,000
	Edison Point		44,000
	Windy Gap		882,000
	Trimmer		69,000
	Sycamore Creek	4,670,000	
	Boat Access		25,000
	Subtotal	\$ 5,260,000	\$ 5,100,000
30	ENGINEERING AND DESIGN	630,000	610,000
31	SUPERVISION AND ADMINISTRATION	420,000	410,000
	TOTAL COST RECREATION DEVELOPMENT	\$ 6,430,000	\$ 6,120,000
	TOTAL OF BOTH PHASES		\$12,550,000

PINE FLAT LAKE MASTER PLAN

TABLE 3

DETAILED COST ESTIMATE - IMMEDIATE PHASE  
(1 October 1976)

Cost :	Item :	Quantity :	Unit :	Unit Price :	Amount :
Account No. :	Item :	Quantity :	Unit :	Price :	Amount :
01	LANDS AND DAMAGES (2 April 1976)	41	Ac	Varies	\$ 120,000
14	RECREATION FACILITIES				
	Island Park				
	Water Facilities				
	Distribution System 2-1/2"	2,000	LF	\$ 7.00	14,000
	Sanitary Facilities				
	Convert Vault Restroom to 4-fixture flush w/ showers (485 SF)	6	Ea	40,000	240,000
	Sewer lines & force mains 6" - 4"	1	Job	LS	55,500
	Septic tank 1500G	6	Ea	4,500	27,000
	Oxidation Pond (0.3 Ac <sup>±</sup> )	1	Ea	30,000	30,000
	Collector tank, lift station, pumps, vehicle dump station, & misc.	1	Job	LS	65,500
	Electrical - transformer & U.G. Service	1	Job	LS	28,900
	Landscaping	1	Job	LS	13,100
	Subtotal				\$ 474,000
	Contingencies - 25% <sup>±</sup>				116,000
	Subtotal Island Park				\$ 590,000
	Sycamore Creek				
	Roads and parking				
	Road - 1 lane paved circulation (renovate)	0.6	Mi	68,000	40,800
	Road - 2 lane paved circulation (renovate)	0.5	Mi	140,000	70,000
	Road - 1 lane paved circulation (10,500 CY <sup>±</sup> exc/Mi.)	2.4	Mi	137,000	328,800

Cost :	:	:	:	Unit :	:
Account:	Item	Quantity :	Unit :	Price :	Amount
No. :	:	:	:	:	:

Sycamore Creek (Cont'd)

Road - 2 lane paved circulation (32,000 CY $\pm$ exc/Mi.)	1.1	Mi	280,000	308,000
Service roads - to water & oxidation ponds, 7 ea 500' (gravel single lane)	1	Job	LS	84,000
Parking - paved	7,700	SY	11.00	84,700
Parking - gravel	5,650	SY	8.00	45,200
Parking spurs & turnouts (renovate)	54	Ea	1,000	54,000
Parking spurs & turnouts	161	Ea	2,000	322,000
<b>Water Facilities</b>				
Drill wells	3	Ea	8,500	25,500
Water Treatment Facilities	5	Ea	75,000	375,000
Distribution systems (6 ea)	1	Job	LS	70,000
Water lines 18,400' (1" to 4")	1	Job	LS	78,650
Storage tanks w/ chlorinator	5	Ea	15,000	75,000
Water facilities - other work	1	Job	LS	75,850
<b>Sanitary Facilities</b>				
Restroom - 6 fixture flush with showers (560 SF)	1	Ea	50,000	50,000
Restroom - 4 fixture flush with showers (485 SF)	11	Ea	40,000	440,000
Restroom - 2 fixture vault (63 SF) convert to flush	6	Ea	7,500	45,000
Portable restroom	6	Ea	500	3,000
Sewer line and force main 6" - 4"	1	Job	LS	84,750
Septic tank 1500G	13	Ea	4,500	58,500
Septic tank 3000G	1	Ea	6,500	6,500
Oxidation Pond	2	Ea	30,000	60,000
Collector tank, lift station, Pumps and other work	1	Job	LS	87,250
<b>Electrical Facilities</b>				
Electrical - O.H. 12KV line	20,000	LF	6	120,000
Electrical - U.G. secondary	7,000	LF	5	35,000
Electrical - other work	1	Job	LS	32,000
Camp unit - with shelter	32	Ea	1,050	33,600
Camp unit	129	Ea	650	83,850
Group camp unit	2	Ea	12,000	24,000
Picnic unit	15	Ea	740	11,100
Boat ramp	3,200	SY	100	320,000
Boarding Float	1	Ea	4,000	4,000
Totlot	1	Ea	10,000	10,000
Horseshoe Court	2	Ea	1,500	3,000
Hiking Trail	3.5	Mi	2,500	8,750



Cost :	:	:	:	Unit :	:
Account:	Item	Quantity :	Unit :	Price :	Amount
No. :	:	:	:	:	:
Sycamore Creek (Cont'd)					
	Fire protection trail	0.2	Mi	5,000	1,000
	Trailer dump station	1	Ea	3,000	3,000
	Fish cleaning station	1	Ea	3,000	3,000
	Signs and barriers	1	Job	LS	\$ 55,000
	Landscaping	1	Job	LS	<u>113,000</u>
	Subtotal				3,732,800
	Contingencies - 25%+				<u>937,200</u>
	Subtotal Sycamore Creek				\$4,670,000
	TOTAL RECREATION FACILITIES				5,260,000
30	ENGINEERING AND DESIGN				630,000
21	SUPERVISION AND ADMINISTRATION				<u>420,000</u>
	TOTAL COST IMMEDIATE PHASE RECREATION DEVELOPMENT				\$6,310,000

PINE FLAT LAKE MASTER PLAN

TABLE 4

DETAILED COST ESTIMATE - FUTURE PHASE  
(1 October 1976)

Cost :	:	:	:	Unit :	:
Account:	Item	Quantity	Unit	Price	Amount
No. :	:	:	:	:	:
14 RECREATION FACILITIES					
Observation Area					
Water Facilities					
	Distribution system (1" & 2")	1	Job	LS	700
Sanitary Facilities					
	Sewer lines and force mains (6" - 4")	1	Job	LS	6,250
	Septic tank (1,500G)	3	Ea	1,500	4,500
	Oxidation pond (0.5 Ac)	1	Ea	36,000	36,000
*	Sewage - other work (incl. sump pumps)	1	Job	LS	11,250 *
Electrical Facilities					
	Electrical - secondary cable	1,200	LF	7	8,400
	Electrical - other work	1	Job	LS	1,600
Overlook and interpretive center w/4-fixture restroom (1,200 SF)					
		1	Job	LS	60,000
	Audio - visual displays	1	Job	LS	5,000
	Landscaping	1	Job	LS	4,000
	Subtotal				\$ 137,700
	Contingencies - 25%+				<u>42,300</u>
	Subtotal Observation Point				\$ 180,000
Pine Flat					
Roads & Parking					
	Road, 1 lane paved circulation	0.4	M1	137,000	54,800
	Parking, paved	8,770	SY	11.00	96,470
Water Facilities					
	Distribution System	1	Job	LS	60,000
Sanitary Facilities					
	Restroom, 6-fixture flush (560 SF)	3	Ea	50,000	150,000
	Restroom, 4-fixture flush (485 SF)	1	Ea	40,000	40,000
	Portable restroom	16	Ea	500	8,000

Cost :	Item :	Quantity :	Unit :	Unit Price :	Amount :
Account:					
No. :					

Pine Flat (Cont'd)

Sewer line and force mains (6" - 4")	1	Job	LS	41,000
Septic tank (1500G)	1	Ea	4,500	4,500
Septic tank (3000G)	3	Ea	6,500	19,500
Oxidation pond (0.3 Ac)	1	Ea	30,000	30,000
* Sewage - other work (incl. sump pumps)	1	Job	LS	27,000 *
<b>Electrical Facilities</b>				
Electrical - Remove O/head	1,800	LF	4.00	7,200
Electrical - U.G. Secondary	3,200	LF	5.00	16,000
Electrical - Secondary RSC	400	LF	7.00	2,800
Electrical - other work	1	Job	LS	10,000
Picnic Unit	50	Ea	740	37,000
Group picnic areas (25 units)	1	Job	LS	17,100
Signs and barriers	1	Job	LS	11,700
Landscaping	1	Job	LS	<u>17,530</u>

Subtotal \$ 650,600

Contingencies - 25%+ 164,400

Subtotal Pine Flat \$ 815,000

Deer Creek

Roads & parking				
Parking, gravel	6,600	SY	8.00	52,800
Sanitary Facilities				
Portable restroom	2	Ea	500	1,000
Boat ramp	8,400	SY	68	571,200
Landscaping	1	Job	LS	<u>26,200</u>

Subtotal \$ 651,200

Contingencies 25%+ 163,800

Subtotal Deer Creek \$ 815,000

Deer Creek Point

Roads & parking				
Road, 2 lane paved access	0.4	Mi	280,000	112,000
Road, 2 lane gravel access	0.2	Mi	128,000	25,600
Road, 1 lane paved circulation	0.5	Mi	137,000	68,500
Parking, paved	186	SY	11.00	2,046
Parking spurs & turnouts paved	40	Ea	2,000	80,000

Cost :	:	:	Unit :	:
Account:	Item	Quantity :	Unit :	Price :
No. :	:	:	:	Amount

Deer Creek Point (Cont'd)

Water Facilities				
	Distribution system	1	Job	LS 64,000
Sanitary Facilities				
	Restroom, 4-fixture flush with showers (485 SF)	2	Ea	40,000 80,000
	Sewer line and force main (6" - 4")	1	Job	LS 45,000
	Septic tank (3000G)	1	Ea	6,500 6,500
*	Sewage - other work (incl. sump pumps)	1	Job	LS 9,500 *
Electrical Facilities				
	Electrical U.G. Primary 12KV	4,500	LF	8.00 36,000
	Electrical U.G. Secondary	750	LF	5.00 3,750
	Electrical - other work	1	Job	LS 3,150
	Camp unit with shelter	8	Ea	1,050 8,400
	Camp unit	32	Ea	650 20,800
	Hiking trail	2.0	Ml	2,500 5,000
	Fire protection trail	0.7	Ml	5,000 3,500
	Signs and barriers	1	Job	LS 9,300
	Landscaping	1	Job	LS 17,500
	Subtotal			\$ 600,546
	Contingencies - 25%+			<u>149,454</u>
	Subtotal Deer Creek Point			\$ 750,000

Island Park

Roads & parking				
	Road, 2 lane paved circulation	0.3	Ml	280,000 84,000
	Road, 1 lane paved circulation	0.5	Ml	137,000 68,500
	Parking spurs and turnouts	40	Ea	2,000 80,000
	Parking, paved	186	SY	11.00 2,046
	Parking, gravel	1,500	SY	8.00 12,000
Water Facilities				
	Distribution system	1	Job	LS 86,000
Sanitary Facilities				
	Restroom 6-fixture flush with showers (560 SF)	1	Ea	50,000 50,000
	Restroom 4-fixture flush with showers (485 SF)	1	Ea	40,000 40,000
	Sewer line and force main (6" - 4")	1	Job	LS 27,500
	Septic tank (1500G)	1	Ea	4,500 4,500

Cost :	Item :	Quantity :	Unit :	Unit :	Amount :
Account:				Price :	
No. :					

Island Park (Cont'd)

Septic tank (3000G)	1	Ea	6,500	6,500
Sewage pump and misc.	1	Job	LS	11,500
Portable restroom	4	Ea	500	2,000
Boat ramp	3,400	SY	68	231,200
Beach Improvement	1	Job	LS	105,000
Camp unit	32	Ea	650	20,800
Camp unit with shelter	8	Ea	1,050	8,400
Portable change shelter	14	Ea	400	5,600
Trailer dump station	1	Ea	3,000	3,000
Electrical	1	Job	LS	4,700
Signs and barriers	1	Job	LS	13,900
Landscaping	1	Job	LS	<u>28,054</u>

Subtotal \$ 895,200

Contingencies - 25%+ 224,800

Subtotal Island Park \$1,120,000

Lakeview

Roads & parking				
Parking, gravel	5,650	SY	8.00	45,200
Sanitary Facilities				
Portable restroom	2	Ea	500	1,000
Boat ramp	2,650	SY	100	265,000
Landscaping	1	Job	LS	<u>9,800</u>

Subtotal \$ 321,000

Contingencies - 25%+ 79,000

Subtotal Lakeview \$ 400,000

Edison Point

Roads & parking				
Parking, paved	620	SY	11.00	6,820
Sanitary Facilities				
Portable restroom	4	Ea	500	2,000
Hiking trail	7.0	Mi	2,500	17,500
Picnic unit	10	Ea	740	7,400
Landscaping	1	Job	LS	<u>1,300</u>

Subtotal \$ 35,020

Contingencies - 25%+ 8,980

Subtotal Edison Point \$ 44,000

Cost :		:	:	Unit :	
Account:	Item	:	Quantity :	Unit :	Price : Amount
No. :		:	:	:	:

Windy Gap

Roads & parking

Road, 2 lane paved circulation	0.5	Mi	280,000	140,000
Road, 1 lane paved circulation	0.4	Mi	137,000	54,800
Parking spurs & turnouts	50	Ea	2,000	100,000
Parking, paved	744	SY	11.00	8,184

Water Facilities

Supply & distribution system	1	Job	LS	64,000
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Sanitary Facilities

Restroom, 4-fixture flush with showers (485 SF)	3	Ea	40,000	120,000
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Sewage collection and disposal	1	Job	LS	87,000
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Camp unit	40	Ea	650	26,000
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Camp unit with shelter	10	Ea	1,050	10,500
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Group Camp	1	Job	LS	11,250
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Trailer dump station	1	Ea	3,000	3,000
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Electrical	1	Job	LS	48,800
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Fish cleaning station	1	Ea	3,000	3,000
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Signs and barriers	1	Job	LS	11,600
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Fire protection trail	0.3	Mi	5,000	1,500
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Landscaping	1	Job	LS	15,000
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Subtotal				\$ 704,634
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Contingencies - 25%+				<u>177,366</u>
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Subtotal Windy Gap				\$ 882,000
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Trimmer

Roads & parking				
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Parking, gravel	6,708	SY	8.00	53,664
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Landscaping	1	Job	LS	<u>1,336</u>
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Subtotal				\$ 55,000
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Contingencies - 25%+				<u>14,000</u>
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Subtotal Trimmer				\$ 69,000
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Cost :	Item :	Quantity :	Unit :	Unit Price :	Amount :
Account:	Item :	Quantity :	Unit :	Price :	Amount :
No. :	Item :	Quantity :	Unit :	Price :	Amount :
	Boat access				
	Picnic unit	20	Ea	740	14,800
	Portable restroom	10	Ea	500	5,000
	Landscaping	1	Job	LS	<u>600</u>
	Subtotal				\$ 20,400
	Contingencies - 25%+				<u>4,600</u>
	Subtotal Boat Access				\$ 25,000
	TOTAL RECREATION FACILITIES				\$5,100,000
30	ENGINEERING AND DESIGN				610,000
31	SUPERVISION AND ADMINISTRATION				410,000
	TOTAL COST FUTURE PHASE RECREATION DEVELOPMENT				\$6,120,000

## CHAPTER XIII - CONCLUSIONS AND RECOMMENDATIONS

89. Conclusions. - Based on the data contained in this Master Plan and attendant studies, it is concluded that:

a. Pine Flat Lake provides water-oriented outdoor recreation opportunities in a region where such opportunities are needed and where facilities to support such opportunities should be provided.

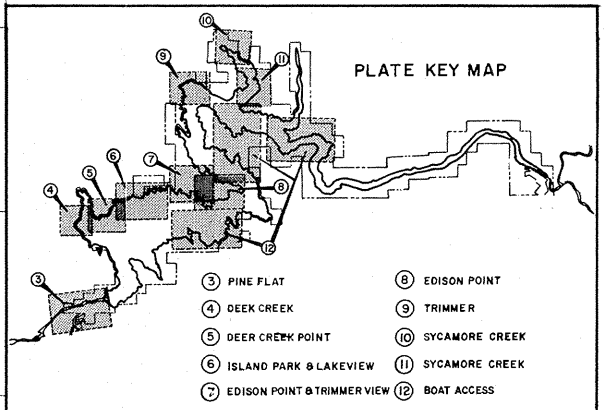
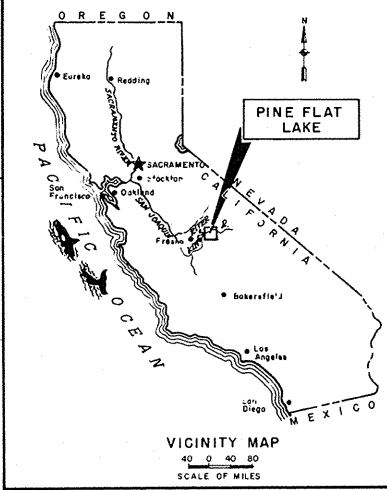
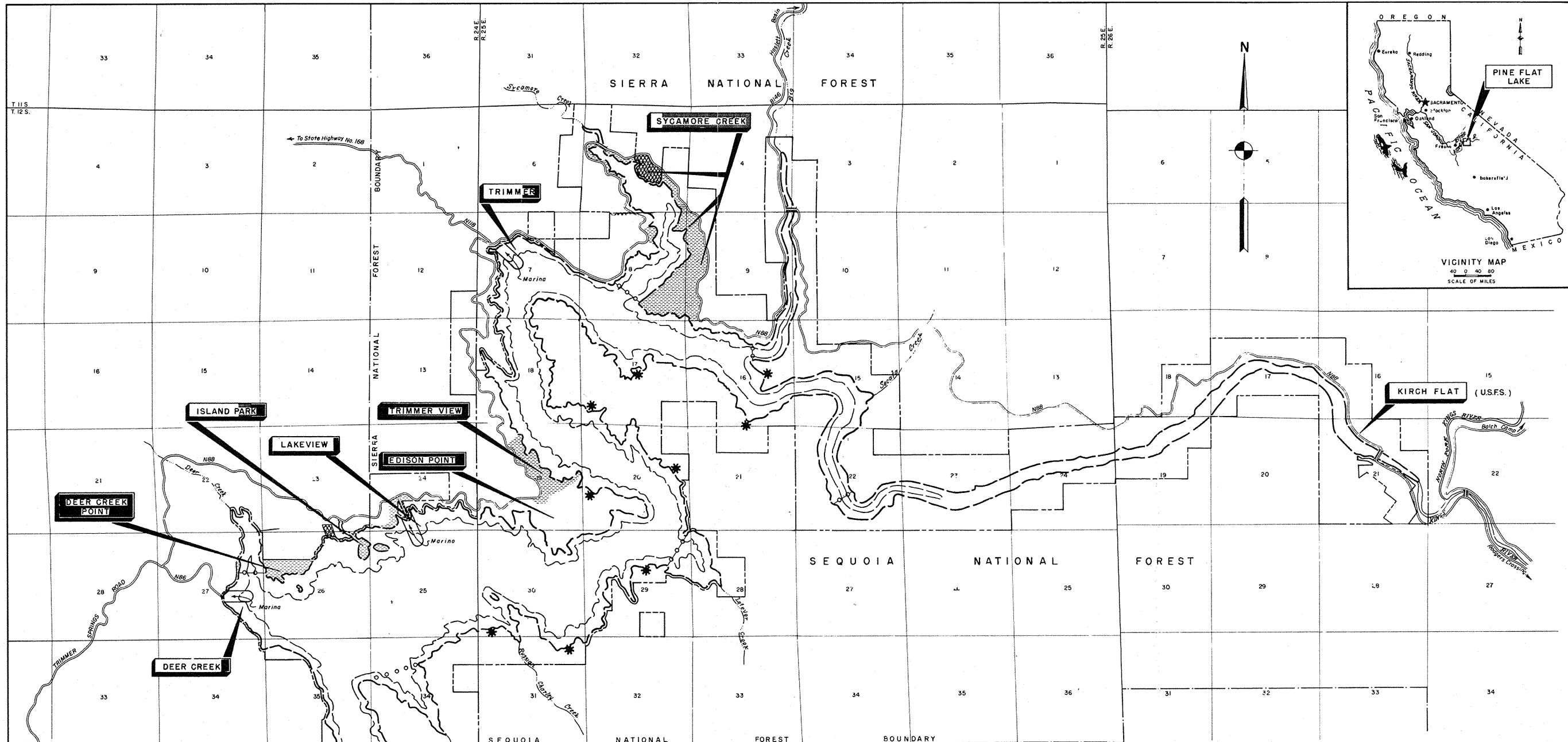
b. The development program described in this Master Plan would provide for the maximum practical use of the recreation resources at the lake and would provide sufficient flexibility to permit modifications that may become necessary due to changes in public-use patterns or for other reasons.

c. Acquisition of additional lands is needed for the identified program of recreation development. At the appropriate time following approval of this Master Plan, and following receipt of a letter from a non-Federal governmental entity expressing intent to pay at least 50 percent of the capital cost of recreation development and operate and maintain the new facilities, a feasibility report will be processed to obtain authorization for the land acquisition. Prior to acquisition of lands, a Real Estate Design memorandum would be prepared and a cost-sharing contract executed. As an alternative to purchase of private lands, a trade of Federal lands for private lands might be arranged. Following approval of this Master Plan, a Supplement would be prepared for the visitor interpretive center.

### 90. Recommendations

a. It is recommended that this Master Plan be approved as the basis for recreation development and management of project resources at Pine Flat Lake.





- LEGEND**
- Project Boundary
  - National Forest Boundary
  - Gross Pool - Elev. 961.5 feet
  - Normal Recreation Pool - Elev. 875.5 feet
  - Roads
  - Boundary for low speed boating zone and restricted area near dam.
  - ▨ Existing and future Corps or Corps licensed recreation development area.
  - ▩ Lands Proposed for Acquisition in fee.
  - ▧ Project Operations Area
  - \* Boat Access Recreation Area

- SCHEDULE OF DEVELOPMENT**
- EXISTING
  - ▨ IMMEDIATE PHASE
  - ▩ FUTURE PHASE



REVISION	DATE	DESCRIPTION	BY

**DEPARTMENT OF THE ARMY**  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE

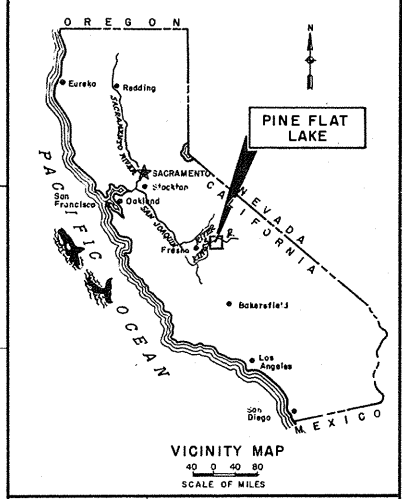
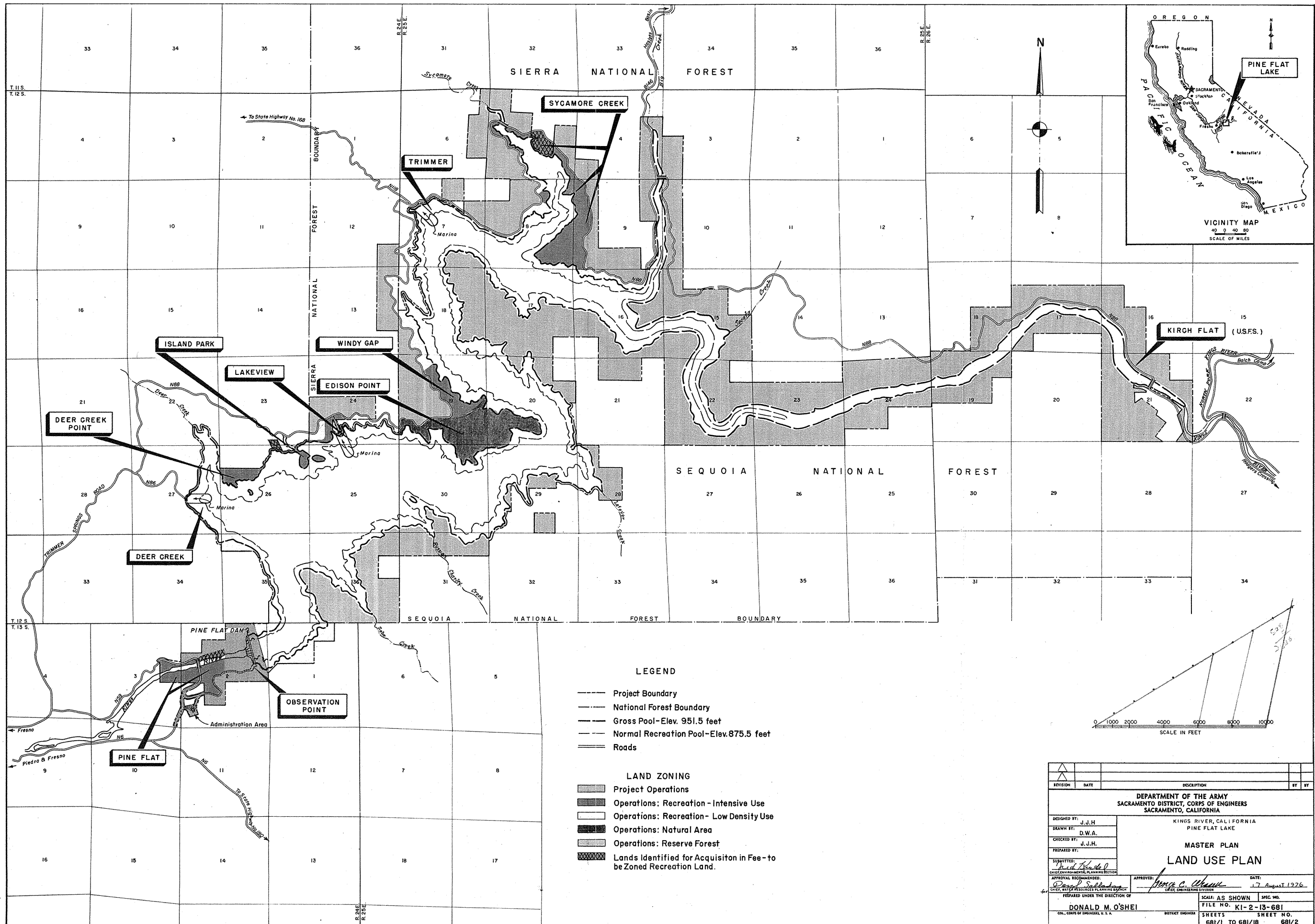
**MASTER PLAN**

**GENERAL RECREATION PLAN**

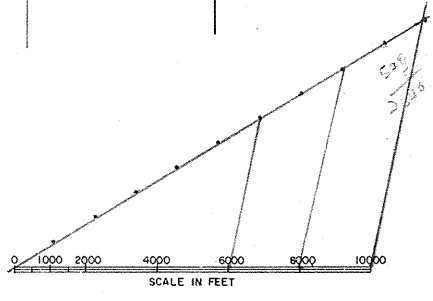
DESIGNED BY: A.R.G. J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: J.J.H.

APPROVED: *Donald M. Oshei* DATE: SEPTEMBER 1976  
COL., CORPS OF ENGINEERS, U. S. A. DISTRICT ENGINEER

SCALE: AS SHOWN SHEET NO. 681/1 TO 681/18  
FILE NO. KI-2-13-681 SHEETS 681/1



- LEGEND**
- Project Boundary
  - National Forest Boundary
  - Gross Pool-Elev. 951.5 feet
  - Normal Recreation Pool-Elev. 875.5 feet
  - Roads
- LAND ZONING**
- Project Operations
  - Operations: Recreation - Intensive Use
  - Operations: Recreation - Low Density Use
  - Operations: Natural Area
  - Operations: Reserve Forest
  - Lands Identified for Acquisition in Fee - to be Zoned Recreation Land



REVISION	DATE	DESCRIPTION	BY	BY

DEPARTMENT OF THE ARMY  
 SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
 SACRAMENTO, CALIFORNIA

DESIGNED BY: J.J.H.  
 DRAWN BY: D.W.A.  
 CHECKED BY: J.J.H.  
 PREPARED BY:

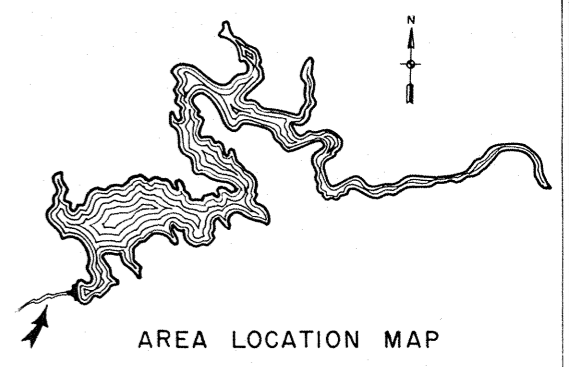
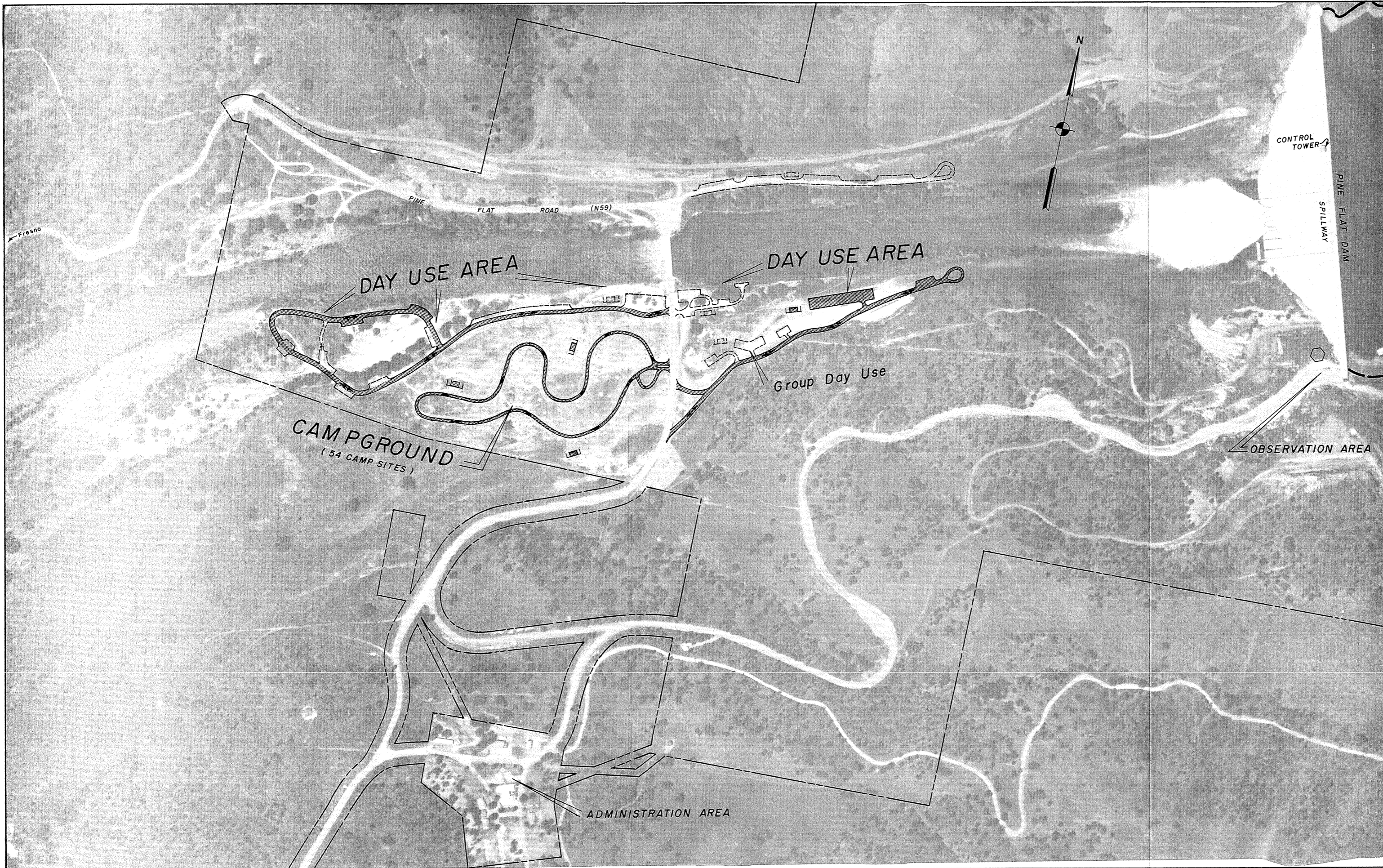
KINGS RIVER, CALIFORNIA  
 PINE FLAT LAKE

**MASTER PLAN**  
**LAND USE PLAN**

APPROVED: *Donal M. O'Shei* DATE: 17 August 1976  
 COL., CORPS OF ENGINEERS, U. S. A. DISTRICT ENGINEER

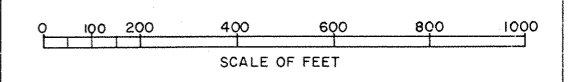
PREPARED UNDER THE DIRECTION OF  
 DONALD M. O'SHEI  
 COL., CORPS OF ENGINEERS, U. S. A.

SCALE: AS SHOWN  
 FILE NO. KI-2-13-681  
 SHEETS 681/1 TO 681/18 SHEET NO. 681/2



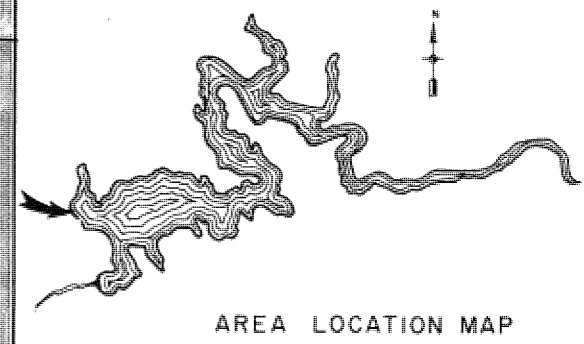
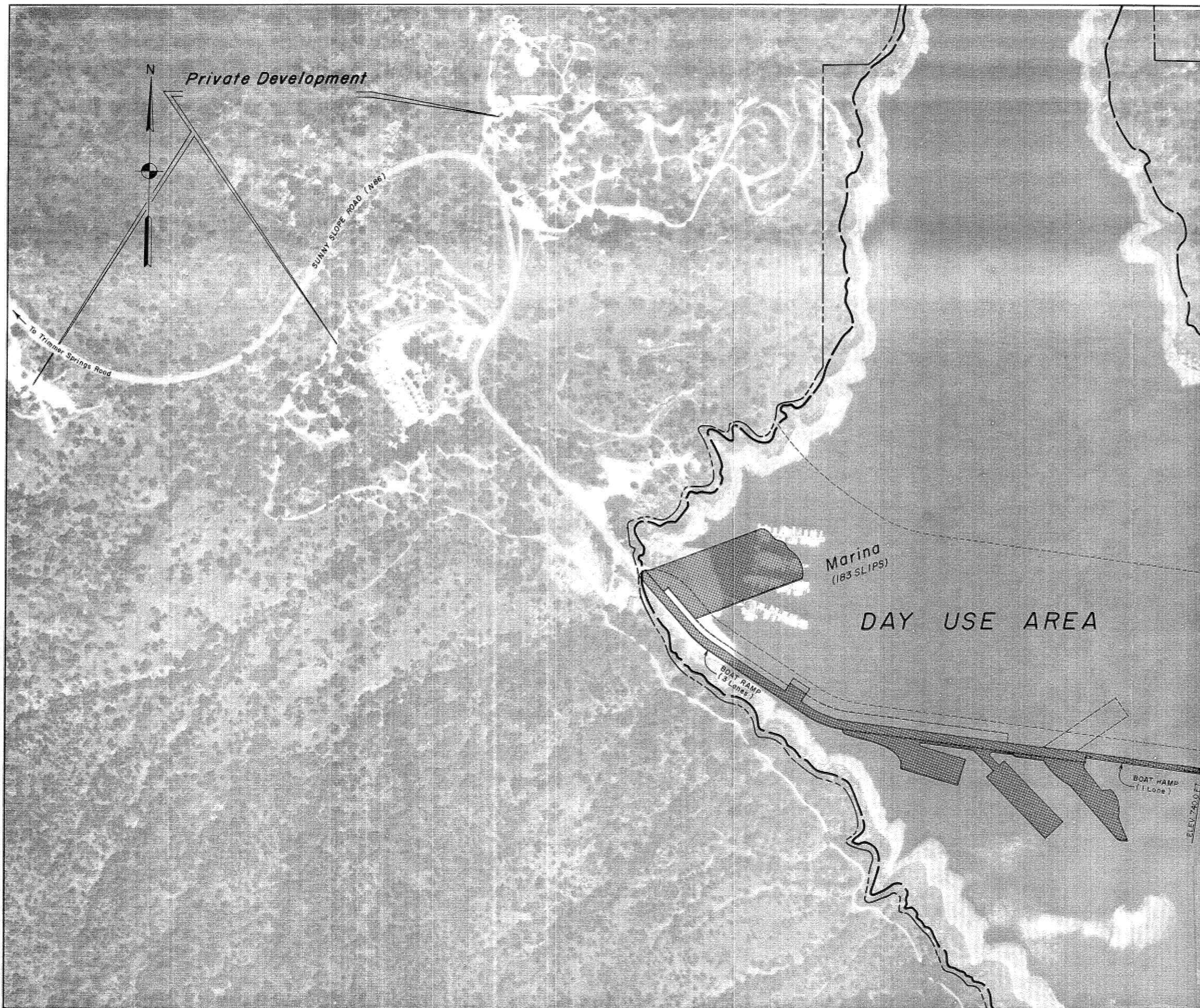
- LEGEND**
- Gross Pool Elev. 951.5 feet
  - Project Boundary
  - Future Phase Facilities
  - ▨ Developed Facilities
  - Restroom
  - ⬡ Overlook—Visitor Center

- NOTES:**
1. Aerial Photography - 21 May 1967 (Pool Elev. 909.0 feet)
  2. See plate 13 for topography of area



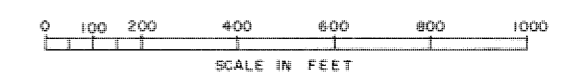
REVISION	DATE	DESCRIPTION	BY

DESIGNED BY: A.R.G. J.J.H.  
 DRAWN BY: D.W.A.  
 CHECKED BY: J.J.H.  
 PREPARED BY: J.J.H.  
 SUBMITTED: *[Signature]*  
 APPROVAL: *[Signature]* DATE: SEPTEMBER 1976  
 PREPARED UNDER THE DIRECTION OF: DONALD M. O'SHEI  
 SCALE: AS SHOWN SPEC. NO. K1-2-13-681  
 SHEETS: 681/1 to 681/18 SHEET NO. 681/3

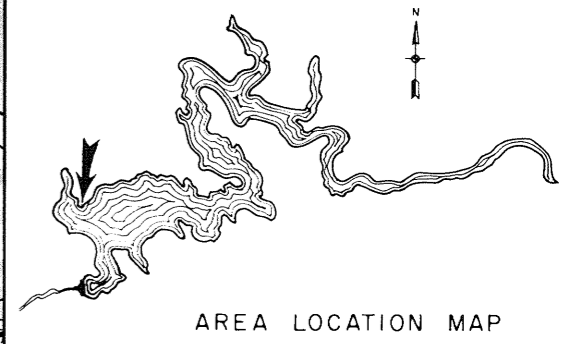
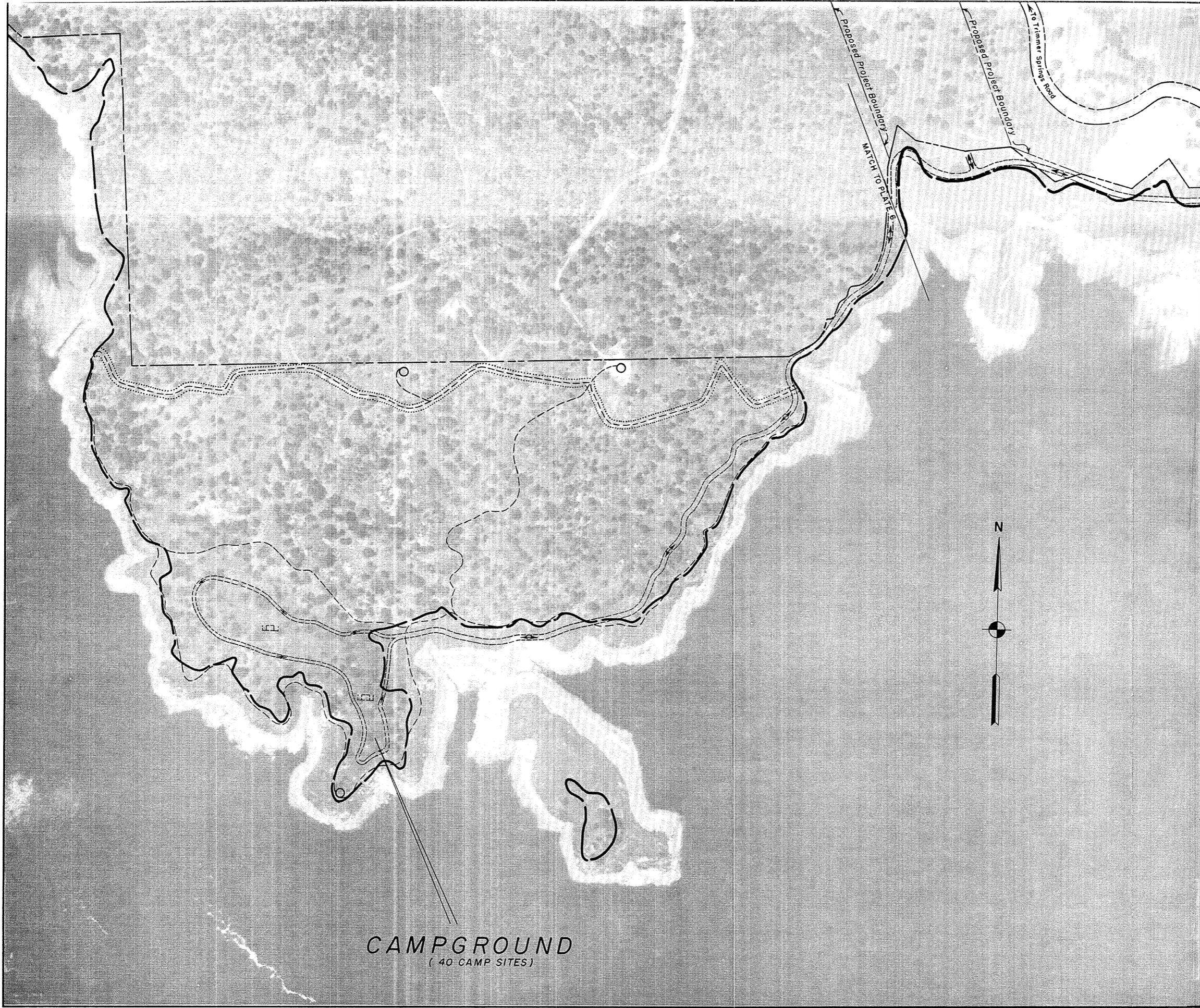


- LEGEND**
- Gross Pool Elev. 951.5 feet
  - Project Boundary
  - Future Phase Facilities
  - ▨ Developed Facilities
  - Marina Corridor

**NOTE**  
 Aerial photography-21 May 1967  
 ( Pool Elev. 909.0 feet )



REVISION	DATE	DESCRIPTION	BY	CHK
DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
DESIGNED BY	ARG. J.J.H.	KINGS RIVER, CALIFORNIA PINE FLAT LAKE MASTER PLAN <b>DEER CREEK            RECREATION AREA</b>		
DRAWN BY	D.W.A.			
CHECKED BY	J.E.H.			
PREPARED BY	J.E.H.			
DATE	SEPTEMBER 1976	PREPARED UNDER THE DIRECTION OF DONALD M. O'SHEI DISTRICT ENGINEER		
SCALE	AS SHOWN	SHEET NO.	FILE NO. KI-2-13-681 SHEETS 681/1 to 681/18 SHEET NO. 681/4	



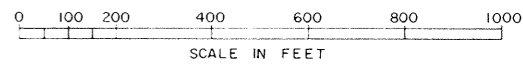
AREA LOCATION MAP

LEGEND

- Gross Pool Elev. 951.5 feet
- - - - - Project Boundary
- ..... Future Phase Facilities
- ..... Future Fire Control Lane
- - - - - Future Hiking Trail
- Future View Point
- - - - - Future Project Boundary
- ▭ Restroom

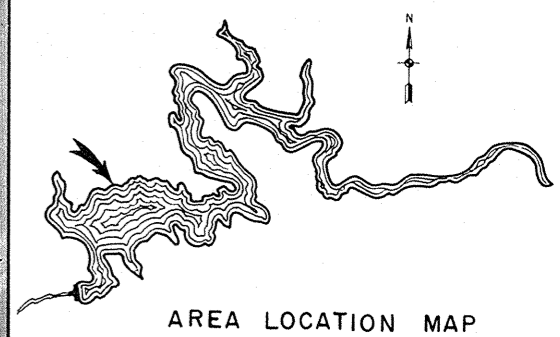
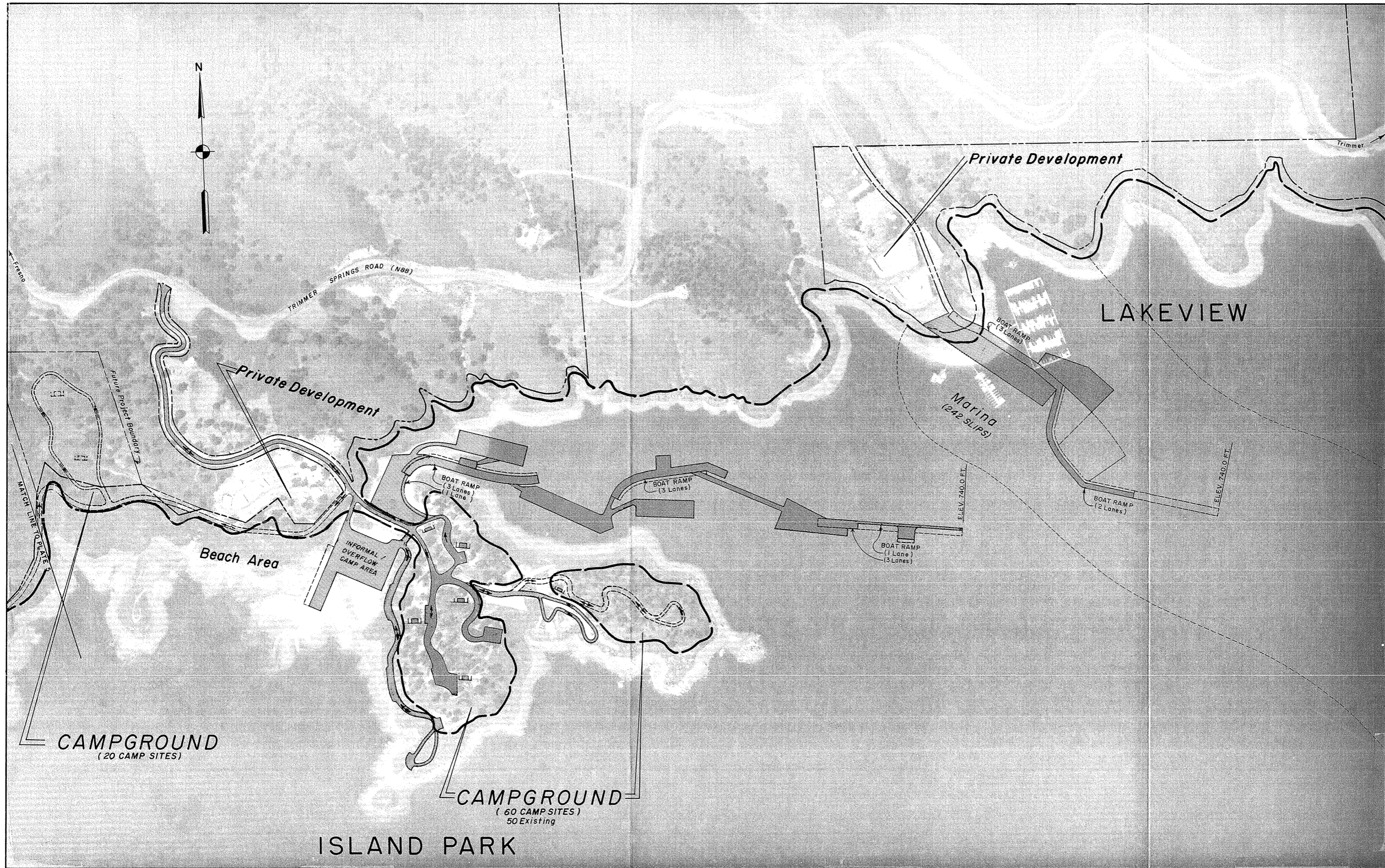
NOTES:

1. Aerial photography - 21 May 1967  
(Pool Elev. 909.0 feet)
2. See plate 14 for topography of area.



CAMPGROUND  
(40 CAMP SITES)

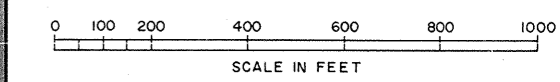
REVISION	DATE	DESCRIPTION	BY	BY
<b>DEPARTMENT OF THE ARMY</b> SACRAMENTO DISTRICT, CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
DESIGNED BY	ARG J.J.H.	KINGS RIVER, CALIFORNIA PINE FLAT LAKE MASTER PLAN <b>DEER CREEK POINT</b> RECREATION AREA		
DRAWN BY	D.W.A.			
CHECKED BY	J.J.H.			
PREPARED BY	J.J.H.			
SUBMITTED BY	<i>[Signature]</i>			
APPROVAL	<i>[Signature]</i>	DATE	SEPTEMBER 1976	
PREPARED UNDER THE DIRECTION OF		SCALE	AS SHOWN	SPEC NO.
DONALD M. OSHEI		FILE NO.	KI-2-13-681	
DISTRICT ENGINEER		SWEETS	SHEET NO.	
		681/1 to 681/18	681/5	



**LEGEND**

- Gross Pool Elev. 951.5 feet
- Project Boundary
- Immediate Phase Facilities
- Future Phase Facilities
- Developed Facilities
- Marina Corridor
- Future Project Boundary
- Restroom

- NOTES**
- 1 Aerial photography - 21 May, 1967 ( Pool Elev. 909.0 feet )
  - 2 See plate 14 for topography of area
  - 3 Existing vault restrooms to be converted to flush



REVISION	DATE	DESCRIPTION	BY

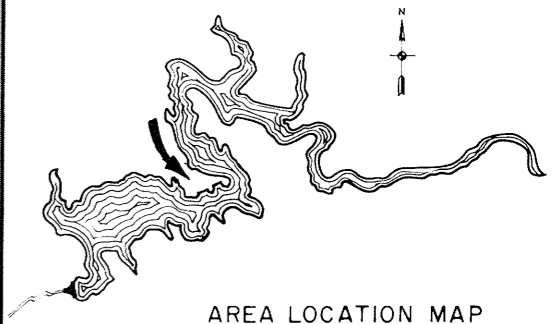
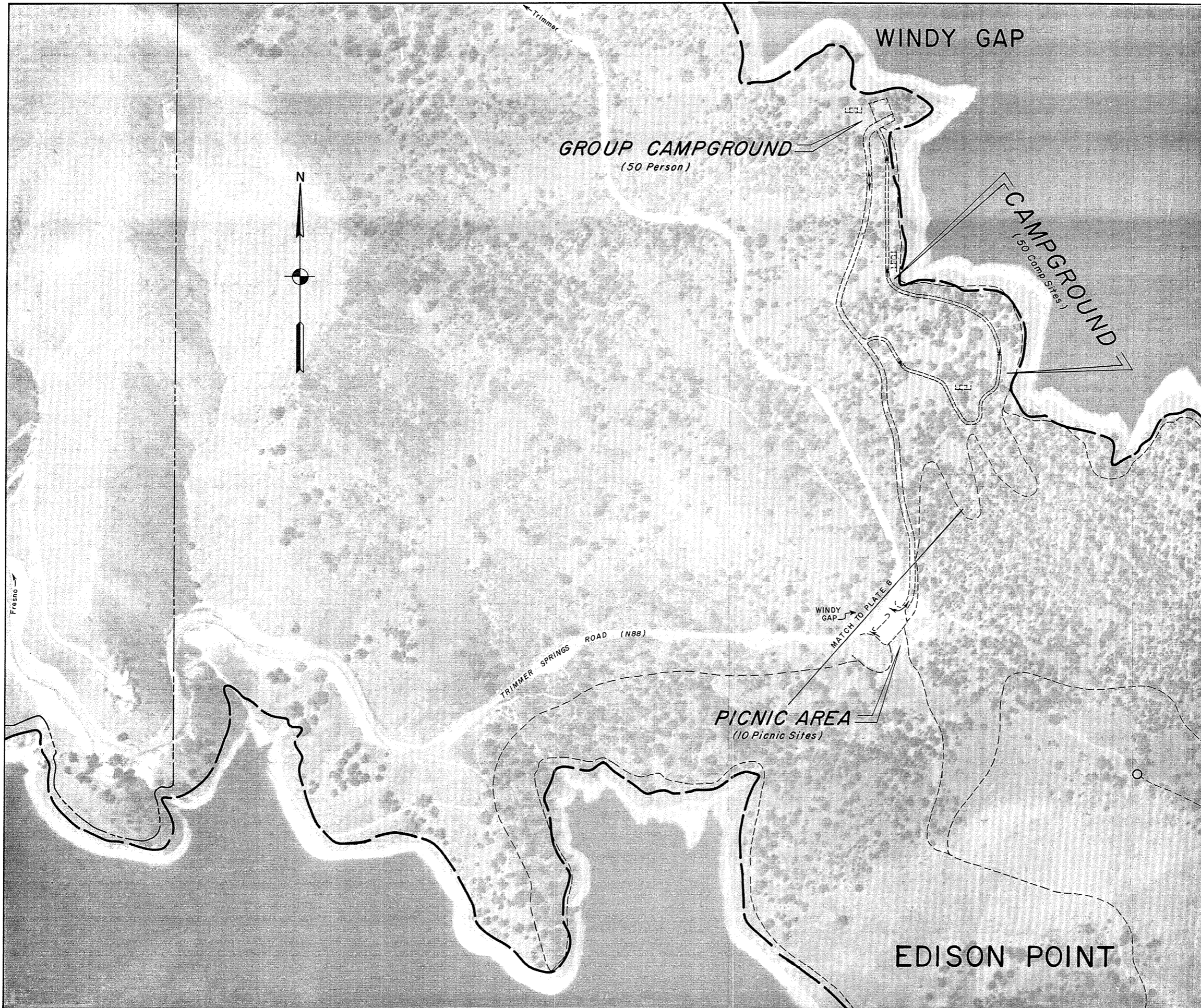
DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

DESIGNED BY: A.R.G. J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: J.J.H.  
SUBMITTED: *[Signature]*  
APPROVED: *[Signature]* DATE: SEPTEMBER 1976

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE  
MASTER PLAN  
**ISLAND PARK & LAKEVIEW**  
RECREATION AREA

PREPARED UNDER THE CORRECTION OF  
DONALD M. O'SHEI DISTRICT ENGINEER

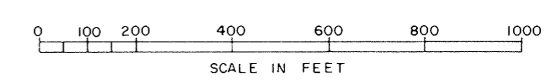
SCALE: AS SHOWN SPEC. NO. \_\_\_\_\_  
FILE NO. KI-2-13-681  
SHEETS 681/1 to 681/18 SHEET NO. 681/6



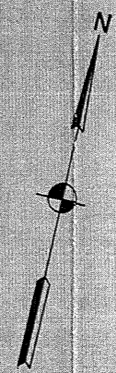
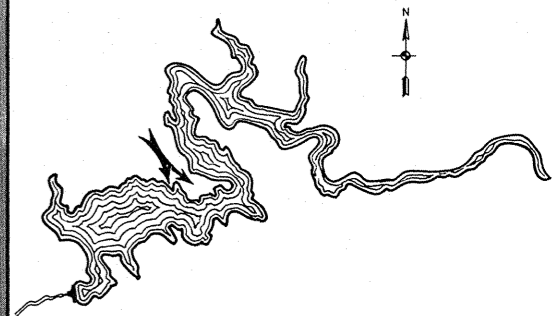
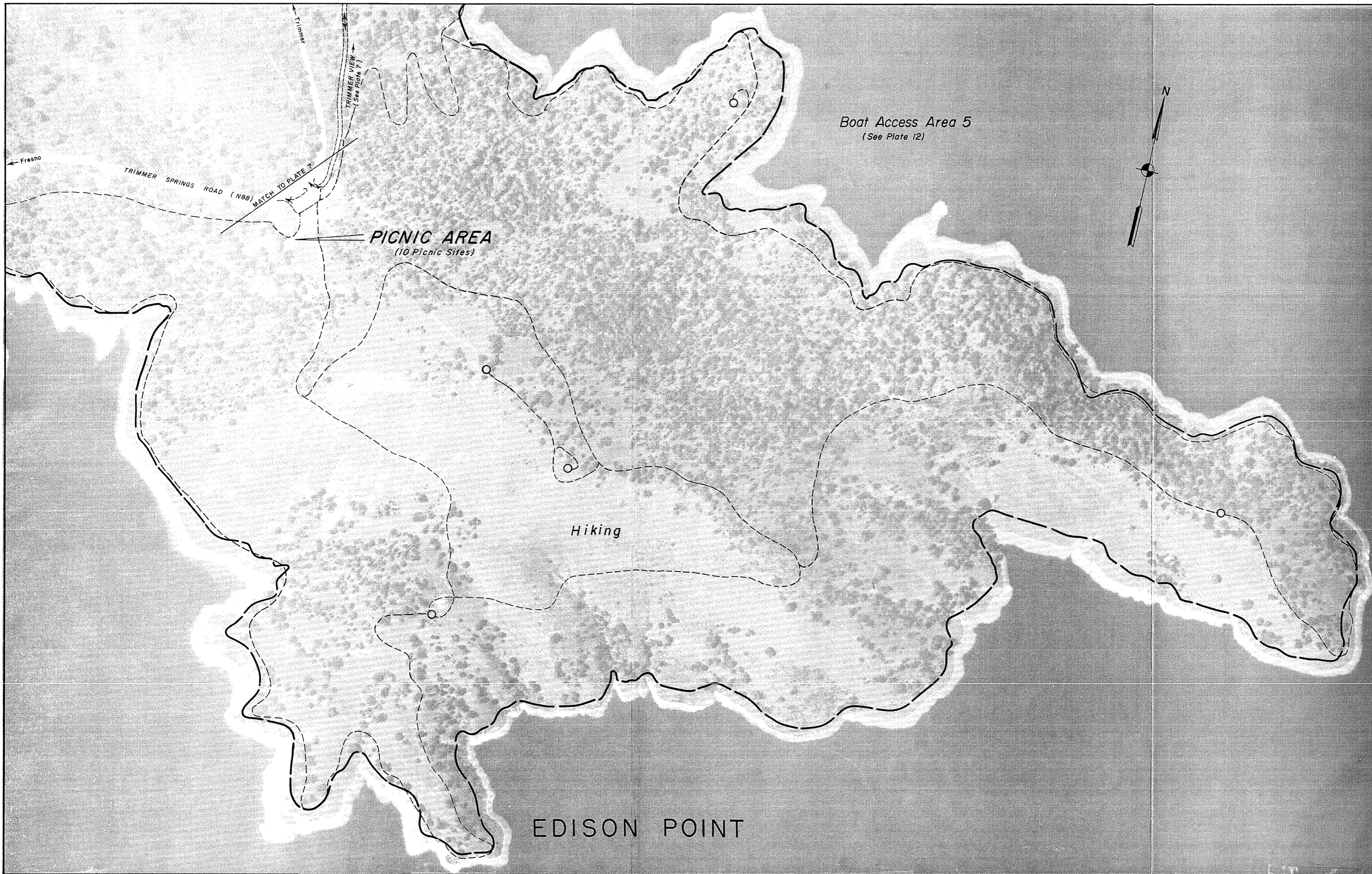
**LEGEND**

	Gross Pool Elev. 951.5 feet
	Project Boundary
	Future Phase Facilities
	Future View Point
	Future Hiking Trail
	Restroom

- NOTES:**
1. Aerial photography - 21 May 1967  
(Pool Elev. 909.0 feet)
  2. See plates 13&15 for topography of areas



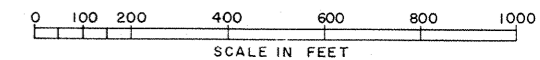
DESIGNED BY A.R.G. J.J.H.	DATE	DESCRIPTION	BY	BY
DRAWN BY D.W.A.				
CHECKED BY J.J.H.				
PREPARED BY				
SUBMITTED				
APPROVAL RECOMMENDATION				
DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA		KINGS RIVER, CALIFORNIA PINE FLAT LAKE MASTER PLAN <b>EDISON POINT &amp; WINDY GAP          RECREATION AREA</b>		
PREPARED UNDER THE DIRECTION OF <b>DONALD M. OSHEI</b>		APPROVED <i>[Signature]</i> DATE <b>SEPTEMBER 1976</b>	SCALE AS SHOWN SPEC NO. FILE NO. <b>KI-2-13-681</b> SHEETS SHEET NO. 681/1 to 681/18 681/7	



**LEGEND**

———	Gross Pool Elev. 951.5 feet
-----	Future Phase Facilities
-----	Future Hiking Trail
○	Future View Point

- NOTES:**
1. Aerial photography - 21 May 1967 (Pool Elev. 909.0 feet)
  2. See plate 15 for topography of area.



REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

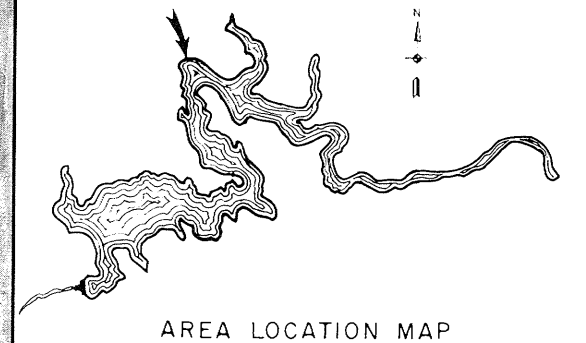
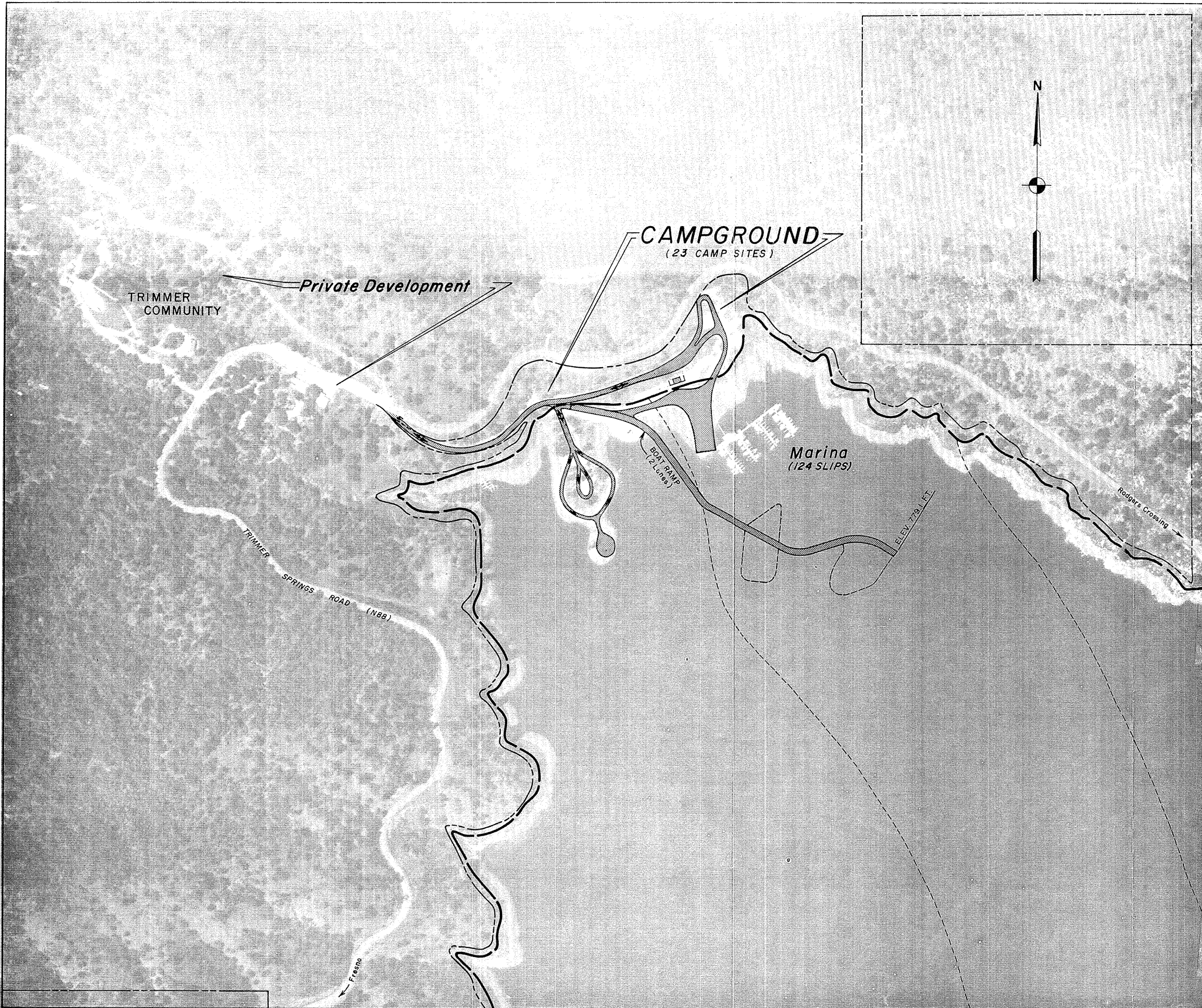
DESIGNED BY: A.R.G. J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: J.J.H.  
SUBMITTED: *[Signature]*  
APPROVAL, RECOMMENDATION: *[Signature]*  
APPROVED: *[Signature]* DATE: SEPTEMBER 1976

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE  
MASTER PLAN  
**EDISON POINT RECREATION AREA**

SCALE: AS SHOWN SPEC NO.  
FILE NO: K1-2-13-681  
SHEETS: 681/1 to 681/18 SHEET NO: 681/8

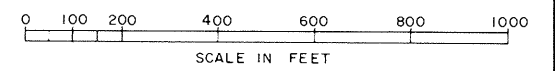
PREPARED UNDER THE DIRECTION OF: DONALD M. O'SHEI  
DISTRICT ENGINEER





- LEGEND
- Gross Pool Elev. 951.5 feet
  - - - - Project Boundary
  - - - - Future Phase Facilities
  - ▨ Developed Facilities
  - - - - Marina Corridor
  - Restroom

NOTE:  
Aerial photography - 21 May 1967  
( Pool Elev. 909.0 feet )



REVISION	DATE	DESCRIPTION	BY

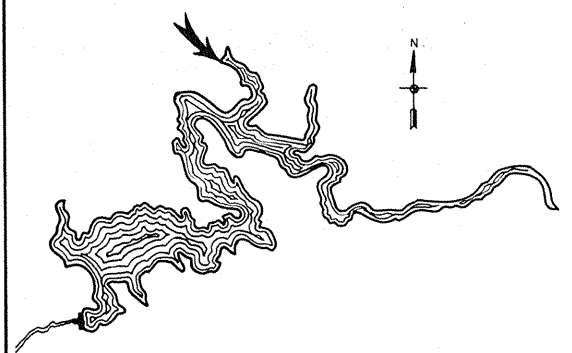
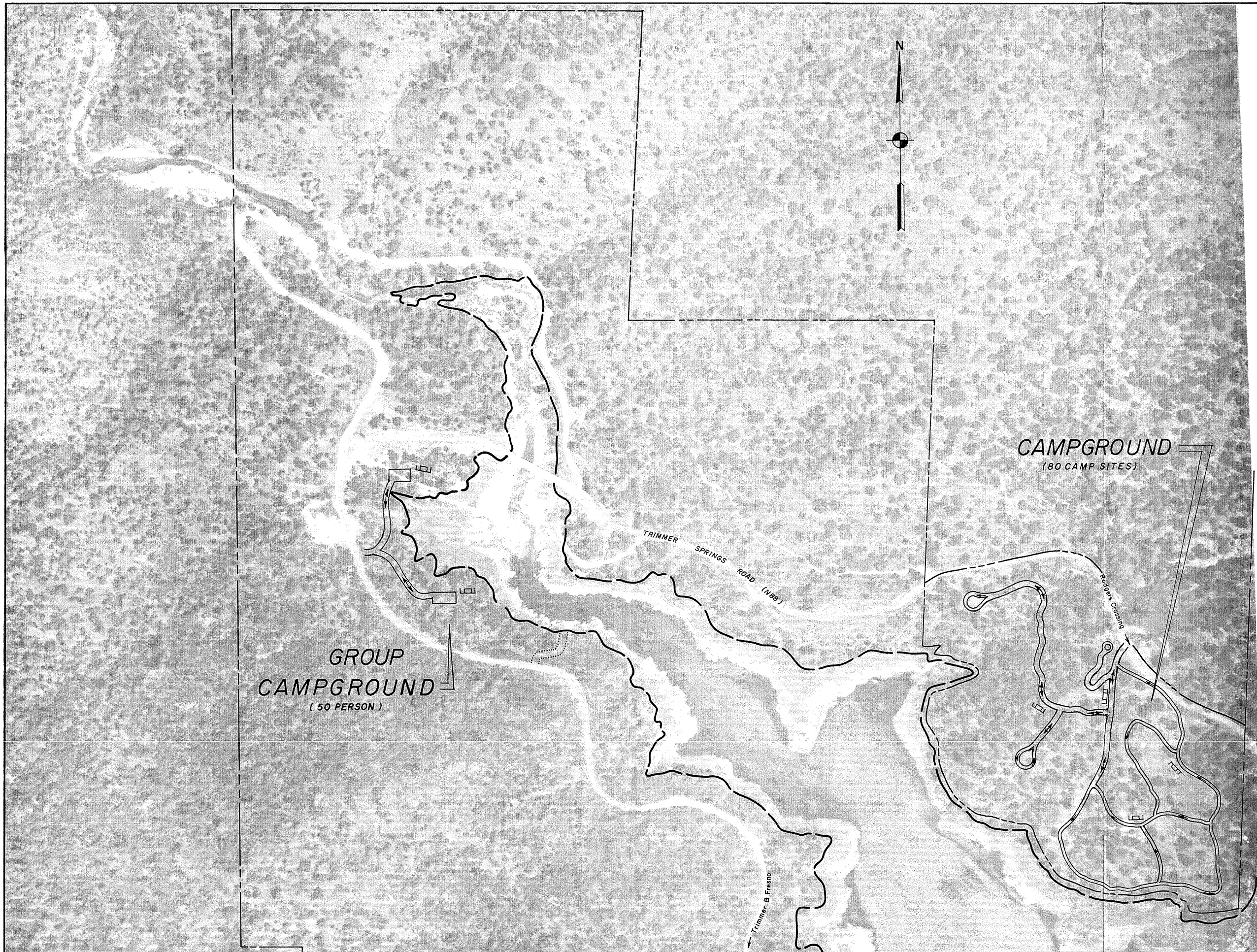
DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

DESIGNED BY: A.R.G. J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: J.J.H.  
SUBMITTED BY: *[Signature]*  
APPROVAL RECOMMENDING: *[Signature]*  
APPROVED: *[Signature]* DATE: SEPTEMBER 1976

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE  
MASTER PLAN  
TRIMMER RECREATION AREA

PREPARED UNDER THE DIRECTION OF  
DONALD M. OSHEI  
COL, CORPS OF ENGINEERS, U.S.A.

SCALE AS SHOWN  
FILE NO. KI-2-13-681  
SHEETS 681/1 to 681/18  
SHEET NO. 681/9



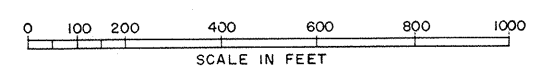
AREA LOCATION MAP

LEGEND

- Gross Pool Elev. 951.5 feet
- - - - - Project Boundary
- ==== Immediate Phase Facilities
- ..... Fire Control Lane
- Restroom
- - - - - Proposed Project Boundary

NOTES:

1. Aerial photography - 21 May 1967 (Pool Elev. 909.0 feet)
2. See plate 13 for topography of area.



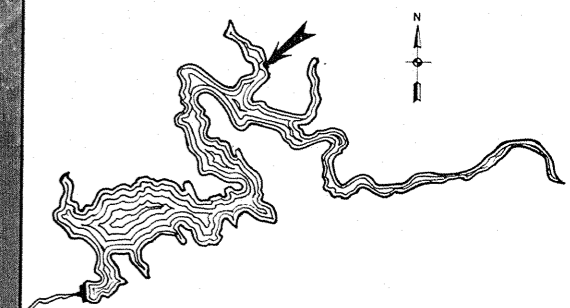
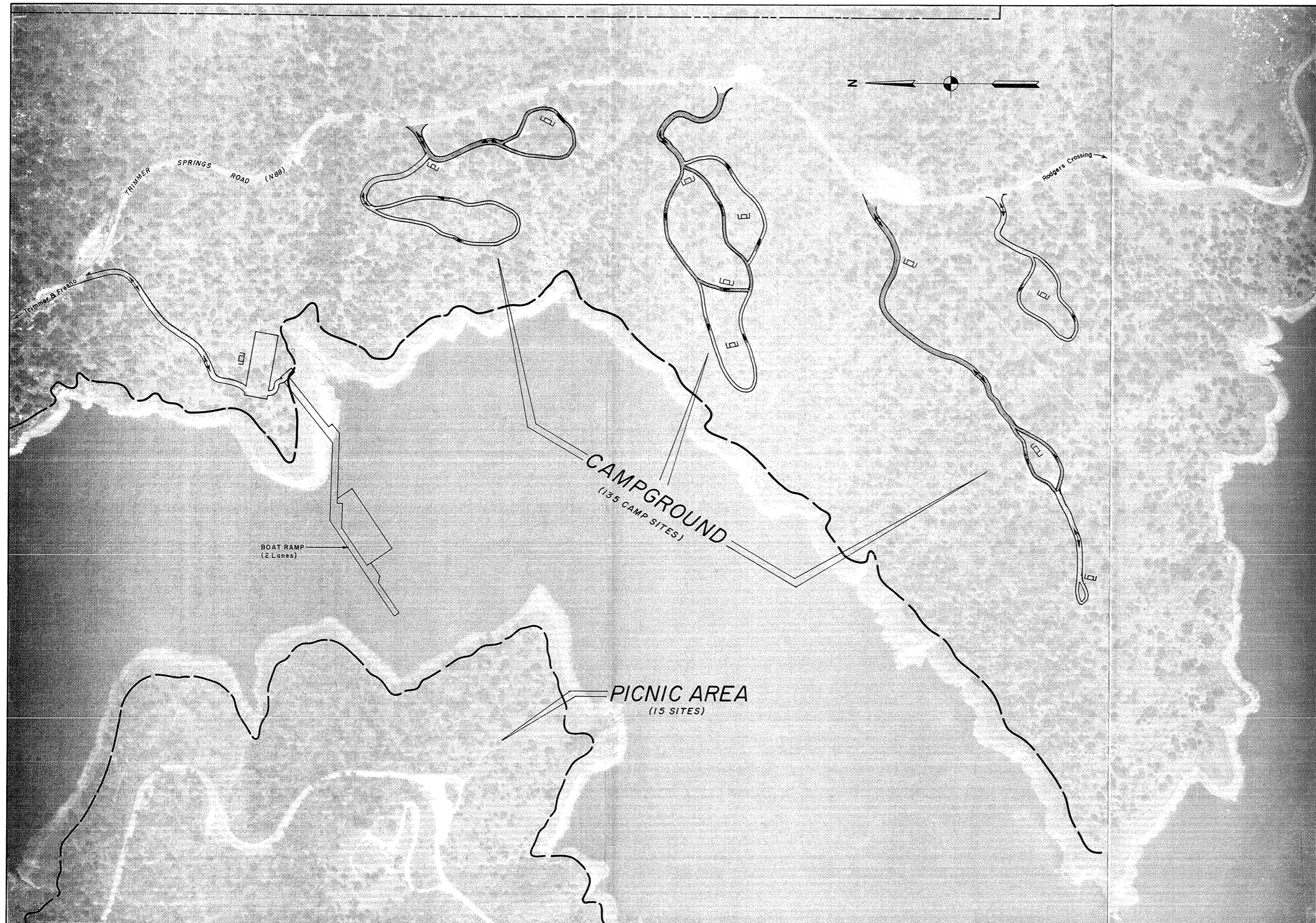
REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

DESIGNED BY: A.R.G.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: *[Signature]*  
SUBMITTED BY: *[Signature]*  
APPROVAL SECONDARY: *[Signature]*  
APPROVAL: *[Signature]* DATE: SEPTEMBER 1976

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE  
MASTER PLAN  
SYCAMORE CREEK  
RECREATION AREA

SCALE: AS SHOWN SPEC NO.  
FILE NO: KI-2-13-681  
SHEETS: 681/1 to 681/18 SHEET NO: 681/10  
DIRECT ENGINEER: DONALD M. OSHEI



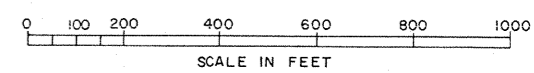
AREA LOCATION MAP

LEGEND

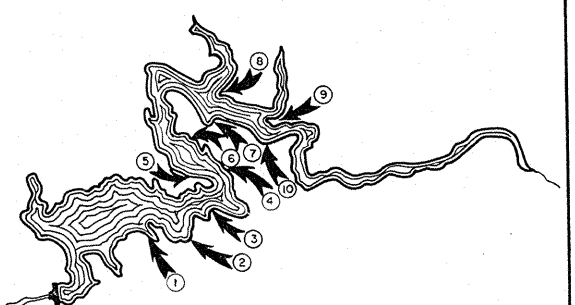
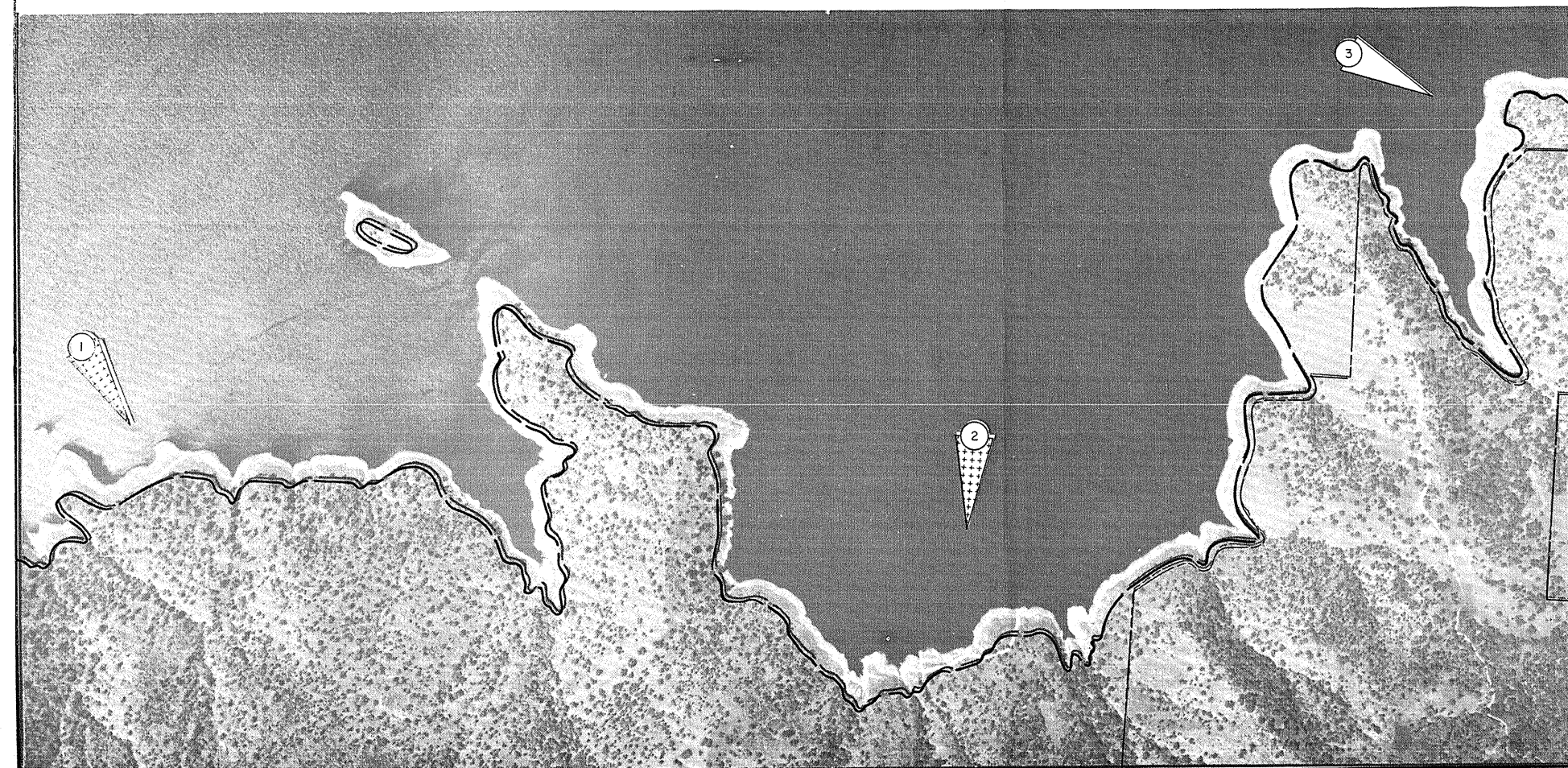
- Gross Pool Elev. 951.5 feet
- - - - - Project Boundary
- ==== Immediate Phase Facilities
- ===== Existing Facilities
- Restroom

NOTES:

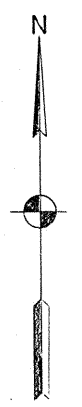
1. Aerial photography - 21 May 1967 (Pool Elev. 909.0 feet)
2. Existing pit type restrooms to be converted to flush.



REVISION	DATE	DESCRIPTION	BY
DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA			
DESIGNED BY: A.R.G. J.J.H.	KINGS RIVER, CALIFORNIA		
DRAWN BY: D.W.A.	PINE FLAT LAKE		
CHECKED BY: J.W.H.	MASTER PLAN		
PREPARED BY:	SYCAMORE CREEK		
SUBMITTED:	RECREATION AREA		
APPROVAL RECOMMENDED:	APPROVED:	DATE:	SEPTEMBER 1976
PREPARED UNDER THE DIRECTION OF:	DONALD M. OSHEI		
SCALE: AS SHOWN	SPEC NO.:	FILE NO.:	KI-2-13-681
SHEETS:	SHEET NO.:	681/1 to 681/18	681/11



AREA LOCATION MAP



LEGEND

- Project Boundary
- Gross Pool
- ① Existing Boat Access Area
- ② Proposed Boat Access Area

NOTES:

1. Aerial photography - 21 May 1967 (Pool Elev. 909.0 feet)
2. Facilities for each boat access area portable.



REVISION	DATE	DESCRIPTION	BY	BY

DESIGNED BY: ARG. J.J.H.  
 DRAWN BY: D.W.A.  
 CHECKED BY: J.J.H.  
 PREPARED BY: *[Signature]*  
 SUBMITTED: *[Signature]*  
 APPROVAL RECOMMENDED: *[Signature]*  
 CHIEF OF WATER RESOURCES PLANNING SECTION  
 PREPARED UNDER THE DIRECTION OF: DONALD M. OSHEI  
 DISTRICT ENGINEER

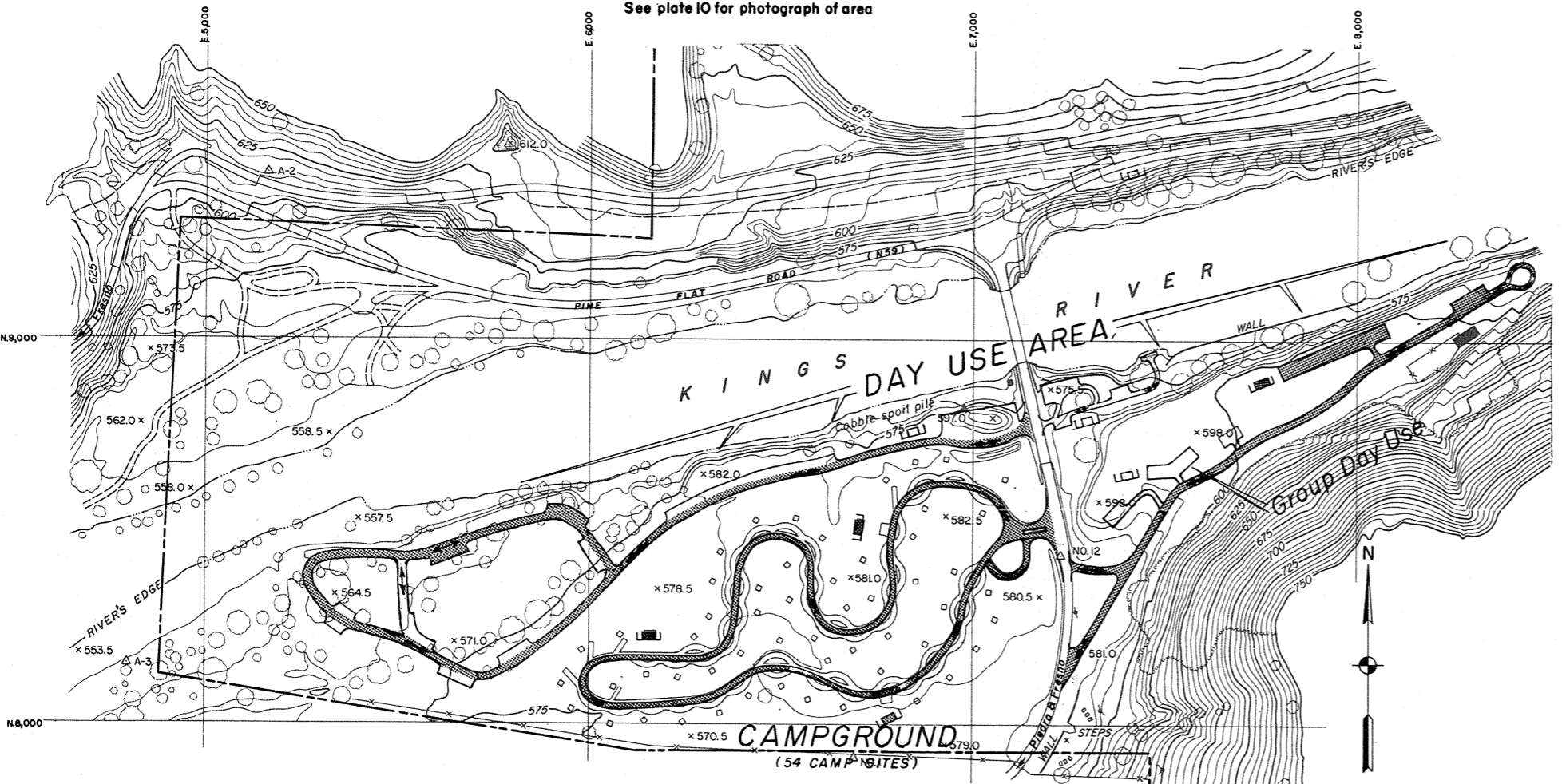
DEPARTMENT OF THE ARMY  
 SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
 SACRAMENTO, CALIFORNIA

KINGS RIVER, CALIFORNIA  
 PINE FLAT LAKE  
 MASTER PLAN  
**BOAT ACCESS  
 RECREATION AREA**

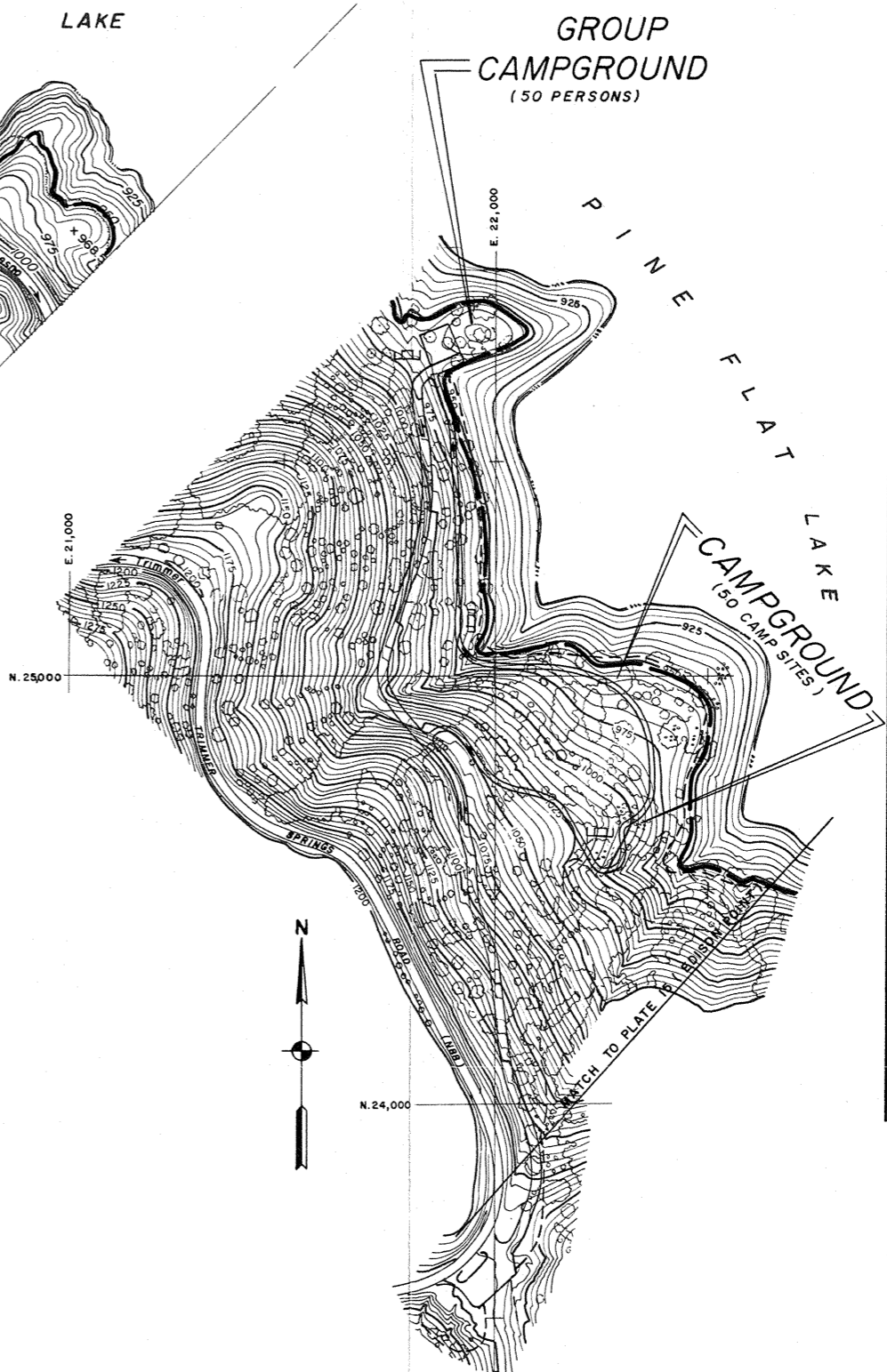
APPROVED: *[Signature]* DATE: SEPTEMBER 1976  
 SCALE: AS SHOWN SPEC. NO. KI-2-13-681  
 SHEETS: 681/1 to 681/18 SHEET NO. 681/12  
 PLATE 12



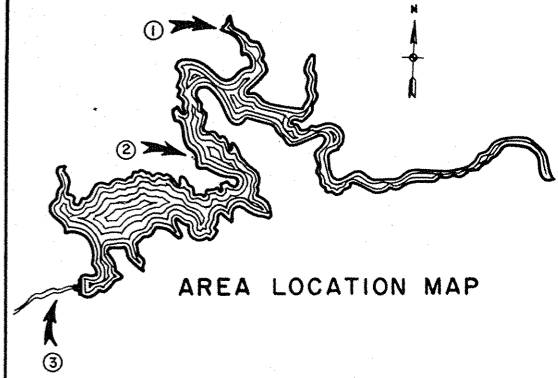
① SYCAMORE CREEK  
See plate 10 for photograph of area



③ PINE FLAT RECREATION AREA  
See plate 3 for photograph of area

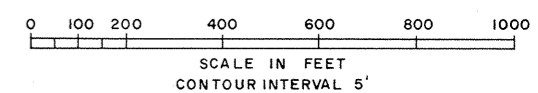


② WINDY GAP  
See plate 7 for photograph of area

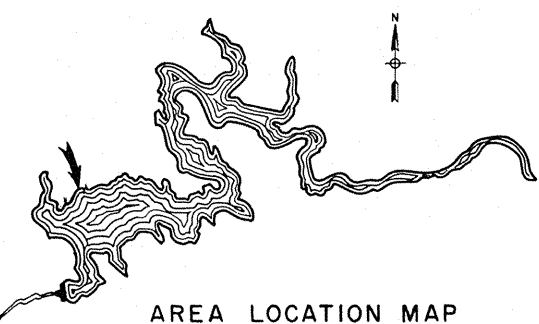
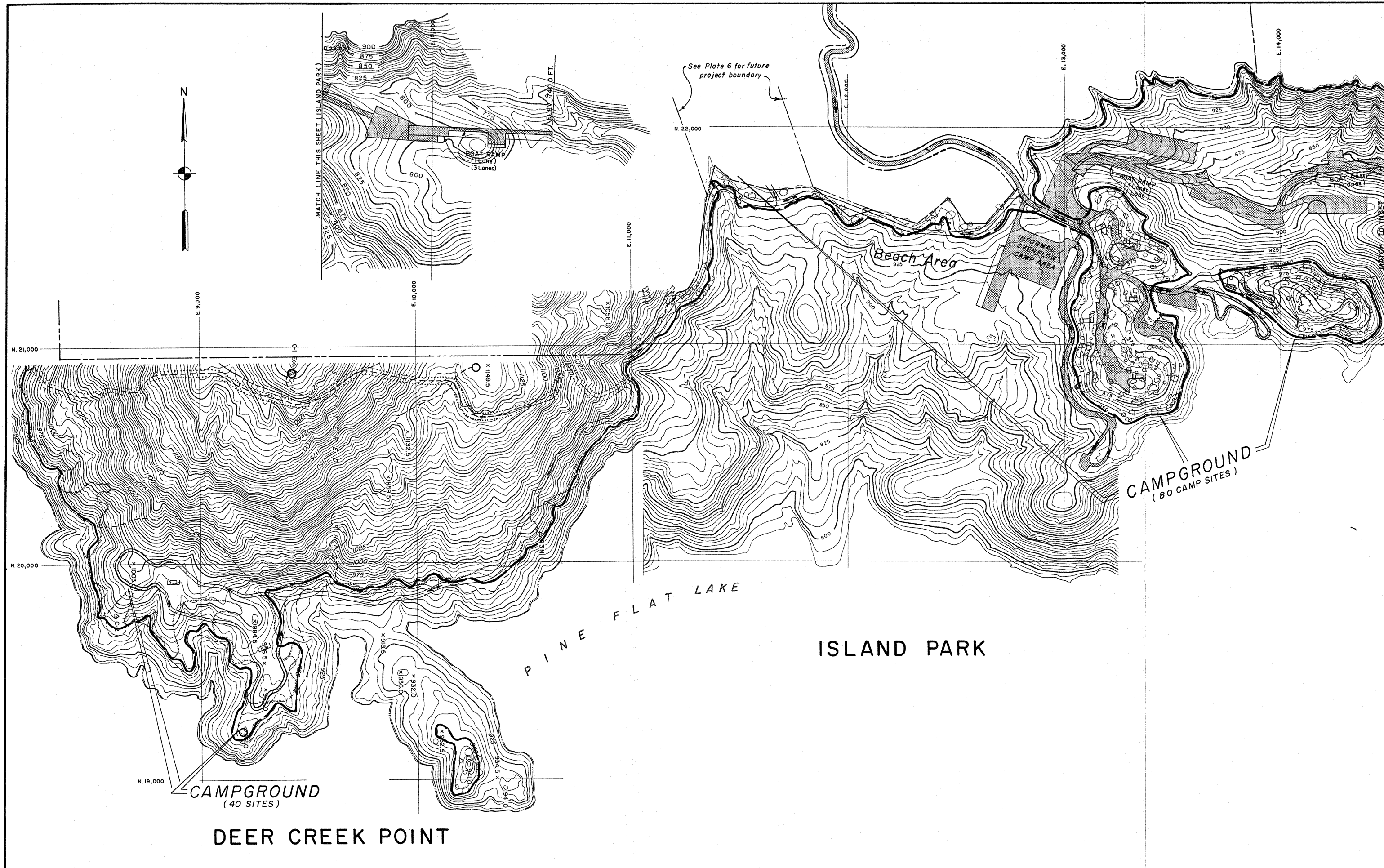


- LEGEND
- Project Boundary
  - Gross Pool Elev. 951.5 feet
  - Water's Edge Elev. 913.0 feet
  - Proposed Facilities
  - ▨ Developed Facilities
  - ⋯ Future Fire Control Lane
  - - - Future Hiking Trail
  - Restroom

- NOTES:
1. Horizontal Control referred to U.S.C.E System for Pine Flat Dam
  2. Elevations are referred to Sea Level Datum of 1929
  3. Aerial Photography 12 May 1967
  4. Topography by Keish Stereo-Plotter  
Area ① May 1967  
Area ② July 1963  
Area ③ May 1967

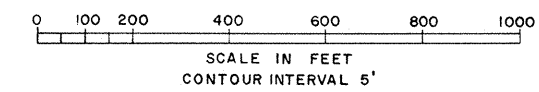


REVISION	DATE	DESCRIPTION	BY	BY
DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
DESIGNED BY:	ARG. B.J.H.	KINGS RIVER, CALIFORNIA PINE FLAT LAKE MASTER PLAN <b>TOPOGRAPHY</b> FOR RECREATION AREAS		
DRAWN BY:	D.W.A.			
CHECKED BY:	J.J.H.			
PREPARED BY:				
SUBMITTED:		APPROVED:	DATE: SEPTEMBER 1976	
PREPARED UNDER THE DIRECTION OF DONALD M. OSHEI		SCALE: AS SHOWN FILE NO.: KI-2-13-681 SHEETS: 681/1 to 681/18 SHEET NO.: 681/13		



- LEGEND**
- Project Boundary
  - Gross Pool Elev. 951.5 feet
  - Water's Edge Elev. 913.0 feet
  - Proposed Facilities
  - Developed Facilities
  - ⋯ Future Fire Control Lane
  - - - Future Hiking Trail
  - Future View Point
  - Restroom

- NOTES:**
1. Horizontal Control referred to U.S.C.E. System for Pine Flat Dam
  2. Elevations are referred to Sea Level Datum of 1929
  3. Aerial Photography 12 May 1967
  4. Topography by Kelsh Stereo-Plotter Area ① May 1967 Area ② August 1960
  5. See Plate 6 for photograph of areas



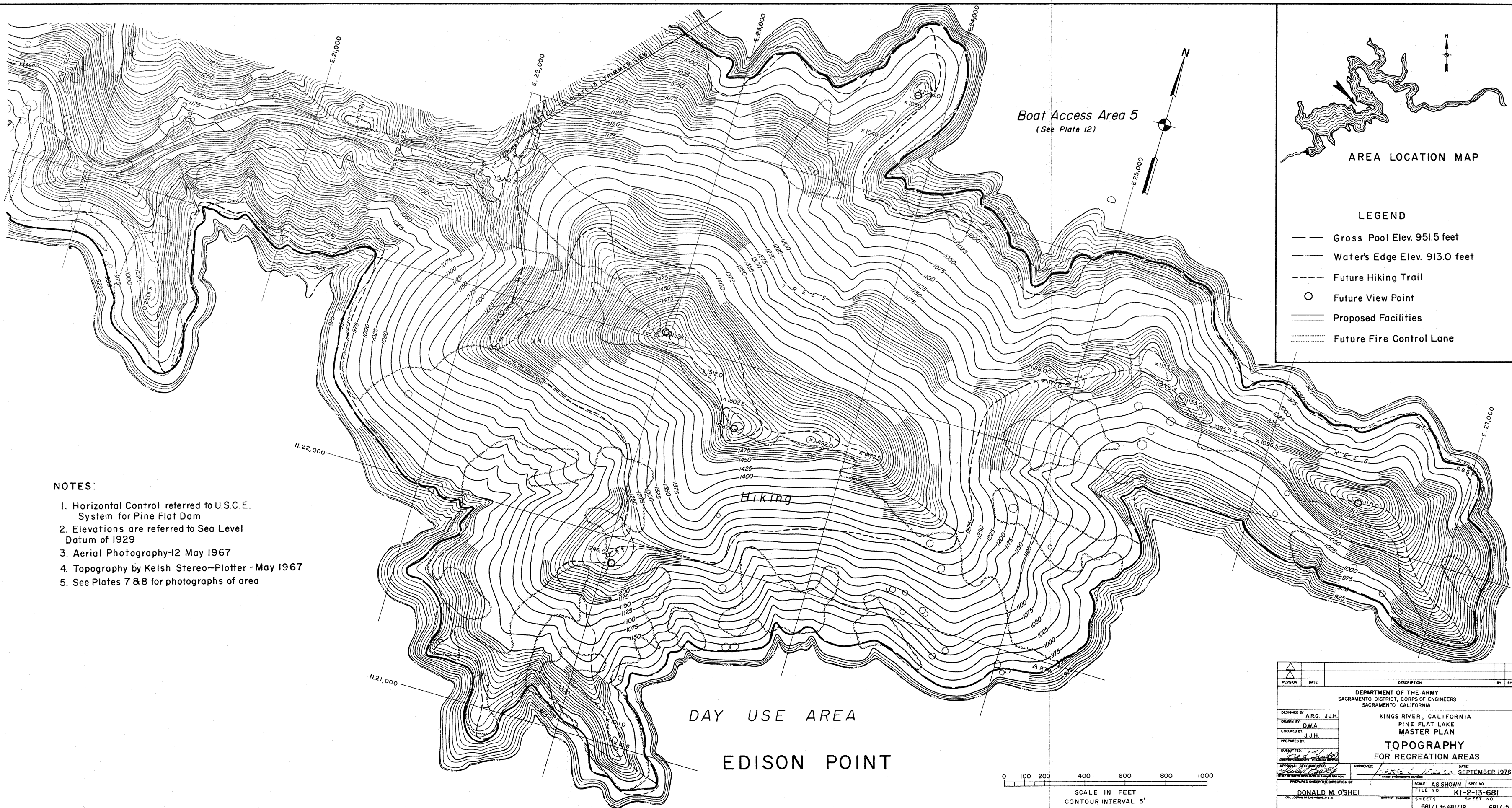
REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

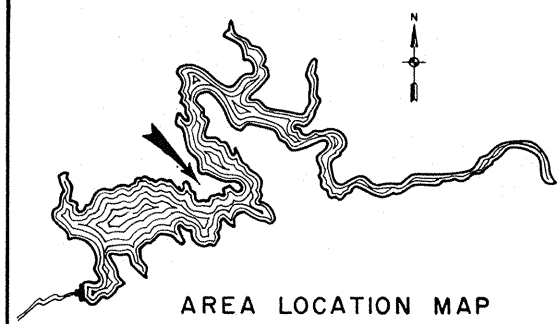
DESIGNED BY: A.R.G. J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY:  
SUBMITTED: *[Signature]*  
APPROVED: *[Signature]* DATE: SEPTEMBER 1976

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE  
MASTER PLAN  
TOPOGRAPHY  
FOR RECREATION AREAS

PREPARED UNDER THE DIRECTION OF: DONALD M. OSHEI  
SCALE: AS SHOWN  
FILE NO: KI-2-13-681  
SHEETS: 681/1 to 681/18  
SHEET NO: 681/14



Boat Access Area 5  
(See Plate 12)

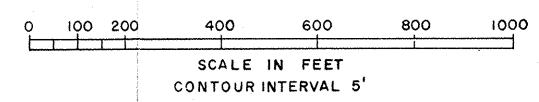


**LEGEND**

- Gross Pool Elev. 951.5 feet
- Water's Edge Elev. 913.0 feet
- - - Future Hiking Trail
- Future View Point
- Proposed Facilities
- ⋯ Future Fire Control Lane

- NOTES:**
1. Horizontal Control referred to U.S.C.E. System for Pine Flat Dam
  2. Elevations are referred to Sea Level Datum of 1929
  3. Aerial Photography-12 May 1967
  4. Topography by Kelsh Stereo-Plotter - May 1967
  5. See Plates 7 & 8 for photographs of area

DAY USE AREA  
EDISON POINT



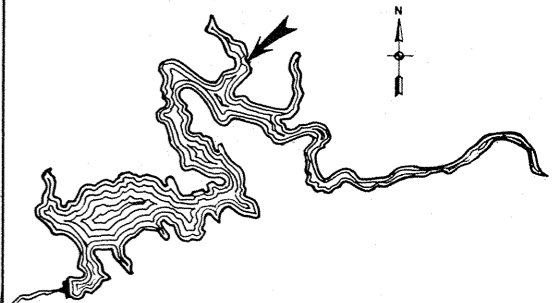
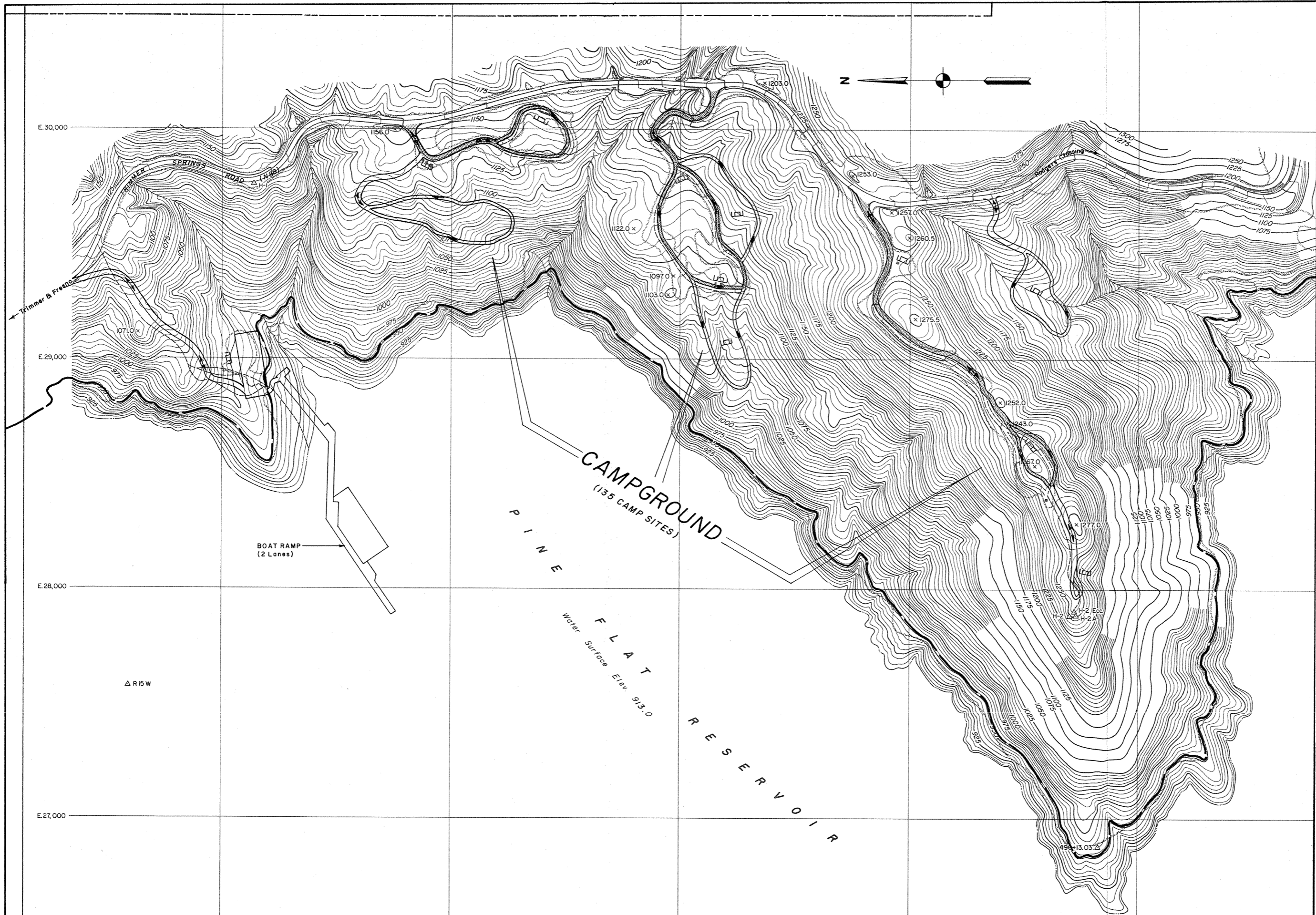
REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

DESIGNED BY: ARG J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: J.J.H.

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE  
MASTER PLAN  
TOPOGRAPHY  
FOR RECREATION AREAS

APPROVED: [Signature] DATE: SEPTEMBER 1976  
PREPARED UNDER THE DIRECTION OF: DONALD M. OSHEI  
SCALE: AS SHOWN | SPEC NO. | FILE NO. | SHEETS  
KI-2-13-681  
681/1 to 681/18 681/15  
PLATE 15



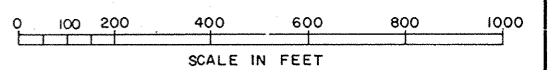
AREA LOCATION MAP

LEGEND

- Gross Pool Elev. 951.5 feet
- Project Boundary
- Immediate Phase Facilities
- Existing Facilities
- Restroom

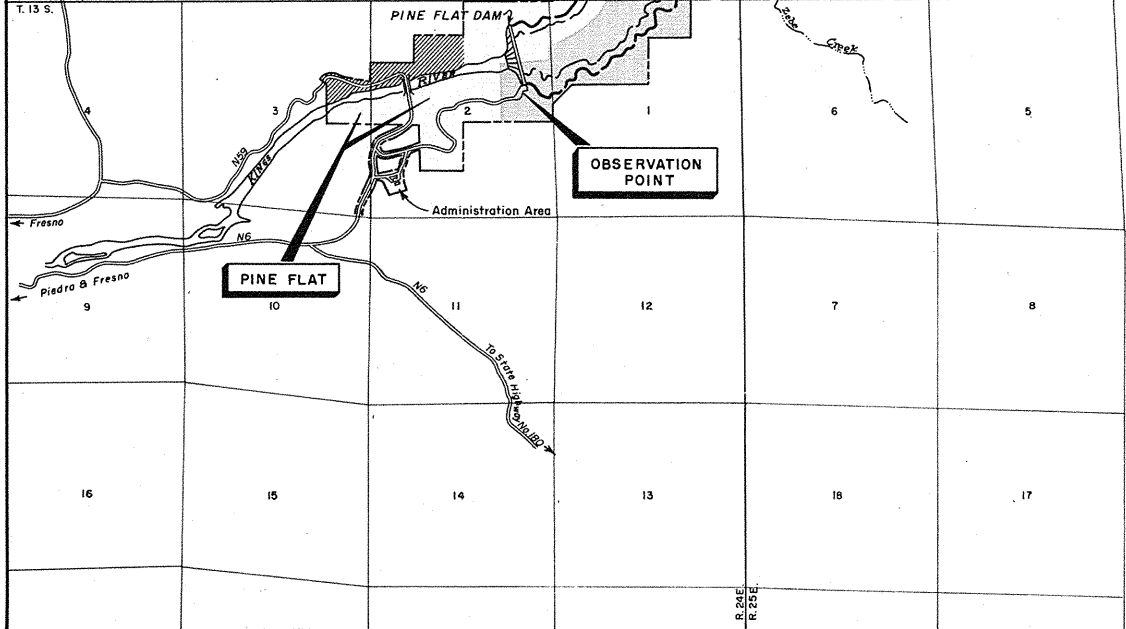
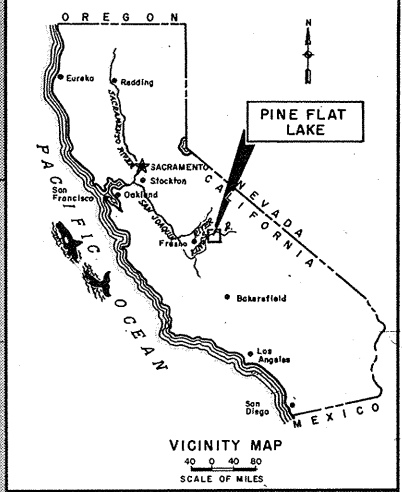
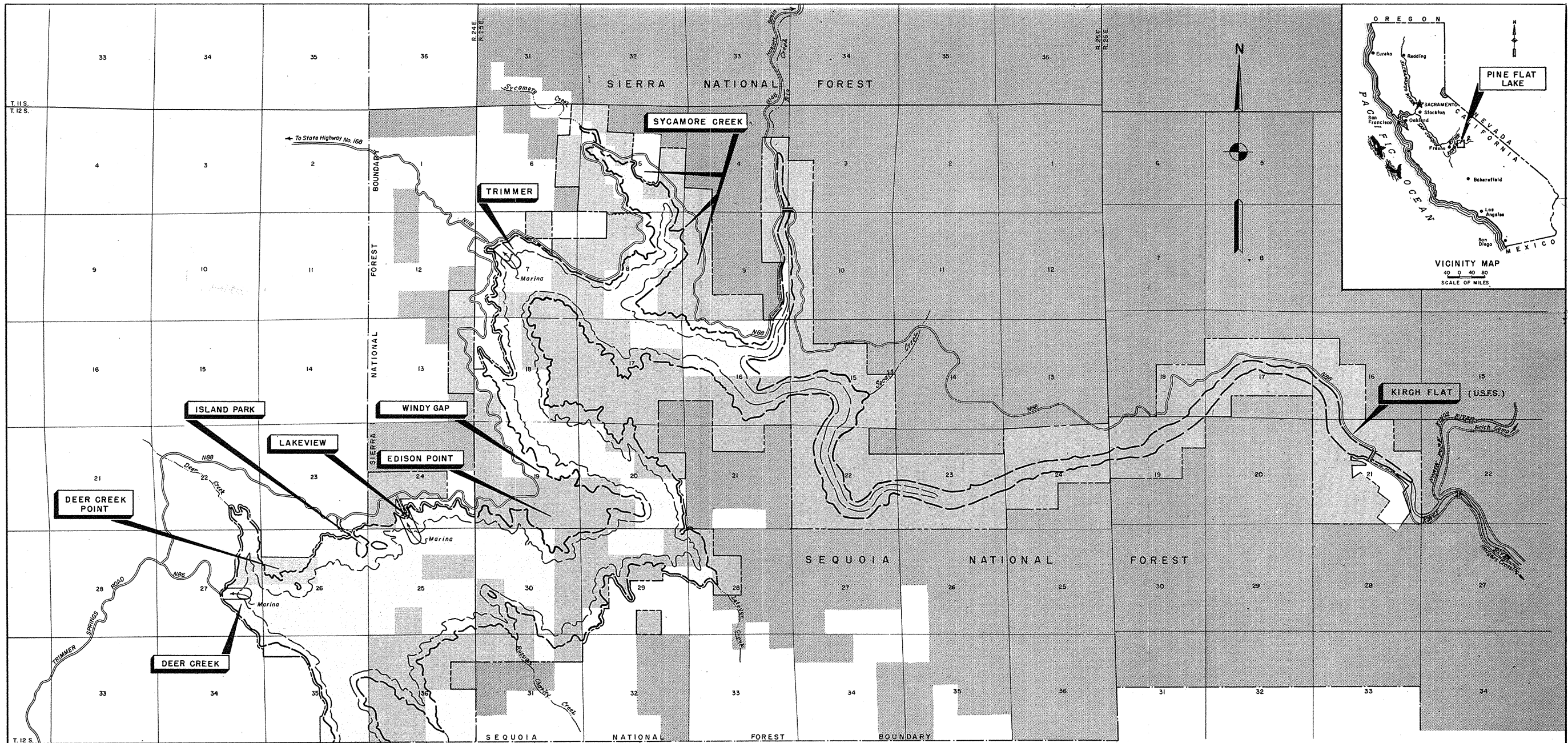
NOTES:

1. Aerial photography - 21 May 1967 (Pool Elev. 909.0 feet)
2. Existing pit type restrooms to be converted to flush.



DESIGNED BY ARG J.J.H.	DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA  KINGS RIVER, CALIFORNIA PINE FLAT LAKE MASTER PLAN  <b>TOPOGRAPHY</b> FOR RECREATION AREAS
DRAWN BY D.W.A.	
CHECKED BY J.J.H.	
PREPARED BY J.J.H.	
SUBMITTED BY <i>[Signature]</i>	
APPROVED BY <i>[Signature]</i>	DATE SEPTEMBER 1976
PREPARED UNDER THE DIRECTION OF DONALD M. O'SHEI	SCALE AS SHOWN FILE NO. K1-2-13-681 SHEETS 681/1 to 681/18 SHEET NO. 681/16

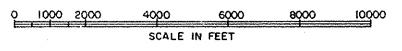




- LEGEND**
- Project Boundary
  - - - National Forest Boundary
  - Gross Pool - Elev. 951.5 feet
  - Normal Recreation Pool - Elev. 875.5 feet
  - == Roads
- LAND STATUS**
- Corps Acquired in Fee
  - ▨ Corps Acquired in Easement
  - ▩ Withdrawn National Forest (for Pine Flat Project)
  - ▧ Withdrawn Public Domain (for Pine Flat Project)
  - National Forest

1. Government lands amount to 13,284 acres within project boundary. Approximately 8,300 acres are withdrawn from the Sequoia and Sierra National Forests and approximately 400 acres are withdrawn from the public domain.

2. Government lands within project boundary include all lands under license agreement and all lands for which easements for spilling, construction, utilities or road rights-of-way have been obtained.



REVISION	DATE	DESCRIPTION	BY	BY

DESIGNED BY: J.J.H.  
 DRAWN BY: D.W.A.  
 CHECKED BY: J.J.H.  
 PREPARED BY: J.J.H.

DEPARTMENT OF THE ARMY  
 SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
 SACRAMENTO, CALIFORNIA

KINGS RIVER, CALIFORNIA  
 PINE FLAT LAKE

**MASTER PLAN**  
**EXISTING LAND STATUS**

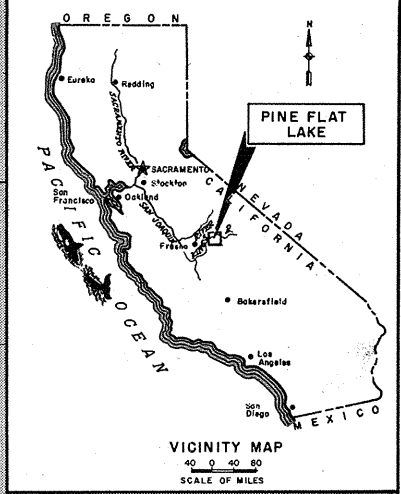
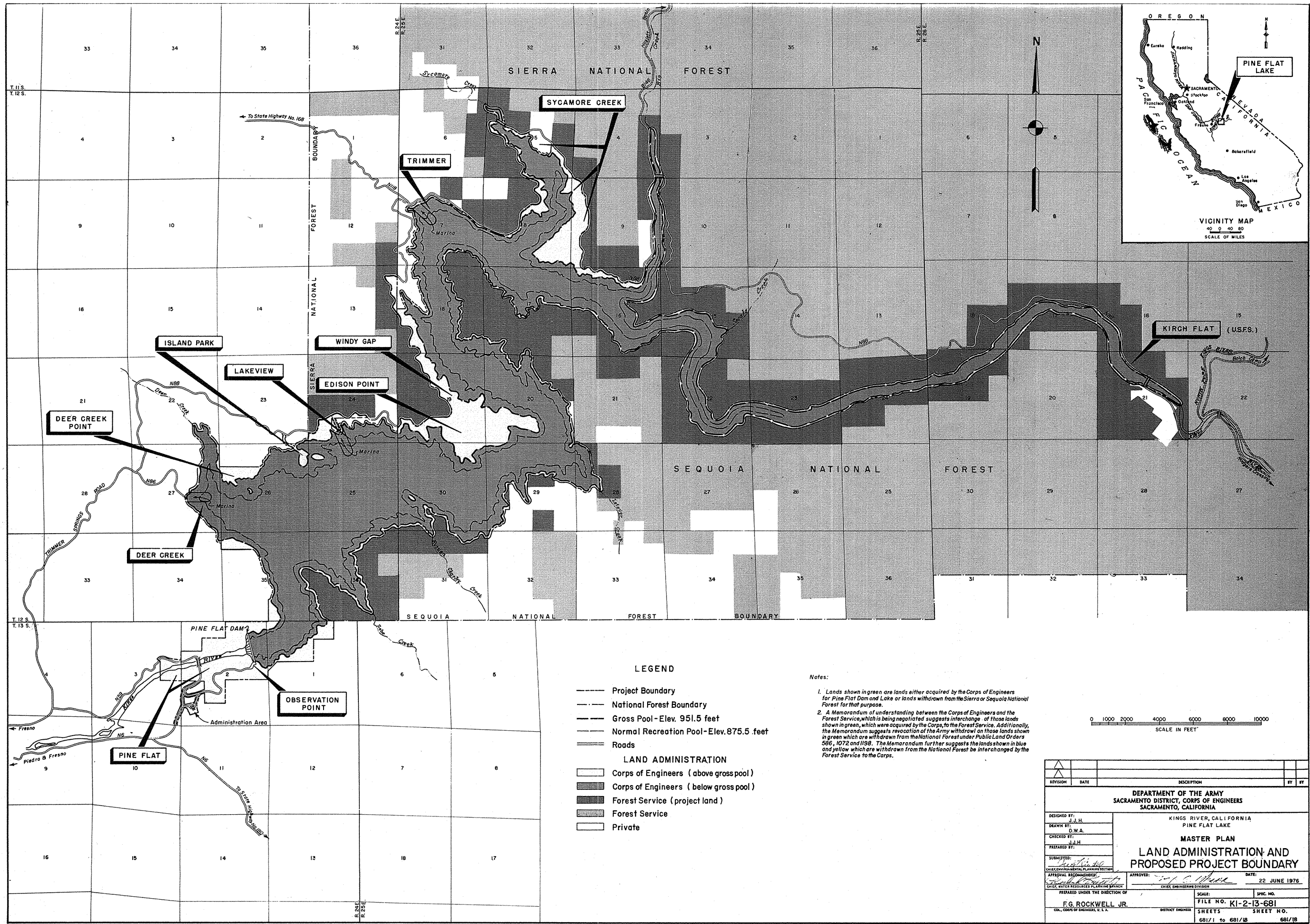
APPROVAL RECOMMENDED: *Donald M. Oshei*  
 CHIEF, CIVIL ENGINEERING SECTION

APPROVED: *Henry C. Whinn*  
 CHIEF, ENGINEERING DIVISION

DATE: 17 August 1976

PREPARED UNDER THE DIRECTION OF  
**DONALD M. OSHEI**  
 COL., CORPS OF ENGINEERS, U. S. A.

SCALE: \_\_\_\_\_ SPEC. NO. \_\_\_\_\_  
 FILE NO. KI-2-13-681  
 SHEETS 681/1 TO 681/18 SHEET NO. 681/17



- LEGEND**
- Project Boundary
  - National Forest Boundary
  - Gross Pool - Elev. 951.5 feet
  - Normal Recreation Pool - Elev. 875.5 feet
  - Roads
- LAND ADMINISTRATION**
- Corps of Engineers ( above gross pool )
  - Corps of Engineers ( below gross pool )
  - Forest Service ( project land )
  - Forest Service
  - Private

**Notes:**

1. Lands shown in green are lands either acquired by the Corps of Engineers for Pine Flat Dam and Lake or lands withdrawn from the Sierra or Sequoia National Forest for that purpose.
2. A Memorandum of Understanding between the Corps of Engineers and the Forest Service, which is being negotiated, suggests interchange of those lands shown in green, which were acquired by the Corps, to the Forest Service. Additionally, the Memorandum suggests revocation of the Army withdrawal on those lands shown in green which are withdrawn from the National Forest under Public Land Orders 586, 1072 and 1198. The Memorandum further suggests the lands shown in blue and yellow which are withdrawn from the National Forest be interchanged by the Forest Service to the Corps.



REVISION	DATE	DESCRIPTION	BY	BY

**DEPARTMENT OF THE ARMY**  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE

**MASTER PLAN**  
**LAND ADMINISTRATION AND**  
**PROPOSED PROJECT BOUNDARY**

DESIGNED BY: J.J.H.	DATE: 22 JUNE 1975
DRAWN BY: D.W.A.	
CHECKED BY: J.J.H.	
PREPARED BY: J.J.H.	
SUBMITTED: [Signature]	
APPROVED: [Signature]	
CHIEF, WATER RESOURCES PLANNING DIVISION	CHIEF, ENGINEERING DIVISION
PREPARED UNDER THE DIRECTION OF	
F.G. ROCKWELL JR.	
COL., CORPS OF ENGINEERS, U. S. A.	
FILE NO. K1-2-13-681	SPEC. NO.
SHEETS	SHEET NO.
681/1 to 681/18	681/18

Appendices A through E have been approved by SPD and are available in the Sacramento District files.

LETTER SUPPLEMENT  
TO 1957 MASTER PLAN  
(ROUGH FISH BARRIER)

F

X

I

D

Z

E

P

R

A

SPKED-W

23 April 1975

SUBJECT: Pine Flat Lake, Kings River, California - Letter Supplement  
No. 1 to Master Plan for Reservoir Management and Public  
Use Development

Division Engineer, South Pacific

1. Purpose. - The purpose of this letter supplement is to describe a proposal for a nongame fish barrier on the Kings River near the upstream limit of Pine Flat Lake, and to discuss the proposal in sufficient detail to permit proceeding with preparation of plans and specifications for construction when funds are available.
2. References. - Previously approved design memorandums are listed on Inclosure 1 and the master plan was approved by OCE on 3 July 1957. Four additional design memorandums or supplements describing recreation improvements have also been approved. The master plan is currently being updated and will include the proposed nongame fish barrier if approved. The master plan revisions are scheduled to be completed January 1976.
3. Basis for the proposed development. - The California Department of Fish and Game has investigated fishery resources of Kings River and Pine Flat Lake. The Department has concluded that a reduction in competing nongame fish is essential in this stream and lake system in order to upgrade the declining game fish resource. Alternatives which have been examined are game fish management practices such as planting, seasons and creel limits; and nongame fish reduction which could be accomplished by poisonous chemicals to produce short-term results or by construction of a permanent barrier to achieve long-term results. The barrier would prevent upstream migration of the nongame fish but, in general, would permit movements of the game fish since they are more efficient swimmers. Provisions would be made in the design for a portable fish trap. Since the nongame fish migrate from the lake to spawn in the river system, interfering with this movement will effectively reduce the nongame fish population which competes with the game fish for food, space and other life history requirements in the lake and river. The Department of Fish

SPKED-W

23 April 1975

SUBJECT: Pine Flat Lake, Kings River, California - Letter Supplement  
No. 1 to Master Plan for Reservoir Management and Public Use  
Development

and Game has concluded that the barrier would be a useful and desirable fishery improvement and desires to participate in the cost of development and to assume operation and maintenance of the completed facility. As explained below, Sacramento District personnel have investigated the feasibility of such a barrier and concluded that it is in the Federal interest to provide the barrier as a fishery enhancement feature of the Pine Flat Lake and Kings River, California, project. Also, the Kings River and Pine Flat Lake are popular fishery and related recreation resources, and there is a strong local (Statewide) demand to improve the declining quality of these resources, as evidenced by several letters from citizen organizations as discussed below.

4. The problem. - Prior to construction of Pine Flat Dam, the Kings River, according to the California Department of Fish and Game, was acclaimed as one of the finest trout fishing streams in California. Since construction of Pine Flat and other dams, the trout population upstream from Pine Flat dam has deteriorated and the nongame fish population has increased. The Department of Fish and Game estimated in 1966 that nongame fish comprised between 70 and 87 percent of the total fish population in the river above Pine Flat Lake. The most troublesome fish appears to be the Sacramento squawfish. Squawfish migrate upstream from Pine Flat Lake to spawn, competing with trout for food and feeding on newly hatched trout. Construction of a barrier at the upstream limit of Pine Flat Lake to prevent nongame fish migration would enhance the establishment of a trout fishery through a decrease in the nongame fish population of Kings River and Pine Flat Lake.

5. Plan of improvement. - The proposed barrier is described in the inclosed Study Summary dated 23 April 1974 (Inclosure 2). Although two alternative barrier sites are described, the proposed site is the one located downstream of the North Fork (lower site). The type of barrier proposed is a reinforced concrete structure that would create a height differential of three feet between upstream and downstream water surfaces and a velocity sufficient to prevent the slower swimming nongame fish from ascending. It is estimated that the barrier would be effective for control of nongame fish for flows up to 20,000 cubic feet per second (50-yr flow during spawning season). The structure would be designed to withstand a flow of 125,000 c.f.s. which is the estimated 100-year rainflood flow.

SPKED-W

23 April 1975

SUBJECT: Pine Flat Lake, Kings River, California - Letter Supplement  
No. 1 to Master Plan for Reservoir Management and Public Use  
Development

6. Cost. - The cost of constructing the barrier is currently estimated at \$550,000, and the cost of operation and maintenance is estimated at \$2,000 annually. The current estimate of first cost is based on updating the July 1973 cost estimate contained in Inclosure 2 to July 1975 prices. This cost includes all construction, engineering, design, supervision, and administration costs and a 25 percent contingency allowance. Details of the cost estimate are presented in Inclosure 3 and are based on office studies without benefit of detailed on-site investigations.

7. Construction schedule. - It is anticipated that the development proposed herein could be completed in one construction season.

8. Funding. - The budget submittal for FY 1977 Code 710 program will include request for funds necessary to complete the Federal share of costs for the nongame fish barrier.

9. Coordination, local support and cost-sharing. - The U.S. Forest Service and the U.S. Fish and Wildlife Service are the two principal Federal agencies involved, and they have expressed concurrence with the barrier proposal (Inclosure 4 and 5). The Forest Service commented on the need to consider a Memorandum of Understanding and a possible conflict with State law prohibiting construction of impoundments on the Kings River above Pine Flat Lake, as well as on fishery improvement aspects. Since the lower site is the one proposed, no separate Memorandum of Understanding with the Forest Service is necessary as the lands on which the barrier would be constructed are within the boundaries of the Pine Flat Lake project presently withdrawn from the National Forest. No conflict is foreseen with Section 5093.65 of the California State Public Resources Code since no impoundment is to be constructed. The fishery improvement aspects appear sufficiently clarified in the inclosed information from the Federal and State fish and wildlife agencies.

10. During coordination of studies for the nongame fish barrier, support has been received from governmental agencies and from citizen groups. The California Department of Fish and Game has stated its commitment to vigorously pursue the necessary approvals and State authorization for participating in the fish barrier construction at the appropriate time (Inclosure 6 and 7). The approvals and authorization would include payment of 25 percent of the construction cost, estimated

SPKED-W

23 April 1975

SUBJECT: Pine Flat Lake, Kings River, California - Letter Supplement  
No. 1 to Master Plan for Reservoir Management and Public Use  
Development

at about \$138,000, and assumption of 100 percent of the operation and maintenance cost, estimated at \$2,000 annually, pursuant to provisions of P.L. 89-72, as amended. In addition to the State's letter of intent to participate, letters of support were received from citizen organizations, as listed on Inclosure 8.

11. Discussion. - The provisions of Public Law 89-72, the Federal Water Project Recreation Act, did not apply to the Pine Flat project, which was authorized (and completed) prior to the date of the Act. However the provisions of the Act requiring 50-50 cost-sharing in the separable first cost and non-Federal assumption of all operation and maintenance costs for recreation and fish and wildlife improvements have been administratively applied to future improvements of this type at the project, as a matter of policy. Section 77, Public Law 93-251, amends P.L. 89-72 to require a local contribution of only 25% of the first cost for fish and wildlife enhancement of the fish resource itself, it is presumed that the 75-25 cost-sharing would apply. The Department of Fish and Game has expressed intent (Inclosure 6) to furnish or make arrangements to furnish 25 percent of the construction cost, together with all of the operation and maintenance costs.

12. Recommendations. -

a. It is recommended that the rough fish barrier described herein be approved for construction at a total estimated cost of \$550,000.

b. It is recommended that the proposal be cost-shared on the basis of 75 percent Federal and 25 percent non-Federal for the first costs of construction, provided maintenance and operation of the facility is accomplished by a non-Federal entity.

8 Incl

1. List of approved DM
2. Study Summary - Wtr Res Plng Br SPK
3. Cost Estimate
4. Ltr from US Forest Service -  
6 Jun 74
5. Ltr from US Fish and Wildlife  
Service - 4 Jun 74
6. Ltr from Calif Dept of Fish  
and Game - 17 Dec 74
7. Ltr from Calif Dept of Fish  
and Game - 3 Jan 75
8. List of Citizen Groups Ltrs

F. G. ROCKWELL, JR.  
Colonel, CE  
District Engineer



PINE FLAT RESERVOIR  
KINGS RIVER, CALIFORNIA

DESIGN MEMORANDUMS

No.	Date	Title	Approved
VI	15 Jan 46	Malaria Control - DPR, Part VI	OCE, 15 Feb 46
I	1 Apr 47	Hydrology - DPR, Part I	OCE, 27 Oct 48
II	25 Aug 47	Utility Revisions - DPR, Part II	OCE, 28 Nov 47
IV	15 Sep 47	Dam and Appurtenances - DPR, Part IV	OCE, 2 Dec 48
VII	25 Aug 48	Recreation Facilities - DPR, Part VII	OCE, 14 Oct 48
VIII	1 Apr 49	Fish Facilities - DPR, Part VIII	OCE, 26 May 49
IX	23 Mar 50	Reservoir Clearing - DPR, Part IX	Returned for revision
1	5 Mar 53 (rev 14 Apr 53)	Erosion of Sluice Conduits	OCE, 8 May 53
2	3 Aug 53 1 Mar 57	Interim Management Regulations Memorandum of Agreement between Department of Army and Depart- ment of Agriculture regarding Administration of Pine Flat Reservoir, Kings River, Calif- ornia, and attached Master Plan for Reservoir Management Plan Public Use Development	OCE, 27 Nov 53 OCE, 3 Jul 57
3	20 Apr 59	General Design (Kings River Channel Improvement)	SPD, 20 May 59
4	19 Feb 60	Public-Use Development - Island Park Recreation Area	OCE, 8 Apr 60
5	8 Oct 62	Public-Use Development - Additions to Island Park and Deer Creek Recreation Areas	SPD, 31 Oct 62
	27 Dec 62	Supplement No. 1 - Improvements Under Public Works Acceleration Act of 1962	OCE, 25 Feb 63
	27 Jun 63	Supplement No. 2 - Recreational Development of Trimmer View and Fresno County Park Areas	OCE, 26 Sep 63

## STUDY SUMMARY

SUBJECT: Reconnaissance Appraisal of Rough Fish Barrier on Kings River

1. Purpose. - The following is a summary of a reconnaissance study to determine the feasibility of constructing a rough fish barrier on the Kings River above Pine Flat Lake. The study was made under the authority of the San Joaquin River Basin Investigation.
2. Description of area. - The Kings River is located in the central portion of California and drains an area of about 1,700 square miles of the Sierra Nevada above Pine Flat Lake. Pine Flat Dam was constructed by the Corps of Engineers in 1954, and is operated essentially for flood control and irrigation. The project is also used extensively for recreation and to reregulate power releases from upstream power projects. Refer to plate I for a general map of the basin.
3. The problem. - Prior to construction of Pine Flat Dam, the Kings River, according to the California Department of Fish and Game, was acclaimed as one of the finest trout fishing streams in California. Since construction of the dam, the trout fishery upstream from the dam has deteriorated due to an increase in the non-game fish population and an associated decrease in trout populations. It was estimated in 1966 that rough fish comprised between 70 and 87 percent of the total fish population in the river above Pine Flat Lake. In order to maintain the remaining trout population, current fishing regulations along portions of the Kings River above Pine Flat Lake require the use of artificial flies only and limit the catch to three fish.

The most troublesome fish appears to be the Sacramento squawfish. The squawfish migrate upstream from Pine Flat Lake to spawn; they compete directly with trout for food and feed heavily on newly hatched trout and on planted trout. The river above Pine Flat Lake still has the potential to be an outstanding wild trout fishery. Construction of a rough fish barrier upstream from Pine Flat to prevent rough fish migration would enable the establishment of a good trout fishery. By preventing rough fish from spawning upstream, a fish barrier would also cause a decrease in the rough fish population in Pine Flat Lake.

4. Desires of local interests. -

- a. The California Department of Fish and Game, by letter dated 4 October 1972, asked for Corps assistance with the construction of a rough fish barrier on the Kings River (attachment 1).

b. By letter dated 18 November 1972, California Trout requested that the Corps prepare a feasibility study of a rough fish barrier on the Kings River. This organization has offered to participate financially in the project.

c. It is known that the Fly Fishermen for Conservation, Inc. of Fresno are vitally interested in maintaining the Upper Kings River in its uncontrolled state and in improving a wild trout fishery through the construction of a rough fish barrier.

d. Substantial interest has been generated by environmental groups to designate the Kings River above Pine Flat Dam as a wild and scenic river. A bill introduced in the State Senate last year was passed and signed into law and prohibits the construction of a dam on the Kings River until 1979. However, according to the Department of Fish and Game this law would not preclude construction of a rough fish barrier.

5. Other studies. -

a. In 1973 the Sacramento District completed very preliminary studies of a possible dam and reservoir on main Kings River at the Rodgers Crossing site. The site is located about one-half mile upstream from the confluence with the North Fork. The potential project would be for power generation, irrigation, flood control, and recreation purposes and would inundate a substantial portion of the Upper Kings River that would benefit from the construction of a rough fish barrier. These studies indicated that the Rodgers Crossing project would not qualify for Federal development at this time.

b. In early 1974 the Kings River Conservation District applied to the Federal Power Commission for a preliminary permit to develop hydroelectric power at several sites on the Kings River. One of the sites is located at Rodgers Crossing. The Conservation District's criteria and evaluation of a different project configuration may result in a project that is suitable for local development. The other sites in the application would not affect a rough fish barrier above Pine Flat Lake.

6. Barrier sites and types investigated. - Two possible rough fish barrier sites have been studied. The first site, or lower site, is located on the Kings River below the confluence with the North Fork Kings River. The second, or upper site, is located upstream from the confluence with the North Fork. Refer to plate II.

The type of barrier envisioned for these sites is a reinforced concrete structure that creates a height differential of three feet between the upstream and downstream water surfaces. Three feet is sufficient to prohibit the passage of rough fish. The barrier will be effective for flows up to 20,000 c.f.s. (50-year flow during spawning season) and will be able to safely pass the 100-year rain flood flow of 125,000 c.f.s.

Other types of physical barriers were considered but did not appear to be feasible or practical to serve as permanent structures because of stability problems associated with high flows and large debris deposits. A velocity type barrier, at the location shown on plate II, was also given some consideration; however, detailed estimates were not prepared due to a lack of adequate topographical information. In addition, an electric barrier was also considered but cost and benefit estimates were not prepared because of questions regarding its effectiveness.

7. Environmental considerations. - There do not appear to be any environmental problems associated with a rough fish barrier other than some temporary damage that may result during construction. However, additional consideration should be given to the environmental aspects of a fish barrier prior to construction of such a project.

8. Costs. - First and annual cost estimates for concrete fish barriers at both the upper and lower sites were prepared. These costs are based on July 1973 prices and include all construction, engineering, design, supervision, and administration costs and a 25 percent contingency allowance. The Department of Fish and Game has indicated that a fish trap at the barrier may be desirable. Informal discussions with members of the Department's staff indicate that if a fish trap is found to be needed, a portable facility would probably be more suitable than a permanent installation. No cost is included for a fish trap; if required, such cost is expected to be quite nominal. Land costs are not included because both barrier sites are on National Forest Lands.

The Department of Fish and Game has given consideration to chemically treating the river upstream from the barrier after it is constructed to eradicate the existing rough fish population and allow the establishment of a trout fishery. At this time, the Department has not decided whether such a program is necessary; however, costs for the work have been included in the cost estimate.

For this study we have considered the possibility of a dam being constructed at the Rodgers Crossing site in 1990. If the dam is not constructed, a fish barrier at either the upper or lower site would be effective throughout the life of the barrier (considered to be 50 years for purposes of analysis). Accordingly, for this condition, annual costs are based on a 50-year amortization period. If a dam is constructed at Rodgers Crossing, a fish barrier at the upper site would be rendered useless after the year 1990, while a barrier at the lower site would still provide benefits to the North Fork. Accordingly, for this condition (dam at Rodgers Crossing) annual costs for the upper and lower sites are based on amortization periods of 10 and 50 years, respectively. Sketches of the barriers are shown on plates III and IV.

First and annual costs are summarized below:

Item	Without Rodgers Crossing		With Rodgers Crossing	
	Upper Site	Lower Site	Upper Site	Lower Site
First Cost	\$299,000	\$495,000	\$299,000	\$495,000
Annual Cost	\$ 22,700 <u>1/</u>	\$ 37,500 <u>1/</u>	\$ 43,700 <u>2/</u>	\$ 37,500 <u>1/</u>

1/ 50-year period of analysis

2/ 10-year period of analysis

9. Benefits. - Benefits that would accrue to a rough fish barrier consist of the increased fishing use attributable to the elimination of rough fish and consequent increase in trout populations. The benefit estimates were prepared from information supplied by the Department of Fish and Game (attachments 2 and 3). The following data and assumptions were utilized in preparing these estimates:

a. The Department of Fish and Game has been negotiating with the power company (PG&E) operating hydroelectric projects on the North Fork drainage for the establishment of minimum fish flows on the North Fork. If these flows are established, the Department plans to initiate a program of planting catchable trout in the North Fork. This program would substantially increase fishing use of the North Fork above that currently being experienced. This program was considered to be a preproject condition since current indications are that it will be initiated.

b. A wild trout fishery would be established on the main Kings River. No plantings would be made. If chemical treatment is required some of the existing wild trout would be removed prior to chemical treatment and then replanted to save this particular strain of trout.

c. The lower barrier is expected to improve the fishery on about 4.5 miles of the North Fork and 16 miles of the main Kings River. The upper barrier would improve the fishery on about 15 miles of the main Kings River and would have no effect on the North Fork fishery. Use estimates for both project and preproject conditions, prepared by the Department of Fish and Game and based on 1973 conditions, are tabulated below. The estimates do not account for any increased use of Pine Flat Lake that may result from a rough fish barrier.

Item	Fishing Use (Angler-Days)	
	North Fork	Main Kings River
Project conditions	10,000	27,500
Preproject conditions	<u>6,400</u>	<u>800</u>
Increase	3,600	26,700

The above use estimates are expected to increase approximately 41 percent by the year 1990 according to the Department. This increase assumes fishing use will increase at the same rate as the population of California. No increase in use was assumed after the year 1990.

d. Fishing use on the main Kings River and on the North Fork was evaluated at \$3.60 and \$3.00 per angler day, respectively. The higher unit value for the main Kings River as compared to the North Fork is attributable to the better fishing experience associated with the wild trout fishery.

e. Average annual equivalent fishery benefits for a 50-year period were computed from the above use estimates and unit values. A discount rate of 6-7/8 percent was used, and 1980 was assumed to be the base year. To account for the possibility of a dam at Rodgers Crossing, it was assumed that construction of such a dam would nullify fish barrier benefits on the main Kings River by 1990. Without a dam at Rodgers Crossing benefits would accrue to a barrier at both the lower and upper sites throughout its lifetime (assumed to be 50 years).

With a dam at Rodgers Crossing, benefits to the upper site would accrue for only 10 years, while benefits to the lower site would accrue over its 50-year life, but would be reduced after 10 years due to the construction of Rodgers Crossing. Average annual equivalent benefits for each condition investigated are summarized on the following page.

Item	: Without Rodgers Crossing :		: With Rodgers Crossing	
	: Upper :	Lower :	Upper :	Lower
	: Site :	Site	: Site	: Site

Average Annual  
 Equivalent Benefits \$130,000 1/ \$145,000 1/ \$124,000 2/ \$77,300 1/

1/ 50-year period of analysis  
2/ 10-year period of analysis

10. Economic feasibility. - The average annual costs, average annual benefits, and benefit-cost ratios for each condition investigated are tabulated below.

Item	:Without Rodgers Crossing:		:With Rodgers Crossing	
	: Upper :	Lower :	Upper :	Lower
	: site 1/ :	site 1/ :	site 2/ :	site 1/
Average annual cost	\$ 22,700	\$ 37,500	\$ 43,700	\$ 37,500
Average annual benefit	130,000	145,000	124,000	77,300
Excess benefits	107,300	107,500	80,300	39,800
Benefit-cost ratio	5.7	3.9	2.8	2.1

1/ 50-year period of analysis  
2/ 10-year period of analysis

It should be noted that the excess annual benefits of \$80,300 creditable to the upper site over a 10-year period is equivalent to \$40,500 over a 50-year period using an interest rate of 6-7/8 percent. Construction of a fish barrier at either the upper or lower site appears to be economically feasible even if Rodgers Crossing dam were to be built by 1990 (assuming fish barrier to be built by 1980).

11. Merits of upper and lower sites. - Using a common period of analysis, the excess benefits creditable to the upper site with Rodgers Crossing are only slightly more than those creditable to the lower site (\$45,000 vs. \$39,800). Without Rodgers Crossing, the upper site is about the same as the lower site from the standpoint of excess benefits (\$107,500 vs. \$107,300). The upper site has the advantage of achieving about the same excess benefits as the lower site with the expenditure of less funds (greater B/C ratio). However, since there is a great deal of uncertainty about Rodgers Crossing Dam (could be built as early as 1979 in accordance

with the wild and scenic river act), it is believed that the lower site is the more desirable one since it benefits both the North Fork and the main Kings River.

Attachments

1. U.S. Dept of Fish & Game  
Ltr dtd 4 October 1972
2. U.S. Dept of Fish & Game  
Ltr dtd 3 April 1973
3. U.S. Dept of Fish & Game  
Ltr dtd 21 September 1973
4. Plate I
5. Plate II
6. Plate III
7. Plate IV

WATER RESOURCES PLANNING BRANCH  
SACRAMENTO DISTRICT CORPS OF ENGINEERS



## DEPARTMENT OF FISH AND GAME

16 NINTH STREET  
SACRAMENTO, CALIFORNIA 95814

G. Ray Arnett, Director

October 4, 1972

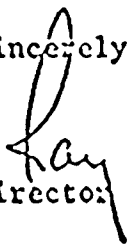
Col. James Donovan  
Corps of Engineers  
600 Capitol Mall  
Sacramento, CA 95814

We see an opportunity, Jim---

---for a desirable project on the Kings River above Pine Flat Reservoir which we would like to explore with you. The project would involve a rough fish barrier in the river at some appropriate location above Pine Flat dam. The purpose of the barrier would be to shift the fish population upstream from primarily rough fish to primarily wild trout. The barrier on lower Hat Creek has been notably successful and we think we can do the same thing on the Kings, on a much larger scale.

It occurred to us that the Corps might be able to assist us with this project, since it involves habitat improvement of an area upstream from a large Federal dam. If you are interested in exploring this matter with us, please let me know so we can arrange a meeting to discuss it at some mutually convenient time.

Sincerely yours

  
Director

DEPARTMENT OF FISH AND GAME

REGION 4

1234 East Shaw Avenue  
Fresno, California 93710

April 3, 1973

Colonel James C. Donovan  
District Engineer  
Sacramento District, Corps of Engineers  
650 Capitol Mall  
Sacramento, California 95814

Dear Colonel Donovan:

On January 8, 1973, four representatives from our department and I met with members of your staff to discuss the proposed fish barrier on the Kings River above Pine Flat Reservoir. Several questions were raised by your staff at this meeting and it is my purpose in this letter to answer these questions.

One question concerned pre and post project (Pine Flat) fishery conditions. Prior to Pine Flat Dam the Kings River above Trimmer was described as a large rubble transition stream with excellent pools and shelter for trout. It was acclaimed as one of the finest trout streams in California. From the site of the Pine Flat Dam to twenty miles above, there was good fishing for smallmouth bass, rainbow trout and brown trout. Trout fishing improved further upstream. King salmon migrated up the Kings River as far as Trimmer until about 1942. The trout fishery was maintained both by natural propagation and the stocking of fingerling and catchable trout. The river from the present dam site to the old Kings River Hatchery (located 1/2 mile below the confluence of the North Fork) was completely accessible and received about 10,000 angler days per year.

The forty-eight miles of the Kings River below the dam contained enough water throughout the year to support a permanent fishery. It was described as a large, rubble, low elevation stream with abundant pools, riffles, and cover for a variety of fishlife. Rainbow trout, green sunfish, smallmouth bass, largemouth bass, bluegill, brown bullhead, and non-game fish were present in this section of the river. Fish also were found below Highway 99, although the river dried up occasionally. Approximately 10,000 angler days annually were expended on the river from the present dam site to Highway 180.

The annual fishery values of the area affected by Pine Flat Reservoir were estimated to be approximately \$20,800. The biggest loss was in the Kings River above the dam site (Table 1).

TABLE 1.

Pre-Project Annual Fishery Value of the Kings River  
and Tributaries to be Affected by Pine Flat Reservoir

<u>Stream</u>	<u>Miles</u>	<u>Value (\$)</u>
Above the Dam		
Kings River	19	\$12,550
Sycamore Creek	3	450
Big Creek	2	600
Below the Dam		
Kings River	48	7,200
	—	—
Totals	72	\$20,800

In addition to the effect on fishing in 72 miles of streams, the Department and the U. S. Fish and Wildlife Service were concerned about the lack of a minimum pool in Pine Flat Reservoir, the extreme fluctuation, lack of littoral area, the competition of warmwater game fish and non-game fish with trout, and the flow release schedule below Pine Flat Dam.

Fishing is considered fair in Pine Flat Reservoir. Rainbow trout, smallmouth bass, largemouth bass, green sunfish, bluegill, black crappie, brown bullheads, white catfish, channel catfish, western suckers and Sacramento squawfish make up the catch. The rainbow trout fishery has declined most likely because of the abundance of non-game fish (suckers and squawfish). Trout now represent less than one percent of the catch. The smallmouth bass population has declined but may increase in the future as habitat conditions change. Kokanee salmon have been introduced but are found rarely in the catch. For those who know the lake, largemouth bass, white catfish and black crappie fishing is very good. Threadfin shad, golden shiners, and hitch provide forage for the piscivorous species. The angler use is approximately 30,000 angler days per year.

The stream above Pine Flat Reservoir has been adversely affected by construction of the dam. Non-game fish (which were estimated to comprise 70-87 percent of the total fish population in 1966) use the river for spawning and compete with the resident trout. Approximately 8,000 angler days annually are expended on the stream from the head of the reservoir to the mouth of the North Fork.

Another question concerned the types of barriers that might be effective. There are several basic types of fish barriers. One type is an actual physical barrier that is placed in the river and fish migration is prevented by either the height of the structure or rapid water velocities or both.

On the Kings River, the main groups of fish that we wish to prevent from migrating are cyprinids (squawfish, carp) and catostomids (suckers). Maximum swimming speeds of these fish are approximately 10-15 feet per second (short duration

only - about 10 seconds) and their jumping ability is in the range of 2-3 feet maximum. Thus, a barrier would have to produce water velocities in excess of 15 fps at all flow conditions and/or be over 3 feet above the downstream water elevation to prevent migration of these fishes.

There are many different materials which can be used for constructing this type of barrier such as steel pile-timber pickets, timber pile-timber pickets, timber box crib-timber pickets, reinforced concrete-steel pickets, gabions and so on. Obviously, initial construction and maintenance costs will vary widely depending upon materials. Barriers which utilize crib type structures have a relatively low initial cost but we understand that maintenance costs are about \$10 per linear foot per year. On the other hand, concrete and/or steel type structures have a high initial cost but low maintenance costs.

It may also be possible to incorporate a fish trap into the design of the aforementioned barriers. This trap could be used seasonally to eliminate migrating undesirable species and to encourage upstream migration of salmonids. However, studies planned for this year on the upper Kings River should give us adequate information to determine whether a trap would be a necessary or desirable addition to the barrier.

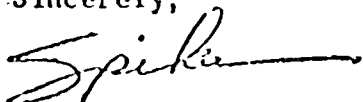
A second type of barrier is the electric fence. The advantages of this type are simplicity of construction and low cost of installation, however, a source of power is required and this could add considerably to the cost. Furthermore, finding an ideal site location (an irregular bottom with boulders must be avoided) or correcting faults at a site could also add to the cost. Another drawback is the danger to humans and animals, requiring sturdy fencing and a close guard to make the installation safe. Also, the uncertainty concerning the loss of fish moving downstream and the fact that maintenance problems can allow large numbers of non-game fish to move upstream are added factors which leads one to believe that this type of barrier would be unsuitable.

Yet another question dealt with the potential benefits of a barrier. The eight mile section above the barrier site averages about 50 feet in width. This would give a total surface area of about 220 acres. Conservatively estimating a total annual harvest of 8,800 pounds (40 pounds per acre), an annual fishery of between 20,500 - 34,500 angler days would be created.

If adequate flows are obtained on the North Fork, we could increase use in that section of the river to about 10,000 angler days per year by planting catchable trout. Thus, on the Middle Fork, the 20,500 - 34,500 angler days would result in a \$71,750 to \$120,750 annual benefit (\$3.50/angler day) and the 10,000 angler days on the North Fork would amount to a benefit of \$25,000 (\$2.50/angler day). The cost of planting catchables would be about \$5,000.

I hope this information will adequately answer the questions posed by your staff at our last meeting. I would also like to suggest that we meet on-site on May 1, 1973, to discuss the barrier. Please feel free to contact me or George Nokes or my staff if you have any questions concerning this matter.

Sincerely,



A. E. Naylor  
Regional Manager

cc: Chief of Operations, Inland Fisheries Branch, Environmental Services Branch

Region 4  
1234 East Shaw Avenue  
Fresno, California 93710

September 21, 1973

Colonel F. G. Rockwell, Jr.  
District Engineer  
U. S. Corps of Engineers - Sacramento District  
650 Capitol Mall  
Sacramento, California 95814

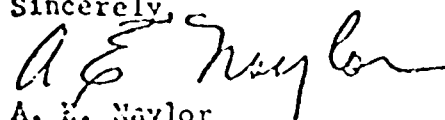
Dear Colonel Rockwell:

On May 1, 1973, George Nokes and Phil Hansen from our office met with three members of your staff to look for potential fish barrier sites on the Kings River above Pine Flat Reservoir. At that time your staff requested some additional information on projected use and potential benefits. We have prepared the following for your use.

Presently, the main Kings River receives approximately 800 angler days of use with a value of \$2,880 per year (\$3.60/angler day) and the North Fork Kings River receives about 200 angler days of use with a value of \$600 (\$3.00/angler day) per year. Assuming no major changes in habitat or fish populations occur, and assuming an increase in the angling use comparable to the increase of the population of California, we would expect these figures to increase approximately 41 percent by 1990. However, increased fishery flows are being negotiated for the North Fork that will affect use. If they are adopted, our Department would be able to stock approximately 20,000 catchable trout per year. We estimate that this would increase use on the North Fork to 6,400 angler days per year with an annual value of \$19,200 (\$3.00/angler day). We further estimate that if the fish barrier were built, use on the North Fork would increase to 10,000 angler days with a value of \$30,000 per year. This extra increase would be due to the stocking of more catchable trout and the contribution of native trout to the fishery. On the main river, we would expect improved fishing as a result of the barrier to increase use to 20,500 - 34,500 angler days per year. This would result in an estimated \$73,800 to \$124,200 (\$3.60/angler day) annual benefit.

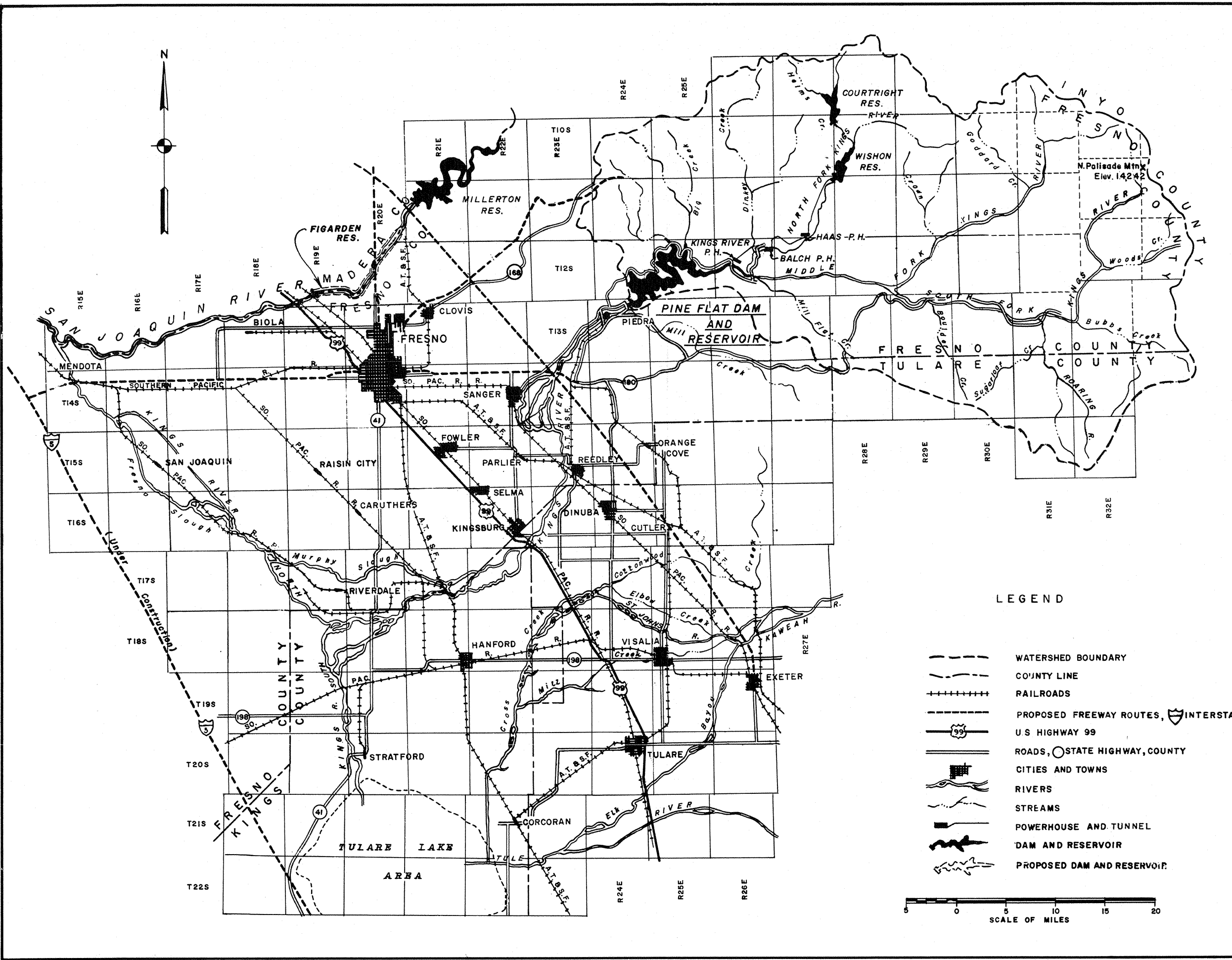
I hope this information will be of use to you in your analysis and report on the fish barrier. Please feel free to contact me or Phil Hansen if you have any further questions. Our office telephone number is (209) 222-3761.

Sincerely,



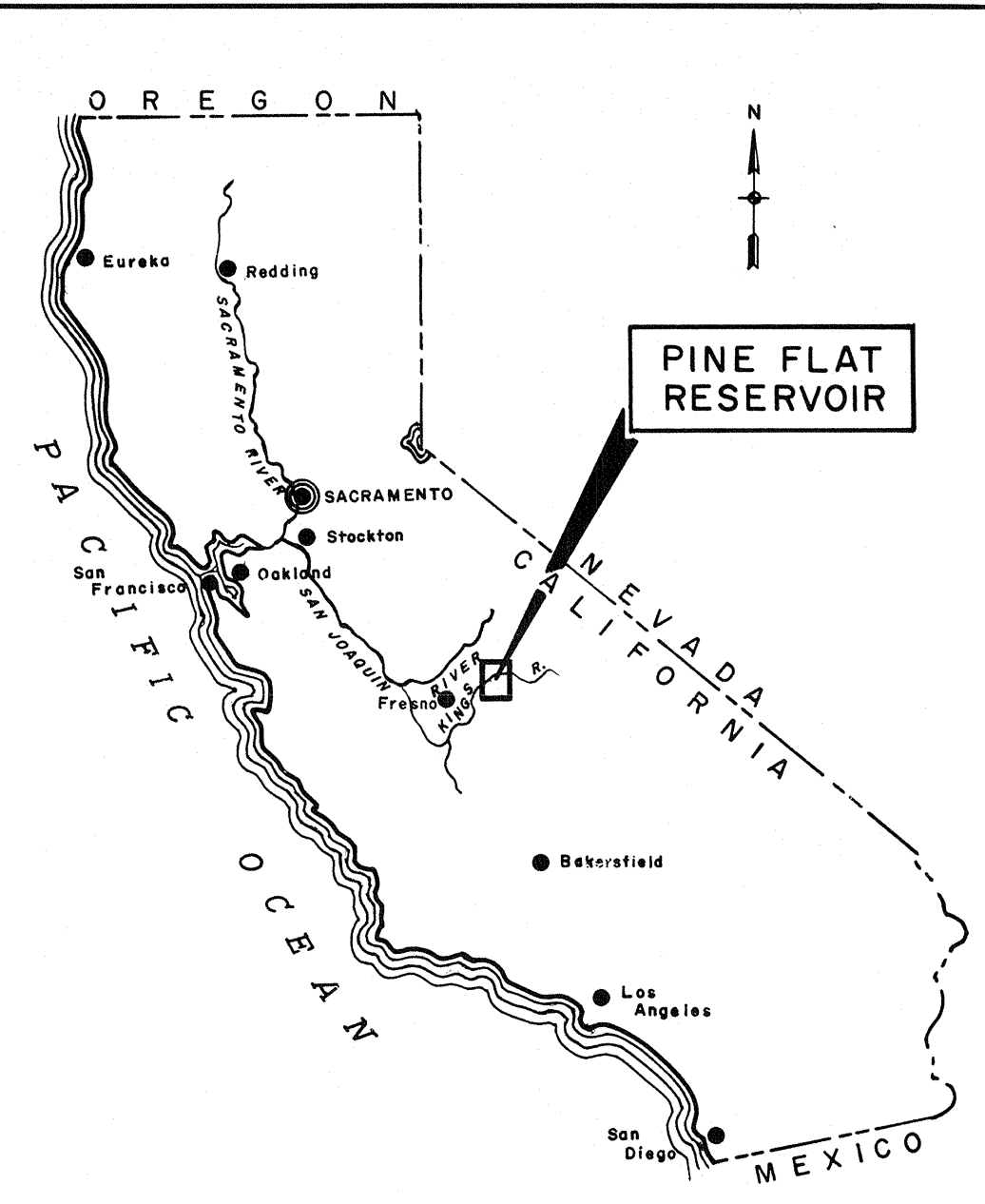
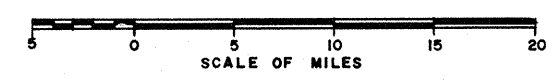
A. E. Naylor  
Regional Manager

cc: Chief of Operations

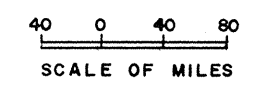


LEGEND

- WATERSHED BOUNDARY
- COUNTY LINE
- RAILROADS
- PROPOSED FREEWAY ROUTES, INTERSTATE
- U.S. HIGHWAY 99
- ROADS, STATE HIGHWAY, COUNTY
- CITIES AND TOWNS
- RIVERS
- STREAMS
- POWERHOUSE AND TUNNEL
- DAM AND RESERVOIR
- PROPOSED DAM AND RESERVOIR



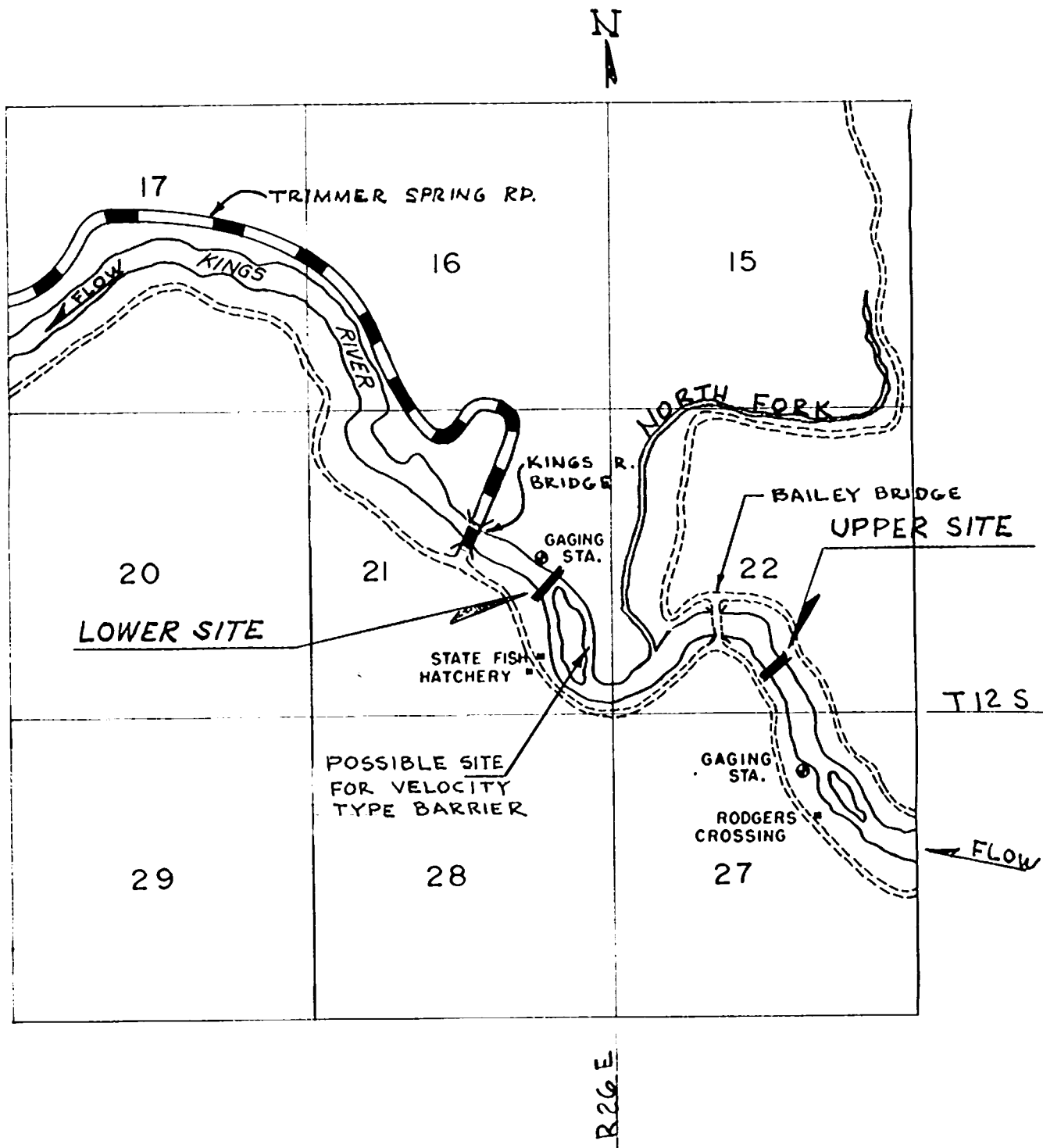
VICINITY MAP



REVISION	DATE	DESCRIPTION	BY

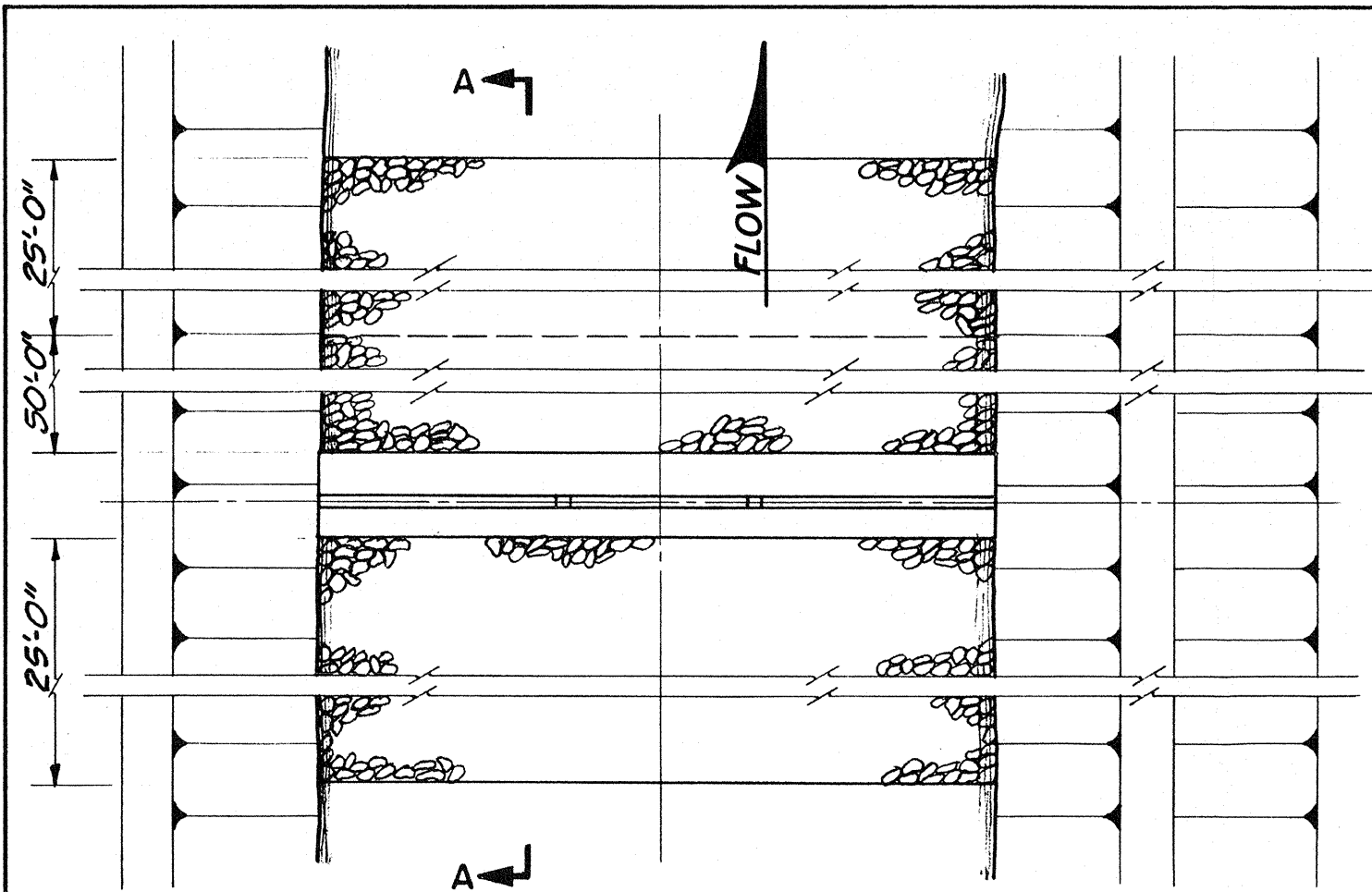
DRAWN BY: D.W.A.		U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA	
CHECKED BY: A.R.G. B.F.K.		KINGS RIVER, CALIFORNIA PINE FLAT RESERVOIR	
PREPARED BY: A.R.G.		PUBLIC USE PLAN	
SUBMITTED BY: A.R.G.		GENERAL MAP OF BASIN	
APPROVED: <i>George B. Fink</i>		DATE: 2 JUNE 69	
PREPARED UNDER THE DIRECTION OF GEORGE B. FINK		SCALE: AS SHOWN	SPEC. NO.
SHEETS		FILE NO. K1-2-13-675	SHEET NO.
675/1 TO 675/15		675/1	675/1



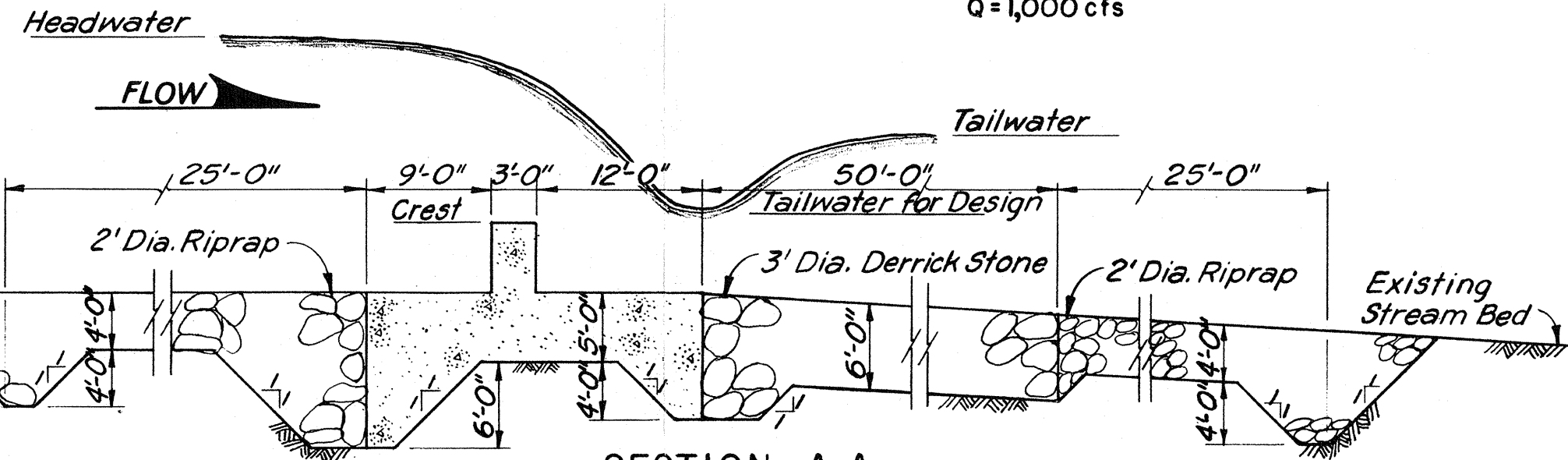
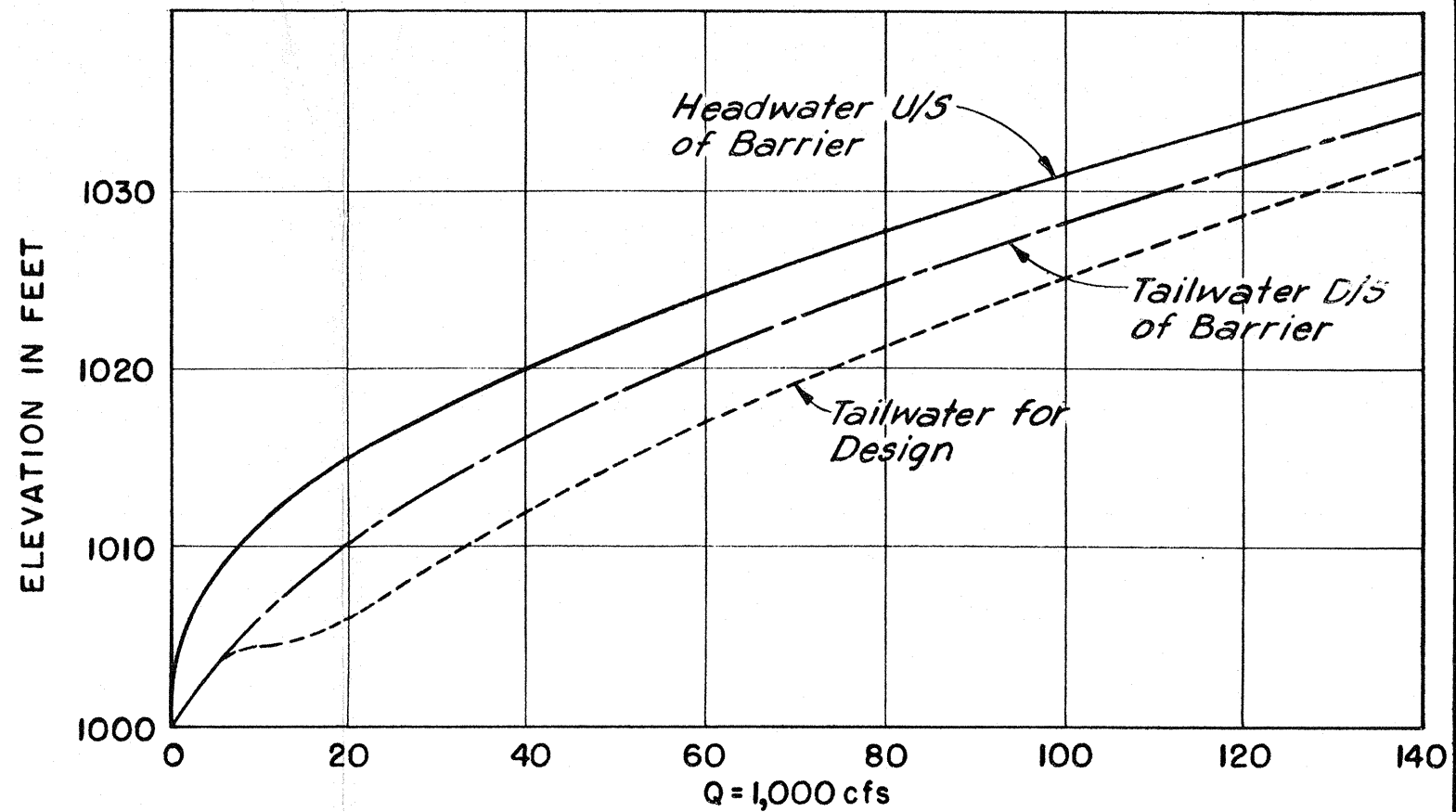
REF. QUAD. SHEET (USGS)  
 PATTERSON MTN. CALIF  
 N3643 - W11900/15  
 1952

KINGS RIVER  
 FISH BARRIER SITES  
 (ABOVE PINE FLAT RESERVOIR)  
 LOCATION MAP  
 BY: HIH                      JULY 1973

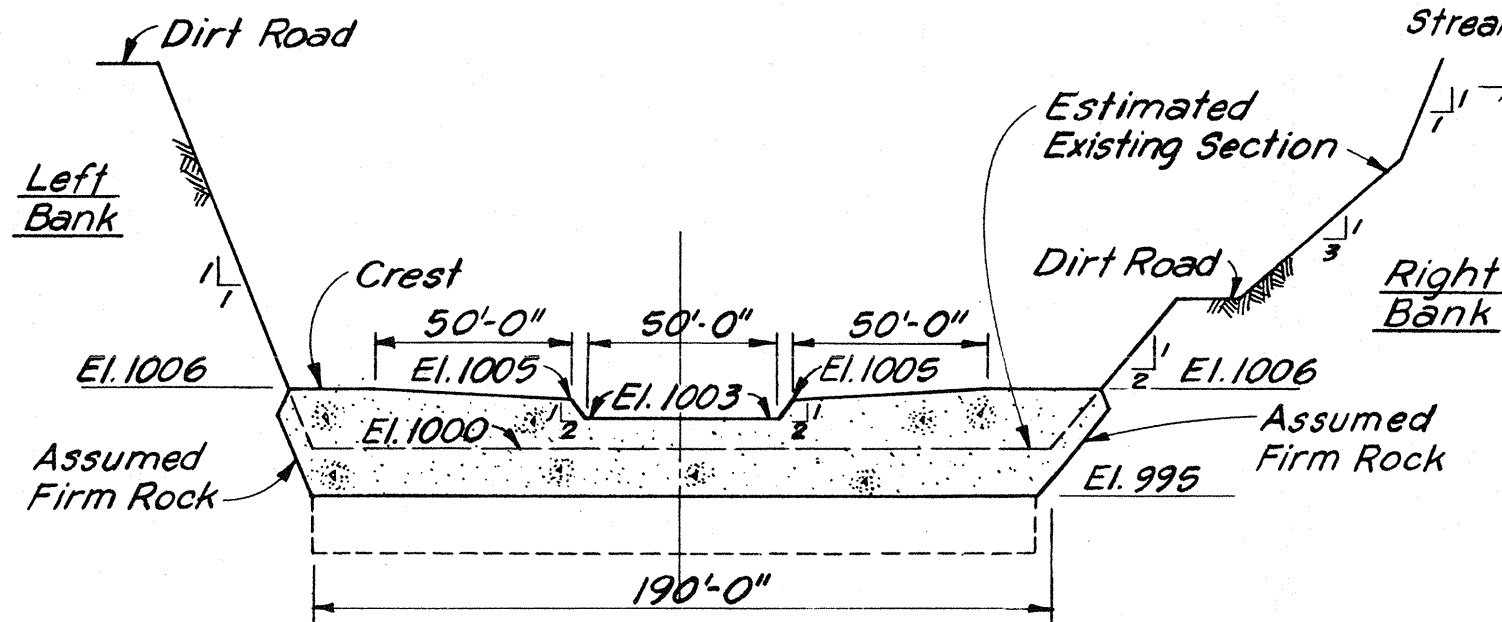
PLATE II



PLAN  
NOT TO SCALE



SECTION A-A  
NOT TO SCALE



PROFILE  
NOT TO SCALE

**GENERAL NOTES:**

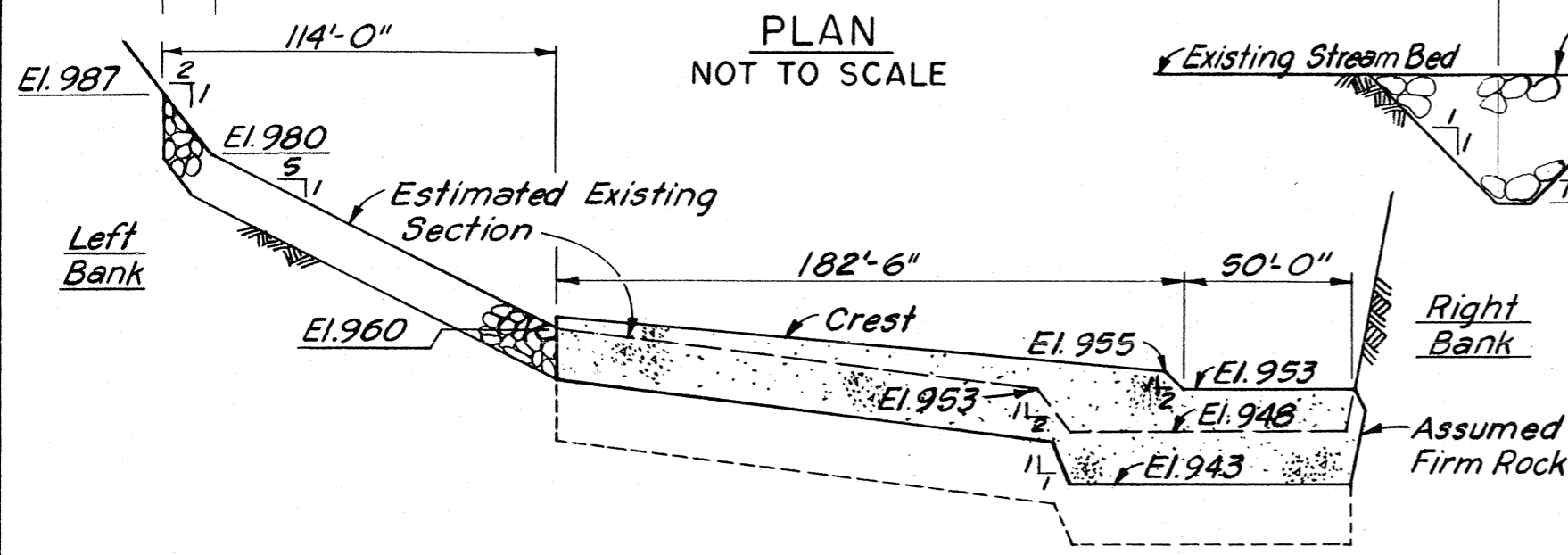
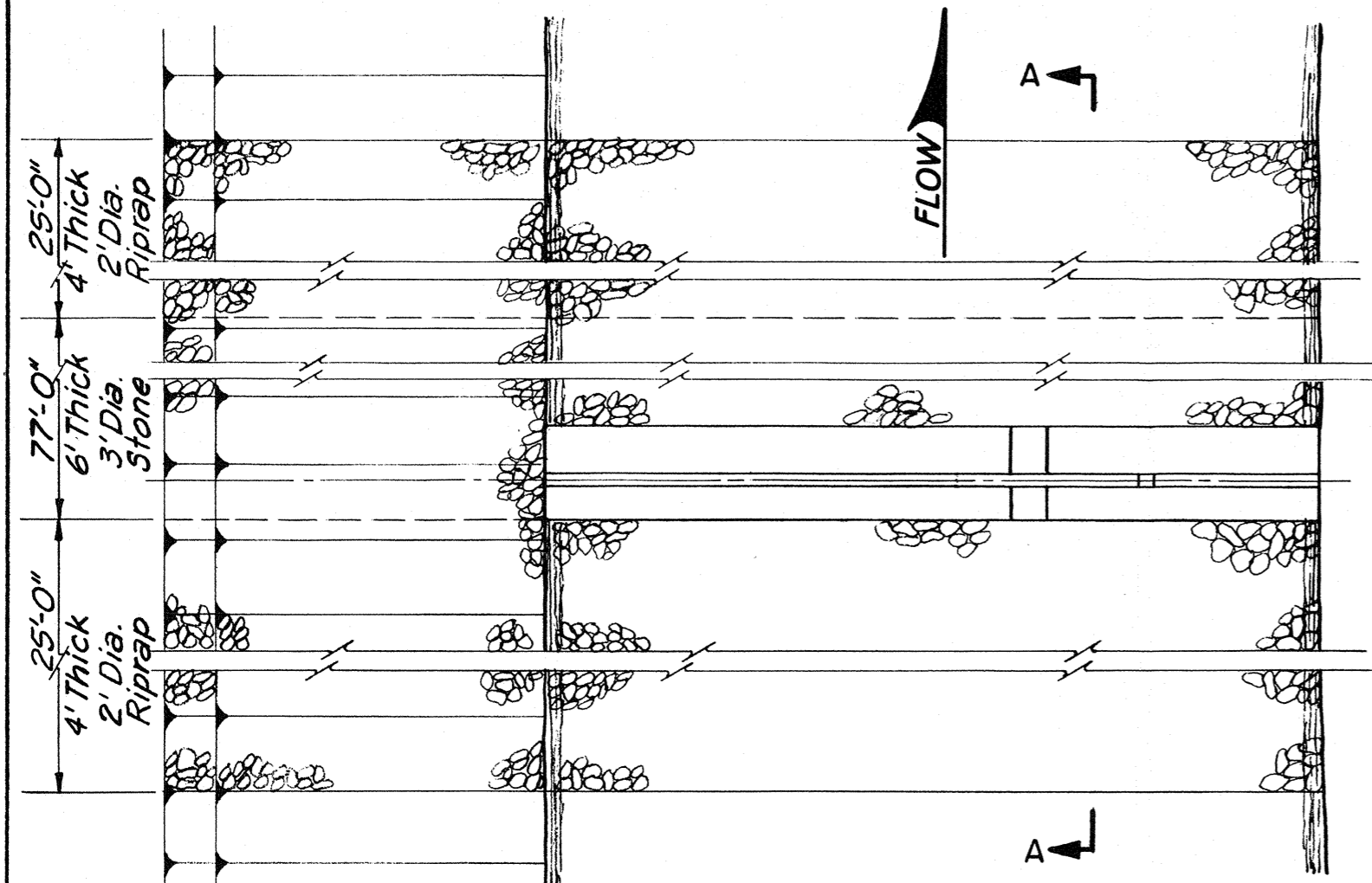
1. Existing stream bed elevation and river cross-section are approximated from USGS quad sheet, Patterson Mtn., Calif. N3645-W11900/15. All structural elevations are relative to assumed stream bed elevation.
2. Hydraulic Requirements:
  - a. Stability Requirement of Structure:  $Q = 125,000$  cfs
  - b. Operational Requirement for Fisheries:  $Q = 20,000$  cfs
3. Foundation Condition:
  - a. River bed materials consist of sand, gravel and boulder. Rock approximately 20-30 feet below stream bed, based on as-built drwg. of Kings River Bridge (K1-2-2-460, Sht. 460/5).

**KINGS RIVER  
FISH BARRIER  
PRELIMINARY LAYOUT  
UPPER SITE  
U/S OF NORTH FORK**

CORPS OF ENGINEERS, SACTO, CALIF.

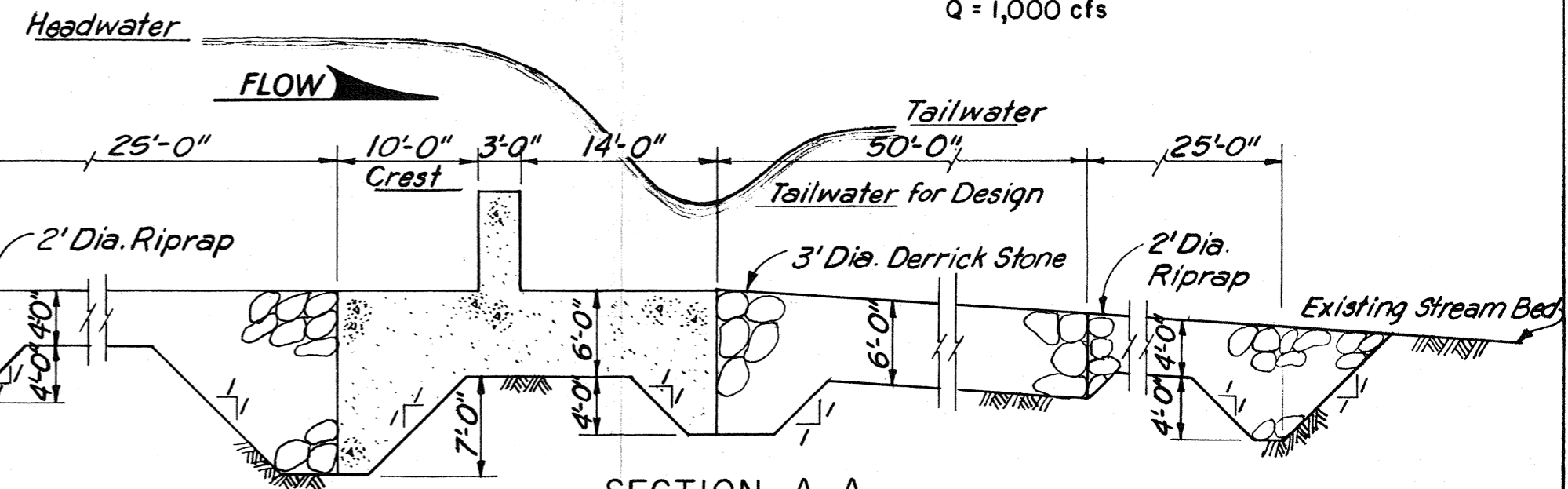
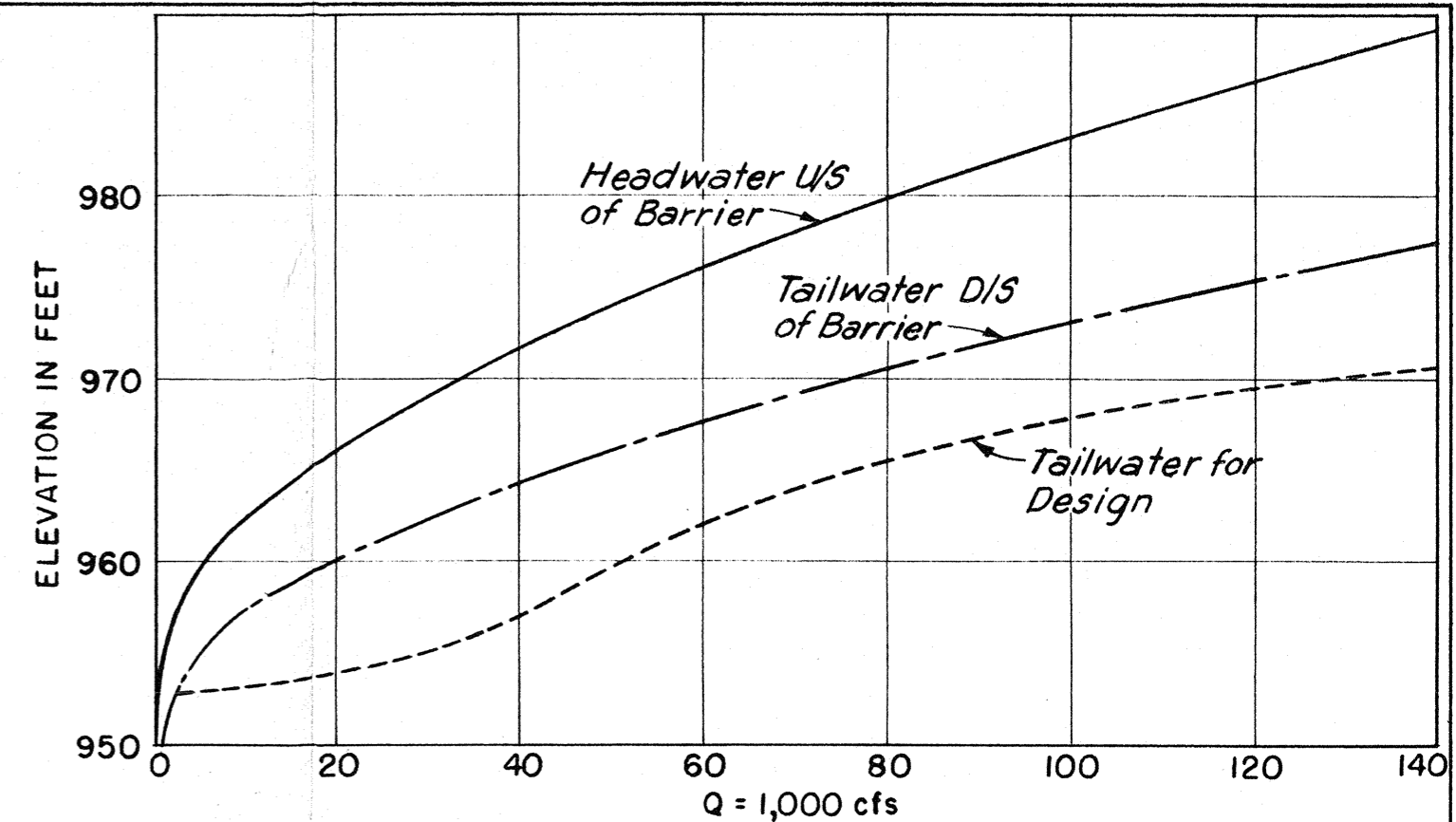
Prepared: H.I.H. Date: JULY 1973  
Drawn: R.A.H.





PLAN  
NOT TO SCALE

PROFILE  
NOT TO SCALE



SECTION A-A  
NOT TO SCALE

**GENERAL NOTES:**

1. Existing stream bed elevation and river cross-section are approximated from USGS quad sheet, Patterson Mtn., Calif. N3645-W1900/15. All structural elevations are relative to assumed stream bed elevation.
2. Hydraulic Requirements:
  - a. Stability Requirement of Structure:  $Q = 125,000$  cfs
  - b. Operational Requirement for Fisheries:  $Q = 20,000$  cfs
3. Foundation Condition:
  - a. River bed materials consist of sand, gravel and boulder. Rock approximately 20-30 feet below stream bed, based on as-built drwg. of Kings River Bridge (K1-2-2-460, Sht. 460/5).

**KINGS RIVER  
FISH BARRIER  
PRELIMINARY LAYOUT  
LOWER SITE  
D/S OF NORTH FORK**

CORPS OF ENGINEERS, SACTO., CALIF.

Prepared: H.I.H. Date: JULY 1973  
 Drawn: R.A.H.

DETAIL ESTIMATE OF FIRST COST  
 KINGS RIVER ROUGH FISH BARRIER  
 PINE FLAT LAKE, CALIFORNIA  
 (1 JULY 1973 PRICE LEVELS)

Cost Acct No	Description	Quantity	Unit	Unit Cost	Amount
	Care & Diversion of Water		L.S.		\$ 19,000
	Excavation - Unclassified	12,200	C.Y.	\$ 3	36,600
	Stone Protection 3' diam	4,900	C.Y.	12	58,800
	Stone Protection 2' diam	5,400	C.Y.	12	64,800
	Concrete Slab	1,900	C.Y.	50	95,000
	Concrete Wall	90	C.Y.	70	6,300
	Reinforcing Steel (50#/C.Y.)	100,000	LB.	0.25	25,000
	Cement (5.2 CWT/C.Y.)	10,000	CWT	1.85	<u>18,500</u>
	Subtotal				\$324,000
	Contingencies (25% <u>+</u> )				81,000
	Total				\$405,000
30	Engineering & Design				45,000
31	Supervision & Administration				<u>40,000</u>
	Total Estimated Cost				\$490,000*

\*Updated to July 1975 price levels by applying 6% per year factor =  
 \$550,000.

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
630 Sansome Street  
San Francisco, CA. 94111

3500  
June 6, 1974

Colonel F. G. Rockwell, Jr.  
District Engineer  
Department of the Army  
Sacramento District, Corps of Engineers  
650 Capitol Mall  
Sacramento, California 94814



Dear Sir:

We have reviewed your preliminary proposal for construction of a rough fish barrier on the Kings River above Pine Flat Lake. This proposal was transmitted by your letter dated April 23, 1974, under your file designation SPKED-W.

We concur in the general proposal at this stage and basically support the necessary continued investigations for development of a firm project proposal along the suggested lines. We recommend barrier construction at the Lower Site. It is suggested, however, that a legal analysis be made of Section 5093.65 of the State Public Resources Code "Kings River; construction of water impoundment facility; moratorium until January 1, 1979" to determine that construction of the proposed barrier would not be in violation of State law.

Prior to development of a final project proposal, we suggest that the Corps of Engineers contract for a thorough research of experience with "Impoundment-Restricted" squawfish to determine the possibilities that reservoir population may continue even without tributary stream spawning (after barrier installation and chemical reclamation). The benefits or costs associated with rough fish control program for the Kings should include Pine Flat Lake Fishery.

We emphasize the necessity for clearly establishing the objective of any possible firm project proposal, i.e., either control or eradication of rough fish in the drainage above any installed barrier (and possibly also below it to Pine Flat Dam) in order to approximately weigh the costs of the program against the benefits.

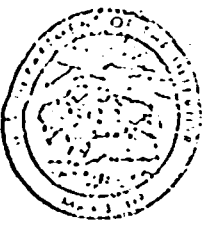
If the Corps of Engineers is to construct the barrier, a Memorandum of Understanding, executed by the Chief of the Forest Service and your Chief of Engineers will be required to enable use of National Forest lands. Terms of the Memorandum of Understanding should be formulated with the Forest Supervisor of the Sierra National Forest. In this regard, both forks of the Kings have become extremely popular for white water recreation use. To accommodate this use it may be appropriate to plan for an area for landing of rafts, kayaks and canoes under terms of the Memorandum of Understanding in conjunction with the barrier.

Thank you for providing us this opportunity to review this worthwhile project.

Sincerely,

*JW Kaskella*

*for* DOUGLAS R. LEISZ  
Regional Forester



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

Reference: RB

1500 N. E. IRVING STREET  
P. O. BOX 3737  
PORTLAND, OREGON 97208

JUN 4 1974

District Engineer  
Sacramento District, Corps of Engineers  
650 Capitol Mall  
Sacramento, California 95814

Your reference:  
SPKED-W  
April 25, 1974

Dear Sir:

This letter responds to your letter concerning the upper Kings River rough fish barrier facility.

Personnel of the Bureau of Sport Fisheries and Wildlife have reviewed the data provided us and inspected the proposed project site.

The Bureau of Sport Fisheries and Wildlife concurs with the California Department of Fish and Game that the installation of a rough fish barrier would enhance the sport fishing of both the upper Kings River and Pine Flat Reservoir.

Possible Revisions:

Of the two proposed sites for the fish barrier, we believe the lower site would be more desirable despite higher construction and maintenance costs. The lower site would prevent the upstream movement of rough fish species into the North Fork Kings River and reduced competition for food and space with trout. Increased water releases from the Pacific Gas and Electric Company's Balch hydroelectric project in the near future would provide additional opportunities to support both a wild trout and catchable trout fisheries. In essence, the lower site would enable California Department of Fish and Game to effectively manage the reservoir and stream fisheries. Thank you for the opportunity to review and comment on this proposed fish barrier.

Sincerely yours,

R. Kahler Martinson  
Regional Director

## DEPARTMENT OF FISH AND GAME

1400 STREET  
SACRAMENTO, CALIFORNIA 95814  
Ray Arnett, Director



December 17, 1974

Col. Frederick Rockwell, District Engineer  
Sacramento District  
U.S. Army Corps of Engineers  
650 Capitol Mall  
Sacramento, CA 95814

Your District, Colonel Rockwell---

---has completed a reconnaissance-level study of a nongame fish barrier on the Kings River above Pine Flat Lake. The study was carried out in accordance with a suggestion from this Department that an effective fish barrier would offer substantial trout fishery benefits and that a barrier project would be consistent with the objectives of P.L. 89-72.

Review of your reconnaissance report on the proposed nongame fish barrier reinforces our belief that barrier construction would greatly increase the effectiveness of the Department's wild trout management program for the Kings River. The lower barrier site would be preferable, since it would provide nongame fish control for both the north and south forks of the river.

If a mutually acceptable final plan for a Kings River fish barrier can be developed, it is the intent of the California Department of Fish and Game to furnish, or make arrangements for others to furnish, the non-Federal requirements for local cooperation as set forth in P.L. 89-72. This would include 25 percent of the construction cost, presently estimated at \$125,000, and 100 percent of operation and maintenance costs, estimated to be about \$2,000.

The expression of intent to participate is offered with the understanding that further planning and design work may result in substantial modification of existing project concepts and estimates of project costs and benefits. In such a case, a reevaluation may be necessary.

The barrier project would be categorically exempt from the formal environmental impact reporting requirements of the California Environmental Quality Act of 1970. Nevertheless, an assessment of the environmental impact of a fish barrier project should be made prior to construction to ensure that any potentially undesirable consequences are identified and avoided. The Department would welcome an opportunity to assist with such an assessment.

Sincerely,

*E. C. Johnston*

## DEPARTMENT OF FISH AND GAME

1416 NINTH STREET  
SACRAMENTO, CALIFORNIA 95814

G. Ray Arnett, Director

January 3, 1975

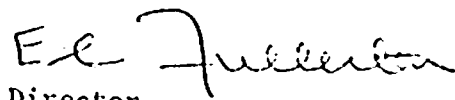
Col. Frederick Rockwell, District Engineer  
Sacramento District  
U.S. Army Corps of Engineers  
650 Capitol Mall  
Sacramento, CA 95814

Our letter, Colonel Rockwell---

---of December 17, 1974 expressed this Department's intent to participate in a Kings River nongame fish barrier project, in accordance with P.L. 89-72 provisions, if a mutually agreeable final barrier plan can be developed. To avoid misunderstanding, it should be noted that our letter did not constitute a formal agreement to administer federal water project land and water areas, as specified in California Public Resources Code Section 5094.1. It was, rather, a firm commitment that this Department will vigorously pursue the necessary approvals and state authorization when a final plan is agreed upon.

If you have further questions about the Department's objectives on this project, please contact George McCammon, Chief of our Inland Fisheries Branch.

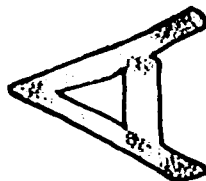
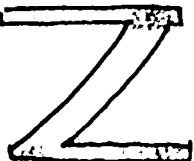
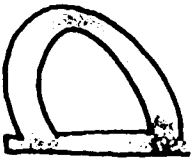
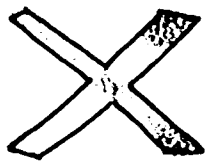
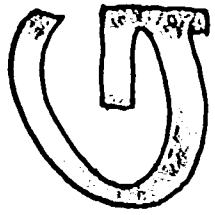
Sincerely,

  
Director

LIST OF LETTERS FROM CITIZEN GROUPS AND INDIVIDUALS  
EXPRESSING SUPPORT FOR NONGAME FISH BARRIER  
AT PINE FLAT LAKE, KINGS RIVER, CALIFORNIA

1. California Trout - 15 January 1975
2. Diablo Valley Fly Fishermen - 28 January 1975
3. Livermore Fly Fishermen - 10 February 1975
4. Friends of the Ventura River - 10 February 1975
5. James R. Godfrey - 28 February 1975
6. Ted Palmen - 30 January 1975
7. Bruce Slightom - 17 March 1975





MEMORANDUM OF  
UNDERSTANDING  
(DRAFT)

SUPPLEMENTAL MEMORANDUM OF UNDERSTANDING BETWEEN THE CORPS OF ENGINEERS AND THE FOREST SERVICE REGARDING INTERCHANGE OF LANDS AND MANAGEMENT OF WATER, LAND AND RECREATION RESOURCES ASSOCIATED WITH THE PINE FLAT LAKE PROJECT, KINGS RIVER, CALIFORNIA, ON THE SIERRA AND SEQUOIA NATIONAL FORESTS, CALIFORNIA.

THIS MEMORANDUM OF UNDERSTANDING is entered into by and between the Corps of Engineers, Department of the Army, Department of Defense, hereinafter referred to as "the Corps", and the Forest Service, Department of Agriculture, hereinafter referred to as "the Service", as of \_\_\_\_\_, 1976.

Recitals

- (1) The Corps operates the Pine Flat Lake Project (hereinafter referred to as the "the Project") on Federal lands along the Kings River in Fresno County, California, some of which are within the exterior boundaries of the Sierra and Sequoia National Forests.
- (2) The Service administers the National Forest System lands within the exterior boundaries of said National Forests.
- (3) The parties hereto wish to establish joint principles and policies concerning interchange and management of Project lands and resources both within and without said exterior boundaries of the respective National Forests.
- (4) This Memorandum of Understanding is entered into pursuant and supplemental to paragraph 9 of the Memorandum of Agreement, dated August 13, 1964, between the Secretaries of Army and Agriculture, relative to cooperating in the planning, development, and management of water resource projects associated with the National Forest System.

## Agreements

The parties hereto agree as follows:

I. A Master Plan for the Project will be prepared by the Corps. The portion of the Plan relating to matters agreed upon as Service responsibilities will be developed with the coordination of the Service and reviewed annually by the Corps Project manager and the responsible District Rangers.'

The Plan will provide criteria for the development, administration, and management of the Project to assure preservation of its scenic, biological, recreational, historical, and archeological resources; and to assure coordination with interested Federal, State and local agencies.

II. The Corps and the Service in coordination will prepare fire prevention and control plans for the Project, which will include provisions for fire prevention and fire control clauses in all Service and Corps contracts. Such plans will be coordinated with the California State Division of Forestry.

III. The Corps will be responsible for removal of debris, control of aquatic weeds, management of the water surface, and management of all Project-related recreation.

IV. The Corps and the Service, recognizing the importance of the forage resource, will continue the utilization of such resource. The Corps and the Service will coordinate such use within the Master Plan, providing for Service management of the forage resource on Corps land not needed for recreation.

V. The Corps and the Service, pursuant to the provisions of Public Law 84-804 (Act of July 26, 1956; 70 Stat. 656; 16 USC § 505a and 505b), shall pursue a policy of interchanging lands and improvements thereon as delineated on the map attached hereto as Exhibit A.

After the interchange is effected, all the lands within the existing project boundary will still be withdrawn from mineral entry. This will be accomplished by modification of the existing Public Land Orders to return the lands interchanged to operation of the public land laws, with the exception of the mining laws.

VI. The Corps and the Service will jointly prepare rules and regulations governing lands on each side of the Project boundary to be used and occupied by the general public. The Corps and the Service through the District Engineer and the appropriate Forest Supervisor, will coordinate land use proposals on adjacent lands prior to issuing any permits, easements, or initiating any land management activities, except as may otherwise be provided for in the Master Plan.

VII. Ancillary operating agreements needed to implement this Memorandum of Understanding may be entered into by the responsible Forest Supervisor or Supervisors and the District Engineer, to the extent of the authorities of their respective offices, to set forth mutual understandings, responsibilities or obligations.

VIII. Each party hereto shall have a right to ingress and egress upon the lands of the other for the purposes of carrying out the authorities of their respective agencies.

IX. The Supplemental Memorandum of Understanding may be amended at any time by the mutual consent of the parties hereto. It supersedes any previous agreements between the Corps and the Service for management of the Project.

X. Management direction provided in this agreement will be implemented upon execution of this Memorandum of Understanding.

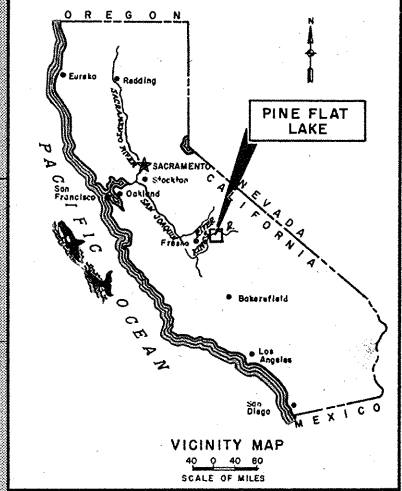
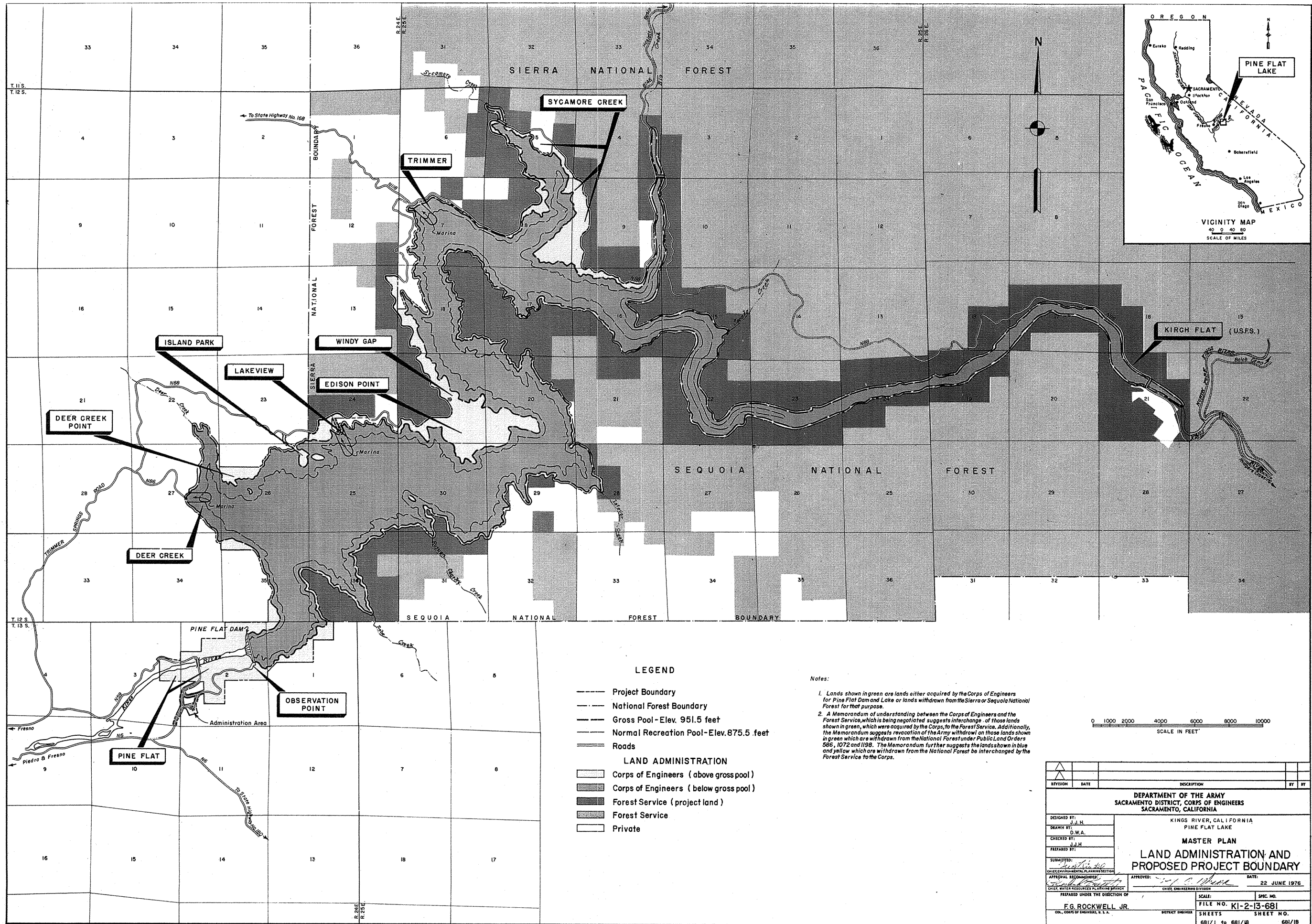
IN WITNESS WHEREOF, the parties hereto have executed this instrument in duplicate as of the date first hereinabove written.

CORPS OF ENGINEERS  
DEPARTMENT OF THE ARMY  
DEPARTMENT OF DEFENSE

FOREST SERVICE  
UNITED STATES DEPARTMENT  
OF AGRICULTURE

By \_\_\_\_\_  
Chief of Engineers  
Corps of Engineers  
United States Army

By \_\_\_\_\_  
Chief, Forest Service



**LEGEND**

- Project Boundary
  - National Forest Boundary
  - Gross Pool - Elev. 951.5 feet
  - Normal Recreation Pool - Elev. 875.5 feet
  - Roads
- LAND ADMINISTRATION**
- Corps of Engineers (above gross pool)
  - Corps of Engineers (below gross pool)
  - Forest Service (project land)
  - Forest Service
  - Private

*Notes:*

1. Lands shown in green are lands either acquired by the Corps of Engineers for Pine Flat Dam and Lake or lands withdrawn from the Sierra or Sequoia National Forest for that purpose.
2. A Memorandum of understanding between the Corps of Engineers and the Forest Service, which is being negotiated suggests interchange of those lands shown in green, which were acquired by the Corps, to the Forest Service. Additionally, the Memorandum suggests revocation of the Army withdrawal on those lands shown in green which are withdrawn from the National Forest under Public Land Orders 585, 1072 and 1198. The Memorandum further suggests the lands shown in blue and yellow which are withdrawn from the National Forest be interchanged by the Forest Service to the Corps.



REVISION	DATE	DESCRIPTION	BY	BY

**DEPARTMENT OF THE ARMY**  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

KINGS RIVER, CALIFORNIA  
PINE FLAT LAKE

**MASTER PLAN**  
**LAND ADMINISTRATION AND**  
**PROPOSED PROJECT BOUNDARY**

DESIGNED BY: J.J.H.  
DRAWN BY: D.W.A.  
CHECKED BY: J.J.H.  
PREPARED BY: J.J.H.

APPROVED: *[Signature]* DATE: 22 JUNE 1976  
CHIEF, ENVIRONMENTAL PLANNING SECTION  
CHIEF, WATER RESOURCES PLANNING BRANCH  
CHIEF, ENGINEERING DIVISION

PREPARED UNDER THE DIRECTION OF  
F.G. ROCKWELL JR.  
COL., CORPS OF ENGINEERS, U.S.A.

SCALE: 1" = 1000'  
SPEC. NO. KI-2-13-681  
SHEETS 681/1 to 681/18  
SHEET NO. 681/18

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SUMMARY ENVIRONMENTAL  
ASSESSMENT AND  
FINDING OF FACT

PINE FLAT LAKE, CALIFORNIA  
(Operation and Management)  
Summary Environmental Assessment

Responsible Office: U.S. Army Engineer District, Sacramento, California

1. Name of Action: Administrative

2. Description of Action: Continued operation and management of the existing dam, lake, and project lands for flood control, water conservation storage, recreation, and other uses. Additional development of recreation areas.

3. a. Environmental Impact: Continuation of operation for flood control and water conservation storage will act to maintain the existing environment at Pine Flat Lake in the Kings River and in the Tule Lake Basin. Additional recreation development will enhance recreation, but may cause some interference with wildlife. Additional landscaping will improve wildlife habitat. Development of additional recreation facilities will reduce conflicts between various recreation uses, enhance aesthetics, and reduce the possibility of water quality degradation.

b. Adverse Environmental Effects: Some interference with wildlife from recreation facilities development and anticipated increased recreation use. A minor temporary increase in noise and dust will occur during construction of additional recreation facilities.

4. Alternatives: Do nothing; restrict attendance; alternative recreation development plans.

5. Coordination: Informal comments were obtained from the Environmental Protection Agency, California Water Quality Control Board, U.S. Fish and Wildlife Service, and the California Department of Fish and Game. None of the comments obtained indicated the need for the preparation of a formal Environmental Impact Statement.



FINDING OF FACT

SUBJECT: Environmental Impact Statement Not Required - Pine Flat Lake, California (Operation, Management, and Development of Project Lands for Recreation)

1. Reference Paragraph 4b(2) ER 1105-2-507, Preparation and Coordination of Environmental Statements.
2. The procedures for operation and management of Pine Flat Lake, and future development of project lands for recreation have been examined for possible environmental impacts. This examination included review of current operation and management procedures, review of AE prepared Environmental Assessment, and coordination with appropriate regulatory agencies. A summary of the results of this examination is contained in the attached Summary Environmental Assessment. This examination found that the proposed actions should not cause any significant adverse environmental impacts. Based on the lack of any significant adverse impacts on the environment, an Environmental Impact Statement is not required for the operation and management of Pine Flat and proposed development of project lands for recreation. This determination will be reevaluated periodically and prior to any change in operation, management, or significant additional recreation development at the project.

1 Incl



F. G. ROCKWELL, JR.  
Colonel, CE  
District Engineer

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LETTERS AND REPORTS  
OF OTHER AGENCIES



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Division of Ecological Services  
2800 Cottage Way, Rm. E-2727  
Sacramento, California 95825

March 12, 1976

Colonel F.G. Rockwell, Jr.  
District Engineer, Sacramento District  
Corps of Engineers  
650 Capitol Mall  
Sacramento, California 95814

Dear Colonel Rockwell:

This is in partial reply to Mr. Weddell's letter of January 5 concerning the updating of master plans for five Corps of Engineers reservoirs. Pine Flat Reservoir on the Kings River in Fresno County, California, is one of these.

At this time, we do not plan to update the comments in our letter of August 31, 1967 concerning the Pine Flat reservoir master plan as that letter is still an accurate statement of our concerns. We are pleased that advanced planning is under-way for the proposed fish barrier upstream from the reservoir. Completion of the barrier would allow for rough fish control and management of the upper Kings River as a trout fishery.

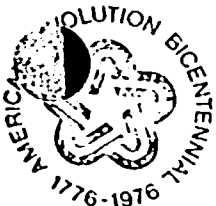
A desirable feature for inclusion in the master plan would be the stabilization of water level in the reservoir to the maximum extent possible during the main fish spawning season, generally April through June.

Comments on the other four reservoirs will be submitted at a later date.

Sincerely,

Felix E. Smith  
Field Supervisor

cc: Reg. Dir., (ES) USFWS  
Portland, Oregon w/cpy. incoming  
Dir., CDF&G, Sacramento, CA





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

ADDRESS ONLY THE  
REGIONAL DIRECTOR

730 N. E. PACIFIC STREET  
P. O. BOX 3737  
PORTLAND, OREGON 97208

Reference: RBS

August 31, 1967

District Engineer  
Sacramento District, Corps of Engineers  
P. O. Box 1739  
Sacramento, California 95808

Dear Sir:

This responds to your request for information on fish and wildlife resources associated with Pine Flat Dam and Reservoir, Fresno County, California. We understand that this information will be used in updating the master plan for the project, and will serve to guide the administration, operations, and maintenance of project lands and waters for recreation and fish and wildlife use. This letter does not constitute a Bureau of Sport Fisheries and Wildlife report on the project within the meaning of Section 2 of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Previous reports by the Bureau of Sport Fisheries and Wildlife concerning the project are: A Report on Fish and Wildlife Resources in Relation to the Water Development Plan for the Pine Flat project, Kings River, California, dated February 1949; Supplementary Follow-up Report for Pine Flat project, California, dated September 1959; and Second Supplementary Follow-up Report for Pine Flat project, Kings River, California dated May 1964.

California Department of Fish and Game personnel provided cooperative assistance during the preparation of this letter and our proposals have been reviewed and endorsed by that Department.

The original project plan included a dam 430 feet high and a reservoir with a storage capacity of one million acre-feet. Provision was made for future power installations. The dam is operated by the Corps of Engineers for flood control and storage of water for irrigation. A hypothetical study of the reservoir operation indicates that storage in the reservoir will rarely go below 50,000 acre-feet (1 of 18 years); however, project plans do not include storage of water (minimum pool) for fish resources in the reservoir or for downstream releases for maintenance of the river fishery.

The reservoir is about 19 miles long and has a surface area of about 6,000 acres at minimum pool. It lies partially within the boundaries of Sierra and Sequoia National Forests. The U. S. Forest Service has jurisdiction, by agreement, over public use on approximately 65 percent of project lands and the Corps of Engineers on the remaining 35 percent. About 22 recreational areas around the reservoir are either developed or planned for development. These areas will be under jurisdiction of either the Corps of Engineers or the U. S. Forest Service.

The reservoir is a steep-sided, fluctuating body of water with little shoal area and its carrying capacity and productivity are low.

Game fish species in the reservoir are rainbow trout, smallmouth and largemouth bass, black crappie, white crappie, green sunfish, white catfish, brown bullhead, and bluegill. Nongame fish species include: golden shiner, hardhead, threadfin shad, Sacramento sucker, hitch, carp, and Sacramento squawfish.

There is no allocated minimum pool in the reservoir. Several approaches to fishery management of the reservoirs have been tried, but no definite plan has been developed. It is difficult to manage a body of water this size without a minimum pool or with little or no control over its operation. California Department of Fish and Game creel census records indicate that in the past few years, fishing use and success have been declining. The major cause attributable to this decline is a large increase in nongame fish populations. Some conflict between fishermen and other recreationists on reservoir waters also may be contributing to the decline in angler use. In 1963, about 137,000 angler-days were expended on Pine Flat Reservoir, and angler success was about 1.3 fish per hour. In 1966, angler use and success had declined to 54,000 angler-days and 0.26 fish per hour, respectively. Fishing use and success, upstream from the reservoir have also declined since project construction. This decline is largely due to the encroachment of nongame fish from the reservoir.

The present fishery in the reservoir is primarily for warmwater species. Rainbow trout were stocked in large numbers during the period 1957 through 1960. However, this program was discontinued in 1960 because of poor results.

Management of the Kings River fishery downstream from the dam has also been difficult since there was not a guaranteed minimum flow in the original project operation plan. Rapid reductions in flows, and reduced flows for extended periods of time have decreased the basic productivity of the Kings River downstream from the reservoir. Following chemical treatment, in 1961, of about 25 miles of the river immediately downstream from Pine Flat Dam, and subsequent rainbow and brown trout stocking, angler success had increased markedly. Adequate

flows occur below the dam during the spring when the majority of rainbow trout spawn; however, low flows in the fall reduce successful brown trout spawning. During the past 10 years (1956 - 1966), over one million fish have been planted in this section of the stream. The lower portion of the river supports a warmwater fishery with the major species present being white catfish, largemouth and smallmouth bass, bluegill, green sunfish, and black crappie. Nongame fish include carp, goldfish, suckers, and squawfish.

A special two-month (December through February) winter fly-fishing season was initiated in 1964 on the first five miles of river downstream from the dam. This special season has met with favorable response, and is a type of angler recreation not normally available.

An agreement was signed, and became effective, on September 11, 1964 between California Department of Fish and Game and the Kings River Water Association, providing for a minimum downstream release of 25 second-feet for fish resources. This agreement was presented April 6, 1967 at the State Water Rights Board's Kings River Water hearing held in Fresno, California; and is now pending approval. With approval of this agreement and its incorporation into operational plans at Pine Flat project, some protection of the downstream fishery has been achieved.

Lands surrounding the reservoir are fairly steep and vegetated with ceanothus, manzanitas, and a few pines and willows. These hillsides provide hunting opportunities and winter range for mule deer. Quail, mourning doves, bandtailed pigeons, and gray squirrels provide good hunting. Fur animals found in the area are gray foxes, beavers, minks, muskrats, raccoons, and opossums. Pelts are of little value and no significant trapping occurs. Waterfowl do not utilize the reservoir in any appreciable numbers. However, considerable numbers of wood ducks nest along the river downstream from the reservoir.

The following management measures would have a direct bearing on public use opportunities and benefits related to fish and wildlife resources. They are presented for your use in updating the master plan for Pine Flat project.

To reduce competition between fishermen and other recreationists, a zoning plan should be developed for Pine Flat Reservoir. The plan should include, but not necessarily be limited to, restricting boats speeds to 5 mph throughout the year in Sycamore, Big, Deer, Zebe, and LeFever Creek coves, and in the Kings River above the power line crossing at Coyote Springs. Final details of a reservoir zoning plan should be developed cooperatively by the Corps of Engineers, California Department of Fish and Game, U. S. Forest Service, and the Bureau of Sport Fisheries and Wildlife.

Control of nongame fishes in the reservoir would be a necessary part of a fish management plan. This could be most economically accomplished by use of fish toxicants at a time when the reservoir water level is at its lowest point. Fishery rehabilitation or related work should be accomplished by methods and materials acceptable to the Secretary of the Interior, the U. S. Forest Service, the State conservation agency, and the project sponsor. Following nongame fish control, the reservoir would be stocked with catchable-sized trout and warmwater game fishes.

A fish barrier constructed above the high water level of Pine Flat Reservoir, would control upstream fish migrations and eliminate the encroachment of nongame fish on fish habitat in the Kings River upstream from the reservoir. Such a barrier would make it possible to chemically treat the Kings River above the reservoir and manage it as a trout fishery. California Department of Fish and Game is considering the desirability of this structure; however details of the structure have not been formulated at this time.

These management measures should be recognized in your master plan. Accomplishment of these measures would require the cooperation of the Corps of Engineers, California Department of Fish and Game, and the Bureau of Sport Fisheries and Wildlife.

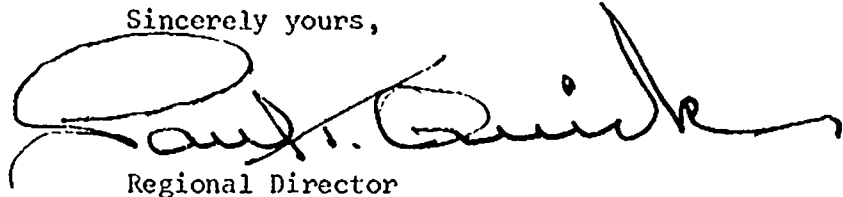
The master plan should include provision for unrestricted public access and use of all project lands and waters, where such access and use would not conflict with primary project operation or plans which may be subsequently developed for recreational use zoning or wildlife management.

The use of chemical herbicides and pesticides for routine project maintenance should be strictly controlled to prevent water pollution and undue damages to fish and wildlife resources. The master plan should provide for the regulation of herbicides and pesticides, based on a maintenance plan developed in cooperation with the California Department of Fish and Game, Federal Water Pollution Control Administration, the U. S. Forest Service, and the Bureau of Sport Fisheries and Wildlife.

The opportunity of assisting you in updating your master plan for Pine Flat Reservoir is greatly appreciated. The inclusion of these considerations for fish and wildlife in a master plan of operation is necessary to assure equitable opportunities for the enjoyment of all land and water resources involved.

Please do not hesitate to call on us for any further assistance you may require.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Paul J. Guich". The signature is written in black ink and is positioned above the typed name "Paul J. Guich".

Paul J. Guich

Regional Director



UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
630 Sansome Street  
San Francisco, California 94111

August 3, 1976  
2510

Mr. George C. Weddell, Chief  
Engineering Division  
Corps of Engineers  
650 Capitol Mall  
Sacramento, California 95814



Attention: Joe Holmberg - Room 5400

With reference to your last week's telephone conversation with Paul Leger, we are enclosing a copy of our letter of July 2, 1976, which contains comments to the draft Master Plan, Pine Flat Lake, King's River, California. We are also taking this opportunity to forward to you some comments made to the draft Master Plan by the Sequoia National Forest, received in this office after our letter of July 2. In the interest of expediency a copy of their letter is enclosed. We feel their concerns are valid, and should be resolved before completion of the final Master Plan.

*Douglas R. Leisz*

DOUGLAS R. LEISZ  
Regional Forester

Enclosures

630 Sansome Street  
San Francisco, California  
94111

July 2, 1976  
(2510)

Mr. George C. Weddell, Chief  
Engineering Division, Corps of Engineers  
650 Capitol Mall  
Sacramento, California 95814

Dear Mr. Weddell:

We have, as requested, reviewed the draft Master Plan Pine Flat Lake, Kings River, and have the following comments:

P. 85-Item 75- The plan seems to favor some type of "pond" system to the exclusion of other treatment.

- a. The dissertation on raw sewage ponds vs. oxidation ponds is somewhat misleading and technically oversimplified and should be deleted.
- b. Experienced personnel are required daily on all secondary and more complex sewage treatment systems whether ponds or plants.
- c. Physical-chemical treatment would be very appropriate in those high use areas with recreation vehicle waste, chemical toilet waste, and fish cleaning station wastes, as well as water borne sewage. P-C treatment requires very little land area and is more efficient than ponds for secondary treatment.

P. 74 -Item 59 - Septic tanks are not acceptable pretreatment facilities for vault waste. These wastes should be hauled to a treatment plant (certified by the Central Valley Regional Water Quality Control Board) for receiving them if on-site treatment is not available.

P. 42 -and Chart 5 - The actual use figures of the recent past seem to be 20-25% lower than the "smooth" projection curve. A new projection curve may be necessary and may change the options for flush toilet facilities for "immediate" and "future" development.

**P.72 -Item 38 -** The new primary drinking water standards will probably make "filtered" surface water sources undesirable from an O&M standpoint

Appendix A

**Item C. Land Acquisition Policy**

The stated need for 0.5 acre acquisition near Kiroh Flat is inconsistent with Exhibit A of the proposed Supplemental Memorandum of Understanding. This area appears best designated for Forest Service operation and management.

**Item D. Public Use Areas**

The item dealing with "Secota Ridge" implies a cooperative development by CE and FS. This appears to be a proposal previously unknown by and not discussed with FS.

**Item J. Cooperative Activities with Other Agencies**

In the third last sentence, reference is made to "four other parcels.... managed by USFS". The area includes that from the Sequoia Forest boundary to Trimmar. Since a large (1400 acres) whole parcel of N.F. land lies therein, this statement is unclear. Should this statement be modified anyway in view of the proposed land interchange?

**Item N. Concessionaire Activities**

**(2) Lombardo's Marina at Lakeview.**

The assertion is made that all Lombardo's facilities are "all on private property". Our surveys indicates portions of the motel, flush restrooms and storage area are on NF land.

Appendix C

The Fire Plan providing for joint protection of lands within Pine Flat Project area, between CE, FS, and the California Division of Forestry should undergo formal notification for execution by the parties thereto, following legal review. It should at least bear appropriate agency signatures signifying agreement.

Appendix D

Fish and Wildlife Management Plan

We feel that this plan should be expanded to thoroughly discuss the Fish and Wildlife Management alternatives, and the resource inventories mentioned therein. The plan as presented appears to be only a discussion of what an adequate management plan might cover.

Appendix F

We feel that our concerns pertaining to the proposed construction of a fish barrier, which we expressed in our letter of June 6, 1974, have not been entirely alleviated. Even though the fish barrier may be constructed on Corps administered lands, we feel that the management objectives and alternatives mentioned would be in the public interest and should be considered when formulating the final plan. Please refer to the June 6, 1974 letter for full expression of our concerns.

Appendix G

The District Engineer and the Regional Forester have submitted a revised proposed Supplemental Memorandum of Understanding for approval by the Chiefs of their respective agencies. A copy is attached for insertion in the final Master Plan.

*for* E. W. Koskella *Juk*

DOUGLAS R. LEISZ  
Regional Forester  
Enclosure  
cc: Chief

Engineering (W. Weaver) ✓  
Lands & Minerals ✓  
FSM ✓  
Sierra N.F. ✓  
Sequoia N.F. ✓

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

Sequoia NF

FS	R-5
RECEIVED	
JUL 06 1976	
LAND USE PLANNING	
June 30, 1976	

REPLY TO: 8200 Land Use Planning

SUBJECT: Comments on the Draft Master Plan for  
Pine Flat Lake (Corps of Engineers Project)

TO: Regional Forester



Here are the Sequoia's comments on the Corps Draft Master Plan for Pine Flat Lake. Comments were asked for in the May 28, 1976 letter from George C. Weddell, Chief, Engineering Division, Corps of Engineers to the Regional Forester.

The improvements and recreation management planning discussed in the draft Pine Flat Lake Master Plan are mainly on the north side of the lake and impact the Sierra National Forest. There are two areas, however, that impact the Sequoia National Forest on the south side of the lake.

One is the location of five existing boat access picnic sites located at intervals along the south lake shore. Each is equipped with two portable chemical toilets and a 10-foot wide fire break around the back side. It is proposed in the plan to add two more boat access picnic sites. Neither the existing sites nor the proposed sites should adversely impact other national forest resources or uses. Grazing would continue off the picnic sites and mineral entry would continue to be excluded as at present on interchanged lands.

The second activity that impacts the Sequoia National Forest is the proposed construction of a \$550,000 fish barrier immediately below the confluence of the North Fork and main fork of the Kings River. The barrier would create a three-foot difference in water elevation between the down stream and up stream side. The height of the barrier and velocity of water flowing over it during trout spawning time would be sufficient to stop squaw fish (a fingerling trout predator) but not spawning trout, they being more efficient swimmers. The 70 to 87 percent of squaw fish in the trout fishery above Pine Flat Lake would be eliminated by the barrier and subsequent poisoning thus restoring what was an excellent trout fishery prior to the erection of Pine Flat in 1954.

The appendix data shows support for the barrier from California Department of Fish and Game and fishing groups but is silent on what impact if any the barrier might have on white water recreational use of the river by kayakers, rafters and tubers.

In a letter (3500 6/6/74) T.W. Koskella indicated general Forest Service endorsement of the fish barrier proposal but cautioned "...both forks of the Kings have become extremely popular for white water recreation use. To accommodate this use it may be appropriate to plan for an area for landing of rafts, kayaks and canoes under terms of the Memorandum of Understanding in conjunction with the barrier."

In a memo 4/23/75 describing the project and its impacts Corps District Engineer Col. F. G. Rockwell, Jr. stated, "Since the lower site (the one below the confluence) is the one proposed, no separate memorandum of understanding with the Forest Service is necessary as the lands on which the barrier would be constructed are within the boundaries of the Pine Flat Lake project presently withdrawn from the National Forest."

In this and subsequent correspondence the Corps is silent on the white water use of the river in connection with the barrier and no consultation with the white water users is indicated.

It appears this is a key omission in as much as at least one of the special use permitted rafting companies (Kings River Expeditions) has their take out point located on PG&E land just downstream from the Kirch Flat bridge below the lower fish barrier site. From time to time tubers are also believed to float down to the Kirch Flat Bridge. Since the impact of the barrier on this use is not discussed and no impact from the white water people is reported it is hard to speculate on what its impact might be. However, the barrier could well be hazardous for white water users if mitigation measures are not provided for.

*Walter Kirchner*

WALTER KIRCHNER  
Acting Forest Supervisor



DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
650 CAPITOL MALL  
SACRAMENTO, CALIFORNIA 95814

REPLY TO  
ATTENTION  
SPKED-W

7 September 1976

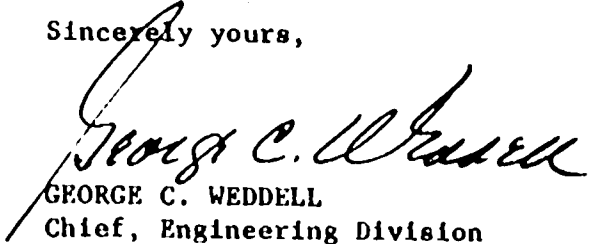
Mr. Douglas R. Leisz  
Regional Forester  
U. S. Forest Service  
630 Sansome Street  
San Francisco, CA 94111

Dear Mr. Leisz:

This regards your letter dated 3 August 1976 commenting on the draft "Master Plan, Pine Flat Lake, Kings River, California." Many of your comments have been used to improve the master plan. There are, however, certain of your comments that we have not incorporated into the final master plan for the reasons stated in the inclosed discussion of comments.

Thank you for your comments, and when the final master plan is approved we will provide you copies.

Sincerely yours,

  
GEORGE C. WEDDELL  
Chief, Engineering Division

1 Incl  
As stated

Discussion of Comments by Forest Service letter dated 3 August 1976 on draft Master Plan, Pine Flat Lake

Identification of comments is similar to identification in the Forest Service letter.

P. 85 - Item 75, P. 74 - Item 59. - Additional information on sewage treatment systems has been added to the master plan as shown on attached photo copied pages from the master plan (pages 61 and 62).

P. 42 - and Chart 6. - The projection of recreation use has been carefully derived from appropriate data on recreation use participation and population, and in accordance with procedures prescribed by the Chief of Engineers. It is recognized that short-term fluctuations from the projection almost always occur in response to lack of needed facilities, varying climatic conditions, corresponding reservoir levels, and other factors. Based on our experience over the long term, this projection is considered appropriate for planning of the recreation developments proposed in the master plan.

Appendix A, Appendix C, Appendix D. - These were prepared prior to and separately from the draft master plan based on earlier data contained in a draft of the master plan prepared in 1969. Appendixes are not bound with the master plan, and we plan to revise them after the master plan is approved.

Appendix F. - (Forest Service concerns relate to the fish barrier and coordination with white water recreation users and inclusion of mitigation features.) Preliminary plans for the fish barrier are being developed in cooperation with the California Department of Fish and Game. Although the fish barrier will be at the downstream terminus of white water activities which end at Pine Flat Lake, features will probably be needed to warn boaters not to attempt to pass over the barrier and to identify a convenient "take-out" upstream from the barrier. Coordination with white water users and others who are interested will be carried out during preparation of detailed plans and specifications for the facility.





EDMUND G. BROWN JR.  
GOVERNOR

State of California

GOVERNOR'S OFFICE  
OFFICE OF PLANNING AND RESEARCH  
1400 TENTH STREET  
SACRAMENTO 95814

September 2, 1976

Mr. Joseph Holmberg  
Resource Planner  
U.S. Army Corps of Engineers  
650 Capitol Mall  
Sacramento, CA 95814

SUBJECT: SCH# 76062114 - MASTER PLAN UPDATE NEW HOGAN LAKE  
76062113 - MASTER PLAN UPDATE - LAKE KAWEAH  
76062112 - MASTER PLAN UPDATE - PINE FLAT LAKE

Dear Mr. Holmberg:

Clearinghouse review of your project is complete. We have no comments on the project.

This letter verifies your compliance with the review requirements contained in the National Environmental Policy Act as implemented by the Office of Management and Budget Circular A-95.

Sincerely,

William G. Kirkham  
Management Systems Officer  
State Clearinghouse

WGK/kam