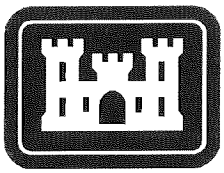
DESIGN MEMORANDUM NO. 14 OCTOBER 1979

LAKE SONOMA

MASTER PLAN



US Army Corps of Engineers
Sacramento District

Lake Sonoma Master Plan

401

"Dry Creek (Warm Springs) Lake and Channel, California"

Design Memorandum Number 14

Department of the Army
San Francisco District
Corps of Engineers
211 Main Street
San Francisco
California

October 1979

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Preface

This Master Plan is the document to be used by the planner, designer and the resource manager to provide a complete and usable multi-use facility. The plans have been developed in conjunction with the public and are presented so as to be comprehended by the public. This report describes the resources of the site, the Master Plan, design of specific areas, management recommendations and estimated costs.

In order to keep the report concise and to the point, only material directly related to the plan has been included.

Summary

Warm Springs Dam and Lake Sonoma were authorized for the purpose of flood control, water supply and recreation. The Master Plan was developed in accordance with guidance outlined by current Corps regulations. The plan for recreation development of Lake Sonoma is based upon the social options and the capability of the land to accommodate and sustain proposed uses.

Facilities programmed at Lake Sonoma cover a wide range of outdoor recreational activity. The site itself has been the guide in determining the planned usage. The extremely steep slopes (85% of the project slopes are over 25%), the potential for soil erosion and the sensitive and critical wildlife areas make access to the Lake difficult and limit the areas where activity can take place. Therefore, auto camping and day use are located close to already existing relocated Rockpile Road and to the relocated Hot Springs Road. Boat access to the water with the necessary ramps and parking facilities is extremely limited. The major project boat ramp is off Rockpile Road approximately one fourth mile west of the existing Warm Springs Bridge. Two minimal boat access sites, capable of accommodating small boats, are near relocated Hot Springs Road on Yorty and Cherry Creeks in the North Lake area. Equestrian and hiking trails are programmed in many areas of the site with hike-in/boat-in camp sites clustered along the trails and shoreline in scenic areas. A multi-purpose day use and interpretive area is located just below the dam, adjacent to the visitor center and fish hatchery.

This plan will provide the basis for feature design memoranda and construction plans and specifications. The Master Plan may be revised in future years to reflect public attitudes and changed management options.

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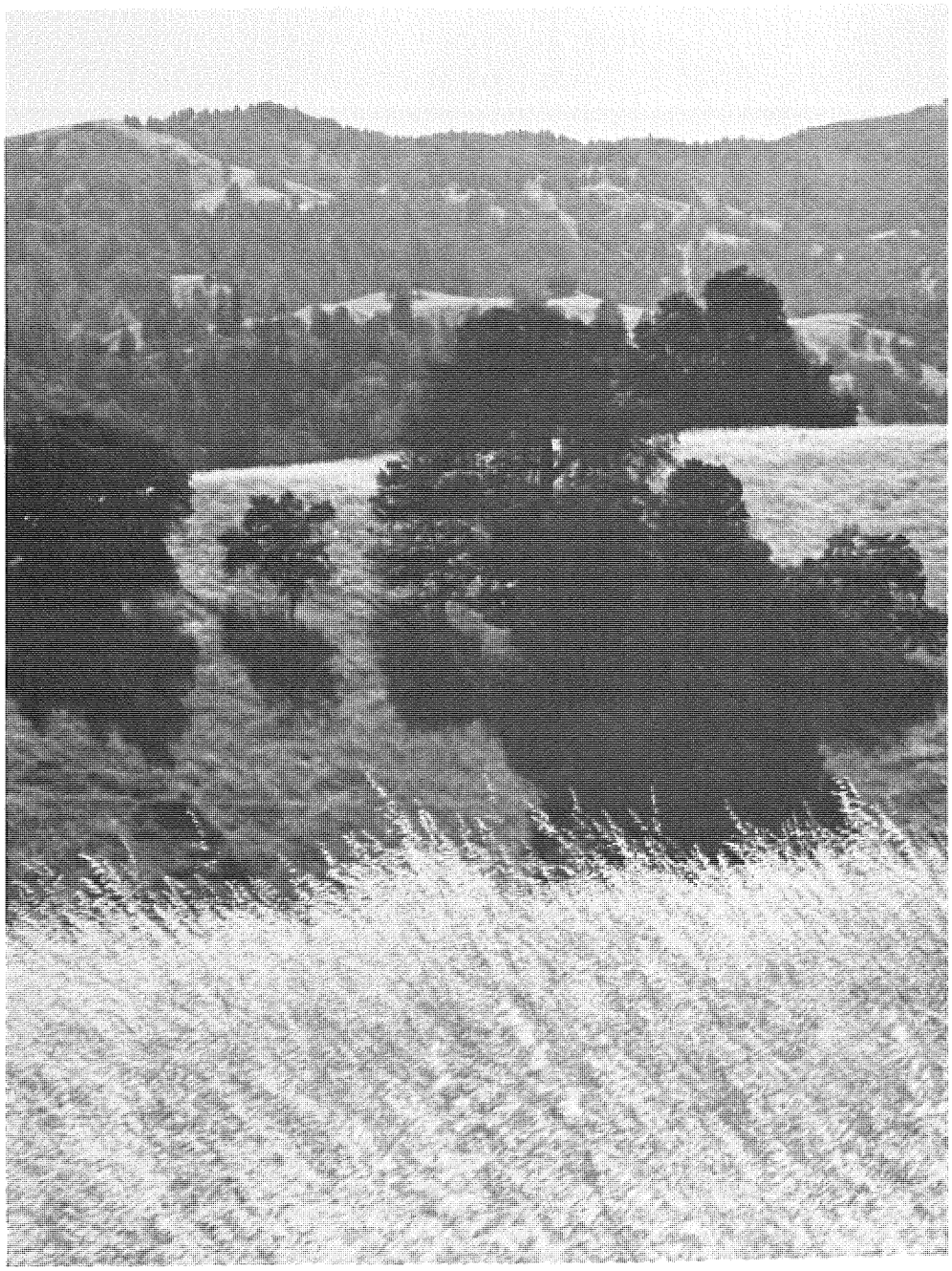


THE RESOURCE

I. The Project

Introduction

Project Authorization
1.01

The Dry Creek Dam and Channel Improvements, also known as the Warm Springs Dam and Lake Sonoma Project was authorized by the Flood Control Act of 1962, Public Law 87-874, approved October 23, 1962 by the 87th Congress, 2nd Session. Basic information supporting authorization of the project is set forth in House Document No. 547 of that session. The authorized purposes of the total project are flood control, water supply and recreation.

1.02

This document, designated the Lake Sonoma Master Plan, describes the resources, land uses, recreation facilities, operations and management of the project lands. Corps of Engineers regulations and policies have been followed in the preparation of the master plan.

Purpose of the Master Plan
1.03

Specific Purposes are:

1. To provide guidelines for implementing recreational development at Lake Sonoma for the use of all age groups and for the handicapped.

2. To present a plan that supports the project purposes of water supply, flood control and recreation.

3. To present a plan that promotes the optimum, not necessarily maximum, recreational use of the resource, minimizing detriment to existing natural and cultural resources.

4. To provide a basis for management of natural and cultural resources.

Scope of the Master Plan
1.04

The report is presented in two parts and eleven chapters. Part One reports on the physical, biological and social characteristics of the site and project area. This resource base includes data on soils, erosion, geology, slopes, views, fish and wildlife, endangered species, vegetation, regional transportation, adjacent zoning and cultural resources. The analysis of this data (resulting in site opportunities and constraints, and site carrying capacity) and the resource use objectives are the foundation for master planning decisions.

1.05

Part Two programs the uses which are appropriate for the project area and establishes plans for the recreational development of the site. The master plan illustrates use locations and types, access to recreation sites and hiking and equestrian trails. Detailed plans are presented for public use areas. Criteria are given for the management of the project and guidelines are outlined for the design of all facilities. Estimated costs of all facilities are presented along with estimates of the amount of people and materials needed for the operation and maintenance of the project once it is complete.

Planning Process
1.06

The direction of the planning process has been to first define the site's resource capabilities and sensitivity to human use. This was accomplished through a review of existing resource data and numerous visits to the site to check data, collect new information and to field check the viability of various recreation uses.

1.07

Public desires were determined through use of three public workshops where citizen goals for the project were developed and alternative uses were reviewed. A series of resource use objectives were then developed which list and discuss the preferred uses at Lake Sonoma. The master plan was developed by applying the resource use objectives to the site opportunities. The result is a plan which allocates use areas so as to provide for optimum use of the resource.

1.08

Public Review and Comment-Refer to Appendix A

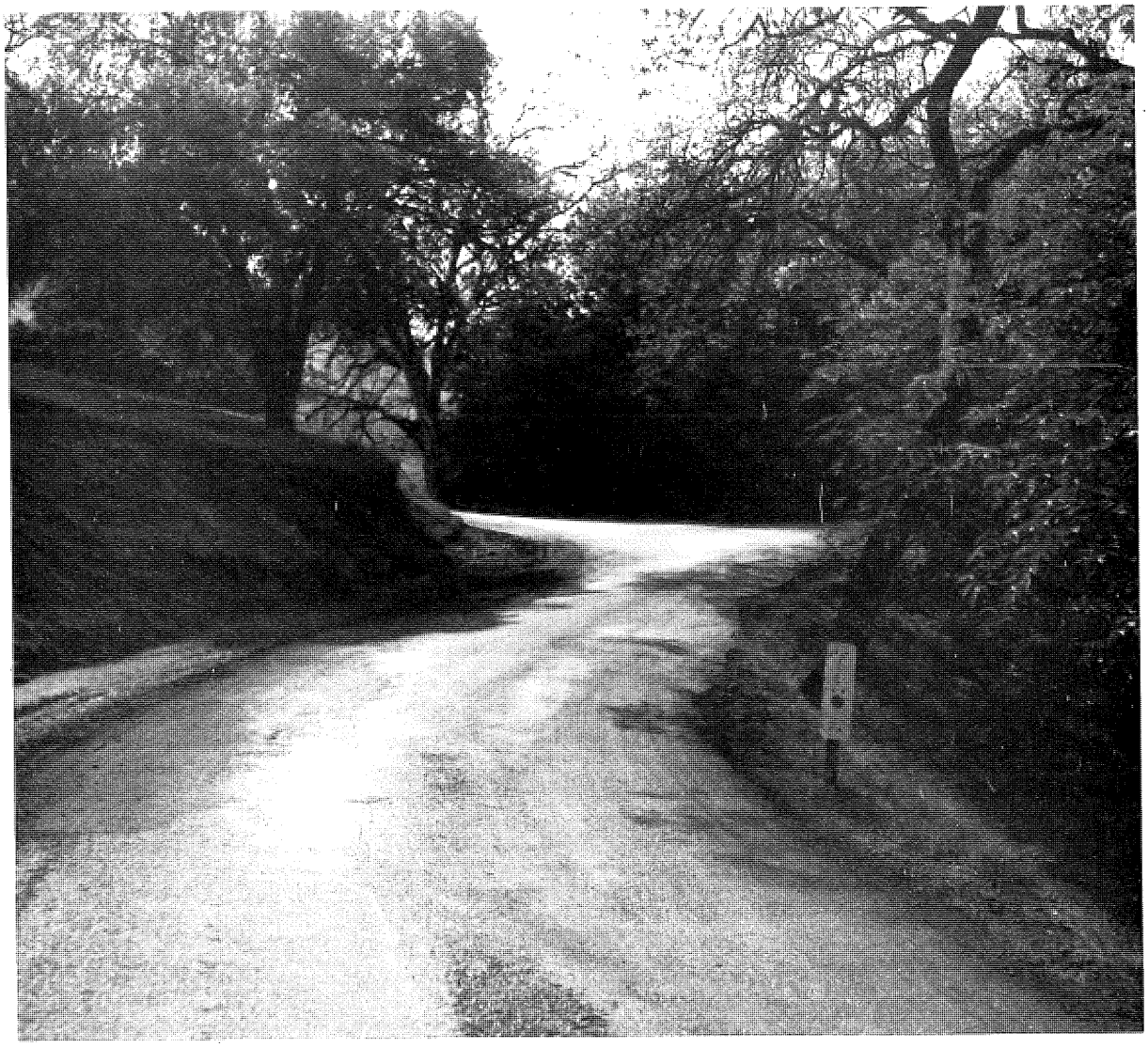
I. The Project

Project History
1.09

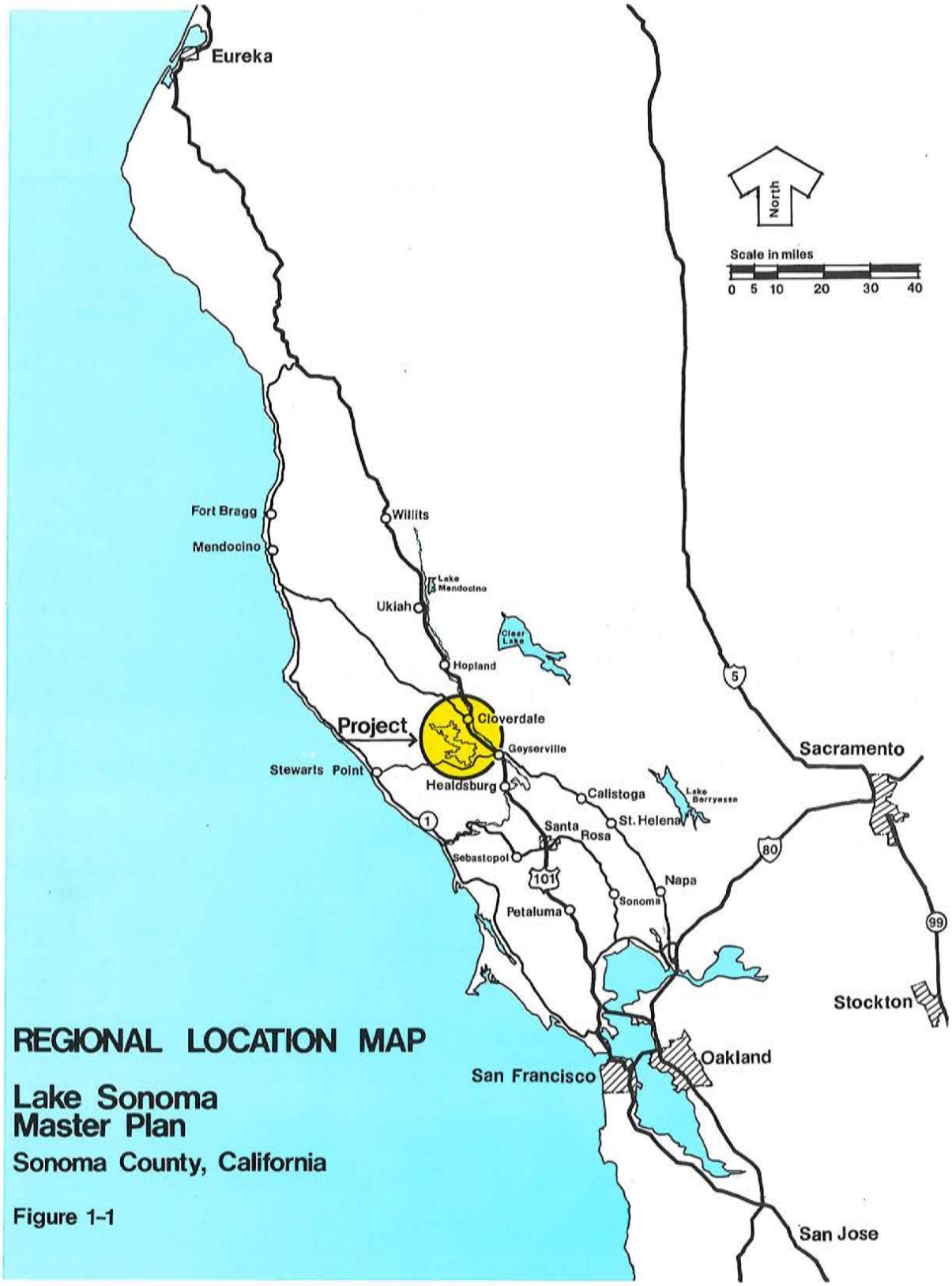
The Warm Springs Dam and Lake Sonoma Project consists of a dam across Dry Creek (a major tributary of the Russian River in Sonoma County, California), a reservoir, a spillway, outlet facilities, a fish hatchery, and erosion protection measures on Dry Creek downstream of the dam. The project includes 17,615 acres of land, approximately 20 miles of relocated roads, several miles of relocated utilities, various public recreation facilities and a wildlife management area.

1.10

Study of Dry Creek for the purposes of flood control, recreation and water supply was authorized by a House Committee in Public Works Resolution on July 1, 1958. Based upon a study by the San Francisco District of the Corps of Engineers, Congress authorized the project as part of the 1962 Flood Control Act on October 23, 1962. Information supporting authorization of the project is set forth in House Document No. 547, 87th Congress. Initial concepts for recreational development were set forth in a Preliminary Master Plan (1966). During detailed reservoir design, presented in a General Design Memorandum, 1967, the project was modified to optimize the site benefits in accordance with U.S. Senate Document 97.



I. The Project



I. The Project

1.11 In December 1973, an Environmental Impact Statement on the Warm Springs Dam and Lake Sonoma project was filed with the Council on Environmental Quality. The purpose of the EIS was to provide a complete description of the project, the project environmental setting and the beneficial and adverse impacts of the project on the environment. In March 1974, a complaint was filed by the Warm Springs Dam Task Force with the Federal District Court alleging inadequacy of the project environmental impact statement. In May 1974, Justice Douglas of the U.S. Supreme Court granted a stay of construction, pending review of the case by the Appellate Court. In August 1975, the Appellate Court remanded the case to the District Court for a review of the additional studies conducted by the Corps in response to questions regarding seismicity and water quality. The Corps filed a Supplement to the EIS in September 1976 to provide the requested additional information on water quality, cultural resources and seismicity. The District Court found that the Supplement satisfactorily addressed the questions raised by the 1974 court actions and lifted the injunction in April 1977. This decision was appealed to the Ninth Court of Appeals and hearings were held on March 15, 1978. The Corps supplied supplementary information on March 17, 1978 and the Court of Appeals did not rule, but denied injunctions on construction. The Corps advertised for bids for construction of the dam and appurtenances in the spring of 1978 and construction was restarted in June 1978.

I. The Project

Project Description

1.12 **Warm Springs Dam**—The dam is a rolled earth embankment located at the confluence of Warm Springs Creek and Dry Creek, approximately 14 miles northwest of Healdsburg, California (Sonoma County) Section 18, NE/4, Skaggs Springs 7½' Quadrangle. The project is 70 miles northwest of San Francisco (see Figure 1-1, Regional Location Map).

1.13 The dam crest elevation is 519 feet above mean sea level (m.s.l.). The top of the dam is about six feet above the maximum water surface in the reservoir. Curved on a 6,000 foot radius, the dam crest extends approximately 3,000 feet across the stream channel, and measures 30 feet wide. The upstream face of the dam is covered with rock for protection against wave action. The downstream face is covered with six inches of topsoil and seeded.

1.14 **Lake Sonoma**—Warm Springs Dam creates Lake Sonoma with a capacity of 381,000 acre-feet at the spillway crest elevation 495 feet m.s.l.). Of this total capacity, 130,000 acre-feet is allocated to flood control, 212,000 acre-feet to water conservation, 26,000 acre-feet to sediment accumulation during the 100-year economic life

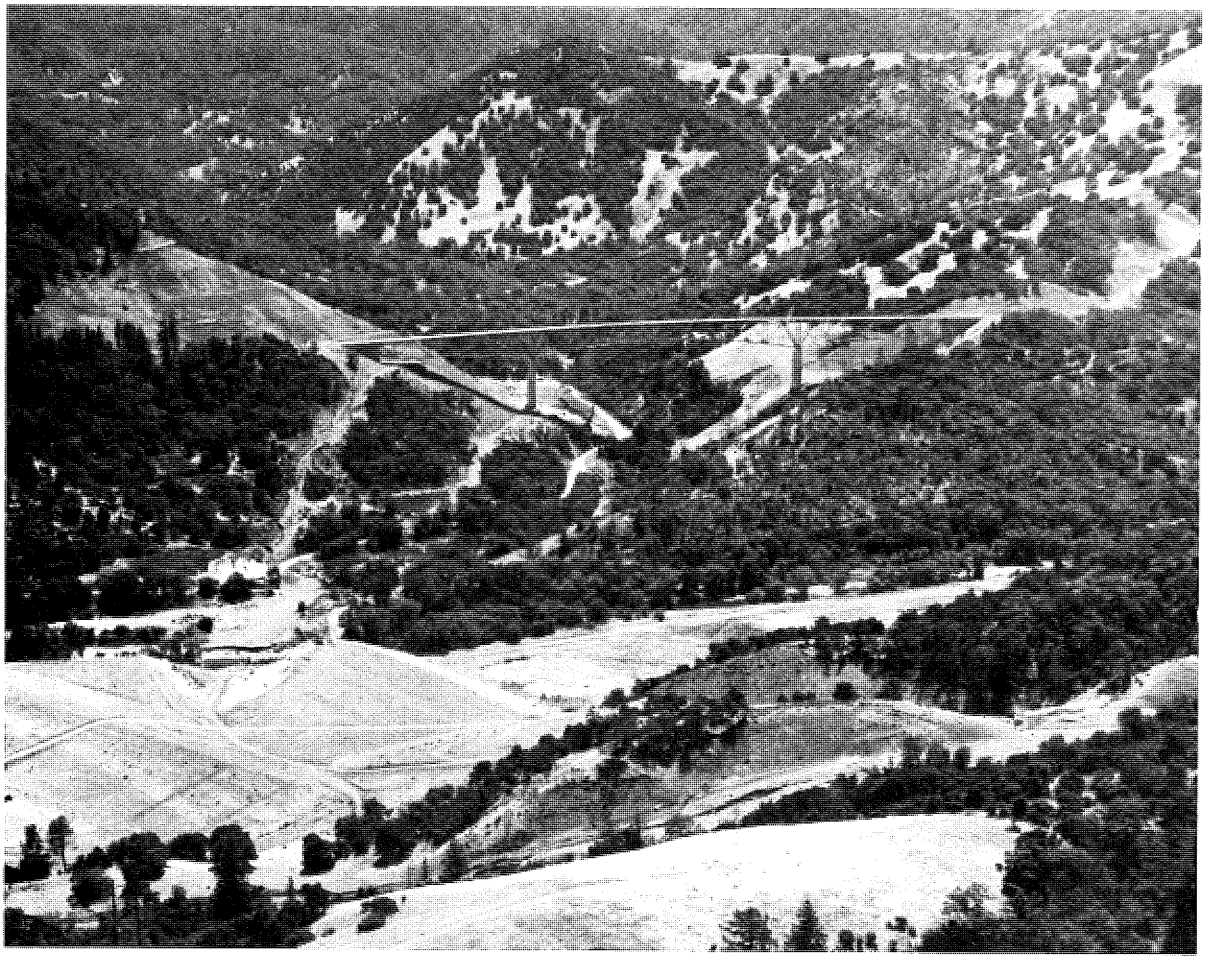
of the project (based on a Department of Agriculture study), and 13,000 acre-feet for maintenance of minimum pool. With the water level at the spillway crest (495 feet m.s.l.), Lake Sonoma has a surface area of 3,600 acres, extends 12 miles up Dry Creek and 7 miles up Warm Springs Creek, and provides 73 miles of shoreline. With the pool at conservation level (451 feet m.s.l.), the impoundment covers 2,700 acres, extends nine miles along Dry Creek and four miles along Warm Springs Creek and provides 53 miles of shoreline. At minimum pool elevation (292 feet m.s.l.), water surface area is 486 acres, extends five miles up Dry Creek and two miles up Warm Springs Creek and creates 17 miles of shoreline.

1.15 **Relocations**—To construct the project, it is necessary to relocate certain existing features. Some of these relocations have already been completed, either in part or in full. A description of the relocations follows:

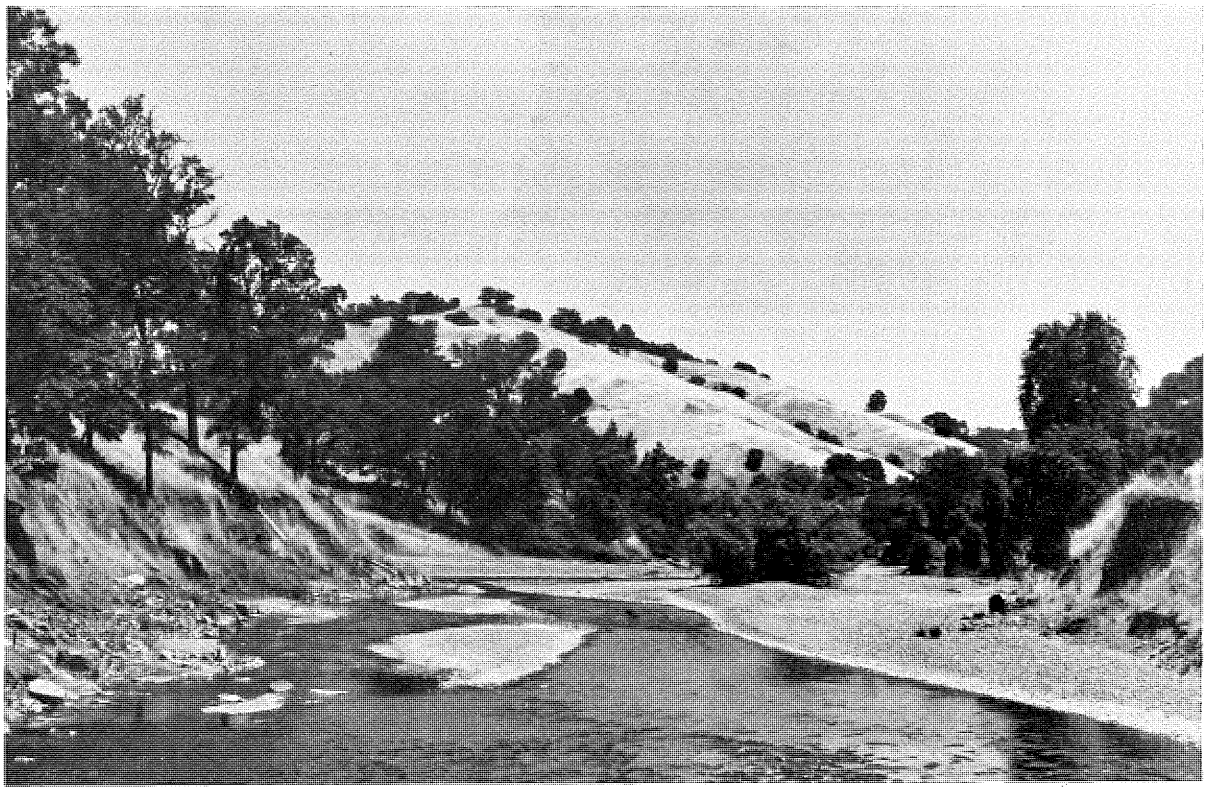
1. Two bridges and approximately 20 miles of county roads are required to relocate roads passing through the reservoir area.

2. Approximately 15 miles of electrical power line and 9 miles of telephone line is being relocated.

3. The Skaggs Springs Cemetery, the Pritchett Family Cemetery and three individual grave sites have been relocated.



I. The Project



1.16 **Public Use Facilities**—This Master Plan delineates regional needs, competing recreational facilities, the resource sensitivity and the recreation uses appropriate to the resource. The development will provide overnight and day-use facilities for camping, picnicking, fishing, water activities, hiking, horseback riding, sightseeing, nature study and interpretive activities.

1.17 **Fish and Wildlife Facilities**—The estimated present annual spawning migration in the total Dry Creek drainage is 8,000 steelhead trout and 300 coho salmon. Since Warm Springs Dam will block the annual upstream migration of about 6,000 of the steelhead trout and 100 of the coho salmon to spawning areas, a fish hatchery is part of the project to mitigate the fishery losses which would otherwide occur. The hatchery will also be utilized for the development of a chinook salmon fishery, an enhancement of existing conditions.

1.18 To compensate for loss of wildlife habitat resulting from filling Lake Sonoma and for the 180 acres of additional habitat that will be taken for roads, parking areas and similar permanent features, a wildlife management area is being established on approximately 5,000 acres of land (including 400 acres of borrow site) located adjacent to the reservoir in the Pritchett Peaks area north of Dry Creek and south of Kelly Road and west of Cherry Creek along upper Dry Creek. A program is being developed to improve habitat for deer, quail and other wildlife species in the management area.

1.19 **Cultural Resources Plan**—A study of the archeological sites within the project area including their relationships to each other, general patterns of settlement, resource utilization as practices at various times and the principal social and cultural processes which have transpired is now ongoing. A summary related to cultural resources is included in Chapter 2.

I. The Project

Project Costs
1.20

The toal cost of development discussed in this Master Plan is estimated to be $32,353,000. Of this amount, $19,248,000 is separable as recreation costs. It is estimated that the average annual operations, maintenance and replacement (OM AND R) costs of the recreation elements of this Master Plan are $836,000.

Project Status
1.21

The following Table of events lists approximate completion dates of items to be accomplished.

TABLE 1-1

Events and Completion Dates

Dam and Reservoir:

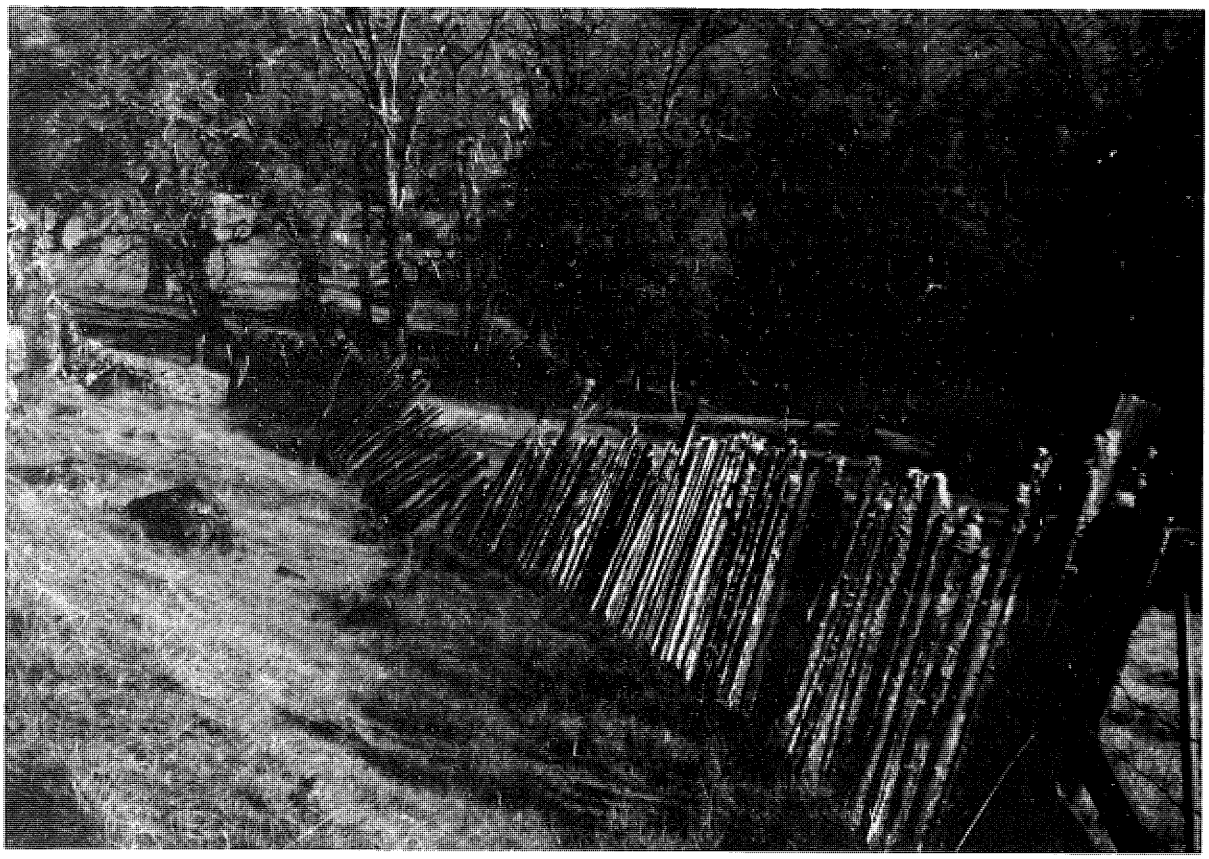
1. Dam Embankment, Outlook works, and Spillway completed .....June, 1982
2. Final completion and cleanup .....April, 1983

Relocations:

1. Skaggs Springs Road .....November, 1978
2. Rockpile Road .....September, 1981
3. Utilities .....September, 1982
4. Hot Springs Road .....September, 1982

Related Works:

1. Fish Hatchery .....September, 1980
2. Cultural Resource Mitigation .....September, 1982
3. Develop Recreation Areas .....September, 1984
4. Downstream erosion protection .....September, 1984



I. The Project

TABLE 1-2

Statistics on Warm Springs Dam and Lake Sonoma

General

Location:	At the confluence of Warm Springs Creek and Dry Creek, approximately 14 miles northeast of Healdsburg, California (Sonoma County) Section 18, NE/4, Skaggs Springs 7½' Quadrangle
Project Area:	17,615 acres (71 square kilometers)

Dam

Type:	Compacted earthfill with impervious core
Height:	319 feet (97 meters) (Crest Elevation: 519 feet m.s.l.)
Length:	3,000 feet (916 meters) at crest
Width:	Top—30 feet (9 meters) Bottom—2,600 feet (793 meters)
Volume:	30 million cubic yards (23 million cubic meters)

Spillway

Type:	Ungated overflow
Elevation:	Crest—495 feet m.s.l. Flood—513 feet m.s.l.
Capacity:	29,600 cubic feet per second (13 million gallons per minute)

Outlet Works

Tunnel:	Intake length—500 feet (152 meters) Intake diameter—10.5 feet (3.6 meters) Outlet length—2,900 feet (884 meters) Outlet diameter—14.5 feet (4.3 meters)
Shaft:	Height—207 feet (63 meters) Diameter—36 feet (11 meters) to 56 feet (17 meters)
Intake Levels:	Elevations—350 feet m.s.l., 390 feet m.s.l., 430 feet m.s.l.
Intake	Diameter—5 feet (1.5 meters)

Reservoir

Drainage Area:	130 square miles (337 square kilometers)
Capacity:	381,000 acre-feet (124 billion gallons) Flood Control—130,000 acre-feet (42 billion gallons) Water Supply—212,000 acre-feet (69 billion gallons) Sediment Accumulation—26,000 acre-feet (9 billion gallons) Fishery Maintenance—13,000 acre-feet (4 billion gallons)

Lake Size:

	Flood Pool	Conservation Pool	Minimum Pool
Elevation	495 feet	451 feet	292 feet
Surface Area	3600 acres	2700 acres	486 acres
Shoreline	73 miles	53 miles	17 miles
Length: Dry Creek	12 miles	9 miles	5 miles
Warm Springs	7 miles	4 miles	2 miles

Fish Hatchery

Annual Production:	Steelhead—300,000 yearlings Silver Salmon—110,000 yearlings Chinook Salmon—1,000,000 smolts

Relocations

Roads:	20 miles of relocated roads plus two new bridges
Utilities:	15 miles of electric power lines; 9 miles of telephone lines.

2. Resource Base

Physical Factors

Climate

2.01 **Project Area Precipitation**—The amount of rainfall falling on-site is affected by topographic variation. As moisture-laden air masses move in from the ocean, they are forced to rise over the mountains, where they cool, condense, and precipitate. Greatest precipitation will be associated with those higher ridges having a more direct access to the ocean. Lower precipitation is found in the sheltered valleys and on secondary lower ridges. See Figure 2-1 for annual average precipitation.

2.02 **Wind**—Winds in the project area are variable during the day and vary from one location to another within the site. There are general diurnal and seasonal differences. Winds during the day are predominantly on-shore and shift to off-shore at night when the pressures inland begin to stabilize or are higher than those over water. These breezes are very mild and do not match the steadier on-shore westerly winds. See Figure 2-2 for the windflow diagram.

2.03 **Temperature**—Topography and vegetative pattern in the area are principally responsible for the microclimatic variations in temperature.

Temperatures decrease as the height above sea level increases. A temperature drop of 3.5° F. for every 1,000 foot rise in elevation is a normal occurence. (Elevations on the property vary from 250 feet to 1800 feet.)

2.04 Aspect (see paragraphs 2.19 to 2.23) and variations in the density of the vegetative canopy cause fluctuations in temperatures. Temperatures can be expected to be 3 to 10° F. cooler under a dense canopy, primarily evergreens. Grasslands and chaparral exhibit temperatures that approximate average free air temperatures.

2.05 Below are listed various temperature related facts (see Figure 2-3: Temperature):

Lowest winter temperature—18° F.
Highest summer temperature—114° F.

Average date of the first freeze—(28° F.)
December 15-December 31

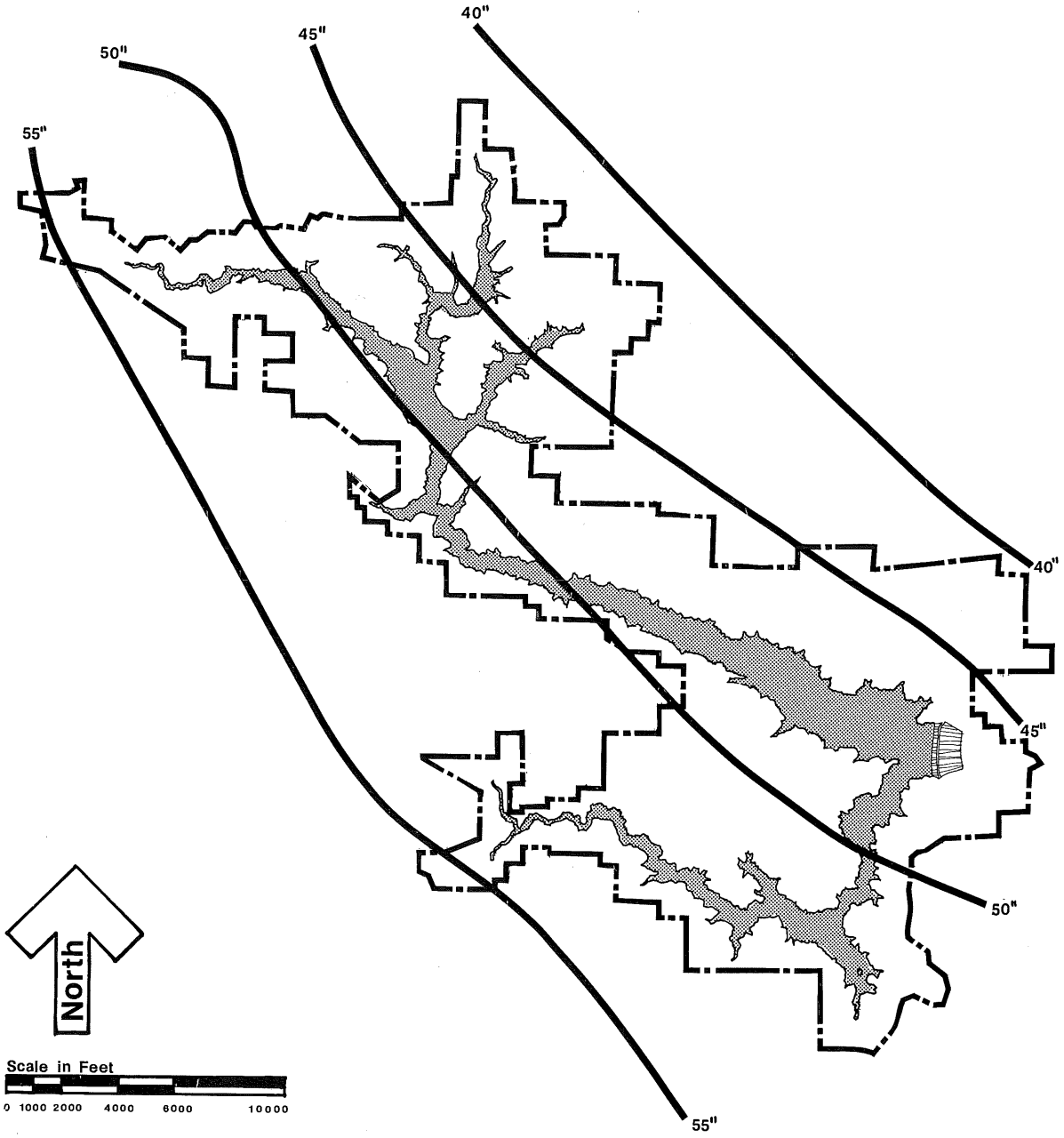
Average date of last freeze—(28° F.)
February 1

Average growing season (28°) is 320-330 days

Soil moisture depletion date—June 15

2.06 **Summer Fogs**—Fog frequency is related to pressure as are winds and therefore both have similar patterns of occurrence. As the pressure drops inland fog rolls in over the hills with the wind. The ability of some areas to remain fog-free is due to a local inversion or the blocking effect of the hills.

2.07 **Winter Fogs**—Much of the winter fog is associated with storm passage. Wintertime variability depends on the timing of winter storms and these often are followed by clear weather. Radiation fog (fog formed at the surface and commonly known as ground fog) is most prevalent in the valleys within the project area during the winter season. Available moisture related to the lake will create conditions conducive to fog occurence (high relative humidity).

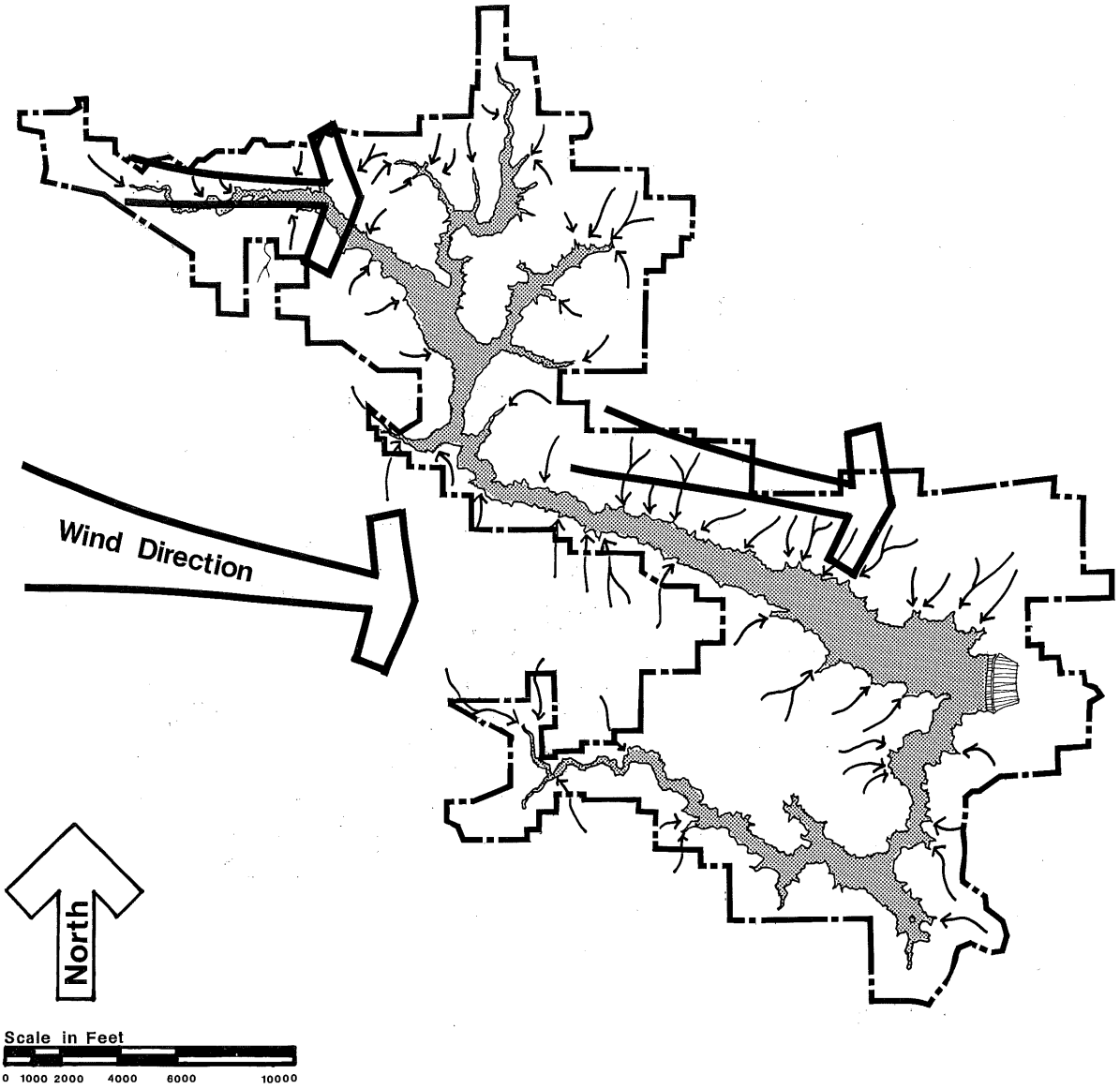


Legend

40" — Precipitation in inches

Climate: Average Annual Precipitation

Figure 2-1



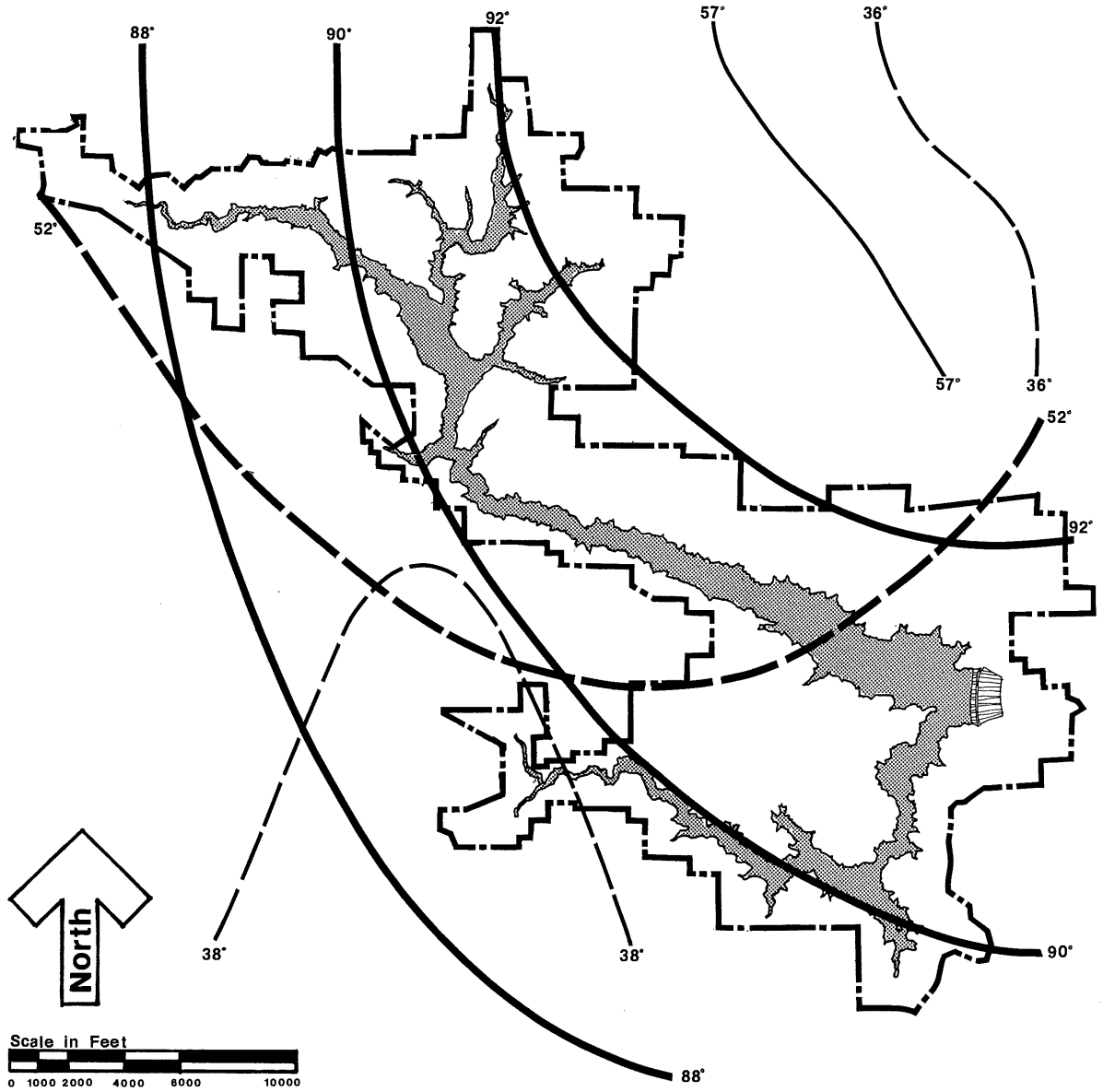
Legend

Climate: Windflow

Cold Air Drainage

Calm air in the morning
Westerly flow in the afternoon

Figure 2-2



Legend

Climate: Temperature

——— January mean maximum
— — — January mean minimum
▬▬▬ July mean maximum
▬ ▬ ▬ July mean minimum

Figure 2-3

2. Resource Base

Soils

2.08 U.S. Department of Agriculture Soils Survey data for the Dry Creek Watershed[1] shows eight major soils groupings on the project area. The ridge tops and north slopes are generally characterized by moderately deep to deep soils of the Hugo and Josephine associations with occasional pockets of shallow soils of the Henneke-Montara and Maymen associations. South facing slopes are generally made up of shallow to moderately deep soils of the Laughlin, Yorkville and Los Gatos associations.

2.09 By far the most serious soils problem is that related to the steepness of slope and erosion hazard relating to soils. The accompanying map (Plate 1) illustrates the erosion hazard based on soils and slope data.

Geology

2.10 The region surrounding the project is a generally mountainous area lying within the Coast Ranges, with several inter-mountain valleys. Topographically, the Dry Creek drainage area is characterized by nearly parallel northwestward trending ridges, with a trellis type of drainage pattern following the intervening valleys and short dendritic tributary drainage cutting the ridges at sharp angles to the main valleys. Crests of the ridges reach 2,000 feet elevation.

2.11 Lake Sonoma is situated in steepsided canyons cut into the Mendocino Plateau by Dry Creek and Warm Springs Creek. Terrace deposits outcrop primarily along the northeastern side of Dry Creek valley and represent Pleistocene erosional remnants. Deposits of Sonoma volcanics underlie the terraces downstream from the dam but are not present in the reservoir area. Recent alluvium in the valley floor is a thin deposit, 10 to 40 feet thick at the damsite. Other recent overburden sediments in the reservoir area are the landslide masses, discussed in greater detail below.

2.12 Franciscan and Great Valley rocks underlying the reservoir area are separated by a fault which also controls the direction of the main valley of Dry Creek upstream of the damsite. Thus, the principal rocks on the northeast shore of the proposed reservoir and in the upstream areas tributary to Dry Creek belong to the Great Valley sequence. In the remainder of the reservoir area, principal rocks belong to the Franciscan assemblage.

2.13 **Physiography**—Plate 2 illustrates major ridge lines as well as prominent water-related features. The major ridge lines are from northwest to southeast and separate the two arms of Lake Sonoma (approximately along Rockpile Road). They visually enclose the project southwest of the Warm Springs arm of the Lake and along Pritchett Peaks to the northeast of the Dry Creek arm. The major water-related features on the existing site are Dry Creek and its tributaries (Cherry Creek, Yorty Creek, Smith Creek) and Warm Springs Creek.

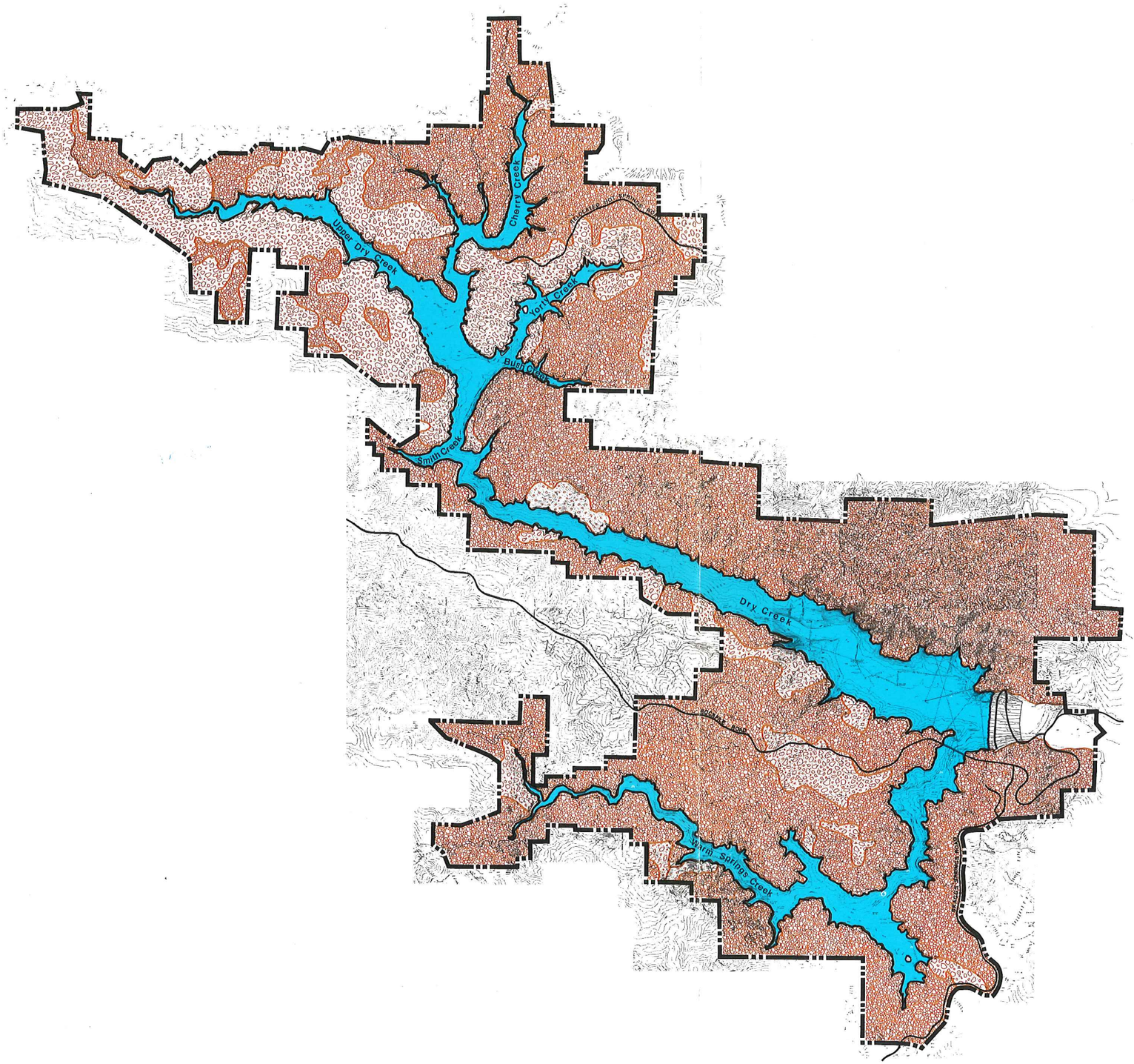
2.14 **Landslides**—Forty major landslides have been mapped in the reservoir area, and numerous smaller slides are known to exist. Additionally, it is expected that new slides may develop on unstable slopes which become saturated by the rising reservoir. Instruments installed and continuing detailed field observations have established movement rates for the largest slides ranging from 0 to 1 inch per year.

2.15 It appears that most of the slides are of ancient origin and only a few may have resulted from deforestation, over-grazing or other human-induced conditions. The slides have developed because of a variety of conditions which make the slopes unstable, but most notable are the nature of the rock, excessive moisture, weathering and faulting. The slides are found in both Franciscan and Great Valley rocks, but a decidedly greater percentage are in the Franciscan. Serpentine rocks are inherently unstable and almost all slopes underlain by such rocks show signs of failure.

1. *Conservation Treatment of the Dry Creek Watershed.* Prepared for the Department of the Army, Corps of Engineers by the U.S. Department of Agriculture, February, 1966.

2. Resource Base

2.16 Scars are formed above the slides as the material falls and moves down slope. Retrogressive slumping has extended the scars above some of the slides to the top of the ridge above. The landslide areas are locally characterized by hummocky terrain, fallen trees, rock and soil debris and gullying.



Legend

- Moderate Erosion Hazard
- High Erosion Hazard
- Very High Erosion Hazard
- Project Boundary

SOIL EROSION HAZARD

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

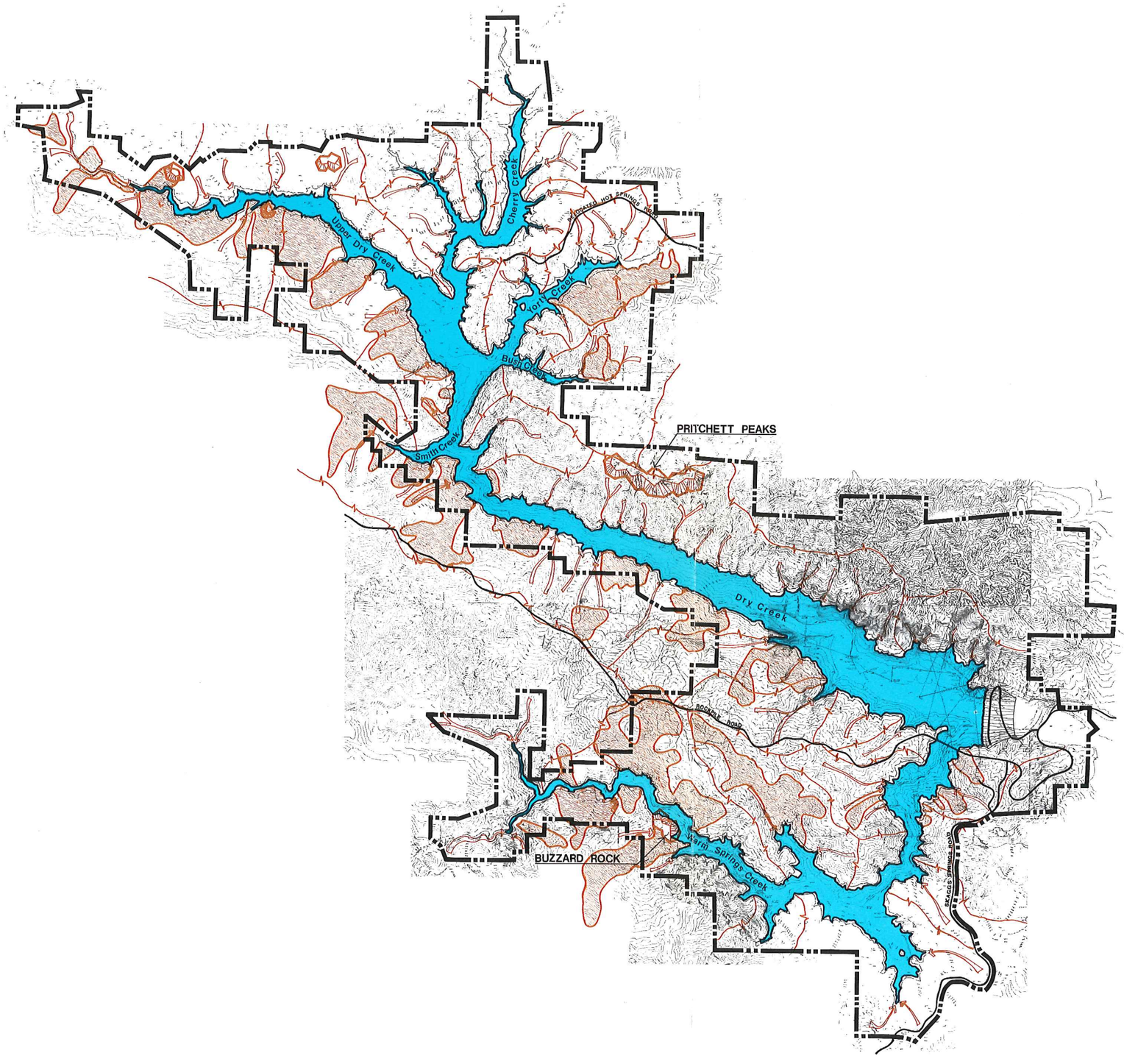
Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 1



Legend

- Landslide Hazard Areas
- Drainage Routes
- Ridges
- Unique Features
  Rock Outcrop
- Project Boundary

GEOLOGY

PHYSIOGRAPHY, HYDROLOGY, AND HAZARDS

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 2

2. Resource Base

2.17 **Unique Features**—The major geologic features on the site are Pritchett Peaks, a series of outcrops rising to an elevation of about 1,800 feet—1,350 feet above the conservation pool of Lake Sonoma. Other geologic features are rock outcrops of interesting form, the most prominent of which is Buzzard Rock on Warm Springs Creek. These huge rocks are especially prominent when compared to the generally rounded, grassy slopes of the project area.

Slopes
2.18 The uses and the intensity of use on a site are often determined by slope. In general, slopes on the project site are over 25% eliminating much project land for any intensive use (see Plate 3). Of the remaining project area slopes, most are between 10% and 25% making intensive use difficult. The only significant area under 10% slope is just downstream of the dam. Slopes are divided as follows:

- 0-10% Flattest land; fewest restrictions to development; located downstream of the dam.
- 11-25% Restrictions for development; easiest areas to develop occur along ridgelines. Access often difficult off ridges.
- 26% + Restricted for most development; access restricted; most slopes along lakeshore are in this category.

Slope Exposure
2.19 Aspect, or the exposure of a slope, is a major factor in the creation of site microclimates. These climatic differences affect plant growth, vegetative types, temperatures and human use and comfort (see Plate 4).

2.20 East-facing slopes are first to receive the sun. In the late afternoon they are predominately shady. Summer uses are most appropriate on these slopes.

2.21 Western slopes receive the sun late and stay moist into the morning. The warm afternoon sun makes these slopes ideal for early evening activities.

2. Resource Base

2.22 South slopes are the driest slopes and are often sparsely vegetated. They are the warmest slopes throughout the year and lend themselves to winter camping and beach use.

2.23 North slopes are the moistest and most vegetated slopes. They provide good climate for summer activities as they remain the coolest of all project areas.

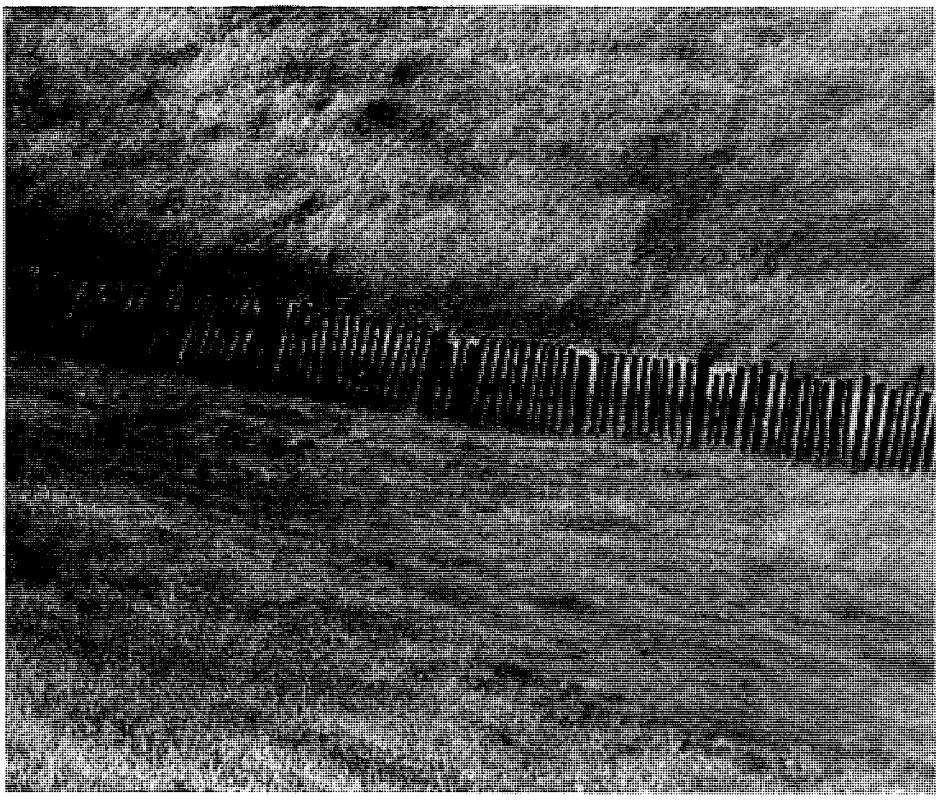
Viewshed
2.24 Viewshed, what one can see from a point or points, has been studied as follows:

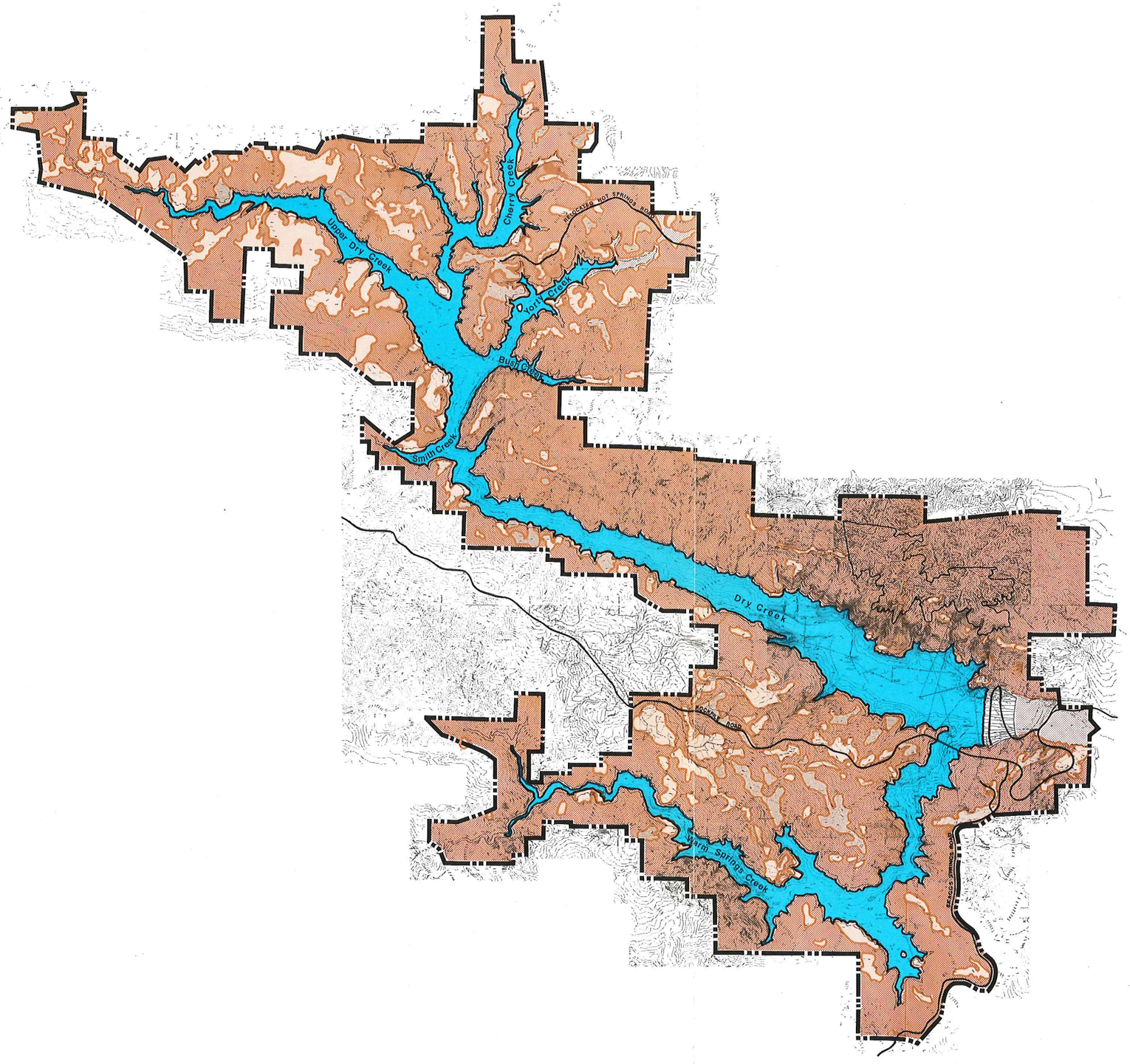
1. Three view points convenient for public access have been chosen and all areas visible from these points have been mapped (see Plate 5).

2. Areas that can be seen from anywhere on the lake surface have been mapped (see Plate 6).

2.25 These studies are important as guides to what can be seen from a place but they are also important as an indication of what cannot be seen. Areas of the Lake not visible from a major viewpoint are considered for recreation development, thus keeping the existing views of rural countryside as unobstructed as possible. Areas not visible from the Lake are important for more intensive recreation development such as overnight camp areas.

Existing Structures
2.26 There are very few structures existing on the project site. Indigenous architecture of the northern Sonoma rural setting such as barns, houses, sheds and farm structures, show a use of woodframing, wood boards and bat siding and wood shingle or corrugated metal roofs. Existing fencing in the project area consists mostly of low wood or wood and wire structures used to define a property or grazing area. They are old and in disrepair and lend a rural charm to the area. The fences existing on the site will not present a barrier to hikers or wildlife in the project area.





Legend

- 0 to 10 Per Cent
- 11 to 25 Per Cent
- 26 Per Cent and above
- Borrow Area
- Project Boundary

SLOPE

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

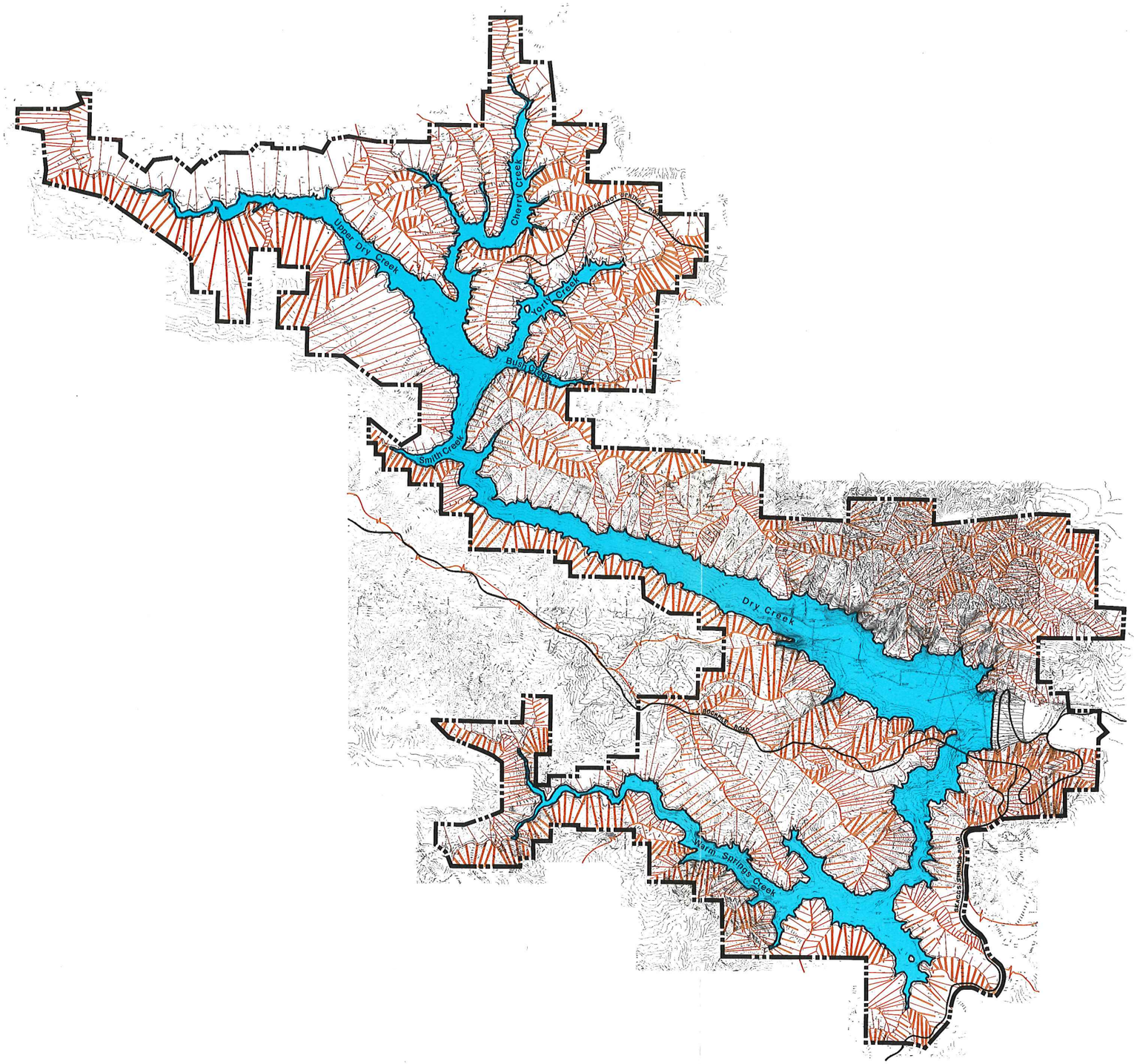
Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 3



Legend

- North Facing
- South Facing
- East Facing
- West Facing
- Valleys
- Ridges
- Project Boundary

SLOPE EXPOSURE

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

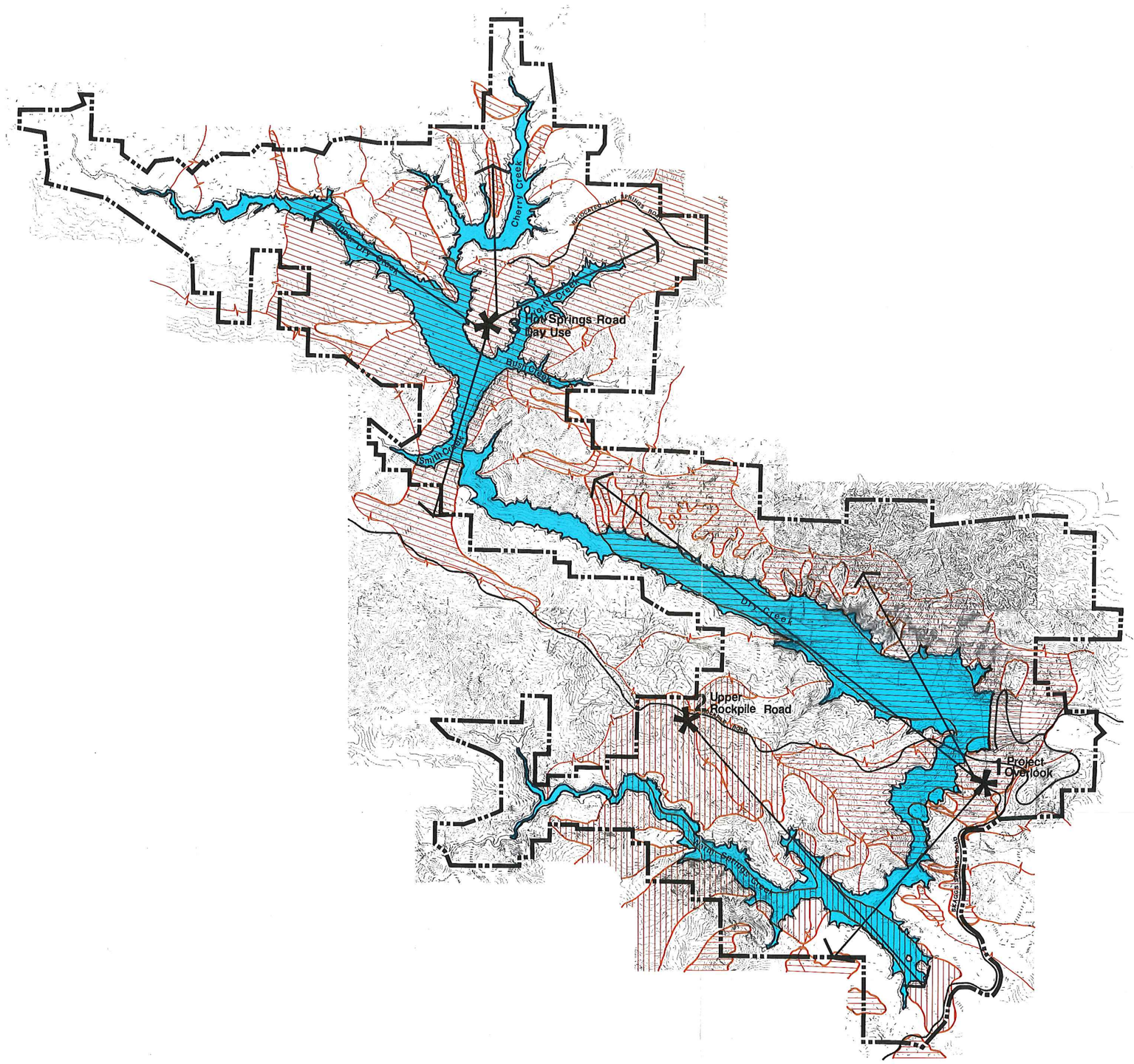
Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 4



Legend

- Viewpoints
- Areas Seen from Point 1
- Areas Seen from Point 2
- Areas Seen from Point 3
- Long Range Views
- Ridges
- Project Boundary

Note: Vegetation not Considered

VIEWSHED FROM THREE POINTS

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

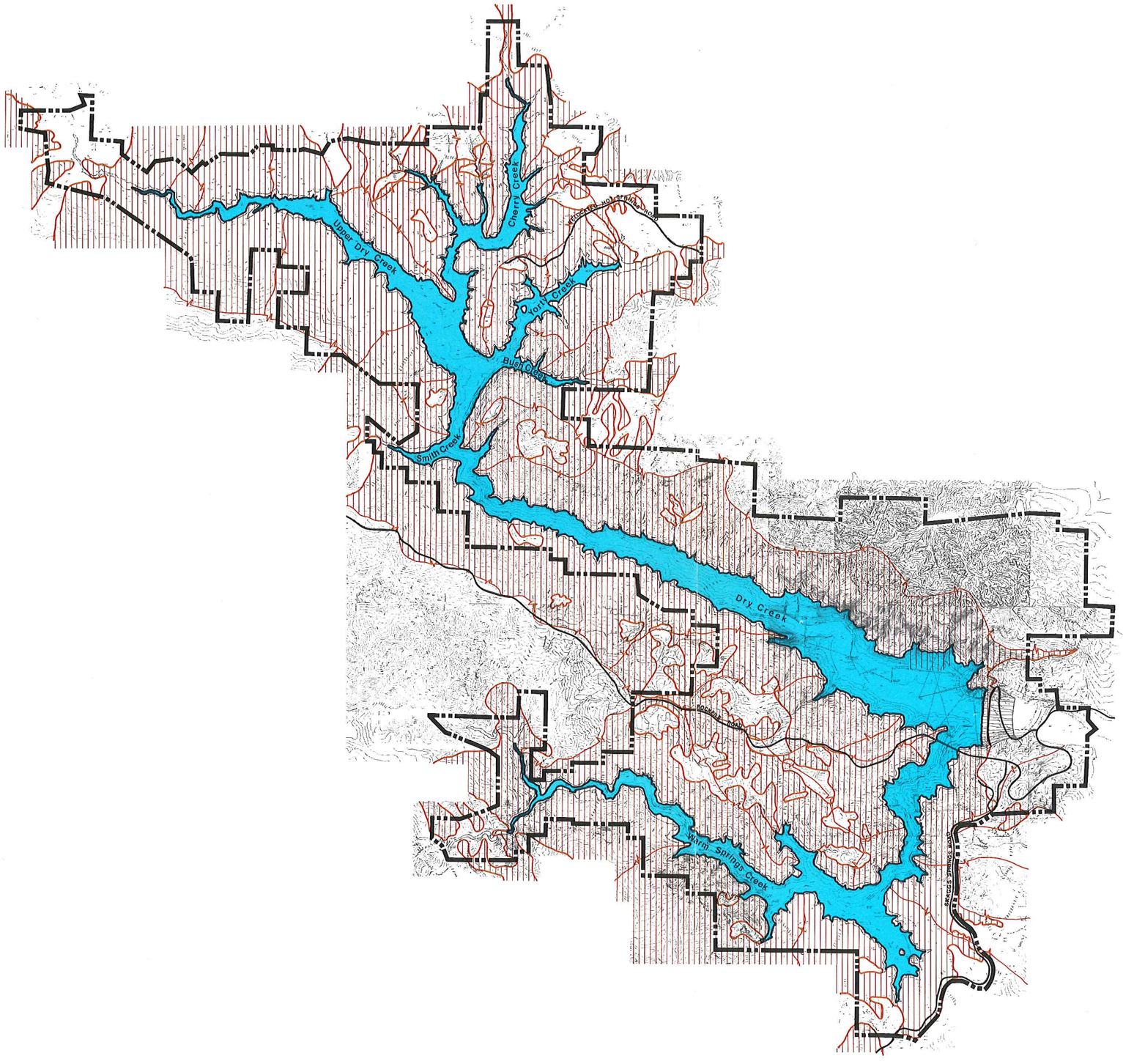
Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 5



Legend

- Visible Areas (Vegetation not Considered)
- Ridges
- Project Boundary

VIEWSHED FROM LAKE SURFACE

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 6

2. Resource Base

Reservoir Operation And Water Levels

2.27 The top of the flood control pool is at elevation 495 m.s.l. The top of the conservation pool is at elevation 451 m.s.l. The bottom of the conservation pool (minimum pool) is at elevation 292. Figure 2-4 presents the Lake Sonoma Drawndown Curves based on "ultimate" use of the water supply pool. The figure illustrates the reservoir water levels as a function of month of year and water storage or water elevation. The percentages refer to the frequency with which the pool will be at any given elevation in any given month. Detailed regulation procedures will be presented in a reservoir regulation manual which will be prepared prior to completion of the dam.

2.28 Figure 2-5 illustrates the typical (or representative) length of time in days that the reservoir level will be above the top of the conservation pool (elevation 451) for a given storm event.

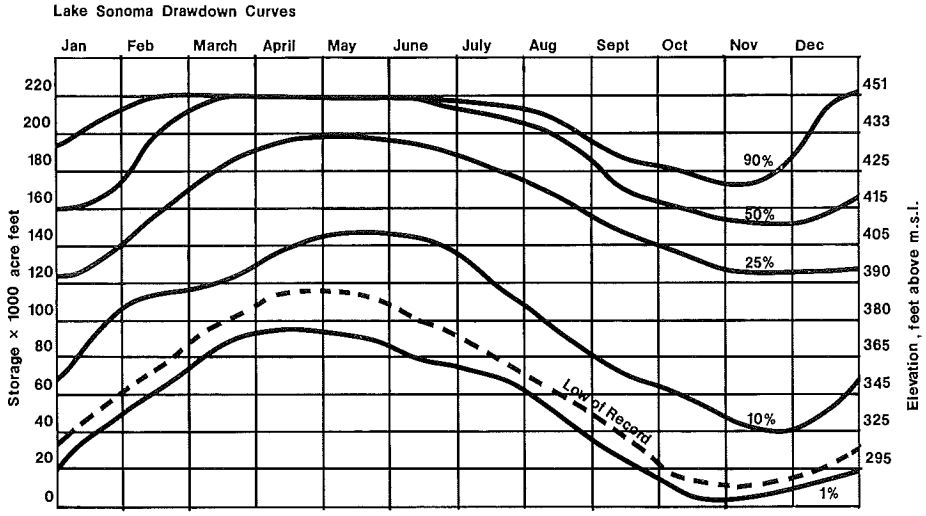


Figure 2-4
Source: Corps of Engineers

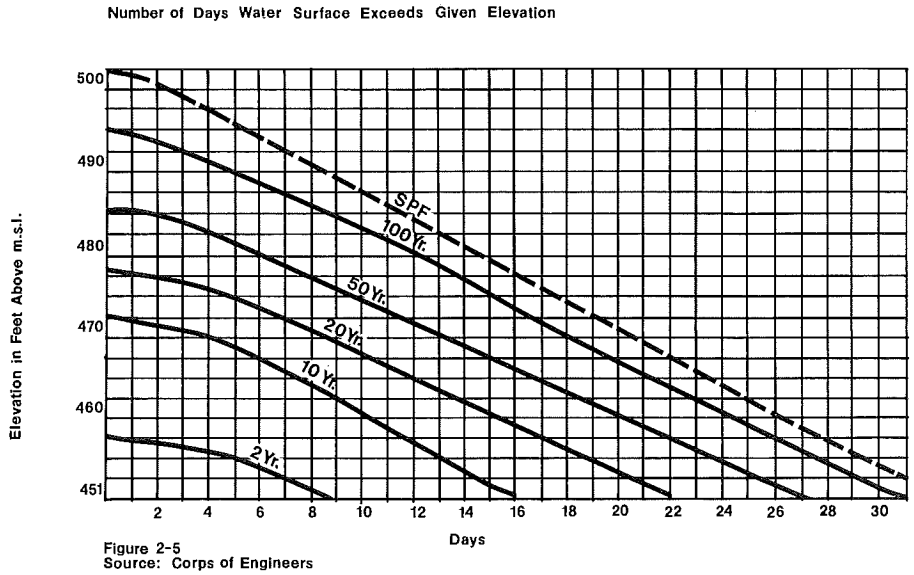


Figure 2-5
Source: Corps of Engineers

2. Resource Base

Water Quality
2.29

Water quality of the surface waters (upper 40 feet) will be sufficiently high to permit maximum development of warm water fishing in the reservoir. The watershed has relatively little intensive agriculture and few people. Therefore agricultural and domestic waste loads will be low. Also, the soils are rather poor so vegetative growth is limited.

2.30

Because of the summer heat and lack of inflow, Lake Sonoma can be expected to be strongly thermally stratified in the summer. The water with the longest residence time, which will be located in the hypolimnion (lower, more stagnant layer of water) can be expected to have a considerable oxygen demand upon it; possibly causing the dissolved oxygen to drop well below the 6 mg/1 level. The water in the euphotic zone (epilimnion—the warmer, upper layer of the Lake water) will rise to temperatures well above that tolerated by salmon, but will have dissolved oxygen levels in excess of 6 mg/1.

2.31

Poor water quality may limit development of a tailwater fishery for the first 3-5 years. However, after this period, a tailwater fishery can be established.

Minimum Fishery Releases
2.32

In response to comments on the EIS made by the State of California Department of Fish and Game, a tentative agreement has been reached between the Sonoma County Water Agency, the State and the Corps allowing additional water releases from the dam.

Biological Factors

Vegetation
2.33

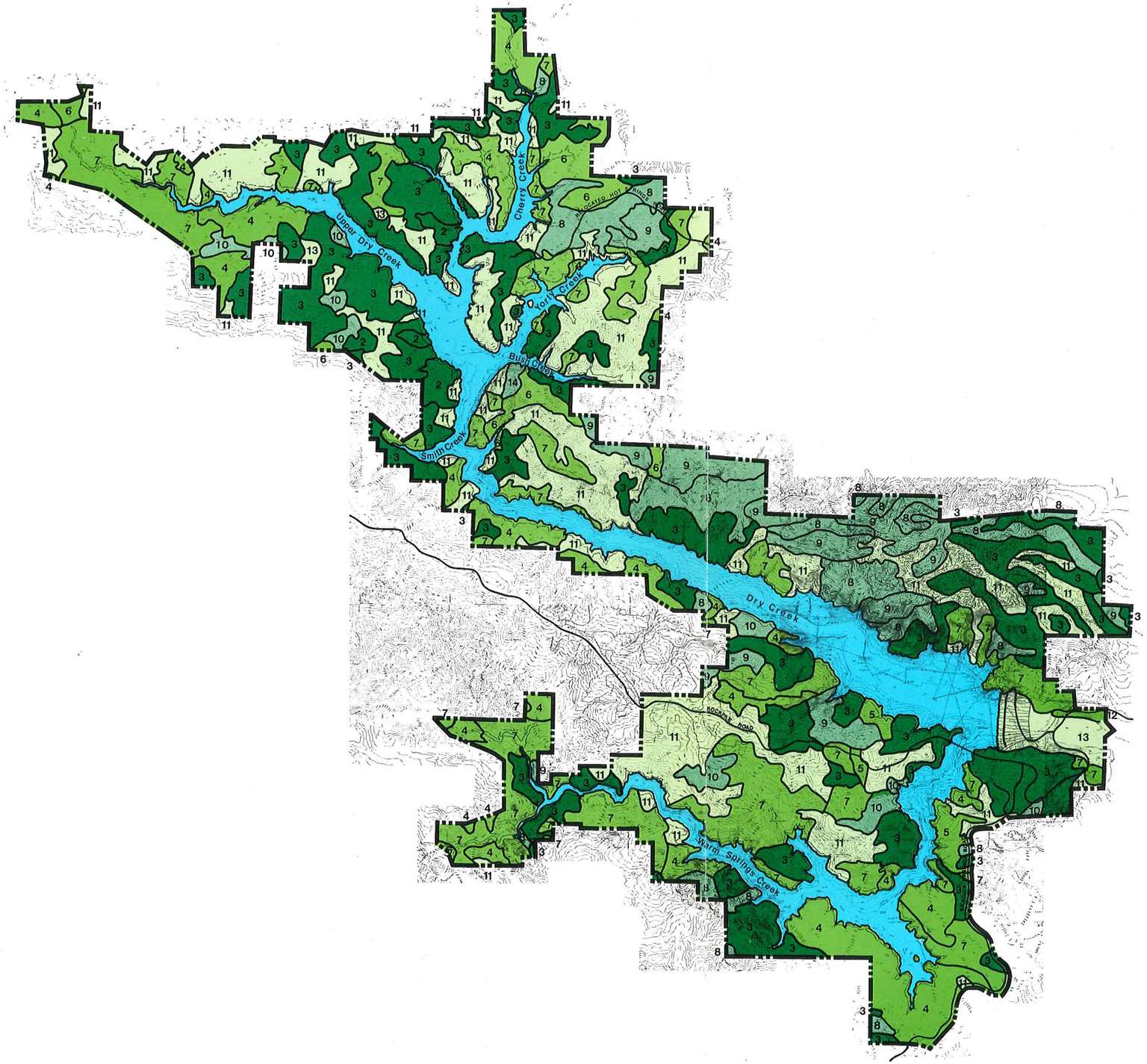
A varied mosaic of vegetation types oocurs on the project site in response to the distribution of soil types, microclimate and land use history (see Plate 7 and Table 2-1). These types are as follows:

Redwood forest
Douglas fir forest
Mixed evergreen forest
Northern oak woodland
Digger pine woodland
Foothill woodlands
Oak savanna
Chamise chaparral
Mixed high chaparral
Serpentine chaparral
Grassland
Riparian woodland
Northern coastal scrub

In addition to these wildland types, orchards and vineyards occur on the site.

2.34

The forest types occur primarily on deeper soils on the north-facing slopes or in deep ravines. Many areas originally dominated by redwood or Douglas fir have been logged or converted to grazing lands. Less than five percent of the project site now supports stands of redwood or Douglas fir. The mixed evergreen forest type, which is characterized by either conifer species and California black oak, Tanbark oak, Madrone, Bigleaf maple, and California bay has been selectively logged for the conifers over much of the project site.



Legend

1 Redwood Forest
2 Douglas Fir Forest
3 Mixed Evergreen Forest
4 Northern Oak Woodland
5 Digger Pine Woodland
6 Foothill Woodland
7 Oak Savanna
8 Chamise Chaparral
9 Mixed High Chaparral
10 Serpentine Chaparral
11 Grassland
12 Riparian Woodland
13 Agriculture
14 Northern Coastal Scrub

Data by Elgar Hill , Environmental Planning

VEGETATION

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 7

2. Resource Base

2.35 The woodland types on the upland areas are dominated by oaks (Northern oak woodland—Oregon oak, Foothill woodland—Blue oak or Digger pine). The oak dominated woodland types are more commonly found on north-facing slopes. The Digger pine woodland occurs on serpentine soils on a variety of aspects. The woodland types show some local evidence of past cutting for firewood.

2.36 The riparian woodland in the project area will, for the most part, be inundated by the reservoir. The remaining Dry Creek and Warm Springs Creek stands are characterized by Willow, Fremont cottonwood, Ash and California bay.

2.37 The Oak savanna type is widely distributed on the project site. A number of oaks may be found in this broad type (Valley oak, Coast live oak, California black oak, Oregon oak, Blue oak and Canyon oak). The type is often observed as an extension of trees from woodland types onto south-facing slopes or broad ridgelands.

2.38 Chaparral and scrub types occur on shallower soils on south-facing slopes on about 10% of the project site. These locations are characterized by low levels of available soil moisture and high insolation. Dominant species include Manzanitas, Chamise, Scrub oak, Toyon, Poison oak and Baccharis. Control burning for range improvement has been used in the past to convert some chaparral dominated areas to grassland. The chaparral type burns readily and is known for its high fire frequency.

2. Resource Base

TABLE 2-1
Major Species by Vegetation Type

Vegetation Type	Latin Name	Common Name
Forest	*Sequoia sempervirens*	Redwood
	Pseudotsuga menziesii	Douglas fir
	Quercus kelloggii	California black oak
	Lithocarpus densiflora	Tanbark oak
	Arbutus menziesii	Madrone
	Acer macrophyllum	Big leaf maple
	Umbellularia californica	California bay
Woodland	*Quercus garryana*	Oregon oak
	Quercus douglasii	Blue oak
	Pinus sabiniana	Digger pine
Oak Savanna	*Quercus lobata*	Valley oak
	Quercus agrifolia	Coast live oak
	Quercus kelloggii	California black oak
	Quercus garryana	Oregon oak
	Quercus douglasii	Blue oak
	Quercus chrysolepis	Canyon oak
Chaparral/Scrub	*Arctostaphylos spp.*	Manzanita
	Adenostoma fasciculatum	Chamise
	Quercus dumosa	Scrub oak
	Heteromeles arbutifolia	Toyon
	Rhus diversiloba	Poison oak
	Baccharis pilularis	Baccharis
Grassland	*Bromus mollis*	Soft chess
	Avena barbata	Slender oat
	Briza minor	Little quaking grass
	Bromus rubens	Foxtail chess
Riparian	*Salix laevigata*	Willow
	Salix lasiolepis	Willow
	Populus fremontii	Fremont cottonwood
	Fraxinus dipetala	Ash
	Fraxinus latifolia	Ash
	Umbellularia californica	California bay

2. Resource Base

2.39 The Grassland type occupies roughly half of the project site. The dominant species in this type are European annual grasses which have taken over grasslands throughout California since the introduction of grazing livestock in the late 18th century. These include Soft chess, Slender oat, Little quaking grass and Foxtail chess. A few grassland areas on the project site still support native grass species (Needlegrass, California fescue and California melic). Heavy grazing was common on many of the grassland areas and elimination of grazing from these lands allows the re-establishment of native grass species where natural seed sources are available.

Fish and Wildlife

2.40 The project site supports a diverse fauna and flora characteristic of the drier inland regions of the North Coast Ranges.

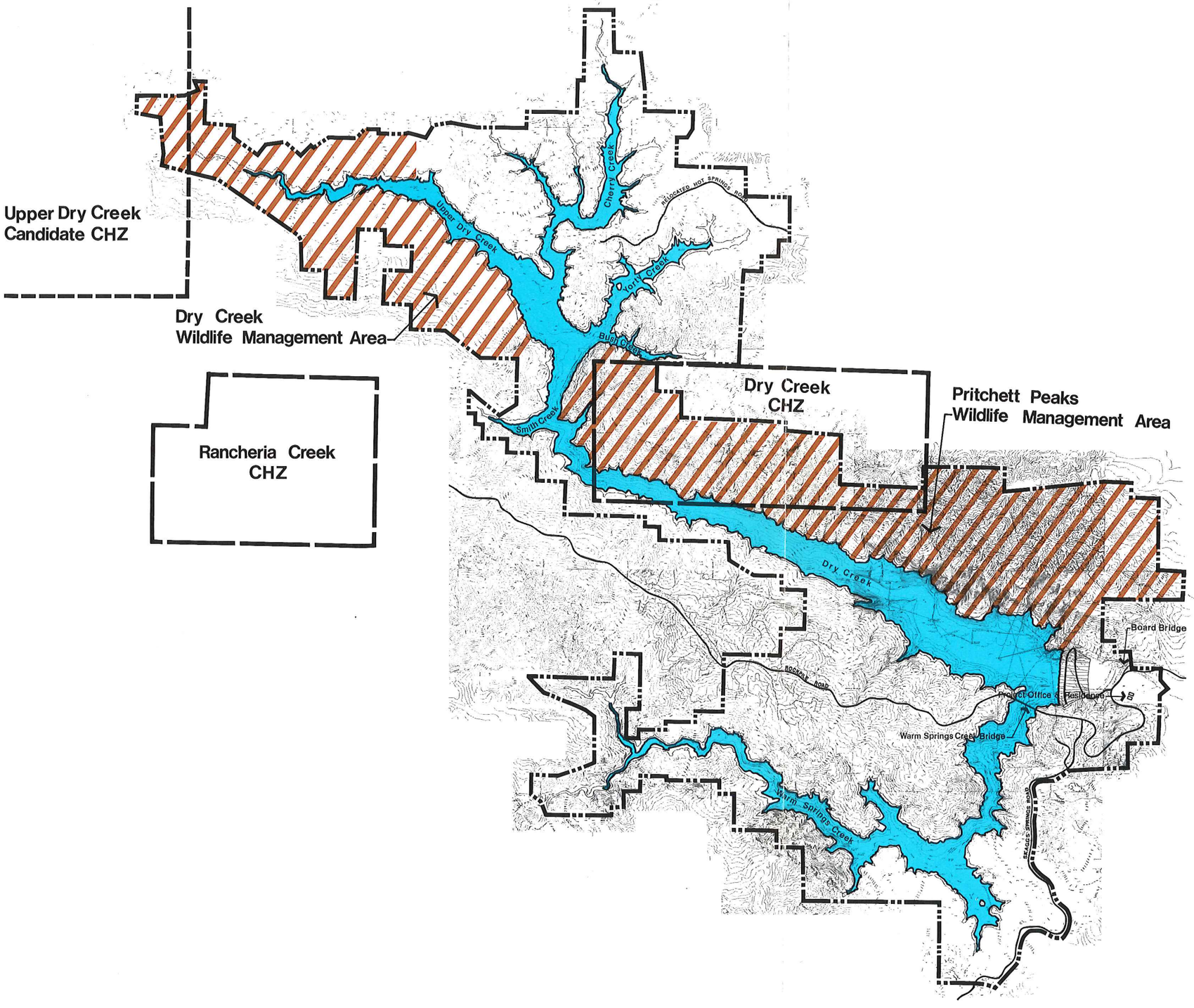
2.41 The diversity of vegetation supports an equally diverse wildlife community. The diversity of wildlife is greatest in riparian and forest habitat types. The non-game wildlife and game species present are typically of the North Coast Ranges of California and no group or species will be significantly depleted by the project. Several additional forms will undoubtedly be attracted to the reservoir, particularly waterbirds, bald eagles (an endangered species) and ospreys.

2.42 Wildlife resources lost or displaced due to inundation of habitat will be mitigated through the establishment and operation of wildlife management areas totalling some 5,200 acres, and the development and implementation of specific habitat management plans (such as erosion control and revegetation). Wildlife species of

economic and recreational importance include the black-tailed deer, brush rabbit, black-tailed jackrabbit, California quail, and morning dove; the list of ecologically important species is considerably greater. Deer population densities are estimated as high as 80-100 per square mile during peak periods.

TABLE 2-2
Representative Site Wildlife

Birds	
Red-tailed hawk	*Buteo jamaicensis*
Golden eagle	*Aquita chrysaetos*
Peregrine falcon	*Falco peregrinus anatum*
California quail	*Lophortyx californicus*
Band-tailed pigeon	*Columba fasciata*
Great horned owl	*Bubo virginianus*
Acorn woodpecker	*Melanerpes formicivorus*
Steller's jay	*Cyanocitta stelleri*
Scrub jay	*Aphelocoma coerulescens*
Common Bushtit	*Psaltriparus minimus*
Wrentit	*Chamaea fasciata*
Western meadowlark	*Sturnella neglecta*
Redwinged blackbird	*Agelaius phoeniceus*
Black-headed grosbeak	*Pheucticus melanocephalus*
Brown towhee	*Pipilo fuscus*
White-crowned sparrow	*Zonotrichia leucophrys*
Mammals	
Raccoon	*Procyon lotor*
Striped skunk	*Mephitis mephitis*
Gray fox	*Urocyon cinereoargenteus*
Mountain lion	*Felis concolor*
Bobcat	*Lynx rufus*
Beecheyi ground squirrel	*Otospermophilus beecheyi*
Western gray squirrel	*Sciurus griseus*
Deer mouse	*Peromyscus maniculatus*
Brush mouse	*Peromyscus boylei*
Duoky-footed wood rat	*Neotoma fuscipes*
Brush rabbit	*Sylvilagus bachmani*
Black-tailed deer	*Odocoileus hemionus columbianus*
Feral pig	*Sus scrofa*
Amphibians	
California newt	*Taricha torosa*
California slender salamander	*Batrachoseps attenuatus*
Arboreal salamander	*Aneides lugubris*
Pacific treefrog	*Nyla regilla*
Foothill yellow-legged frog	*Rana boylei*
Reptiles	
Western fence lizard	*Sceloporous occidentalis*
Northern alligator lizard	*Gerrhonotus coeruleus coerulens*
Western yellow-bellied racer	*Coluber constrictor mormon*
Pacific Gopher snake	*Pituophis melanoleucus catenifer*
Common garter snake	*Thamnophis sirtalis*
Western rattlesnake	*Crotalus viridis*



Legend

- Canidate Critical Habitat Zone
- Critical Habitat Zone (CHZ)
  See Federal Register Vol. 42 No. 155 Aug. 11, 1977 for Boundary
- Wildlife Management Area
- Project Boundary

WILDLIFE
(And Existing Structures)

Lake Sonoma Master Plan
Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 8

2.43 **Peregrine Falcon**—Prior to distribution of the draft Master Plan, information was brought to the attention of the Corps regarding an endangered species coming under the Endangered Species Act of 1973 (16 USC 1533). A portion of a critical habitat zone, which contains a breeding site of the peregrine falcon falls within the project boundary and two other critical habitat zones for this species are located near the project. At the request of the U.S. Fish and Wildlife Service, reference to the peregrine falcon was not made in the draft Master Plan for the protection of the Species. The draft Master Plan was reviewed by the U.S. Fish and Wildlife Service. In addition, formal consultation pursuant to Section 7 of the Endangered Species Act of 1973 as amended in 1978 was requested to evaluate the effect of implementing the draft Master Plan on the American peregrine falcon. The Biological Opinion concluded that implementation of the draft Master Plan and associated accumulative impacts would likely jeopardize the continued existence of the peregrine falcon and would likely adversely modify its critical habitat. The Biological Opinion offered a number of alternatives which, if implemented, would remove jeopardy to the species. This revised plan does not preclude alternatives contained in the Biological Opinion. These alternatives are being assesed and evaluated with the cooperation of the U.S. Fish and Wildlife Service prior to recommendations for imlementation.

2.44 **Bald Eagles**—All bald eagles in California are protected under the Endangered Species Act of 1973. The Warm Springs Project is south of their current breeding range in the Coast Range Mountains. In winter months, bald eagles disperse throughout California and most of the man-made lakes extending into southern California support a substantial wintering eagle population.

2. Resource Base

Fisheries

2.45 **Dry Creek Drainage Aquatic Inventory**—The critical period for fish survival in the Dry Creek drainage is during the latter part of the summer when the streams have the lowest flows and water temperatures often exceed 80° F. During this period, few salmonid fishes can survive in the section encompassed by headwaters of Lake Sonoma downstream to the mouth. Fishes found during this critical period are included in Table 2-3.

TABLE 2-3
Fishes of Lake Sonoma Watershed

Name		Abundance
1. Sacramento sucker*	*Catostomus occidentalis*	Numerous
2. California roach	*Hesperoleucus symmetricus*	Numerous
3. Sacramento squawfish	*Ptychocheilus grandis*	Common
4. Pacific lamprey	*Lampetra tridentata*	Common
5. Hardhead	*Mylopharodon conocephalus*	Common
6. Tule perch	*Hysterocarpus traski*	Uncommon
7. Stickleback	*Gasterosteus aculeatus*	Uncommon
8. Green sunfish	*Lepomis cyanellus*	Rare
9. Steelhead	*Salmo gairdneri*	Rare

*Common names taken from Moyle, 1976

2.46 To the best of our knowledge, other fish species (e.g. sculpins) probably occur.

2.47 Other organisms associated with the water are toads, yellow-legged frogs, western pond turtles, and California newts.

2.48 Those fishes occuring in Dry Creek which should survive in the reservoir include:

1. Sacramento sucker
2. Sacramento squawfish
3. Tule perch
4. Riffle sculpin (if present now)
5. Hardhead
6. Green sunfish

2.49 **Water Quality of the Tailwater**—Because large quantities of organic material exist in the area to be flooded, there will be considerable oxygen demand due to decay of the organics in the reservoir waters the first few years of closure. The great water depths will produce an extensive hypolimnion over a large portion of the year. Coupled with the large oxygen demand, the hypolimnion can be expected to have low oxygen levels and contain toxicants such as reduced heavy metals and hydrogen sulfide. Discharges of this poor quality hypolimnetic water into the tailwater will probably limit the resident fishery development over the first few years while the reservoir is being filled. Eventually the organics will completely decay and the problem will right itself. Multi-level water intakes will help to mitigate this condition. It is probable that there will be little effect on hatchery production as the fish will only be present in the tailwater during those portions of the year when the reservoir is destratified and discharged water quality is high. The cold water releases will probably limit the creek immediately downstream from the reservoir to coldwater fishes. The warmwater species of fish presently occuring at that location will be displaced downstream.

2.50 The fish hatchery as designed should function well and produce more than enough fish to offset the losses due to the dam construction. Because of the unpredictable nature of the numbers of returning salmonids, the net results should vary from adequate numbers of returning adults to large excesses of returning fishes. These could be harvested by fishermen in the Russian River.

2. Resource Base

Social Factors

Regional Transportation

2.51 **Regional Access**—The proximity of the project to U.S. Highway 101 places it at the northern end of the Golden Gate Corridor, the major north-south transportation and transit corridor linking the urbanized areas of Marin and Sonoma Counties to San Francisco. U.S. Highway 101 provides freeway services from a point just south of Cloverdale to Healdsburg, Santa Rosa, Petaluma and southward through Marin County to the Golden Gate Bridge and San Francisco.

2.52 Access from U.S. Highway 101 to the project is by county-designated arterials. Traveling north along Highway 101 the first access point is Dry Creek Road, from its intersection with 101 at Healdsburg. Further north both Lytton Springs Road and Canyon Road connect U.S. Highway 101 to Dry Creek Road. Canyon Road at Geyserville provides the most direct access to the dam site via Dry Creek Road.

2.53 Traveling south along U.S. Highway 101 from Cloverdale, the first improved access route is via Dutcher Creek Road, the only other county-designated collector from U.S. Highway 101 leading to the site of the Warm Springs Dam. Two unimproved roads, Hot Springs Road and Kelly Road (a private road), provide access to the northern portion of the reservoir from the Cloverdale area. Sonoma County intends to provide one improved road from U.S. Highway 101 to the northern project area. Access to the project from the coast is via Stewarts Point-Skaggs Spring Road, a county-designated arterial.

2.54 With the exception of Greyhound Bus Service along U.S. Highway 101 and Golden Gate Transit Service bus along U.S. Highway 101 between San Francisco and Santa Rosa, there is no transit service available in the area.

2.55 **Current Plans**—The only highway improvement planned by the California Department of Transportation affecting the immediate area is the proposed Cloverdale bypass, which is tentatively designed to include an intersection at Kelly Road, a potential access road to the northern portion of the site. This project has not been funded. The Sonoma County General Plan includes the upgrading of the Stewarts Point-Skaggs Spring Road as an east-west arterial as well as Dry Creek Road, and four collectors. The following three are presently upgraded: Dutcher Creek Road, Canyon Road and Lytton Springs Road, all of which connect U.S. Highway 101 with Dry Creek Road.

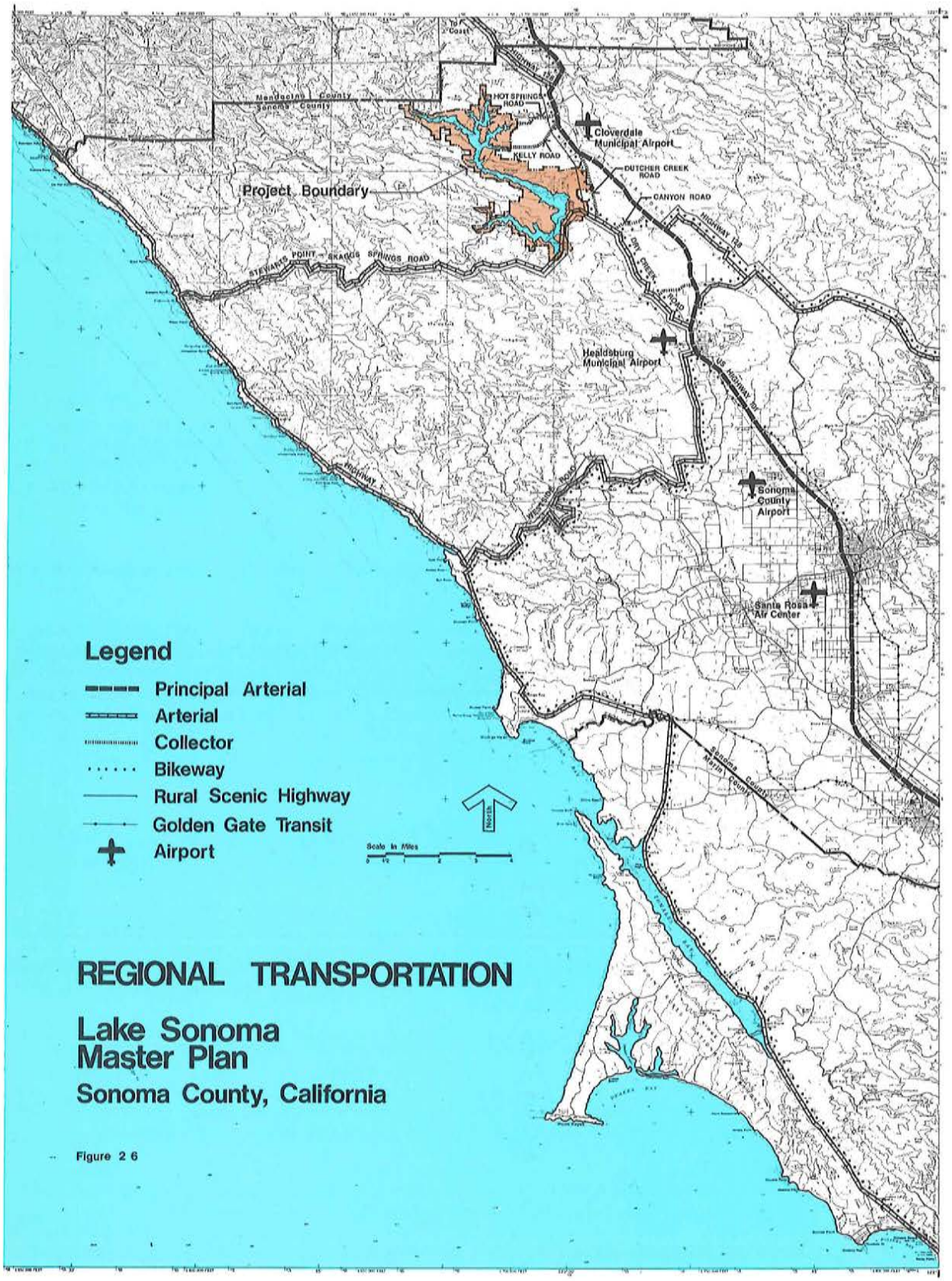
2.56 **Scenic Highways**—Stewarts Point-Skaggs Spring Road, Dry Creek Road and Dutcher Creek Road have been designated in the Sonoma County General Plan as Rural Scenic Highways.

2.57 **Bikeways**—The site of the dam is on the CALTRANS-designated bicycle touring route, following the route of the old Redwood Highway north to Dry Creek Road. From the north this route follows U.S. Highway 101 south to Dutcher Creek Road and Dry Creek Road to the dam. This route coincides with the County-designated Roadway Bicycle touring route.

2.58 **Public Transit**—The County's long-range plan for public transit emphasizes intra-community service for low-mobility groups (the elderly, the young, the economically disadvantaged and the handicapped) in smaller communities, including Cloverdale and Healdsburg. Inter-community service would be extended north from Santa Rosa along U.S. Highway 101 to Healdsburg and Cloverdale.

Local Transportation

2.59 Sonoma County does not have transit systems in many of its smaller communities. There is no local transit source available in Cloverdale and Geyserville; Healdsburg has a fixed route bus system. The County General Plan proposes, as part of its long-range transit development plan, a "low-mobility" transit service system for both Cloverdale and Healdsburg. These systems would be designed primarily to serve the


Mendocino County
Sonoma County
HOT SPRINGS ROAD
KELLY ROAD
Cloverdale Municipal Airport
DUTCHER CREEK ROAD
CANYON ROAD
Project Boundary
STEWARTS POINT - SKAGGS SPRINGS ROAD
DRY CREEK ROAD
HIGHWAY 128
Healdsburg Municipal Airport
US HIGHWAY 101
Sonoma County Airport
Santa Rosa Air Center
Sonoma Marin County
Legend
Principal Arterial
Arterial
Collector
Bikeway
Rural Scenic Highway
Golden Gate Transit
Airport
North
Scale in Miles
REGIONAL TRANSPORTATION
Lake Sonoma Master Plan
Sonoma County, California
Figure 2 6

needs of the transit-dependent; that is, the elderly, the young, the economically disadvantaged, and the handicapped. At such time that these systems are initiated, they are likely to follow a "demand-responsive service" model, with relatively small capacity vehicles dispatched in response to calls for service. If there is a local demand, the flexibility of such systems should allow the initiation of limited transit service to the project from both Cloverdale and Healdsburg.

2.60 **From Healdsburg**—Local access to the project from Healdsburg is via Dry Creek Road, West Dry Creek Road via the Westside Bridge, and less directly via Highway 101 and the Canyon Road from Geyserville. Current County plans to promote the Canyon Road route as the primary southern entry to the project from U.S. Highway 101 may have an influence on local traffic as well, making the Highway 101-Canyon Road route the favored access route from Healdsburg.

2.61 **From Geyserville**—From Geyserville the most direct route will be via Canyon Road; there are no current plans for the development of any local transit service in the community of Geyserville.

2.62 **From Cloverdale**—Local roads from the Cloverdale area will be the only means of access to the northern portion of the reservoir and the adjacent recreational facilities. County plans have not been finalized but State plans for the proposed Cloverdale bypass suggest that the most likely route will be via Kelly Road with a new connection to Hot Springs Road. Hot Springs Road will be partially relocated within the project boundaries and serve as the primary access road through the northern portion of the recreational area.

2.63 The most direct route from Cloverdale to the southern portion of the project will be via Dutcher Creek Road or, alternatively, Canyon Road. Both routes intersect Highway 101 south of Cloverdale.

Adjacent Zoning

2.64 **Area Described**—All land use zoning in the immediate vicinity of the project is under the jurisdiction of the County of Sonoma. Current zoning was reviewed for all lands contiguous to the project boundaries, including the lands to the east as far as U.S. Highway 101 and the south through the Dry Creek Valley toward the City of Healdsburg.

TABLE 2-4: Definition of Zoning Categories

Category	Permitted Uses	Conditional Uses
AE Exclusive Agricultural	Single family dwellings, livestock farming, agriculture, wholesale nurseries, game preserves	Farm labor camps, dairies, livestock feed yards, commercial stables, hunting clubs, agricultural/animal processing plants, public utility buildings, schools, other community service buildings
A1 Primary Agricultural	Single family dwellings, home occupations, home care facilities, livestock farming, agriculture, wholesale nurseries, game preserves	All uses permitted in AE Districts with the addition of campgrounds, major medical facilities, recreational vehicle parks, open air theatres, race tracks, cemeteries
A-2 Secondary Agricultural	All uses permitted in A-1 Districts	All uses requiring use permits in A-1 Districts, C-1, C-2, and C-3 Districts, junk yards, salvage yards

TP Timber Preserve	Commercial production of trees, related facilities, fish and wildlife management areas, recreational and educational uses not requiring permanent facilities, one single family dwelling	Additional single family dwellings (not to exceed four), saw mills, private and public campgrounds

Combining Districts

AE-B5	Exclusive Agricultural District with 20-acre minimum lot size.
AE-BS, A1-BS	Agricultural districts with residential densities varying according to slope characteristics.

2.65 **Zoning Categories**—Most of the land in and around the project area is zoned in one of several agricultural districts modified by combining districts that relate to maximum residential density.

2.66 **Description of Adjacent Zoning**—Current zoning adjacent to the project boundaries is one of the following categories: AE, Agricultural Exclusive; A1, Primary Agriculture; TP, Timber Preserve. These categories have been further defined by certain Combining Districts, as discussed in the preceding section. From the northern boundary and moving clockwise around the project boundaries to the east, south and west, land use zoning is generally as follows.

2.67 North of the project, in the vicinity of the Dry Creek arm of the reservoir, the majority of the adjacent lands are zoned A1-BS, Primary Agriculture. This zoning holds generally for the lands to the east as far as the Highway 101 corridor and the City of Cloverdale where the city's local zoning ordinance has jurisdiction. Some small portions of land along Kelly Road, which enters the project from the east, have been maintained in AE zoning, AE-BS, Agricultural Exclusive.

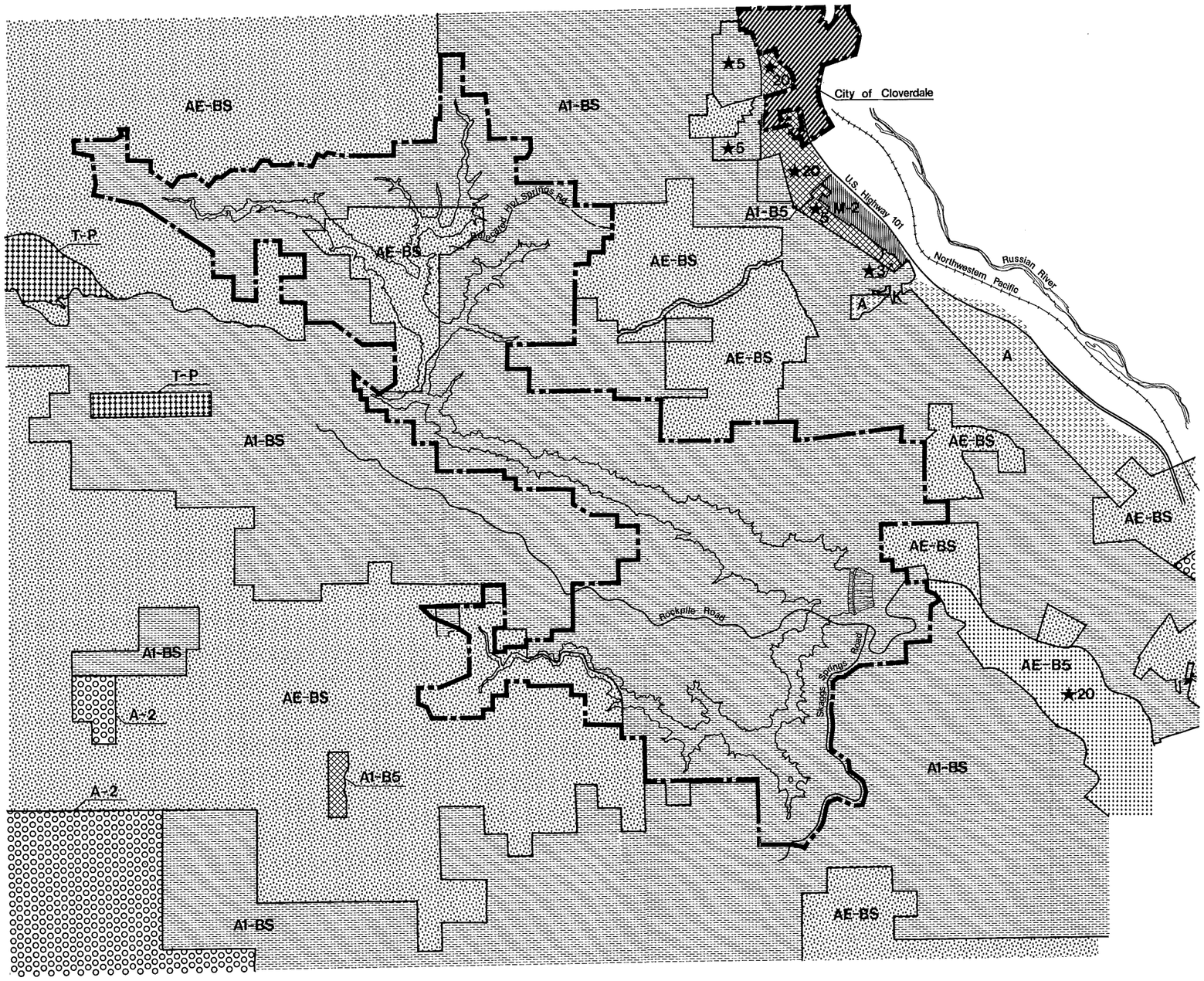
2.68 In the south, moving down the Dry Creek Valley toward Healdsburg, all lands between Dry Creek Road and West Dry Creek Road are currently zoned AE-B5, Agricultural Exclusive, with 20-acre minimums for development. To the southwest, west and northwest in the more remote portions of the project area, zoning is predominantly A1-BS and AE-BS with a small portion designated TP, Timber Preserve.

Cultural Resources

2.69 **Summary of Cultural Resources**—A total of 65 different sites in the project area have been identified as having prehistoric cultural value. Eight botanical sites which are still in use have both prehistoric and historical importance. Two trails passed through the project area in prehistoric times, and their routes formed the basis for roads that have been constructed since then. In addition 23 sites with potential value relating to the historic period have been noted, though many of them are on or close to prehistoric sites.

2.70 The Corps of Engineers has entered into a Memorandum of Agreement with the Advisory Council on Historic Preservation, Department of the Interior, and the California State Historic Preservation Officer by which it agrees to follow a stipulated program to avoid or mitigate for adverse effects on the Dry Creek-Warm Spring Valley Archeological District.

2.71 Within the project area, the 65 prehistoric sites include 35 middens, 11 surface scatters, petroglyphs (rock etchings) in 7 locations, housepits at 6 locations, hunting blinds (possibly 6), and two chert quarries. Middens range in size from 300 square meters to 25,000 square meters, and in depth from barely more than a surface scatter to over two meters of stratified cultural materials. Four chronological cultural periods have been identified in both the northern and southern sections of the project. Defined primarily on the basis of tool typology and obsidian, the periods have been assigned dates of: Period I—pre-1500 B.C., Period II—1500 B.C.-1 A.D., Period IIIA—1-1200 A.D., and Period IIIb—1200-1800 A.D.



Legend

- AE-B5 Exclusive Agricultural District Minimum 20 Acre Parcel
- AE-BS (table 45) Exclusive Agricultural District with Slope/Density Building Site Regulations
- A1-BS (table 40) Primary Agricultural District with Slope/Density Building Site Regulations
- A1-B5 Primary Agricultural District with Special Building Site Area Regulations
- A-2 Secondary Agricultural District
- A Primary Agricultural District
- T-P Timber Preserve
- M-2 Heavy Industrial District
- K Recreational District
- ★20 Minimum Acreage
- Project Boundary

Note: Tables 40 and 45 refer to County tables

ZONING

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

NORTH

Scale in Feet
0 1000 2000 4000 6000

2. Resource Base

2.72 In the downstream survey, south of the Corps' project, 25 prehistoric sites were identified. These include middens, surface scatters, and several housepits, one of which possibly from a sweathouse. Many of these sites have been disturbed by agricultural activity, erosion, roads and modern buildings.

2.73 **Non-Indian Settlements**—The first non-Indian settlement, that of Jose German Pena, dates from 1838. In 1843, a Mexican land grant of over 15,000 acres was given to Pena as Rancho Tzabaco. The boundry of the grant extended to just within the east side of the project area.

2.74 Scattered throughout the project area are the remains of mid-to-late 19th century homesteads which collectively have been defined as having historic value. Most of the historic sites that have been identified within the project area are collapsed buildings with associated turn-of-the-century remains. Many of the other sites are wooden fences, bridges and sheep shearing stations. There do not appear to be any existing structures that could be maintained for their historic interest without extensive rehabilitation, restoration and/or stabilization. Many structures from mid-late 19th century homesteading have naturally decayed. Others were destroyed in a 1944 forest fire, and some have been taken down recently because they were being vandalized and becoming hazardous to health and safety.

2.75 Skaggs Springs Resort, founded in the 1850's as one of the earliest resorts in the state of California, was also located in the project. Its remains may contain material of archeological interest. Mercury mining, tanbark collection, timber cutting and grazing were all important economic activities which left their marks on the project lands.

2.76 **Indian History**—While the term "Pomo" is widely used today for many Indian groups from Sonoma, Mendocino and Lake Counties as a generic cultural name, the term is of historic, non-Indian origin and refers to the speakers of seven related languages of the Hokan language family. Southern Pomos were a language group occupying two zones, the coastal redwood Gualala River area and the lower Russian River drainage. The latter group included tribelets of the project area and the areas surrounding it to the north, east and south. Trade and communication with other groups was extensive.

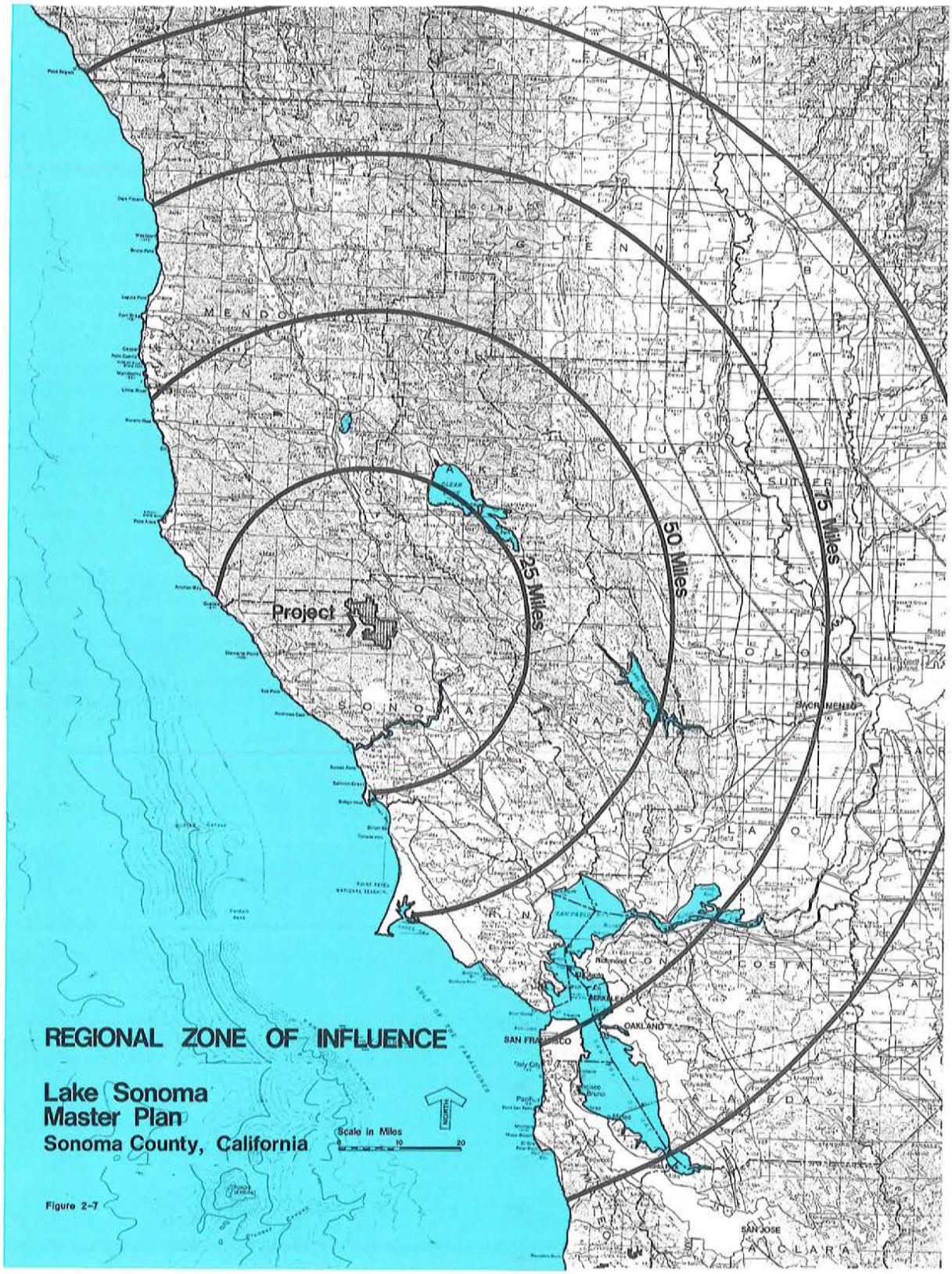
2.77 Trails were widely used by prehistoric Indians, generally lying along waterways, on top of ridgelines, and along other natural topographic features. The three major areas of Pomo occupation were the Coast, the Russian River Basin and Clear Lake, and the most important trails led between these areas.

2.78 Two trails are known to have passed through the southern portion of the project area, and were incorporated into Rockpile and Skaggs Springs-Stewarts Point Roads. The most important trail in the area appears to have been the one that led northeast from Dry Creek Valley approximately 2½ miles south of the project. The importance of this area south of the project is underscored by the fact that three other trails led into it.

2.79 At the time non-Indians moved into the Dry Creek Valley, the Mahilkaune Pomo tribelet was living in the area where Warm Springs Dam is located. Their principal village, Aca Modot, was located about 2½ miles downstream from the project area. At the northern part of the project area lived the Makamotcemi Pomo of the Cloverdale area, and/or possibly another tribelet. It has been difficult to ascertain many of these details, since the original populations of each group numbered only in the hundreds and they were subjected to forced dislocation, disease, intermarriage and encouragements to disassociate themselves from the past.

2.80 While there are little more than remnants of other tribelets of lower Dry Creek, the Mahilkaune dialect is one that is still in use, and the ancestry of 100-200 individuals can be traced back to the prehistoric residents of the valley. Some trace their ances-

2. Resource Base



try directly back to the village of Aca Modot. While these people did not live in the project area, and most have never lived in the valley itself, the Dry Creek basin has remained as both a focus of ethnic identity and a source of botanical materials. The Mahilkaune have perpetuated language, territorial identity, genealogical data, patterns of inter-group relations, aspects of religion and healing, foods, and other facets of their cultural and social organization.

2.81 The lands acquired by the Corps have been homesteaded, logged, grazed, cultivated and altered by these processes since the time of the Indians. Consequently, with the exception of some botanical areas, the lands acquired for the project do not appear to have played major roles in Mahilkaune culture for at least a century.

Regional Recreation Pressure

2.82 The existing demand on water-oriented recreational areas north of San Francisco is substantial. In part this is satisfied by proximity to San Francisco Bay and the Pacific Ocean coast line. However, the demand for inland recreation areas goes largely unsatisfied. The *1974 California Outdoor Recreation Resources Plan* noted that only 4 percent of the land area in their Planning District 4, made up of nine Bay Area counties was available for public recreation (p. 125). This land area includes federal, state, and local facilities. State park units tend to be coastal, salt water-oriented facilities.

2.83 Most inland lakes are intended for domestic use and so are not available for public recreation which involves water contact. This is especially the case in Marin County, San Francisco City and County, San Mateo County and to a lesser extent in Contra Costa and Alameda Counties. Exceptions are Napa County (Lake Berryessa) and Santa Clara County with several reservoirs open to the public.

2.84 The rather heavy use at Lake Mendocino near Ukiah in Mendocino County becomes understandable in light of this scarcity and further points out the demand for an inland water-oriented recreation facility in the Sonoma County area.

Competing Recreation Areas

2.85 Several existing recreation areas are likely to compete with Lake Sonoma for public patronage. Competing recreation areas are open to the public, have a large lake or extensive river as a focus, are not difficult to reach from the Bay Area and, are developed rather than primitive. Areas that meet most of these criteria for potential competition with Lake Sonoma are (see map, Figure 2-8):

Clear Lake, Lake County
Lake Mendocino, Mendocino County
Lake Berryessa, Napa County
Russian River, Healdsburg to Guerneville

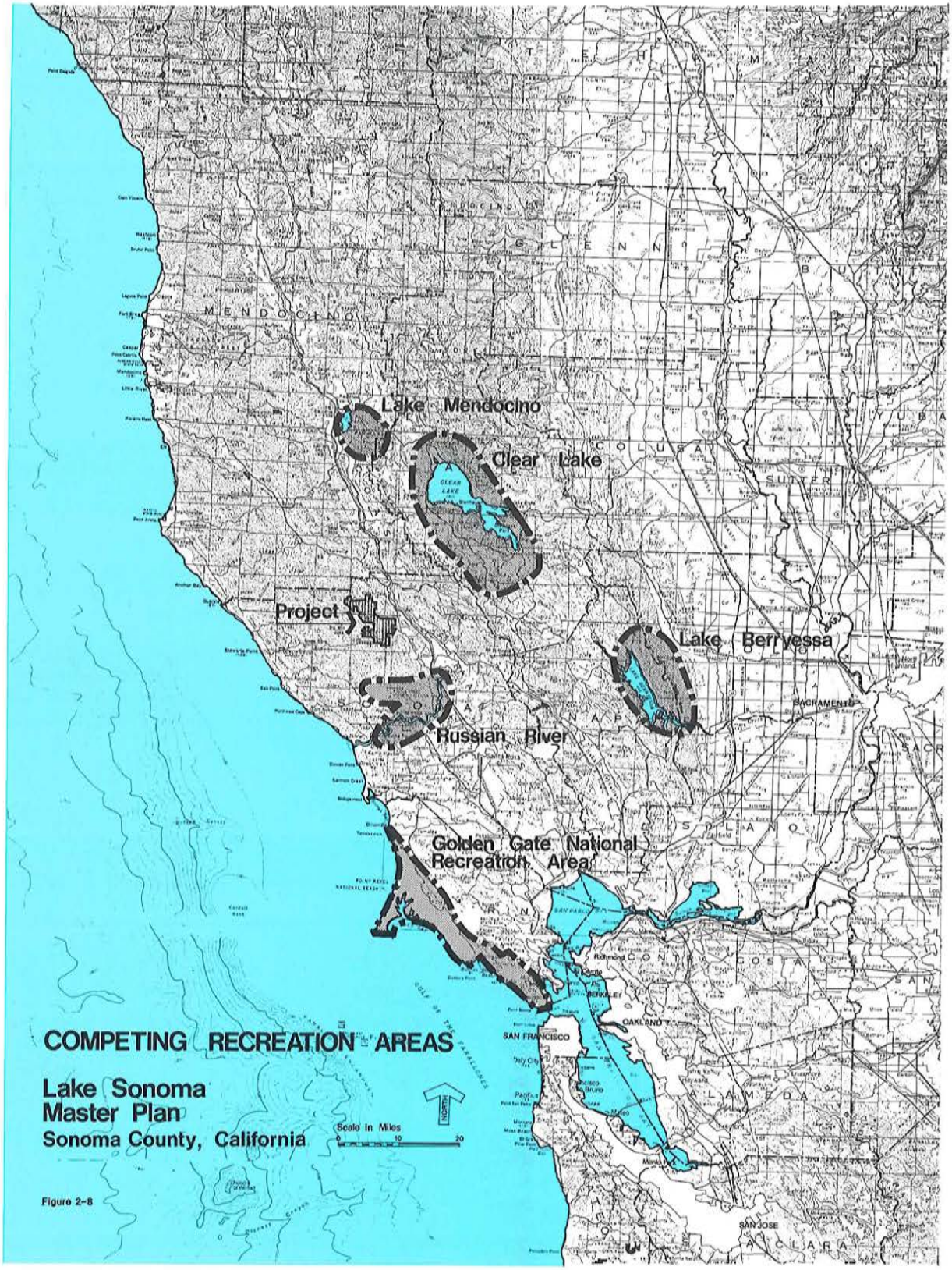
2.86 Table 2-5 lists these major competing recreation areas and their facilities.

TABLE 2-5
Competing Recreation Areas

	Tent/ Trailer Sites	Tent/ Trailer Totals	Boat Launch Areas	Fishing	Picnic Sites	Trails
Clear Lake	321	1,462	96	X	X	
Lake Mendocino*	321	677	3	X	X	X
Surrounding Area	356					
Lake Berryessa	380	501	8	X	X	
Surrounding Area	121					
Russian River		998	1	X		
TOTALS:		3,638	108			

*A Corps' Project

2. Resource Base



2. Resource Base

Potential Visitation
2.87

For the purpose of determining potential visitation, a 100 mile distance from the project is used as the zone of influence (see Figure 2-7). Factors used to evaluate anticipated initial and projected visitation are in accordance with methodology outlined in Technical Report No. 2 (see Appendix D). The potential visitation in 1985 is 1,695,000 and the projected potential visitation in 2,020 is 2,479,000. It should be noted that the site has a limited capacity (see paragraph 2.94, Project Carrying Capacity) and recreation development reflects this capacity.

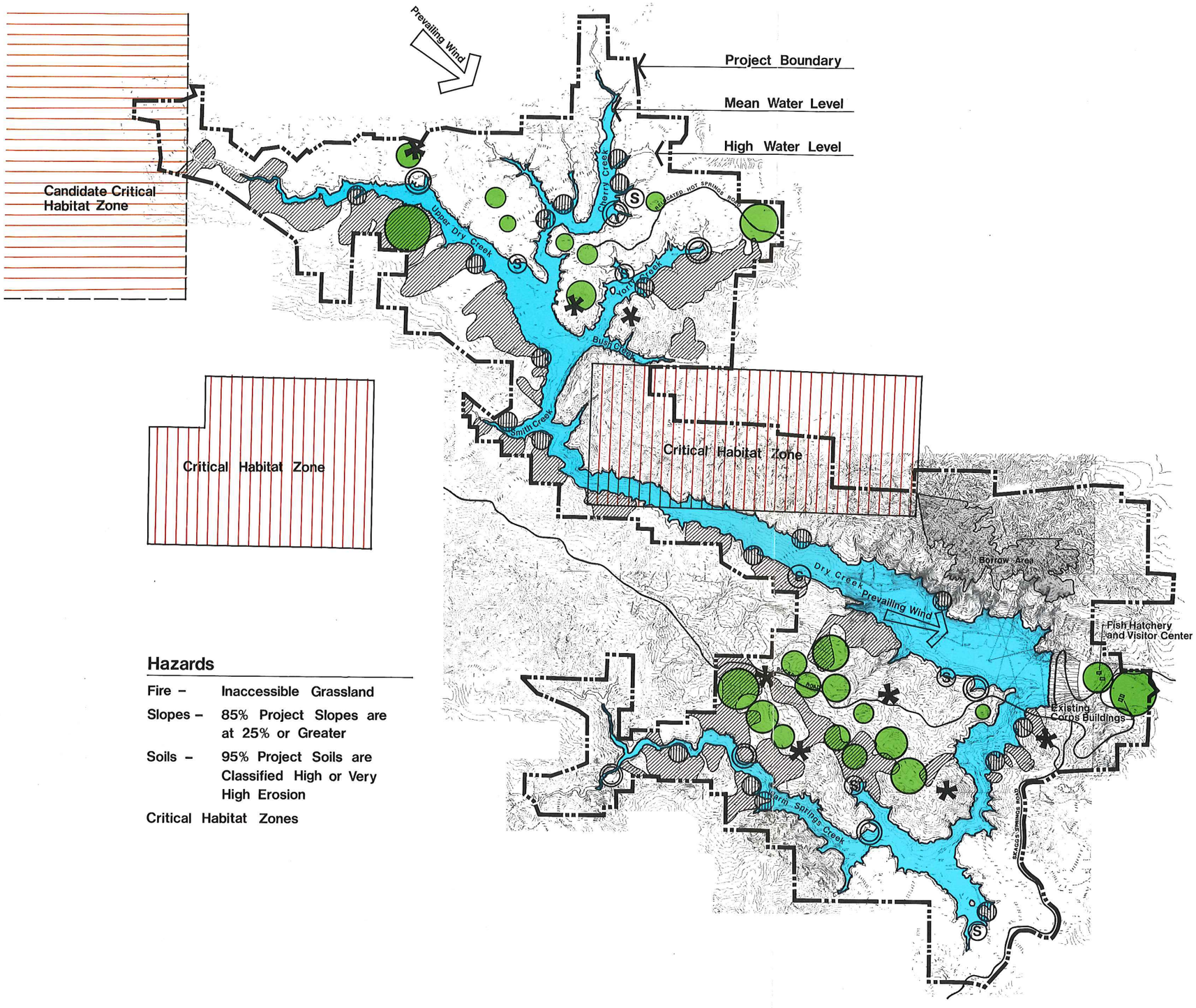
Opportunities and Constraints
2.88

The ultimate character of the Lake Sonoma project is a function of the existing condition of the land, its ability to maintain its integrity under pressure of human use, and the various natural and cultural factors that influence this use. The result of assessing both the sensitivity of natural resources to human use and the influences of the land on human use is a composite analysis map, Opportunities and Constraints (see Plate 10). Opportunity and Constrant zones represent broad guidelines for the maximum use potential of the project and lead to determination of the site's carrying capacity. Combined with the Resource Use Objectives (Chapter 3), the site carrying capacity will result in a Resource Use Plan (Plate 11) allocating various land use classifications to specific site areas.

2. Resource Base

2.89 **Constraints**—The major constraints to use are slope, erosion potential, landslide areas and critical wildlife and vegetation areas. The large majority of slopes on the site are over 25% making use for recreation extremely difficult and any intensive use impossible without great destruction to the land. Often related to steep slopes are areas of high erosion potential or high landslide potential. These areas cannot sustain development without mitigation. Critical habitat zones are restricted to uses that will not endanger the wildlife living within the zone. There is also a candidate critical habitat zone at the northwest portion of the project (upper Dry Creek). Archeological sites are also a constraint. Further, cultural resources studies are presently ongoing and results will be utilized in detailed design of facilities.

2.90 **Opportunities**—The picturesque setting of the site provides the basic opportunity for use. The site's rolling hills and oak woodland provide beautiful views and scenic areas in which to plan recreation uses. The history of the area is rich in Indian lore and California's varied heritage under the Spanish, British, Mexicans and Americans. The lake itself, despite the difficulty of access to it, provides a wonderful opportunity for boating, swimming, and fishing. High points on the site provide good views of the lake and of most of the project lands.



Hazards

Fire –	Inaccessible Grassland
Slopes –	85% Project Slopes are at 25% or Greater
Soils –	95% Project Soils are Classified High or Very High Erosion
Critical Habitat Zones	

Legend

- View Points
- Potential Swimming Access
- Potential Pedestrian or Boat Access to Lake Edge
- Potential Limited Vehicular Access to Lake
- Areas with Some Slopes Less than 25%
- Borrow Area
- Critical Habitat Zone
- Candidate Critical Habitat Zone
- Slide Areas

OPPORTUNITIES and CONSTRAINTS

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

2. Resource Base

2.91 **Summary of Opportunities and Constraints**—The few acres of potential access to the water have been illustrated on the Opportunities and Constraints Map as potential wateredge camp areas and swimming areas. These are spots that can be reached by boat or foot. Where auto access is possible, a walk of several hundred feet from parking to facility is still often necessary. Boat launch areas are possible only where a two-lane road can be built to the ramp at a grade of no more than 10% to 12% and where parking for autos and boat trailers can be provided. The ramp itself can be at 15%.

In the final analysis only five such areas exist on-site where the level of the lake bottom is deep enought to insure water being present for most of the recreation season. Access from the water is a bit easier and 17 potential lake camp areas and six beaches are shown.

2.92 Land uses are also limited to areas accessible by foot or car. Tent and recreational vehicle spaces must have auto access and be located on fairly level ground—usually restricted to ridge tops or one or two wide rolling valleys adjacent to Rockpile Road. New road construction is difficult and auto related areas are as close to existing roads as possible.

2.93 To summarize, use of the Lake Sonoma site is limited by steep slopes, erosion hazards, limited access and sensitive wildlife areas. The history and scenic quality of the area, however, provide opportunities for use as long as planning is done with an awareness of the land's inherent sensitivity.

Project Carrying Capacity
2.94 Recreational facilities at Lake Sonoma are being developed within carrying capacities that provide a desirable recreation experience without creating resource degradation, (See Table E-1 Appendix E). Average daily carrying capacity is determined to be 8,800 recreation days. A "recreation day" is defined as one user's day at the project participating in one or more activities. Carrying capacity is based on the opportunities and constraints to development (see paragraphs 2.88 and 2.93 and Plate 10). To insure that project resources will not be depleted, carrying capacities will not be exceeded. Overflow parking is not planned in areas of high intensity development since numbers of spaces provided corresponds to the capacity of the provided facility. Peak use is established at the facility and will not be exceeded merely to satisfy demand at the expense of the resource. Once capacities are met, facilities will be closed to additional use or until normal turnover permits additional visitations.

Anticipated Visitation
2.95 Based on carrying capacity, visitation is anticipated to be 1,520,000 recreation days per year. Due to the immediate demand for use of Lake Sonoma, it is anticipated that visitation will be reached within three years. Thus all facilities have been planned for immediate development with completion expected at the time of project opening. See Appendix E for a discussion of anticipated visitation.

3. Resource Use Objectives

Definition
3.01

Resource use objectives complement the analysis of the resource base. The objectives define the desires for resource use of the project while the resource base analysis directs the location of the desired uses.

3.02

Resource use objectives were obtained from the public during the three project related workshops, from recent recreation trends in the United States and California and from the experience of the Corps of Engineers with similar projects.

Basic Objectives
3.03

Overall objectives are outlined below:
1. To support the project purposes of flood control, water supply and recreation.

2. To provide diverse recreation opportunities for quality recreation experiences which are compatible with the resource and which promote the optimum, not necessarily maximum, use of the resource.

3. To protect and conserve natural and cultural resources and to mitigate for resources lost or degraded by the project.

Resource Use Objectives
3.04

1. **To locate project facilities with respect to the resources' sensitivity to human use.**
The project site has many areas sensitive to human use due to steep slopes, landslide potential, erosion potential and sensitive wildlife habitat which have dictatted the limits of planned development.

3.05

2. **To interpret the project resources to the public.**
The opportunities for education of the public are great at Lake Sonoma, including archeological areas, historic trails and Indian activity, fish and wildlife resources and the story of the dam construction.

3.06

The visitor center is a permanent location for displays, talks and education programs. Brochures, pamphlets, fliers and trail guides will be available for visitor orientation. Throughout the site, permanent displays are used wherever appropriate, including trailside signs and mini-interpretive structures. By providing the interpretation throughout the site, the public's involvement will be more constant and more site specific. These programs are proposed to assist the visitor develop an understanding of the resource and an appreciation of the environment.

3.07

3. **To protect areas of archeological and cultural value.**
The history of the Pomo Indians and non-Indian settlements of Sonoma County is part of the Lake Sonoma site. Recreation areas and trails are located to avoid these sites except when they are incorporated into an interpretive program.

3.08

4. **To design all structures based on an architectural theme.**
There is an indigenous rural architecture of the project area. It consists mostly of wooden, slope-roofed barns and farm-related structures. These indigenous farm structures are redefined as modern structures that will serve the Lake Sonoma recreation purposes and fit the site as well. An overall architectural theme has been developed including form, material size and color of structures. All structures, including service buildings and signs are designed to reflect this theme.

3.09

5. **To minimize impact of the automobile on project resources.**
In addition to the impact of the automobile on air quality, the auto adds to environmental noise and one's feeling of crowdedness on a recreation site. By limit- automobiles, the rural quality of the site will remain available to all.

3.10

Site constraints limit where roads can be built and whether some areas can be reached by auto. As a result, activities have been planned which encourage people to leave their car to walk to a prime site or beach or to camp. If economically feasible, land and water shuttles may be considered, but at present, public response has not been in favor of van, bus or boat shuttles. Such on-site transit ser-

3. Resource Use Objectives

vice could be implemented by a concessionaire if public perception of this feature changes.

3.11 Local agencies are encouraged to participate in the development of site access routes which minimize the impact of vehicular traffic on residents in the project vicinity.

3.12 **6. To manage project facilities so as to maximize efficiency and minimize required staff and cost.**
Through use of control points at key places in the site, use areas can be filled in sequence creating fewer areas that need staff control. By use of gates instead of staffed control booths for most day use areas, personnel is minimized, freeing them to concentrate on control of overnight areas where potential conflicts may occur.

3.13 **7. To minimize conflicts between project uses.**
Providing uses which are compatible with one another maintains a high level of user satisfaction and safety. Uses that do not compete for the same physical space or that do not visually or aurally annoy participants of an adjacent activity are compatible.

3.14 **8. To limit incompatible development.**
Commercial development of the site will be minimal in order to maintain the rural character. Architectural controls are set to control the appearance of any structures built on the site. In addition, certain uses are not appropriate on the site. These include gas stations, major commercial concessions, trailer parks, vacation residences, houseboats, major organized playing fields and off-road vehicles.

Objectives Related to Land Use Allocation

3.15 **1. To provide areas for high-intensity recreation.**
High intensity recreation is appropriate in limited locations at Lake Sonoma (see Plate 10, Opportunities and Constraints). The following are sub-objectives appropriate to the provision of high-intensity recreation:

a. **To provide a marina**—Access to the lakeshore is extremely difficult due to the steep slopes of the project. A marina is needed to store boats once they are launched and to provide a base for rental boats to be used by those who do not own boats.

3.16 The marina is in a location sheltered from the prevailing wind and also accessible to the major use areas of the project. It is primarily a boat docking and rental facility, not providing room for day storage. Land support facilities are limited to a small structure providing gasoline and emergency supplies and a small grocery store. No restaurant or major boat repair is proposed.

3.17 b. **To provide power boating**—A zone is provided for use of powerboats. No water skiing is permitted in this zone. Other forms of boating are permitted with safety regulations enforced. Motor boats are restricted to those with a noise level not exceeding 70 decibels.

3.18 c. **To provide water skiing**—A zone is provided as a water skiing area. Other forms of boating are permitted with safety regulations enforced. Motor boat restrictions are the same as in paragraph 3.17.

3.19 d. **To provide boat launching areas**—Although access to Lake Sonoma is extremely difficult, it is necessary if this 3600 acre lake is to be enjoyed. Boat launching ramps are provided which work well with the existing site constraints; one large ramp in the South Lake area and two minimal boat access sites in the North Lake area. Boat ramps do not have commercial facilities related with them.

3.20 e. **To provide a visitor center**—A facility is provided near the center of project activity as a base for visitor orientation, education and interpretation. The visitor center is located adjacent to the fish hatchery in the Warm Springs Dam Recreation area. It is the focal point of the South Lake experience and of the interpretive program.

It is also a place where visitors can orient themselves to the entire site and can inquire about campsite availability.

3.21 f. **To provide a North Lake information center**—The North Lake area is characterized by a quiet atmosphere with less formal facilities than the South Lake. Due to the site terrain, one cannot reach the North Lake area by vehicle directly from the South Lake but must first drive east to Highway 101 and then drive to Cloverdale and back into the project. There will also be visitors that prefer the North Lake area and who wish to drive there directly. These people will be serviced by the North Lake information center. It is a structure whose basic function is to provide data and orientation related to the North Lake area. A visitor can also determine the availability of north and south area campsites. Adjacent to the center will be an interpretive trail illustrating the archeology and natural features of the North Lake area. Seasonal living history exhibits will be held in proximity to the center.

3.22 g. **To provide group picnic areas**—Many visitors to Lake Sonoma will be day use visitors and will require picnic areas. Some of these visitors will be in an organized group or will be attending a special event. Group picnic areas are provided with restrooms and large group picnic shelters to handle these organized events. They may be reserved in advance.

3.23 h. **To provide recreation vehicle camp areas**—In order to provide for those campers who have a self-contained camping van or other vehicle, a camp area is provided. A large level parking pad is provided as well as a space with a picnic table and fireplace. R.V. areas are located so as to minimally impact the project environment.

3.24 i. **To provide group camping**—These are areas that groups can reserve for their overnight use. They are equipped with picnic facilities and restrooms and basically consist of a number of campsites sharing a centralized eating and open space area. These group camps are suitable for private and public educational study groups as well as special interest organizations. Facilities are provided that will encourage non-recreation season as well as recreation season usage.

3.25 j. **To provide auto access tent camp areas**—The ability to drive to one's destination is important to many campers, especially those carrying heavy supplies or equipment. Two intensities of auto access tent camp areas are provided. Those in the South Lake area are less formal than R.V. sites but could be used by R.V.'s if project management found it appropriate. Parking areas will not necessarily be level and a pad for tent camping is provided. Restrooms with showers are centrally located to each camp area.

3.26 Auto access tent camp areas in the North Lake area will be less formal than in the south and have fewer campsites per acre than in the South Lake. North area sites incorporate a rougher terrain and are not appropriate for R.V. camping. Restrooms with showers are centrally located within each camp area. Some tent sites are a short distance from auto parking.

3.27 k. **To provide a project overlook**—In order to better orient visitors, a project overlook is provided at an easy-to-reach location which affords an overview of a great expanse of Lake Sonoma. The overlook will be accessible by automobile and provide views of both arms of Lake Sonoma, the Rockpile Road peninsu-

la, Pritchett Peaks and Warm Springs Dam. The overlook is located with a minimum of vegetative disturbance. Day use picnic areas are located adjacent to the overlook area.

3.28 **2. To provide areas for moderate-intensity recreation.**
Areas suitable for moderate-intensity recreation are scattered throughout the project site. Moderate recreation use is compatible with the rural atmosphere of Lake Sonoma especially in areas of lower slope and erosion hazard. Following are sub-objectives appropriate to the provision of moderate-intensity recreation:

3.29 **a. To provide areas of sailing and 10 miles per hour maximum boating**—Boaters interested in fishing and sailing in a rural atmosphere require an area where high-powered boats are restricted. Areas of Lake Sonoma also require a lower intensity boating use due to sensitive slope and erosion conditions along the shoreline and the critical habitat zone at the north end of the Pritchett Peaks area. Powered and non-powered boats are allowed in this zone as long as they do not exceed a noise level of 70 decibels.

3.30 **b. To provide for fishing**—Typically, fishing areas are quiet and away from activity centers. The coves and small arms of Lake Sonoma are such places and high-intensity boat uses are not allowed in these areas.

3.31 **c. To provide flexible day use and picnicking space**—Day use areas are to provide the transient visitor with space to relax, picnic and play. They are to be located easily accessible from county roads through the project. All day use areas consist of an open grass area, usually irrigated, facilities for picnicking and restrooms.

3.32 **d. To provide swimming beaches**—Beaches are important transition points where visitors can achieve easy access to the lake for swimming and wading. Beaches are provided where one to two acres of low to moderately sloping land exists adjacent to the top of the recreation pool (elevation 451) and where the reservoir bottom is also of a low to moderate slope. Parking is located as close as possible to the beach in keeping with environmental constraints. A walk from parking to the beach is necessary in some cases. All beaches are accessible by boat and hiking trail. Day use facilities are located adjacent to beaches.

3.33 **e. To provide overlooks as part of the trail system**—In order to assist visitors to be aware of the scenic qualities of Lake Sonoma, overlooks are provided as part of the trail system. Overlooks are either wide spots in the trail at a place affording a scenic view or they are short side trails leading to a scenic view. Where appropriate, interpretive signs are provided at overlook areas to describe the surrounding area or some feature of particular interest in that area.

3.34 **f. To provide auto access walk-in camp areas**—In areas of rough terrain and where it is preferable to have auto access as close as possible to campsites, a paved trail is provided as access from auto to campsite. Parking spaces will be designated by campsite number so that the visitor's walk is minimal. The walk from parking to campsite varies from 100 feet to 200 feet.

3.35 **g. To provide interpretive trails**—Where there are special project characteristics or areas to interpret, trails linking these features and providing interpretive signs are provided.

3.36 **h. To provide specialized trails for the handicapped**—At the Warm Springs Dam Recreation Area and where special project characteristics exist, paved trails are provided.

3.37 i. **To provide small interpretive structures**—In areas of cultural or natural importance, small wayside exhibits incorporating displays and graphics are used. They are in the vicinity of other uses such as the visitor center and day use areas and supplement the visitor center interpretive program. They are unstaffed and designed to withstand use.

3.30 **3. To provide areas for low-intensity recreation.**
Many areas of Lake Sonoma are appropriate for activities which take minimal space and have a minimal impact on the resource. Following are sub-objectives appropriate to the provision of low-intensity recreation.

3.39 a. **To provide areas of the Lake surface for boats with no motors or with electric motors**—There are visitors who prefer to sail or to row their boat for the slower pace or quiet that it provides. There are also areas of Lake Sonoma which are sensitive wildlife habitats or very narrow arms of the Lake where motors could create a noise or environmental intrusion. Such areas are zoned to permit only boats with no motors or with electric motors.

3.40 b. **To provide trails for hiking and horseback riding**—A trail system is provided which connects major uses around Lake Sonoma. Where it is preferable to go cross-country and incorporate steep slopes for a horse trail, hiking trails are also provided which stay more with the contour of the land. Trails are natural dirt and are maintained by park staff as well as by volunteer labor.

3.41 c. **To provide primitive camp areas**—In scenic areas which are difficult to reach by auto, it is appropriate to provide hike-in camp areas for visitors who desire a quieter, less dense atmosphere when they camp. Facilities will include a fairly level area for sleeping and fireplaces as well as portable toilets. Areas will be accessible only by foot except for emergencies and service: trails will be capable of handling a 4-wheel service vehicle. No potable water or showers will be available.

3.42 d. **To provide trailside interpretation**—At points of special interest or signifi- to the visitor, signs will be erected along trails to interpret the surroundings to the hiker.

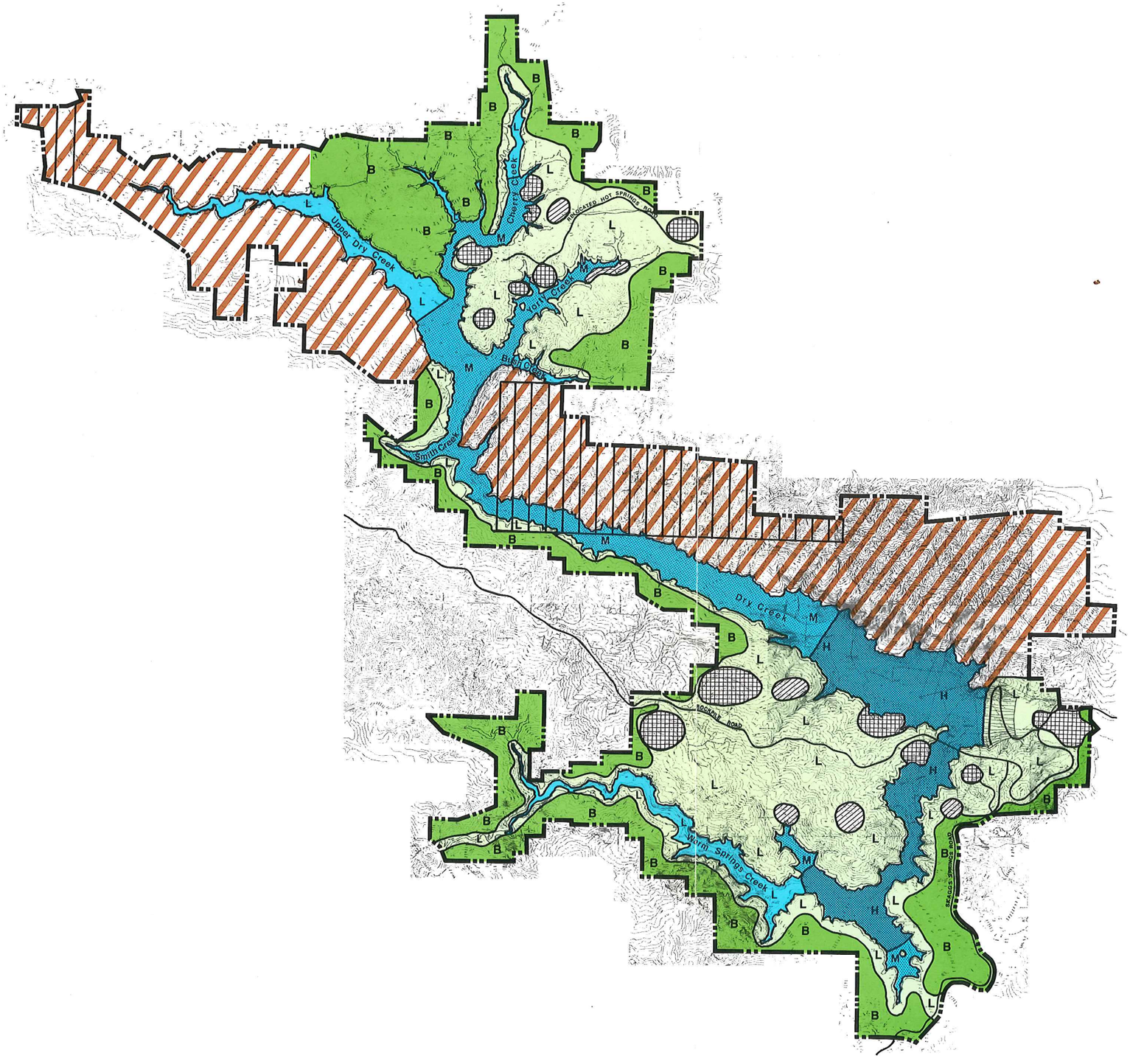
3.43 **4. To provide separation between non-compatible uses.**
Separation is required adjacent to private property, adjacent to government storage and maintenance facilities, and between higher intensity uses. Visual barriers and noise barriers are used as transition between uses. Where separation is required and does not occur naturally, groves of native trees are planted. Buffers are of sufficient size to maintain the existing rural character of the site.

3.44 **5. To conserve, preserve and enhance fish and wildlife habitats.**
The following sub-objectives are appropriate for the conservation, preservation and enhancement of wildlife habitats.

3.45 a. To provide areas of management for the protection of fish and wildlife resources.

3.46 b. To construct a fish hatchery for the mitigation of fish habitat lost through the creation of Lake Sonoma.

3.47 **6. To preserve habitat values for endangered species on project and adjacent lands.**
Areas of Lake Sonoma and adjacent land serve as critical habitats for certain species. These habitats must remain undisturbed if the species residing there are to be protected. The following sub-objective is appropriate to the preservation of these critical habitat areas.



Legend

Water

- L — Low Intensity Use
- M — Moderate Intensity Use
- H — High Intensity Use

Land

- High Intensity Use
- Moderate Intensity Use
- L — Low Intensity Use
- B — Buffer Zone
- Wildlife Management Area
- Critical Habitat and Canidate Critical Habitat Area

RESOURCE USE PLAN

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

plate 11

3. Resource Use Objectives

3.48 To preserve the critical habitat zones and candidate critical habitat zones that occur at and adjacent to Lake Sonoma.

Land Use Allocation

3.49 Resource use objectives are allocated to areas of Lake Sonoma most suited for them based on the characteristics of the resource. Plate 11, the Resource Use Plan illustrates this allocation.

The following land uses shown on Plate 11 are listed below with the primary and secondary objectives most appropriate to each category. Secondary objectives will be addressed within a given land use classification only as they do not interfere or conflict with the achieving of the primary objective for that land use classification.

3.50 **High Intensity Recreation Use Lands.**
Primary: To provide areas for high-intensity recreation
Secondary: To conserve, preserve and enhance wildlife habitats

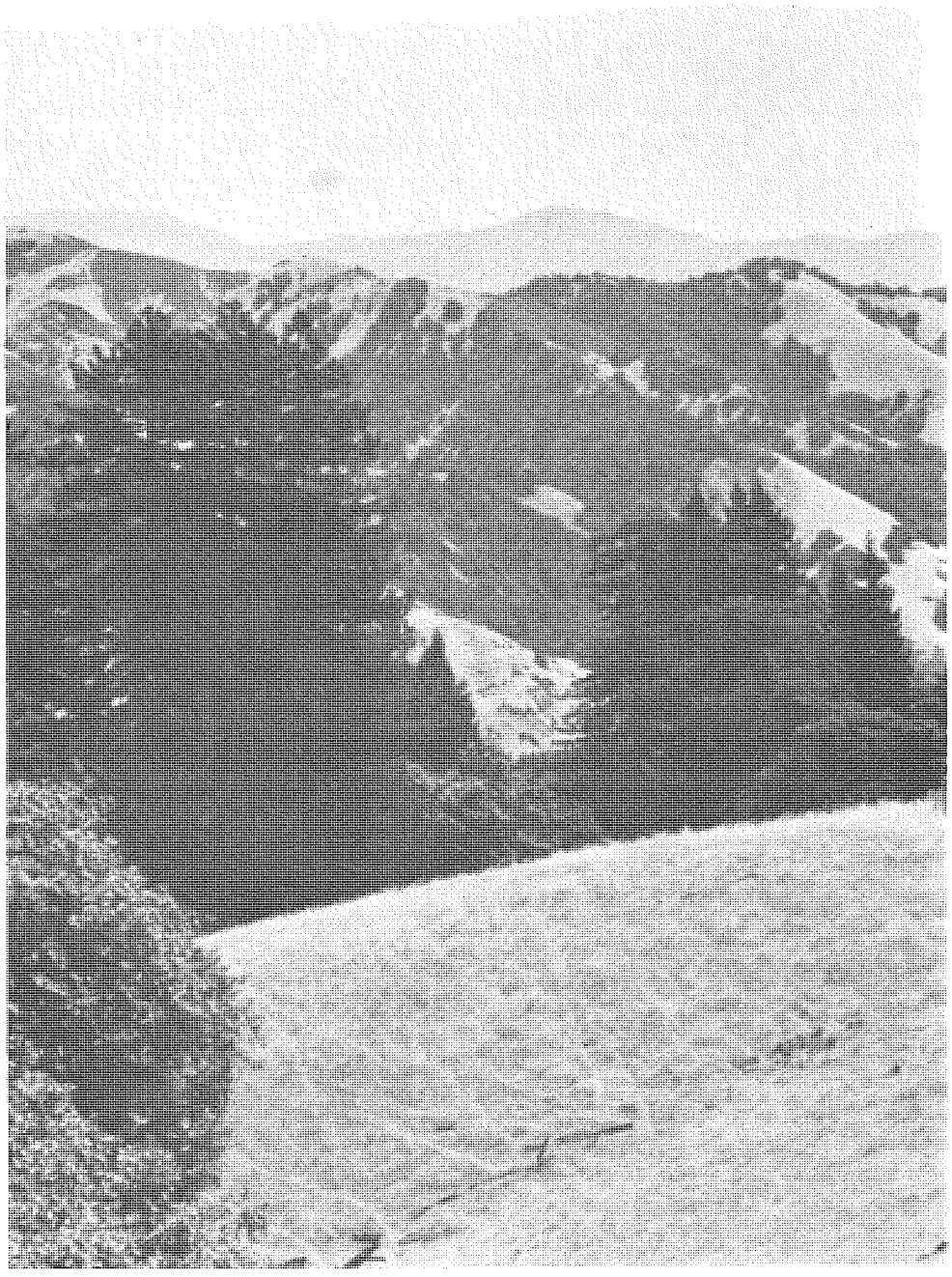
3.51 **Moderate Intensity Recreation Use Lands.**
Primary: To provide areas for moderate intensity recreation
Secondary: To conserve, preserve and enhance wildlife habitats

3.52 **Low Intensity Recreation Use Lands.**
Primary: To provide areas for low intensity recreation
Secondary: To conserve, preserve and enhance wildlife habitats

3.53 **Buffer Space.**
Primary: To provide physical separation between project uses
To conserve, preserve and enhance wildlife habitats
Secondary: To provide opportunites for low intensity recreation

3.54 **Wildlife Management Areas**
Primary: To conserve, preserve and enhance wildlife habitats
Secondary: To provide opportunities for low intensity recreation

3.55 **Critical Habitat Zones and Sensitive Wildlife Areas.**
Primary: To protect habitat values for endangered species on project and adjacent lands
Secondary: To conserve, preserve and enhance wildlife habitats



THE PLAN

4. Facility Development Plans

Master Plan

General

4.01 The Plan for Lake Sonoma is a conservation or "wise use" plan. It does not prohibit use, but advocates resource sensitivity. It establishes a balance between recreation scenic preservation, natural habitat and historical protection. The Plan recognizes the desire for recreation in the region and the potential of Lake Sonoma to accommodate a portion of this demand.

4.02 The recreation development at Lake Sonoma will provide a variety of recreational experiences within the resource guidelines set out above. Major development is limited to those areas where the land is capable of sustaining recreation use. Activities have been located based on the development potential shown on the Opportunities and Constraints Map. A few of the recreation areas are located within or near sites that are classified as Landslide Hazard Areas. Generally, slopes within these areas are not steep and no major structures or facilities will be placed on these sites until additional soils investigations are completed.

4.03 Major uses have been placed as close to major roads as possible in order to limit the amount of new road construction. Most occur in the South Lake area to take advantage of the existing roads, project entrance, dam location and greater amounts of buildable slopes to be found there. The North Lake area is treated so as to preserve a rural atmosphere and will require less development than uses in the South Lake area.

4.04 The project terrain and other constraints eliminate the possibility of a direct project road linking the North and South Lake areas. Thus, information and orientation center and maintenance facilities are provided at both areas. Although there are speed and and noise restrictions to boat use, the boater will be able to travel to most areas of the Lake (See Project Management Plan, Plate 30).

4.05 In order to minimize staff requirements and cost of development, uses have been clustered. Each of these use areas is presented below with full description and plan for development. Several sketches are also included giving an artist's conception of the major developments. Cost estimates for each area of development are presented in Chapter 8

Warm Springs Dam Recreation Area

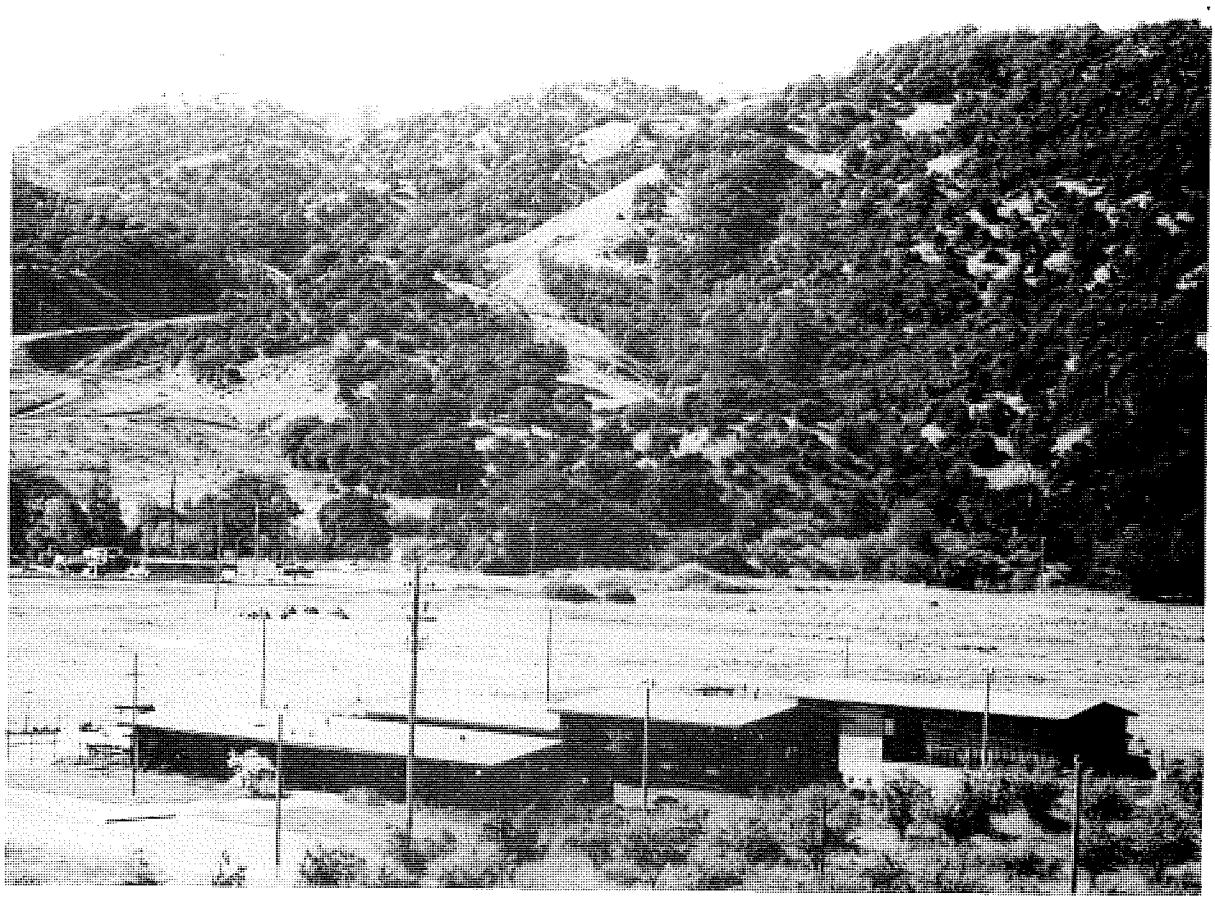
4.06 Located just downstream of Warm Springs Dam, this area occurs on the largest single piece of relatively flat land on the project site, and is envisioned as a multipurpose day use area. Mounding and trees are used to shield views of parking areas and to separate use areas. The entire area has been laid out in an informal and relaxed manner.

4.07 After passing the project entrance sign as one enters the project lands, the visitor will cross Board Bridge and pass a gated service road to the right. Just beyond, also on the right, is the entrance to the Visitor Center and a large parking area. This parking area serves the Visitor Center and visitors to the Fish Hatchery which is accessible via a foot bridge.

4.08 The main purposes of the Visitor Center are to interpret the site for visitors, to transmit information about the site, to orient visitors within the project and to assist visitors to locate camping sites. The interpretive story is mostly related to the project, construction of the dam and the Corps role in water supply, flood control and recreation.

4.09 A day use area is located immediately east of the Visitor Center. It provides 12 acres of irrigated turf and landscape including open fields, four group picnic areas with shelters, 20 individual picnic areas of 3 to 4 tables each, and parking for 180 cars. A mile of trails loop around the day use area. Two restrooms with flush toilets are provided. Fishing along Dry Creek on Government property will be regulated by the California Department of Fish and Game.

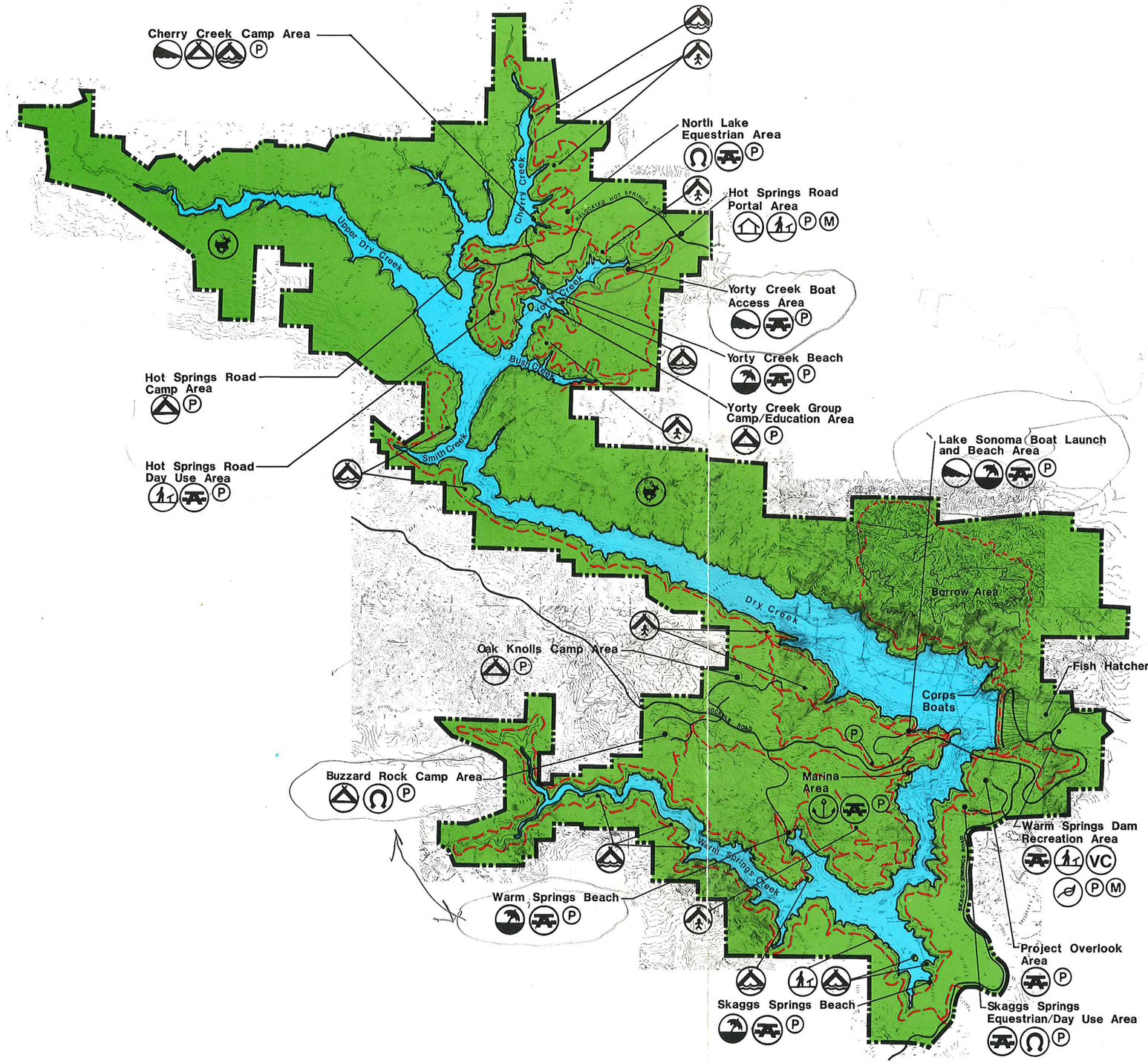
4. Facility Development Plans



4.10 Adjacent to the Creek downstream of Board Bridge is an ethno-botanical and riparian interpretive area and trail suitable for the handicapped. Plant materials used by the Pomo Indians for their basketry are grown and explained at this location. An assembly area for interpretive presentations and a mini-interpretive center for displays are adjacent to the interpretive trail. A controlled interpretation concession may also be provided. No public access will be allowed along the north bank of the Creek in order to protect another ethno-botanical preserve.

4.11 Along the south edge of the area are the Corps administration and operations buildings and maintenance yard. The maintenance yard will be well screened by a landscape buffer. The Corps administration building,which is now a project construction facility, will be upgraded to make it functional for the management and operations of the Lake Sonoma project.

4.12 A native plant propagation area and sewage leaching field are located adjacent to the south boundary. Most of these uses will be fenced from the public and act as a landscape buffer between Government property and private landowners. The native plant propagation area will allow plants to be raised in the environment in which they will be planted, thereby creating a higher survival rate when they are transplanted to their final location. The plant propagation area will be used to replace and supplement the reforestation and recreation landscaping of the Lake Sonoma project.



Legend

- Marina
- Boat Launching Ramp
- Beach
- Day Use/Picnic
- Parking Area
- Boat-in Camp
- Camp Area
- Primitive Camp
- Equestrian Area
- Interpretive Area
- Information/Administration
- Visitor's Center
- Maintenance Area
- Native Plant Propagation
- Wildlife Management Area
- Trail System
- Project Boundary
- Roads

MASTER PLAN

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres / 10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

Legend

- Restroom (f)
- Group Picnic Area with Shelter
- Picnic Area
- Existing Trees
- Proposed Trees
- Trail System
- Pumping Station
- Leach Field

Note: Riparian vegetation to be preserved

Warm Springs Dam Recreation Area

Site Plan

Lake Sonoma Master Plan

North

Scale in Feet
0 100 200 400

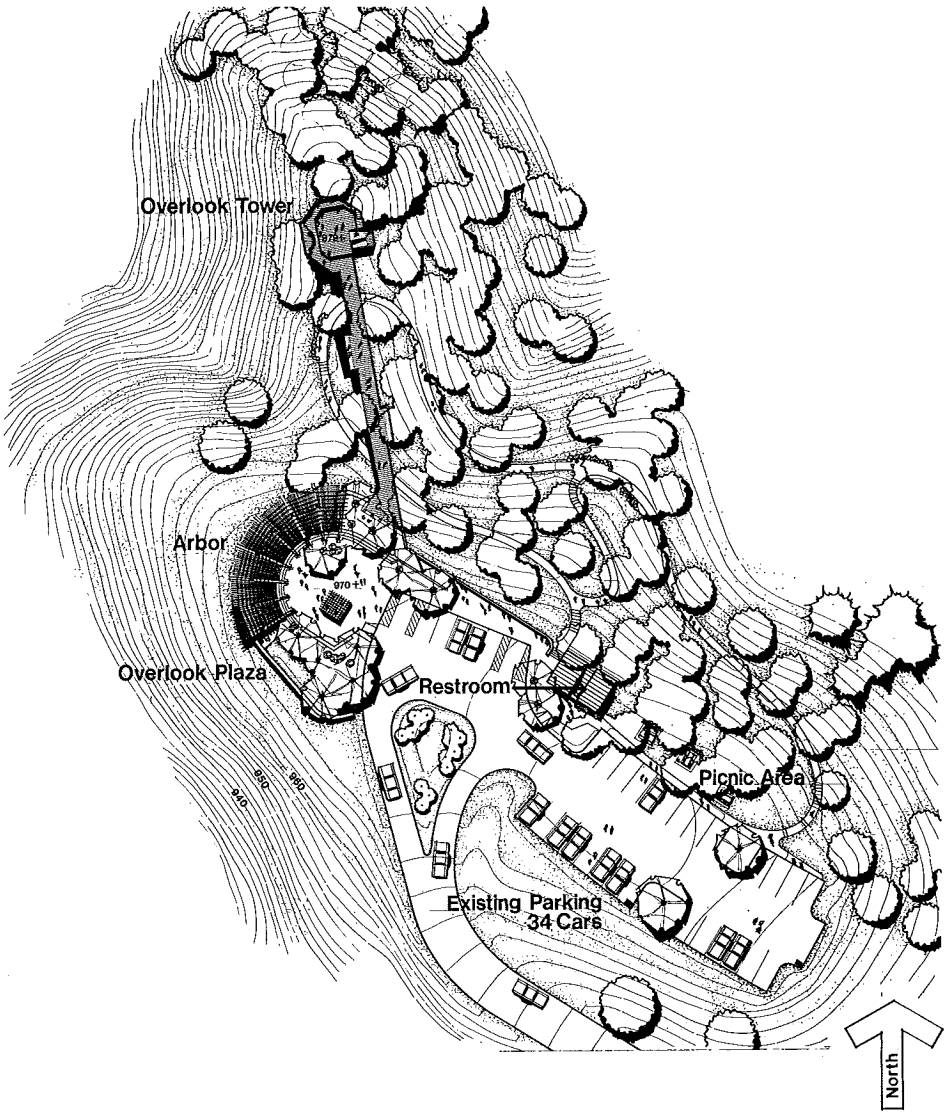
plate 13

4. Facility Development Plans

Project Overlook

4.13 The access road and overlook parking area (34 cars) are now existing and are utilized in the overlook area. There is a major viewing plaza to the west of the parking lot. It is arbor-covered to shield visitors from the sun and has spectacular views of the Warm Springs arm of Lake Sonoma, the marina area, the Rockpile Road peninsula including Bummer Peak and Pritchett Peaks. Benches are located to allow people to relax while enjoying the view.

4.14 A viewing tower is located to the north of the parking lot and is reached by an elevated walkway. The platform itself is at tree top level thirty to forty feet above the hillside. It provides a view of the dam and surrounding area. Both the plaza and platform are located so as to preserve the existing oak and redwood groves.



Project Overlook

Figure 4-1

4.15 A picnic area of 4 tables is located adjacent to the parking area in the shade of the trees. A restroom with flush toilets is also provided. Short trails around the crest of the overlook promontory afford a variety of views from under the trees as well as from open fields.

Skaggs Springs Equestrian/Day Use Area
4.16 Located in an area of existing springs, the Skaggs Springs Equestrian/Day Use Area overlooks the Lake, bridge and marina to the northwest and provides a restroom with flush toilets, and group picnic area. A control gate is provided across the entrance road. This road follows an existing termporary county road down to the Lake edge and is located so as to connect to the Lake Sonoma trail system. The day use area can be used by either equestrian or other groups by reservation. The existing level area near the facility entrance is regraded to provide parking for 40 cars with trailers.

Marina
4.17 A marina, to be operated by a concessionaire, has been located at a site protected from wind. Due to the steep slopes behind it which continue well below elevation 451, this site is least affected by the Lake surface fluctuation. Access must be by foot or shuttle with parking located above, closer to Rockpile Road.

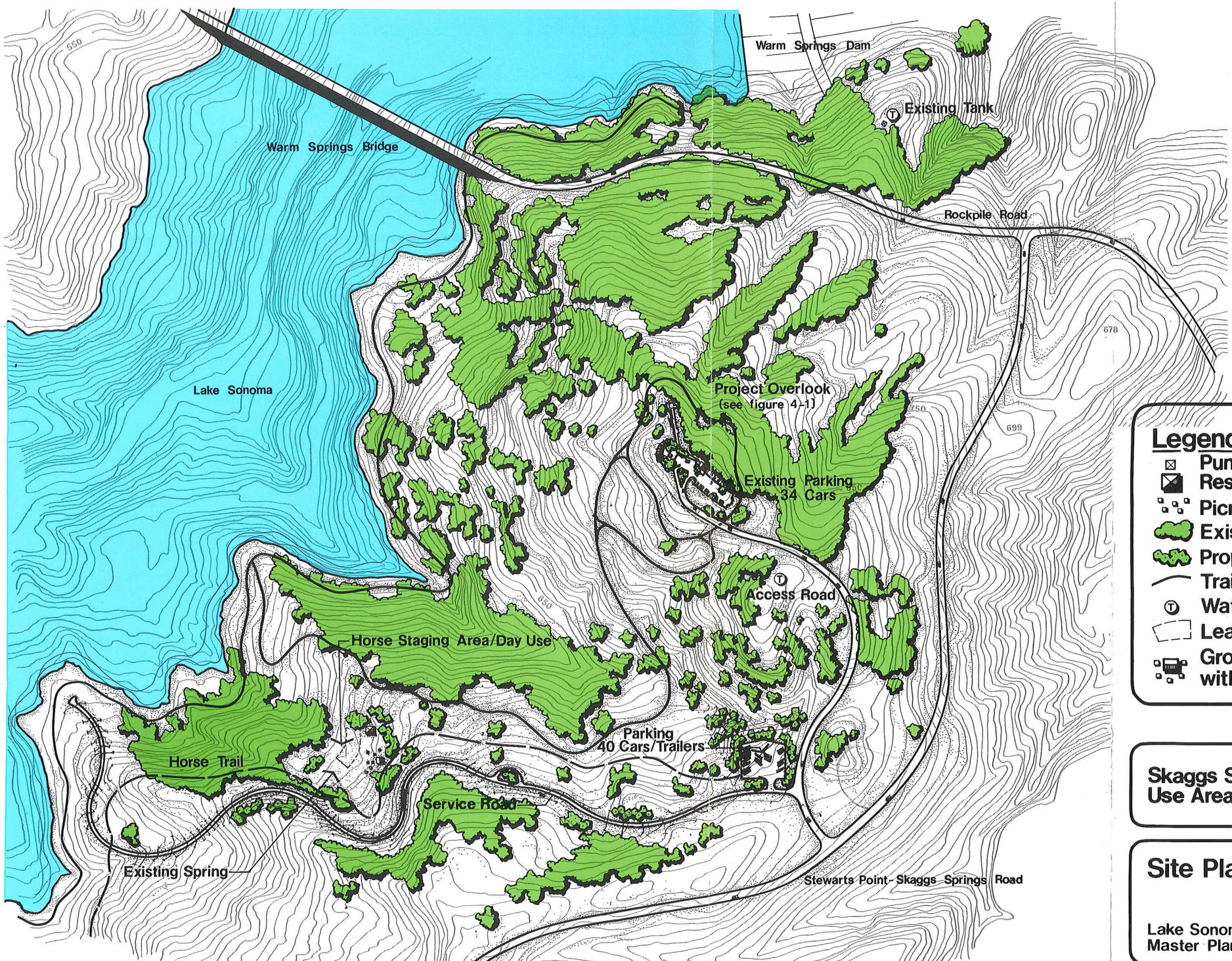
4.18 Entrance to the marina area is located on third of a mile west of Warm Springs Creek Bridge. The entrance road, through steep terrain, connects a series of parking lots for 175 cars terraced into the slopes along the road. Adjacent to the parking areas at elevation 700 and at the edge of the marina promontory is a sitting and picnic area with an excellent view of the Lake, Warm Springs Creek Bridge and dam. Adjacent to this view area is a small general store carrying basic supplies for users of the marina and campers.

4.19 At the end of the parking lots a gate controlled service road allows access to the marina land support facilities. These buildings, at elevation 495, include a restroom with flush toilets and parking for service vehicles. Pedestrian access to the marina and support facilities is by path adjacent to the service road or possibly by a shuttle, run by a concessionaire.

4.20 The marina itself is located in one of the more secluded coves of the Lake. There are 150 slips for storage of private and rental boats. A small gas dock and a structure for provision of emergency repairs and supplies is located on the marina dock adjacent to the land support facilities. The marina fluctuates with the water level and changes minimally in horizontal position. The boat storage docks are on an adjusting system to allow for this fluctuation. The land now under the marina has been graded flat so as to allow the docks to rest at elevation 350 when the Lake surface is at that level or below. Prior to detailed marina design, a marina feasibility study will be made. If the study shows that a marina is not feasible, secondary use for the marina area is to utilize the space and parking above the marina for a day use picnic area, taking advantage of the beautiful oak groves and views existing on that site. Parking would be as shown with picnic tables scattered among the trees.

Lake Sonoma Boat Launch and Beach Area
4.21 The entrance to the boat launch and beach area is located approximately ½ mile west of Warm Springs Creek Bridge at elevation 750. The road travels through a low swale to a saddle between two hlils where parking is located. A knoll has been graded down by 50 feet to provide space for parking 120 cars with trailers and 40 cars at elevation 600. Soil generated through construction of the parking lot is used to fill the upper end of the boat launch ramp.

4.22 The boat launch ramp is concrete, 5 lanes and 75 feet wide. At elevation 400 the ramp narrows to three lanes. The ramp then extends down the elevation 320. A courtesy pier is provided and self adjusts as the Lake surface lowers. Short term parking is provided in pull outs at the upper end of the ramp between elevation 450 and 500.



Legend

- Pumping Station
- Restroom (f)
- Picnic Area
- Existing Trees
- Proposed Trees
- Trail System
- Water Storage Tank
- Leach Field
- Group Picnic Area with Shelter

Skaggs Springs Equestrian / Day Use Area and Project Overlook

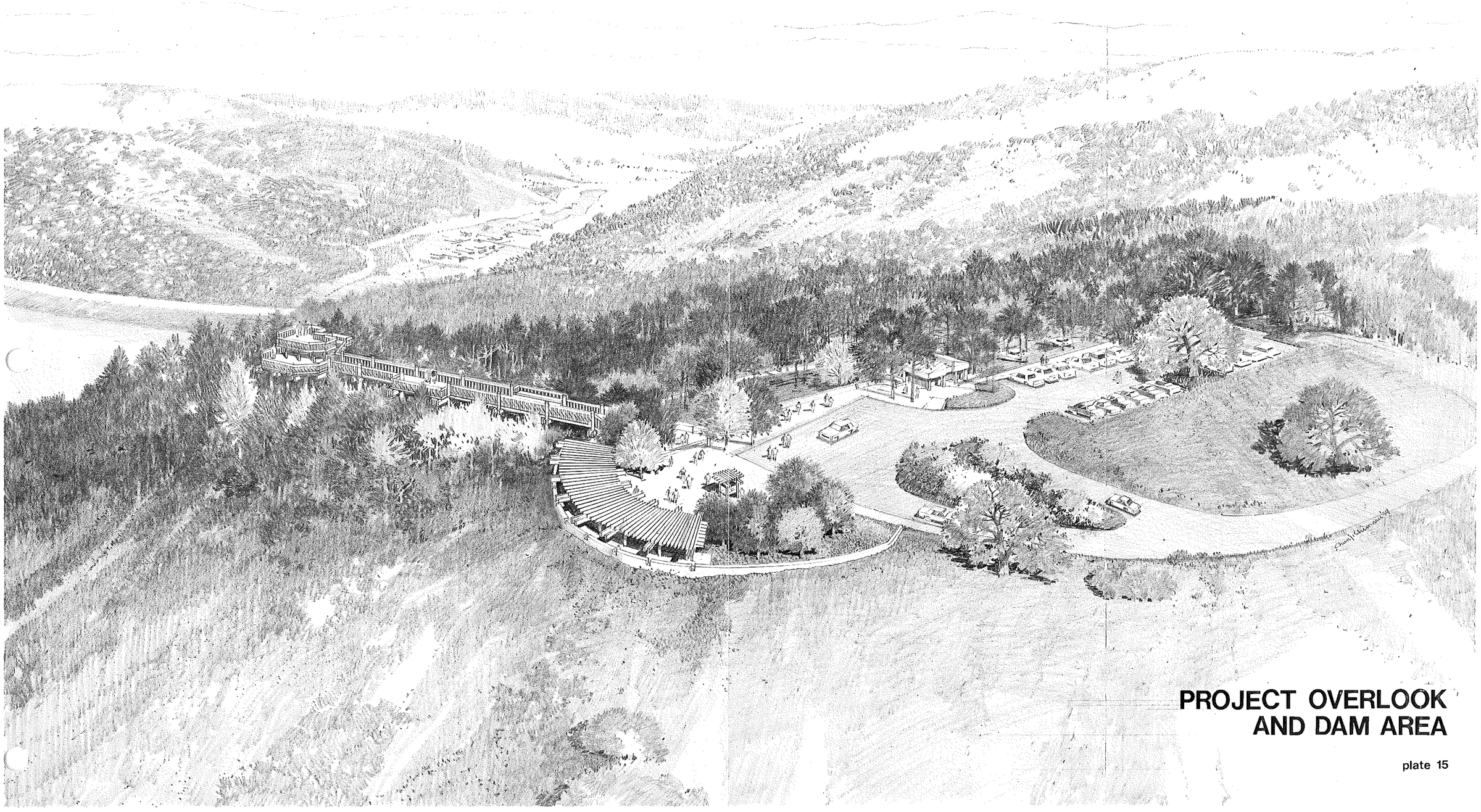
Site Plan

Lake Sonoma
Master Plan

North

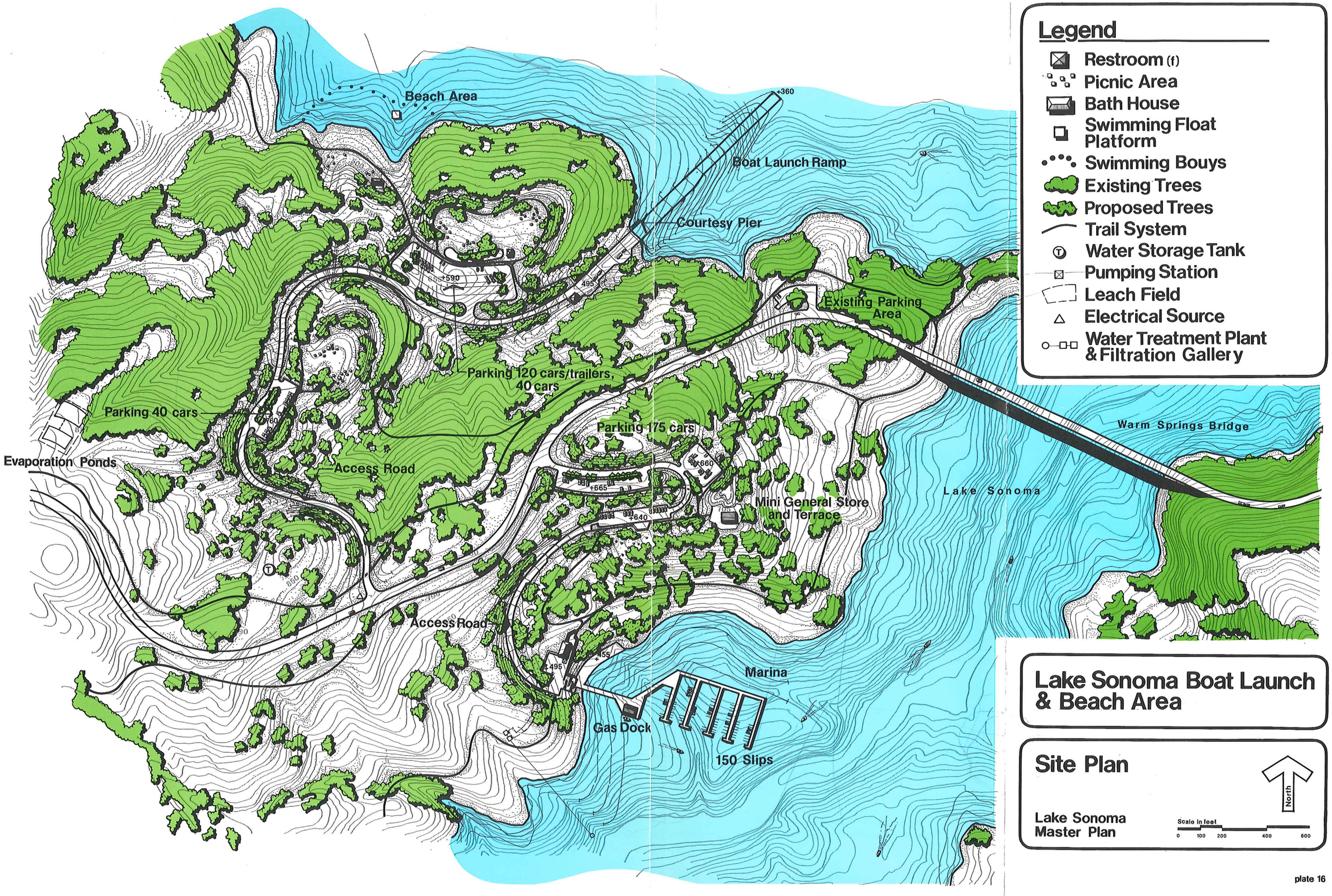
Scale in feet
0 100 200 400 600

plate 14



PROJECT OVERLOOK AND DAM AREA

plate 15



Legend

- Restroom (f)
- Picnic Area
- Bath House
- Swimming Float Platform
- Swimming Bouys
- Existing Trees
- Proposed Trees
- Trail System
- Water Storage Tank
- Pumping Station
- Leach Field
- Electrical Source
- Water Treatment Plant & Filtration Gallery

Lake Sonoma Boat Launch & Beach Area

Site Plan

Lake Sonoma
Master Plan

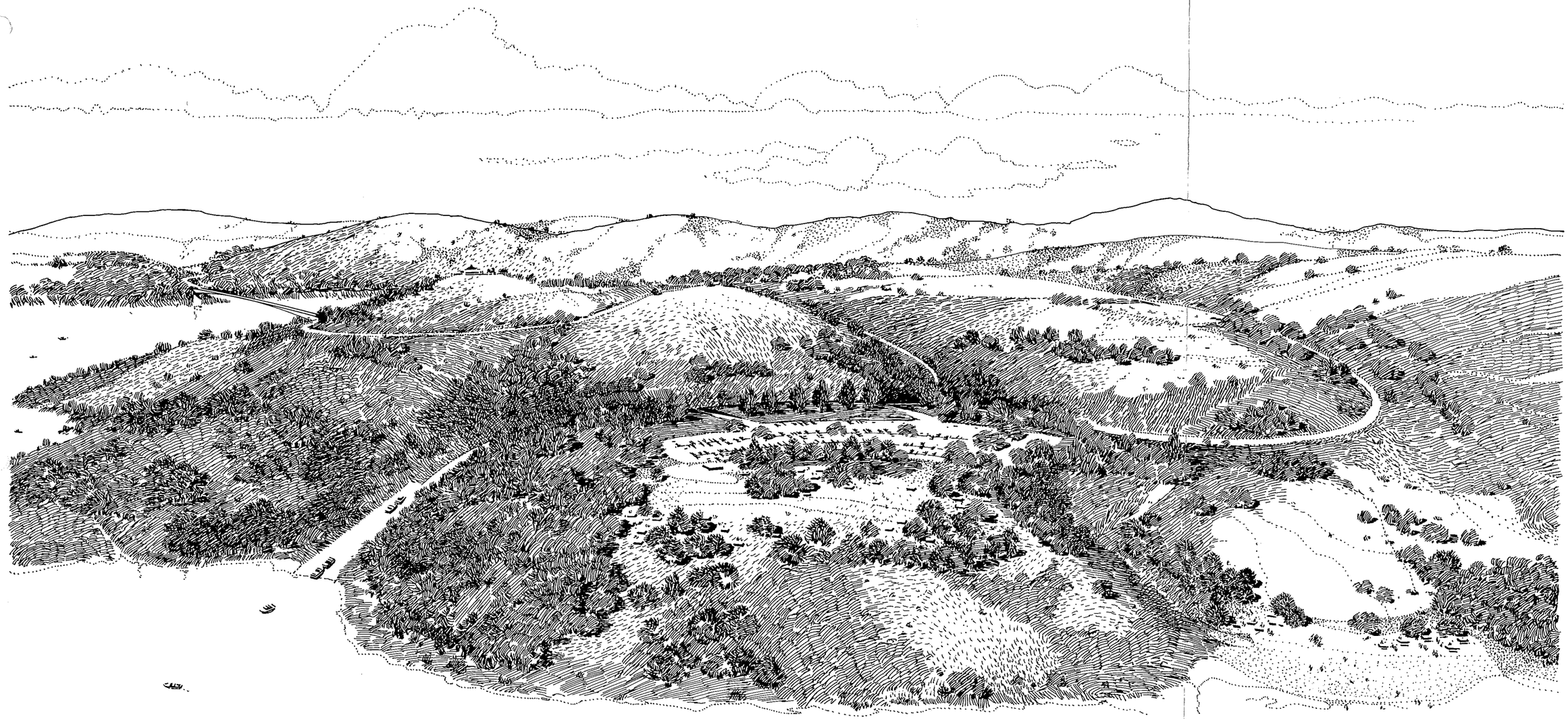
North

Scale in feet
0 100 200 400 600

plate 16

MARINA AREA

plate 17



LAKE SONOMA BOAT LAUNCH AND BEACH AREA

plate 18

4. Facility Development Plans

4.23 On a knoll between the parking area and Lake, at elevation 600, is located a 2½-acre irrigated turf day use area with picnic areas and a restroom with flush toilets. To the west of the parking areas is a beach requiring a 250 yard hike from the parking lot. A floating platform is provided in the water and a bath house and picnic tables are provided adjacent to the beach.

4.24 Close to Rockpile Road on the way to the boat launch an upper day use area with good views of the Lake, parking for 50 cars, 1½ acres of irrigated turf, picnic areas and a restroom are provided. A total of 80 picnic tables are provided at both the upper and lower day use areas.

Buzzard Rock Camp Area
4.25 The Buzzard Rock Camp Area is located just south of Rockpile Road near the western boundary of the project. The site is open and rolling with few existing trees. The camp areas, as laid out, respect the natural drainage ways of the site and landscaping is provided to generate shade for the campers.

4.26 A connector ramp is provided on Rockpile Road to guide campers to a control structure used to control both the Buzzard Rock and Oak Knolls Camp Areas. In addition, the access road and each camp area are controlled by a gate (total of 5).The road to Buzzard Rock goes left under Rockpile Road and leads to three (R.V.) camp areas of about 25 sites—total: 75 Class A campsites. Each site has a large level back-in parking pad and a nearly level spot for table and fireplace. Each area has a restroom flush toilets. An amphitheatre is located central to the three areas.

Buzzard Rock Group Camp/Education & Equestrian Area
4.27 Adjacent to the three R.V. camp areas is a group camp area with space for 50 vehicles with trailers. The area acts as the equestrian trail head for the South Lake area and provides horse hitching and feeding areas as well as a restroom with showers and group facilities for the campers.

Oak Knolls Camp Area
4.28 Entrance to Oak Knolls Camp Area is from Rockpile Road via the same ramp and control structure as for Buzzard Rock Camp Area. Beyond the control structure, the road turns right and generally follows the ridge out to Oak Knolls. A total of 128 units of Class A campgrounds are provided in three camp areas. Campsites are primarily for auto or van tent camping; all sites may not be suitable for recreation vehicle camping. Parking at each campsite is provided for 2 vehicles and designed to accommodate a car or van and boat trailer.

4. Facility Development Plans

4.29 The camp areas sit among existing oak groves and have views north and east to Lake Sonoma and Pritchett Peaks. Trees are planted to supplement existing vegetation for screening between campsites.

4.30 Two camp areas are separated from the access road by control gates and can be closed to use if necessary. At the end of the camp loop road parking for 30 cars is provided for those campers hiking in to primitive camp areas.

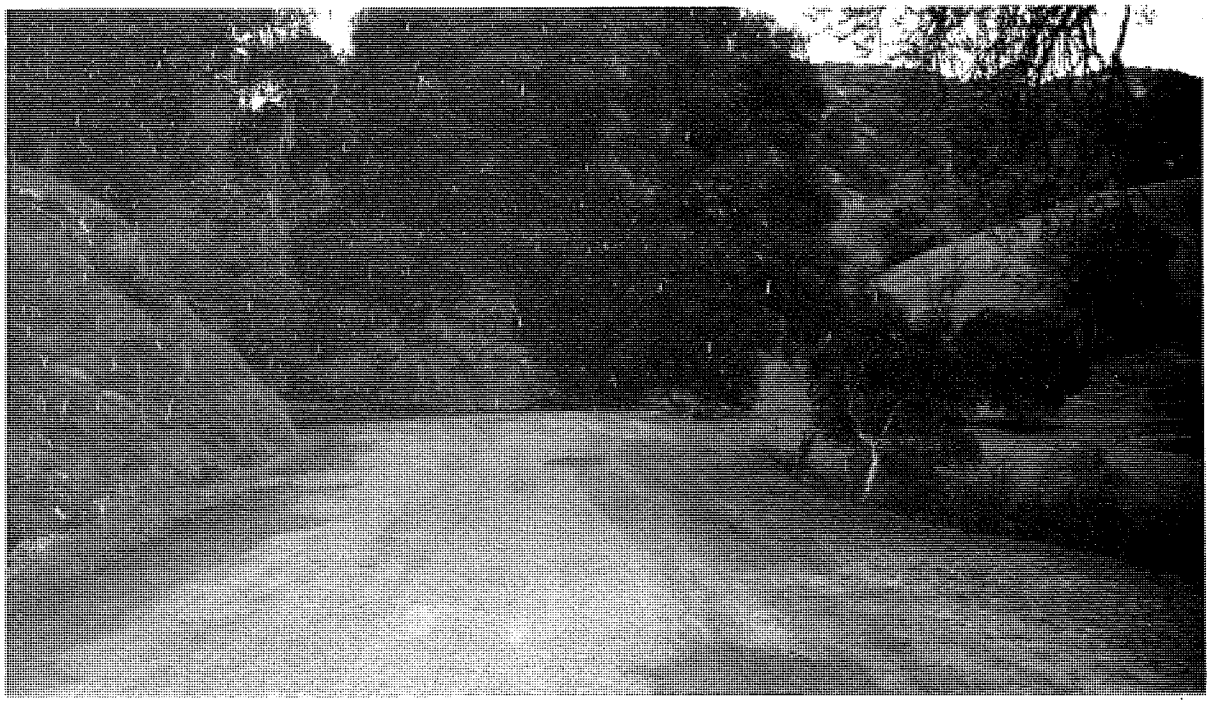
4.31 Four restrooms with showers are located so no camper is more than 400 feet distant from a restroom facility. An amphitheater is centrally located to all the camp sites.

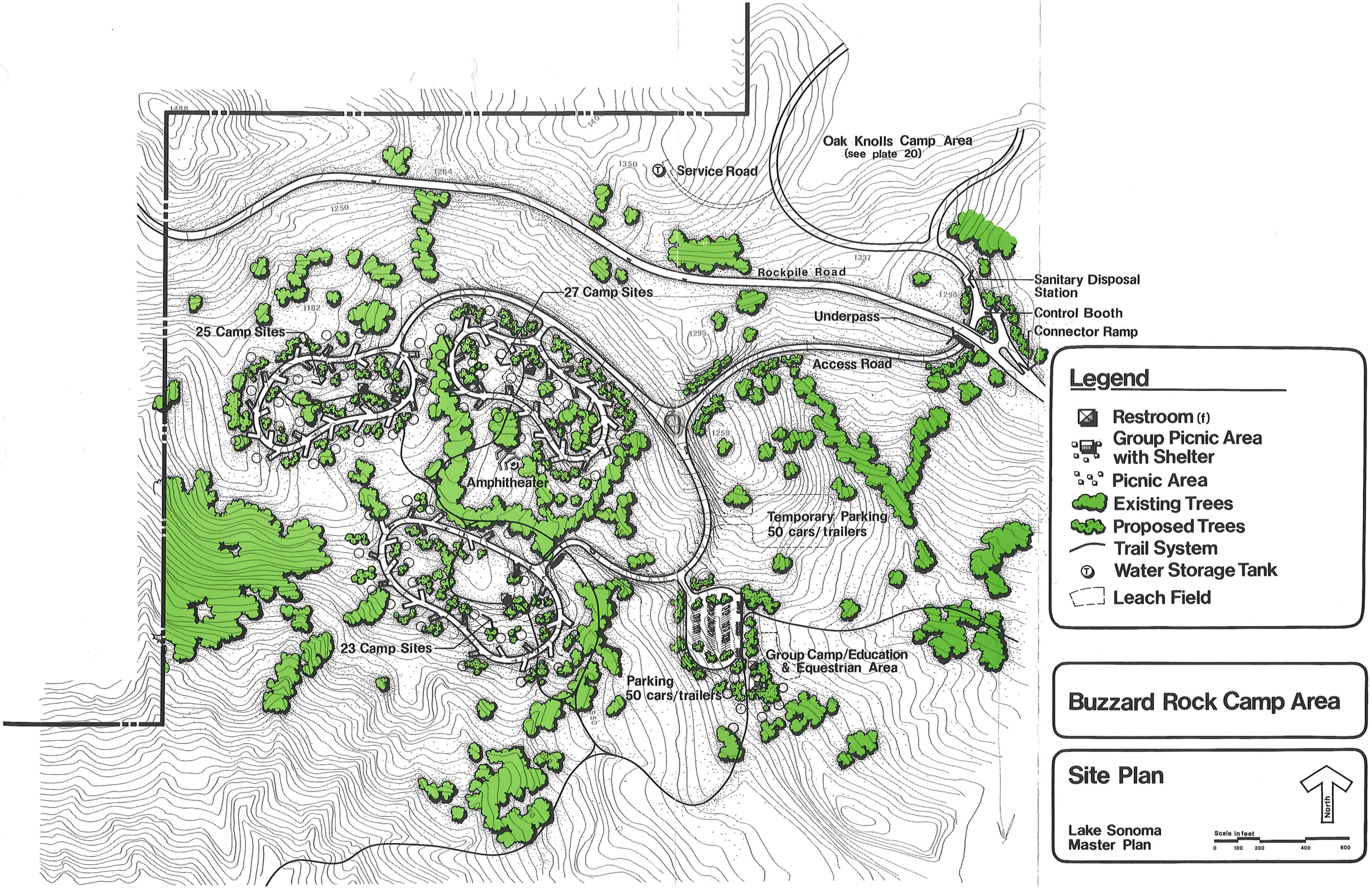
Warm Springs Beach
4.32 One of the few beaches with parking close in, Warm Springs Beach is accessible by auto from Rockpile Road at elevation 1100. The road winds down to elevation 580 and parking for 45 cars. It is a short hike down to elevation 451 and the beach.

4.33 This south facing beach is located on a quiet area of the Warm Springs arm of Lake Sonoma. Although water skiing is permitted in the main arm of the Lake adjacent to Warm Springs Beach, the cove on which the beach is located is restricted to boating at 10 miles per hour. Skiers can boat out from the beach to the higher speed section of the Lake. Land facilities include an irrigated turf space with 8 picnic areas of 3 or 4 tables each and a bath house. Trees have been planted to provide additional shade.

Skaggs Springs Beach
4.34 Access to this beach is via a ½ mile trail down from Stewarts Point-Skaggs Springs Road where a parking area is provided for 40 cars. The asphalt surfaced trail can be used as a service road as well and connects to the Lake Sonoma trail system. At the beach, portable restrooms are provided and 4 picnic areas of 3 or 4 tables each are located under the trees.

Hot Springs Road Portal Area
4.35 The portal area is the arrival point for North Lake visitors. As one drives downhill after entering the project lands, the Portal Area Information and Administration Center comes into view. It is a place for visitors to check in and get oriented, check on campsite availability and be exposed to some interpretation of the North Lake archaeology, history and vegetation. Adjacent to the center, an archaeological loop





Legend

- Restroom (f)
- Group Picnic Area with Shelter
- Picnic Area
- Existing Trees
- Proposed Trees
- Trail System
- Water Storage Tank
- Leach Field

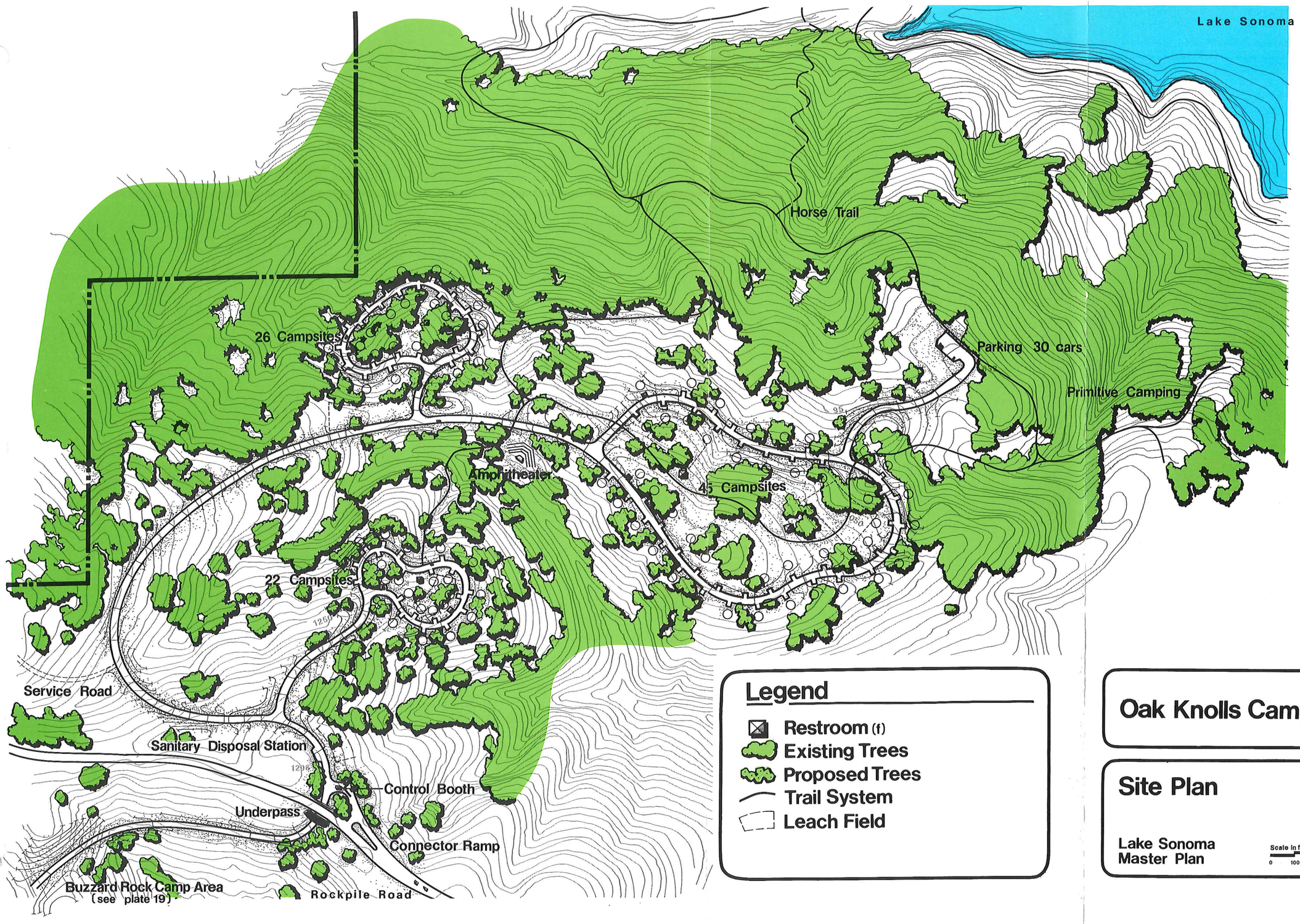
Buzzard Rock Camp Area

Site Plan

Lake Sonoma
Master Plan

North

Scale in feet
0 100 200 400 600



Legend

- Restroom (f)
- Existing Trees
- Proposed Trees
- Trail System
- Leach Field

Oak Knolls Camp Area

Site Plan

Lake Sonoma
Master Plan

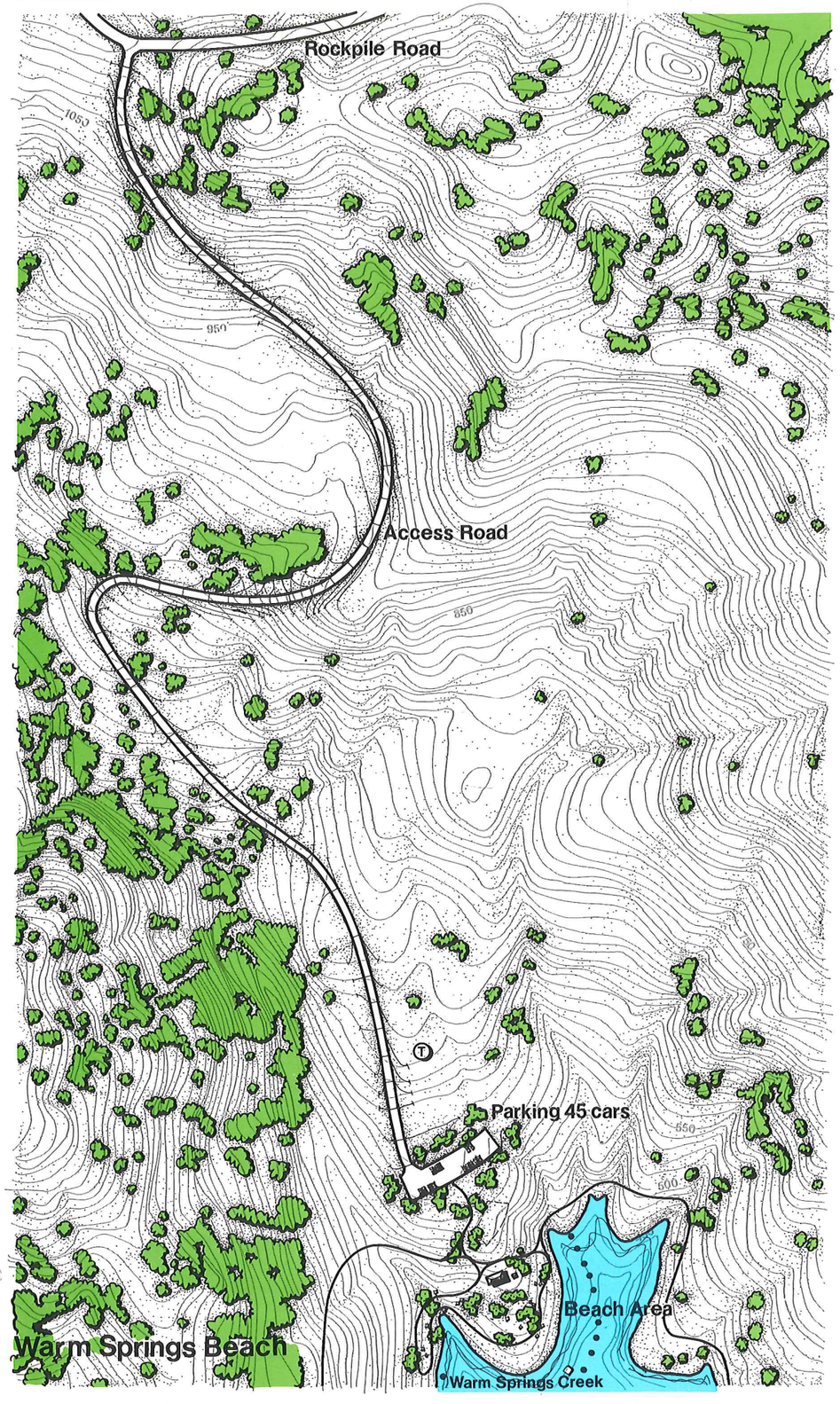
North

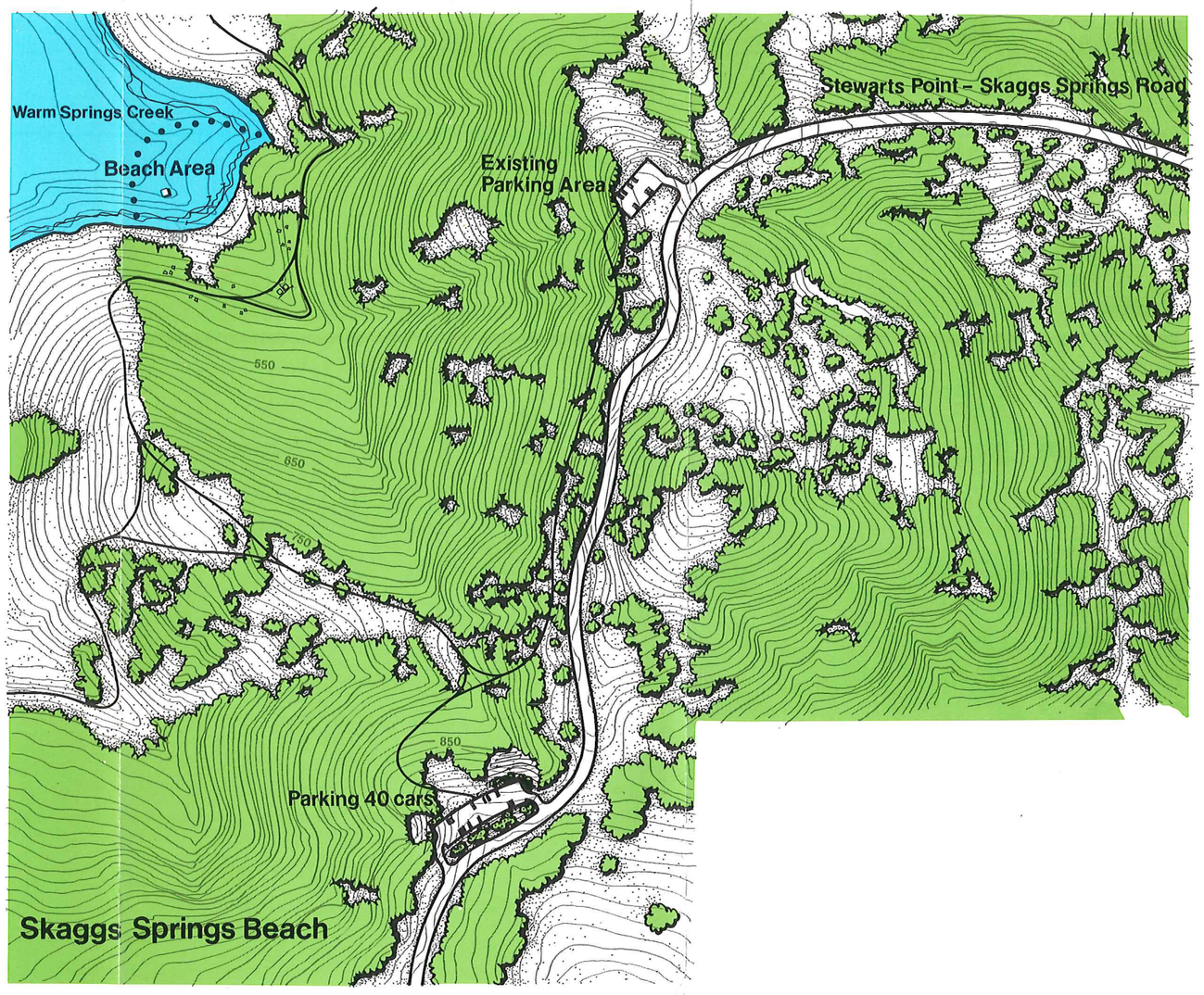
Scale in feet
0 100 200 400 600

plate 20

OAK KNOLLS CAMP
AREA CAMP SITE

plate 21





Legend

- Restroom (portable)
- Picnic Area
- Trail System
- Water Storage Tank
- Pumping Station
- Leach Field
- Existing Trees
- Proposed Trees
- Bath House
- Swimming Float Platform
- Swimming Bouys

Warm Springs Beach
Skaggs Springs Beach

Site Plan

Lake Sonoma
Master Plan

North

Scale in feet
0 100 200 400 600

plate 22

trail leads to several cultural sites of interest. At various times, living history exhibits and ranger programs will take place.

4.36 Across Hot Springs Road, out of view of the motorist, is the North Lake maintenance area. This facility supplements the main facility located below the dam. Parking at both the maintenance facility and Information Center can be closed by control gate.

North Lake Equestrian Area
4.37 Located off Hot Springs Road approximately one mile west of the Portal Area, this ridge top promontory serves as the equestrian staging facility for the North Lake area. A group picnic shelter, restrooms, potable water and parking for 40 cars with trailers are provided. Access to trails in this area of the project is very convenient. Use of the area is controlled by a gate across the access road.

Yorty Creek Boat Access Area
4.38 One of the two boat access points to the North Lake, this facility is located on existing Hot Springs Road one-half mile southwest of the Portal Area. The boat launching ramp is concrete and has two 15 foot wide lanes. The top of the ramp is set at elevation 454 and extends down to elevation 416. A courtesy pier fluctuates with the water level.

4.39 Parking is provided for 80 cars with trailers. Picnic tables, potable water and portable restrooms are included in the facility.

Yorty Creek Beach
4.40 This beach is easily accessible from parking, with only a 25 foot vertical change in grade from parking to beach. Access is off Hot Springs Road and parking is provided for 40 cars. Eight picnic areas provide about 30 tables, only a 50 foot walk from parking. The day use area has irrigated turf; and to provide shade, trees and shrubs have been planted to supplement existing vegetation.

4.41 The beach is serviced by a bath house containing restrooms, showers and change space. In the Lake is a floating platform for swimmers to rest and congregate.

Cherry Creek Camp Area
4.42 This camp area provides 45 Class A campsites scattered among the trees along the gently sloping eastern edge of Cherry Creek. Access to the site is by private boat or hiking along a service road crossing a narrow low level bridge. Limited space and the sensitive environment prohibits campers from bringing their vehicles to the camp sites. Three restrooms with showers and an amphitheater are provided.

4.43 A two lane concrete boat launching ramp is located at the entrance to the camp area. Parking for 40 vehicles with trailers and an additional 40 cars for campers is located immediately above the boat ramp at elevation 570 and is approximately 200 yards north of Hot Springs Road. The top of the launch ramp is set at elevation 454 and extends down to elevation 416. Potable water and portable restrooms are located nearby.

Hot Springs Road Camp Area
4.44 Hot Springs Road provides the access for these 50 Class A campsites scattered among the trees above Cherry Creek. Upon entering the access road an area of free campsites is provided. Other campsites lie in a linear arrangement along the circulation road requiring a short walk (100 to 300 feet) to reach one's site. Parking for two vehicles per campsite is usually provided but there are some campsites with sapce for only one vehicle. A variety of parking arrangements in concert with the site topography accommodate boats and tent trailers. Three restrooms are located along the circulation spine and an amphitheatre is centrally placed among the camp areas.

Hot Springs Road Day Use Area
4.45 Located on one of the most prominent ridges in the North Lake area at the junction of Dry and Yorty Creeks, this site affords spectacular views both up and downstream. The Lake is visible on both sides of the area. In addition to a large open space day use meadow with picnic tables located between the two parking areas, seasonal interpretive programs will be conducted on the adjacent trails related to a

mini-interpretive center. Seasonal programs will focus on cultural and native vegetative themes. Adjacent to the south parking lot is a restroom with flush toilets and the mini-interpretive structure containing displays and graphics.

Yorty Creek Group Camp/ Education Area
4.46

One of the two group camp areas on the project site (the other is located at the Buzzard Rock Camp Area), the Yorty Creek camp is reached off the access road to Hot Springs Road Day Use Area. This site, located at elevation 500, is bounded on two sides by the Lake and has easy acces to the shoreline via the alignment of an existing jeep road. Parking is provided for cars and busses. A group picnic shelter, restrooms with showers, and an amphitheater will make this a popular nearly year-round facility. Trees, shrubs and turf will be planted to provide shade and usable playing surfaces.

Corps/County Boat Area
4.47

Adjacent to the dam outlet works, on the land side, a space is provided for the docking and repair of Corps and County boats. The area is designed to tuck into and blend with the natural coves.

Skaggs Hot Springs
4.48

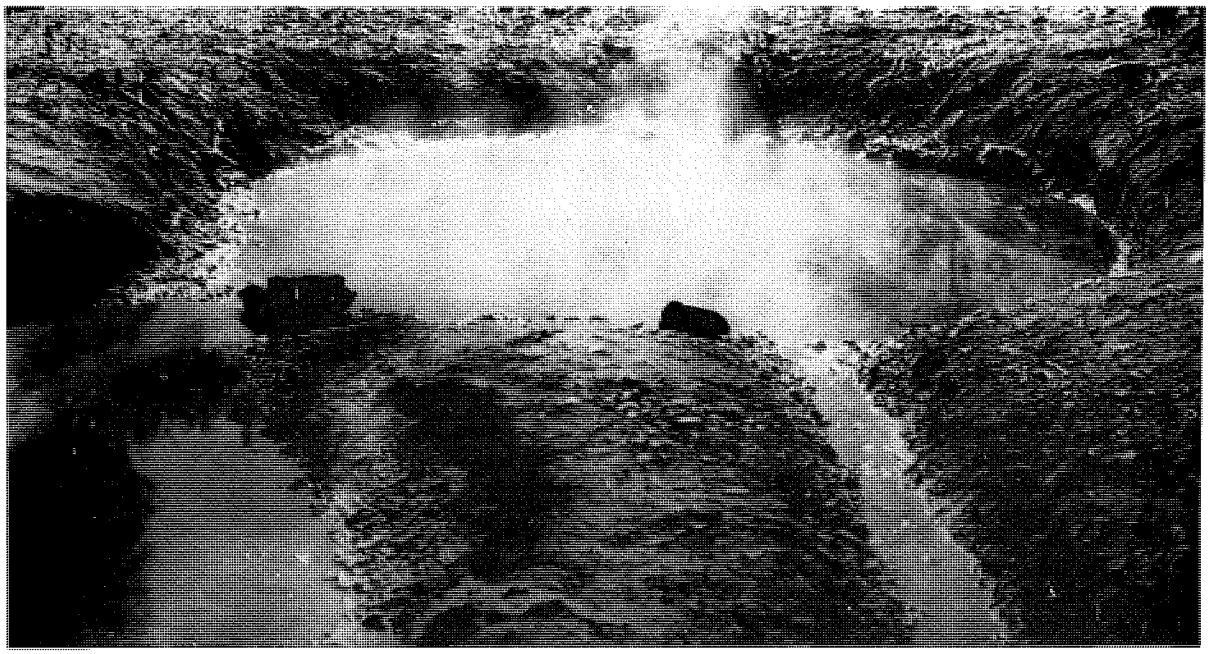
Further study is needed to determine the feasibility of preserving these existing hot springs by piping the water to the surface of the Lake and displaying it in a series of pools. Access would be by foot only and interpretive signs, discussing the history of the site, would be placed in the area. In the event that this is not feasible, minimum development should be the placement of interpretive signs.

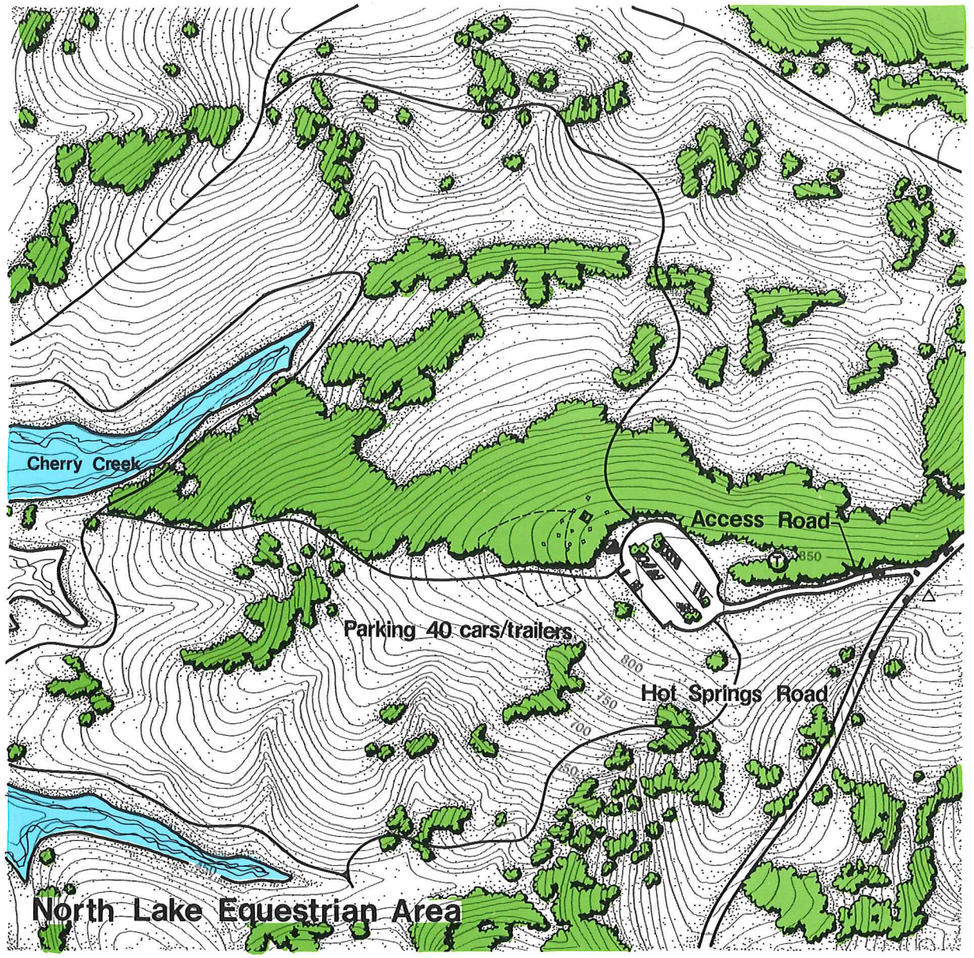
Group Educational Facilities
4.49

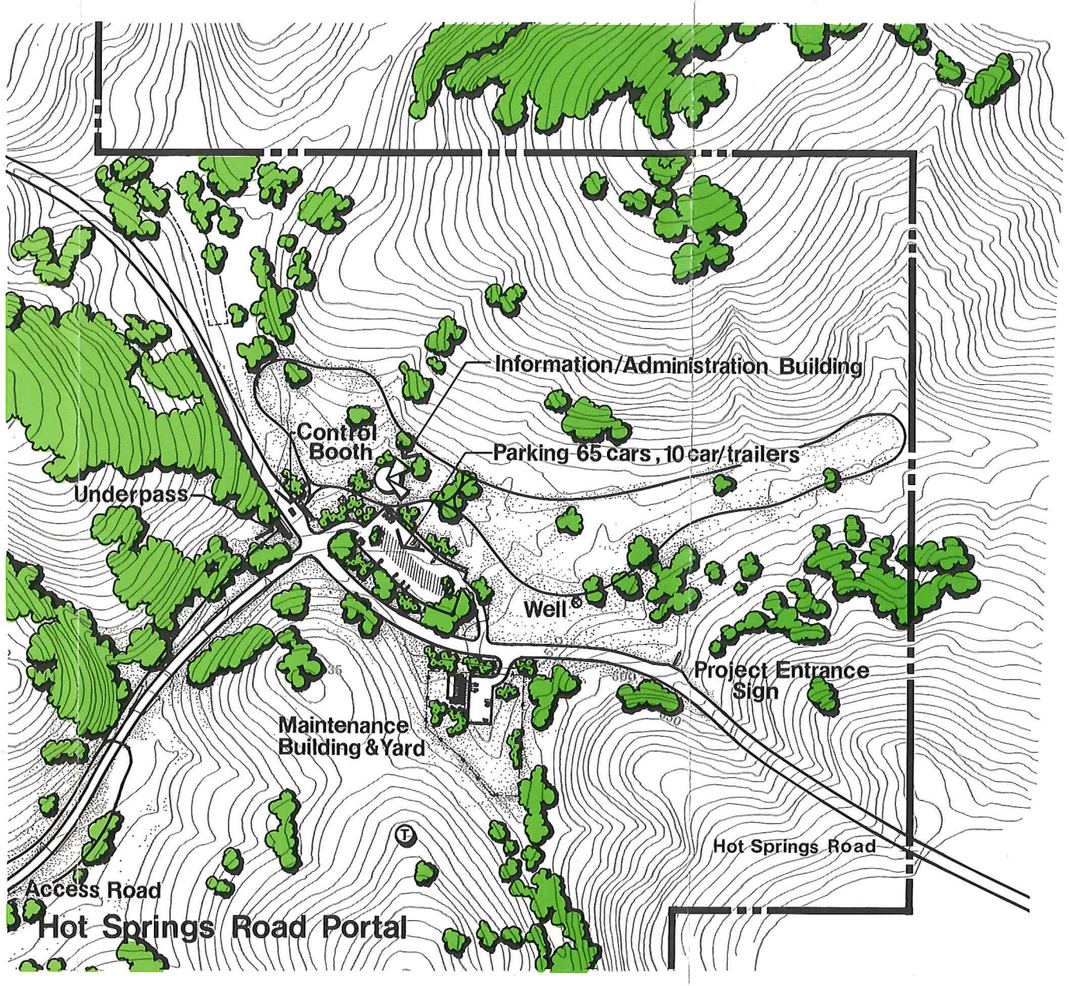
The Master Plan provides extensive opportunity for use by organized public or private educational groups. The total Lake Sonoma project lands, including the Visitor Center, fish hatchery, mini-interpretive centers and programs, and trails provide a living laboratory for study and learning at all age levels.

4.50

The largest percentage of usage by educational groups will be the day-use, class room trip type of visitation. In addition, overnight and longer term (approximately one week) visitation will be accommodated in the two group camp areas located in the north and south lake areas. Each of these facilities will accommodate up to 200 campers. The final criteria, themes and design of facilities for these group camp areas will be developed with input from interested educational agencies and other recognized special interest groups.







Legend

- Restroom (portable)
- Picnic Area
- Existing Trees
- Proposed Trees
- Trail System
- Water Storage Tank
- Pumping Station
- Leach Field
- Restroom (f)

Hot Springs Road Portal & No. Lake Equestrian Areas

Site Plan

Lake Sonoma
Master Plan

North

Scale in feet
0 100 200 400 600

plate 23

Hot Springs Road

Access Road

Bridge

Parking 40 cars

Group Camp/ Education Area (see plate 26)

Beach Area

Yorty Creek

Two Lane Boat Launch Ramp

416

454

Trail

Yorty Creek

Parking 20 cars

Parking 80 cars and trailers

Yorty Creek Boat Access

Legend

- Restroom (portable)
- Picnic Area
- Bath House
- Swimming Float Platform
- Swimming Bouys
- Existing Trees
- Restroom (f)
- Proposed Trees
- Trail System
- Water Storage Tank
- Pumping Station
- Leach Field
- Electrical Source

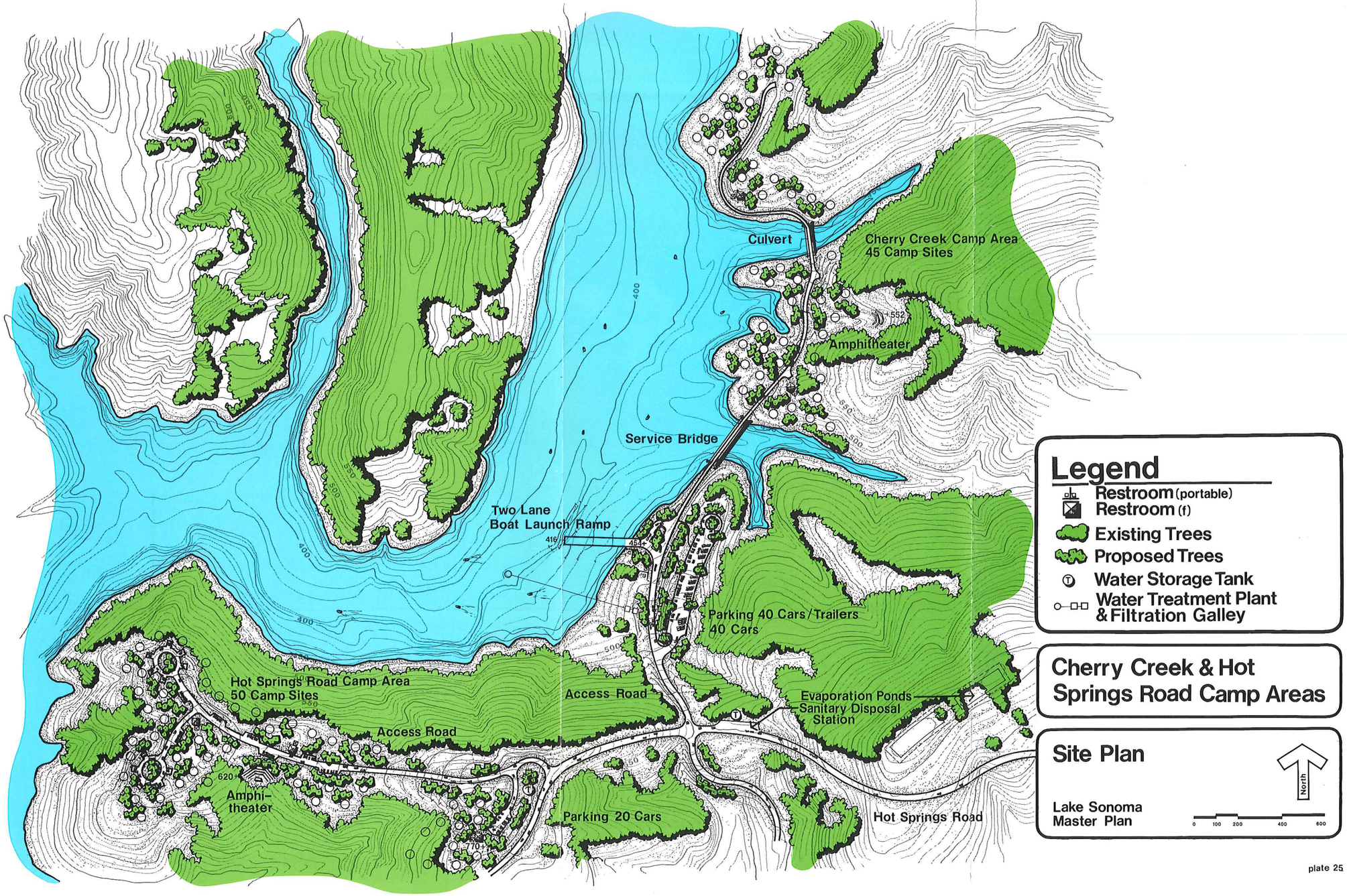
Yorty Creek Boat Access & Beach Areas

Site Plan

Lake Sonoma Master Plan

North

0 100 200 400 600



Legend

- Restroom (portable)
- Restroom (f)
- Existing Trees
- Proposed Trees
- Water Storage Tank
- Water Treatment Plant & Filtration Galley

Cherry Creek & Hot Springs Road Camp Areas

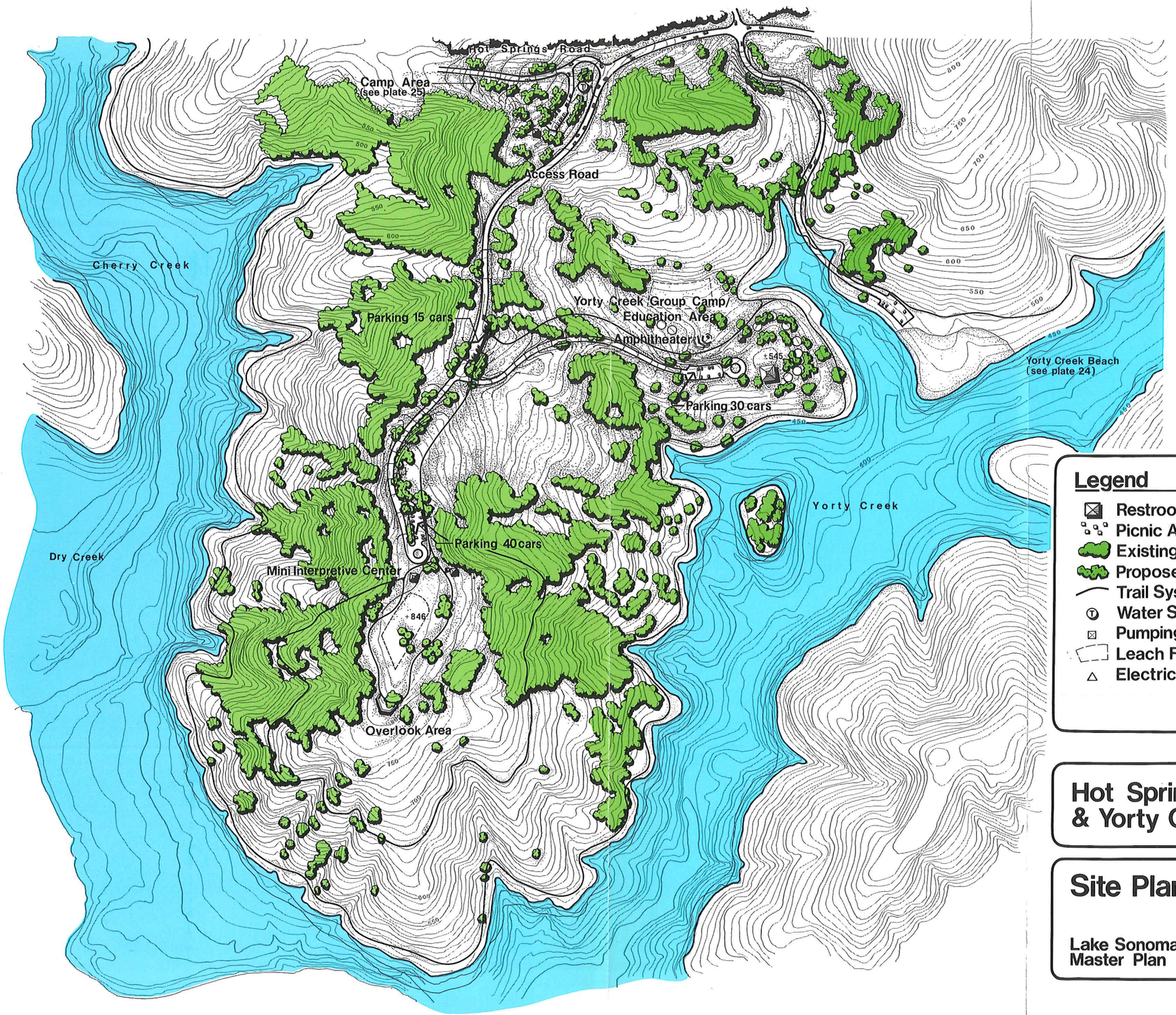
Site Plan

North

Lake Sonoma
Master Plan

0 100 200 400 600

plate 25



Legend

- Restroom (f)
- Picnic Area
- Existing Trees
- Proposed Trees
- Trail System
- Water Storage Tank
- Pumping Station
- Leach Field
- Electrical Source

Hot Springs Road Day Use & Yorty Creek Group Camp

Site Plan

North

Lake Sonoma
Master Plan

Scale in Feet
0 200 400 800

4. Facility Development Plans

TABLE 4-1

MASTER PLAN FACILITIES FOR RECREATION USE AREAS

RECREATION AREAS	Warm Spring Dam Recreation Area	Project Overlook	Skaggs Springs Equestrian/Day Use Area	Marina*	Lake Sonoma Boat Launch & Beach Area	Buzzard Rock Camp Area	Oak Knolls Camp Area	Skaggs Springs Beach	Warm Springs Beach	Hot Springs Road Portal Area	North Lake Equestrian Area	Yorty Creek Boat Access Area	Yorty Creek Beach Area	Cherry Creek Camp Area	Hot Springs Road Camp Area	Hot Springs Road Day Use Area	Yorty Creek Group Camp/Education Area
Sanitary Dump Station					●		●							●	●		
Trash Receptacles	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Potable Water	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Restrooms/Portable								●				●		●			
Restrooms/Showers						●	●							●	●		●
Restrooms	●	●	●	●	●					●	●					●	
Bathhouse					●				●				●				
Fire Circle	●					●	●							●	●		●
Amphitheater	●					●	●							●	●		●
Group Camp Facilities						●											●
RV Camp Sites						●											
Auto/Tent Camp Sites							●								●		
Tent Camp Sites														●	●		
Swimming Beach					●			●	●				●	●			
Boat Slips & Rentals*				●													
Courtesy Pier					●							●		●			
Boat Launching Ramps					●							●		●			
Group Picnic Facilities	●		●			●					●		●			●	●
Fireplaces	●				●	●	●		●				●	●	●	●	
Picnic Sites	●	●		●	●			●	●			●	●			●	
Turf Play Area	●				●				●				●			●	●
Interpretive Trail	●									●						●	
Bicycle Paths	●																
Access/Equestrian Trails	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●
Access to Hiking Trails	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Auto/Trailer Parking	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Access Roads	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Interpretive Facilities	●									●						●	
Overnight Camping						●	●							●	●		●
Day Use Only	●	●	●	●	●			●	●	●	●	●	●			●	
Access To Lake				●	●			●	●			●	●	●			●
North Lake Area										●	●	●	●	●	●	●	●
South Lake Area	●	●	●	●	●	●	●	●	●								

*Concession Operated

5. Design of Facilities

Design of Facilities

5.01 The following paragraphs present guidelines for the detailed layout of recreation areas including all facilities. All recreation areas have been designed with a sensitive concern for the environment. Preliminary designs will be confirmed, changed to meet unforseen topographical requirements, and staked in the field. Field design and staking will be performed by an interdisciplinary design team which will include a landscape architect, a design engineer and a recreation specialist familiar with operations and maintenance. After the recreation areas are designated by this team, a survey will be made prior to commencement of contract drawings. The design team will visit the recreation sites during construction and operation as a regular part of the design procedure.

High and Moderate Intensive Use Areas
5.02 These areas include recreation sites easily accessible by auto. They are located wherever site conditions will allow this level of development. Structures are fairly refined (including restrooms having ceramic tile where required and flush type toilets) with exteriors designed to fit the terrain following the architectural style set in this section. Paved all weather access roads and parking areas, durable, long lasting outdoor furniture designed to enhance the natural beauty of the surrounding area, electricity where required, a centrally located telephone service and a reliable water supply will be installed. Camp areas have wash houses which include hot showers. Also provided in the camp areas designed for R.V.'s are sanitary dump stations for cleaning out the holding tanks in these vehicles. Swimming facilities include bath houses (with restroom, showers and changing facilities) and picnic units. Boat launching sites include floating courtesy docks.

Low Intensity Use Areas
5.03 Primitive areas, usually reached only by water or trails, have a minimum of facilities including portable restrooms and outdoor furniture. Where a more natural and attractive camping area is accessible but cannot be readily developed into a formal camp area, a lesser degree of facilities are provided. The facilities in these intermediate areas include designated campsites, off-road parking, outdoor furniture and flush-type restrooms. These areas are suitable for campers without trailers and may require a short walk to the campsites.

Recreation Road Design
5.04 The design and location of roads has been accomplished with sensitivity to the view of the driver and how the road fits into the landscape. No road is imposed on the site simply to connect points of interest. The road is designed as a part of the visitor's active enjoyment of the site along with the other activities.

5.05 In the recreation areas, roads will be field checked and staked in the field by a recreation design team. The turning radii, grades, and widths will be appropriate for a recreation area and have a corresponding speed limit. The road will be field located to follow existing jeep trails and natural grades as much as possible, with a minimum of disruption to the vegetation and a minimum of cut and fill. The alignments will meander through existing vegetation preserving it wherever possible. Any tree which is located in the shoulder of the road will be saved if possible and any clearance needed will be accomplished by selective pruning rather than by removal. Road design will take into account the terrain through which the road travels. Long straight tangents and short radius curves will be avoided since they are foreign to the environment. The traditional concepts of straight lines between location controls connected by circular curves will be broken in favor of flowing curves with short tangents or spirals which can fit the road into the landscape. Cuts through ridgetops in a direct line of sight from the roadway will be avoided since they create an unnatural break in the skyline. When possible, a combination of vertical and horizontal curves will make the road appear as part of the landscape. Vertical and horizontal curves will not begin or terminate simultaneously since this tends to emphasize the curves. If possible, the horizontal curve will begin before the vertical curve section ends. This pleases the eye and leads the driver into the horizontal

curve. A pleasing relationship of road and terrain will be achieved by setting maximum sight distances and using combinations of horizontal and vertical curvatures which will restrict long distance views of road segments. Roads will be wide enough to safely accommodate bicyclists.

Pedestrian Bridges
5.06

Pedestrian bridges, where needed, will have the major, or heavier, structural elements below the bridge surface. Structural members, guardrails and railings located above the bridge surface will be designed to minimize blocking the pedestrian's view of the scenery. Wherever possible, bridges will be designed as light-appearing, thin objects of functional beauty which do not obscure the landscape.

One-Way Roads
5.07

In general, the philosophy is followed that the primary park purposes of preservation, enjoyment and interpretation are collectively served best by one-way roads. This is especially true where loop roads are appropriate. Where terrain is such that a road must go to a facility turn-around and return, a two-way road is most appropriate.

Parking Areas
5.08

The placement of parking areas where they intrude, by sight or sound, on significant features will be avoided. All parking will be restricted to designated parking areas since off road parking compacts the soil and prevents the growth of young trees and other plants. The size of parking areas will be limited to that needed for effective operation. This practice will restrict the visitation in a recreation area controlling its overuse and corresponding decrease in environmental quality. Where large parking areas are necessary, they will be designed to incorporate tree planting within the paved areas. Barriers will be used whenever needed to prevent cars from leaving the paved surface. All barriers will be constructed of natural materials, and if possible, those found in the immediate area. Guardrails and/or bollards used in parking areas requiring minimum public safety or control will be constructed of peeled logs.

Roadway Landscaping
5.09

Landscaping of the roads is an intrinsic part of location and design. Roads will be designed so that they will display and take advantage of the best of the natural scenery through which they travel. In addition, the landscaping will aim toward preventing erosion, softening the transition from the old to the new and applying design talents to obtain harmony and balance. Roadways will be planted with trees and shrubs to reduce the noise level and create a buffer zone near all public use areas.

5.10

Roadways will be designed based on the type of use area and the roadway classification. Important considerations in the design of the access roadways include:

1. Soil conditions and erodibility.
2. Soil and slope stability.
3. Balance grading to minimize need for disposal of excess material or to import soil material.
4. Maximum width of 24 feet with some extra width at selected locations for turnouts and viewpoints.
5. Roadway grading not to exceed 12% to boat launching ramps and recreational vehicle (R.V.) camp areas, and to 14% depending upon the classification of roadway. The Corps of Engineers' standards define the width of road, maximum grade and other design requirements depending upon the classification or roadway. Table 5-1 summarizes the design criteria for each classification of roadway.

5.11

TABLE 5-1

Roadway Design Criteria

Access Road (To a recreation use area):

Paved Width	—	20-24 ft. (max. 24 ft.)
Shoulders	—	4 ft. each side
	—	Usable for bicyclists
Gradient	—	12% maximum

5. Design of Facilities

Circulation Road (Within a recreation area):

Paved Width	—	18 ft.
Shoulders	—	2 ft. each side
	—	Unpaved
Sight Distance	—	300 ft. at intersections
	—	175 ft. all other locations
Design Speed	—	15 m.p.h.
Curvature	—	25 degrees maximum
Gradient	—	12% maximum
Loop & One-Way Roads	—	12 ft. including 2 ft. shoulder

Service Road:

Controlled Access	—	Locked Gate
Roadway Width	—	10 ft. plus approp. shoulder
Gradient	—	12% maximum

Vehicle Trail (Patrol and Fire Suppression):

Controlled Access	—	Locked Gate
Roadway Width	—	10 ft. with minimum shoulder and pullouts
Gradient	—	14% maximum
Surface	—	Only if required

5.12 Storm drainage and erosion control is important in the design of each roadway. Where cut and fill slopes are required, erosion control landscaping will be installed to protect the slopes from excessive runoff and erosion. Storm drainage conduits will be placed to provide for cross drainage under the roadways at existing drainage swales. Drainage from the roadway section will be collected and directed away from the road into existing drainage swales. In each case, provision will be made to dissipate the energy and prevent erosion.

Launching Ramps

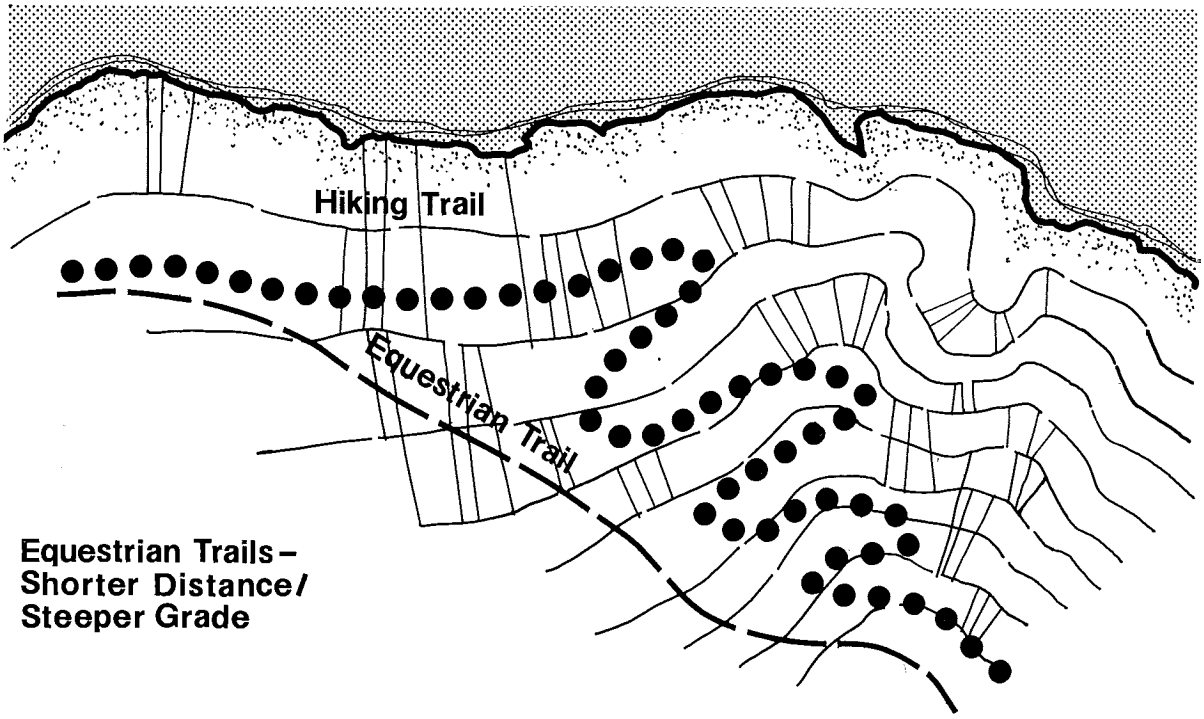
5.13 The location of boat launching ramps on Lake Sonoma is limited because of the steep slopes of the reservoir, vehicular access to the water's edge, and inadequate space for parking. Three locations have been selected which meet the general criteria for construction of the boat launching facilities.

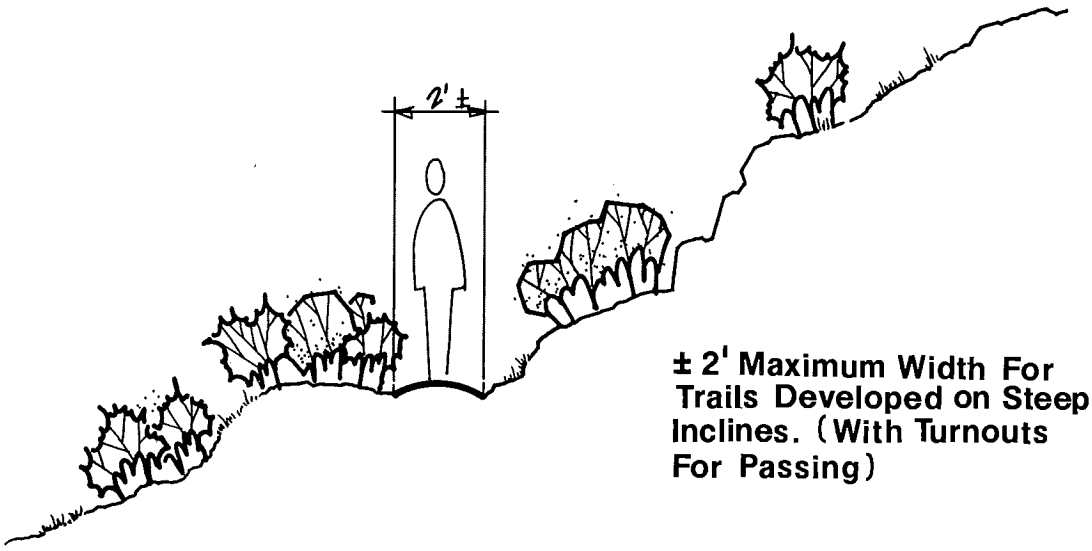
5.14 The primary launching ramp is located to the northeast of the Warm Springs Creek Bridge in the area designated as the Lake Sonoma Boat Launch and Beach Area. Five lanes are planned for this site. Vehicular access is possible by a road not exceeding 10% -12% grades. To provide parking, grading is required to create a bench above the launching area.

5.15 Because of the annual drawdown, the launching ramp is planned to be 1,100 feet long, beginning at the 495 foot elevation which is the spillway crest, and ending at elevation 320. This is just above the minimum pool elevation. Grading is required to create the planned 14% gradient for the concrete launching ramp.

5.16 Parking for cars and boat trailers is provided: 120 vehicle and trailer spaces and an additional 40 car spaces for the beach and day use area.

5.17 The other boat access points are located at Yorty Creek west of Hot Springs Road Portal Area and at the entrance to Cherry Creek Camp Area. Two lanes are planned for each ramp with parking for vehicles and boat trailers.





Hiking & Equestrian Trails (Typ.)

Figure 5-1

5. Design of Facilities

Trail Design
5.18

Trails have been generally laid out on the Master Plan Map. Detailed design and location of trails will be finalized in the field following the guidelines below. Trails will appear to be completely immersed in the landscape. They will be designed to fit with the contour, to display sudden vistas and dramatic overlooks, and to encounter unique scenes of natural beauty. Trail standards will reflect the needs of the users. The scenic trail will be designed to accommodate the type and amount of expected use, and the age and general physical condition of the users. A family hiking trail to a picnic area will need a safe, hard surface. Trails through wilderness or hike-in camping areas will be subtle, building suspense or anticipation by allowing occasional brief or incomplete views or hints of the final goal. The trail will lead the traveller from one point of interest to another but not necessarily to the point itself. The visitor can then detour to "discover" the scene. The trail also need not arrive at its destination by the easiest or most direct route. Upon reaching his goal, the traveler should have a feeling of accomplishment, having experienced nature and enjoyed the interesting points along the way.

Field Development of Trails
5.19

All trails will be developed in a rustic manner. The trails will be hand constructed with necessary steps or ramps made of natural materials found along the way. Trail alignments will be dictated by the areas they traverse so that existing trees and ecologically unique areas will be saved. The surfacing of the trails will either be crushed rock or natural ground except in some formal recreation areas where a hard surface will be used. Equestrian trails need not be wider than hiking trails, will be developed in the same manner as hiking trails and, in many cases, can be used by hikers as well as horsemen. Members of the California State Horseman's Association have expressed a willingness to actively participate in the layout and maintenance of an equestrian trail system.

Camp Area Design
5.20

Camp Areas are located where they are least detrimental to the environmental resources. They are located to prevent any undue interference with the regulation plan for the Lake. Areas subject to frequent or long durations of flooding have been avoided in all formal camping areas. Some areas are provided for pickup campers and recreational vehicles located so as to minimize the visual impact from roads and other public areas. Other camping facilities provided are primitive campsites, walk-in camp areas and areas designated for groups. Each campsite is restricted to a single-family unit. The minimum distance between vehicle oriented camp spaces will be 75 feet center to center, adjusted to fit the terrain and cause the least disturbance to the forest and other vegetative cover. Primitive campsites will be located in clusters of 6 to 8 sites, each site located to fit the terrain and provide privacy from the next site.

Field Development of Camp Areas
5.21

All camp areas will be laid out in the field by a recreation design team. In a formal camp area, the camping spurs will be determined on the ground after the circulation road alignment has been staked. The spurs will be placed where existing grades and vegetation allow. After the campsites have been determined, restrooms will be field located. Water, electricity and sewerlines (constructed at the time roads and campsites are constructed) will be field located to follow existing road alignments and disturb as little natural vegetation as possible. Utilities will be underground. Within a recreation area, road surfacing will be kept to a minimum. The access roads will be paved with asphaltic concrete and the circulation roads and camping spurs will be paved with either asphaltic concrete or bituminous material. After a camp area is constructed, the recreation design team will locate the tent, table and fireplace sites in the natural vegetative openings surrounding the spurs, rather than formal placements immediately adjacent to them. Camp area furniture and materials will be installed in the designated locations. Because of the steep terrain, some of the camping pads will be at elevations different than the spurs. Earthwork may be done to level the camping pads but not to match the elevations of the pads and spurs. The vegetative screens which divide the campsites will be allowed to remain.

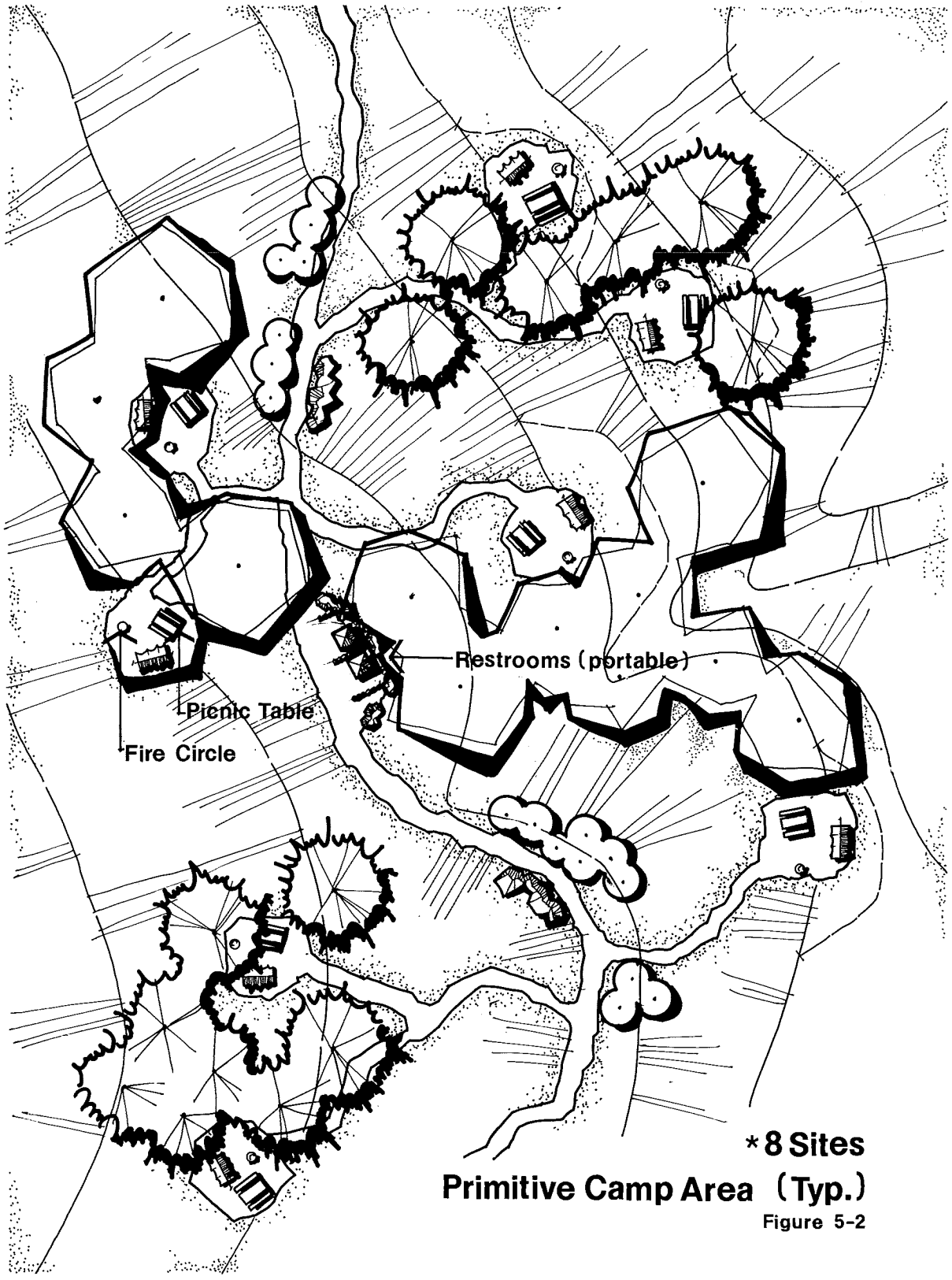

Restrooms (portable)
Picnic Table
Fire Circle
*8 Sites
Primitive Camp Area (Typ.)

Figure 5-2

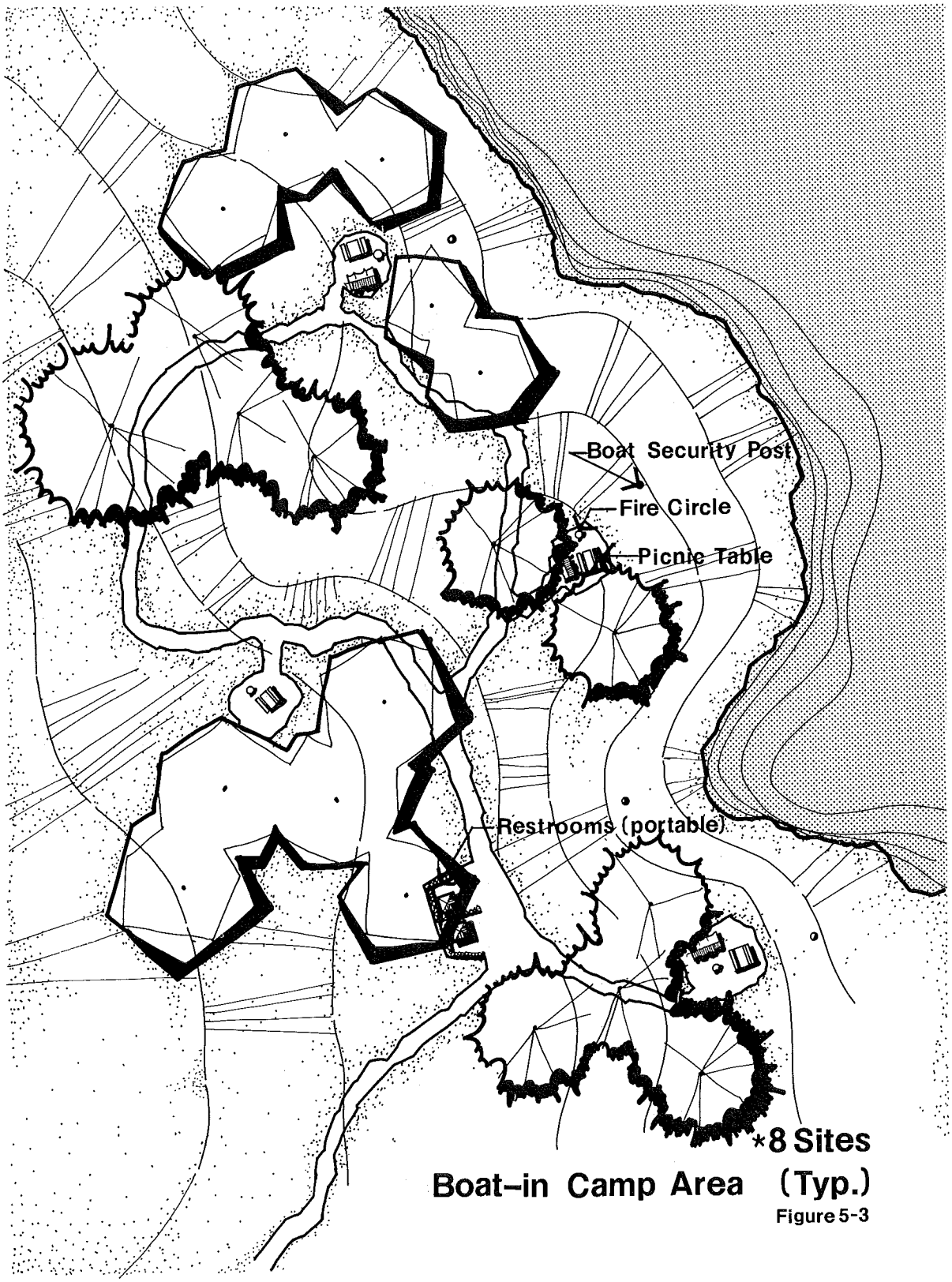
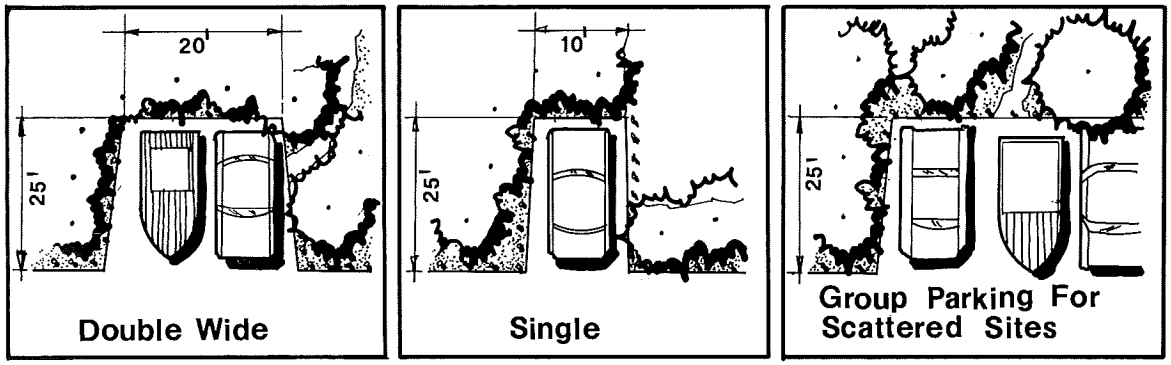
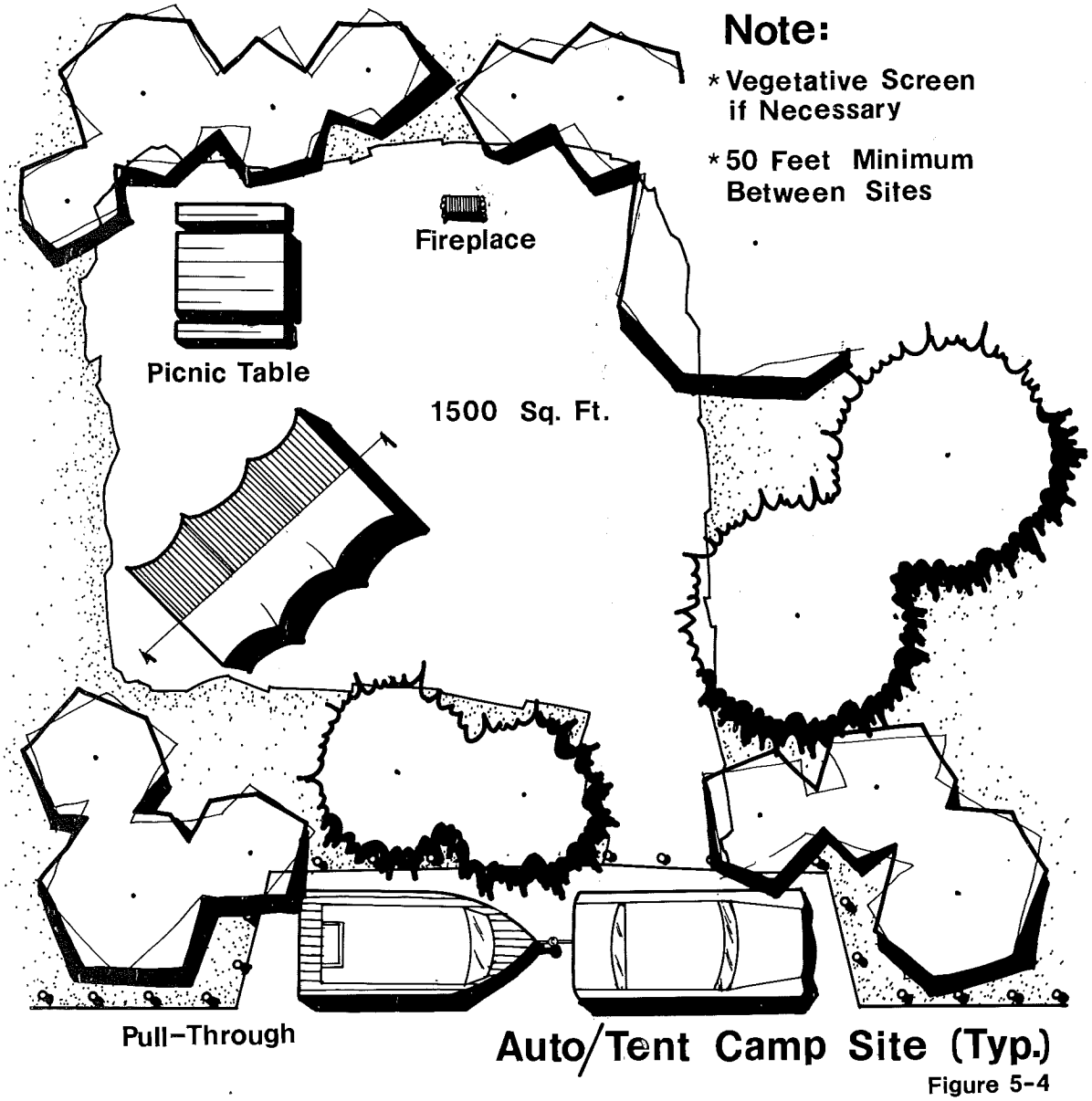

Boat Security Post
Fire Circle
Picnic Table
Restrooms (portable)
*8 Sites
Boat-in Camp Area (Typ.)

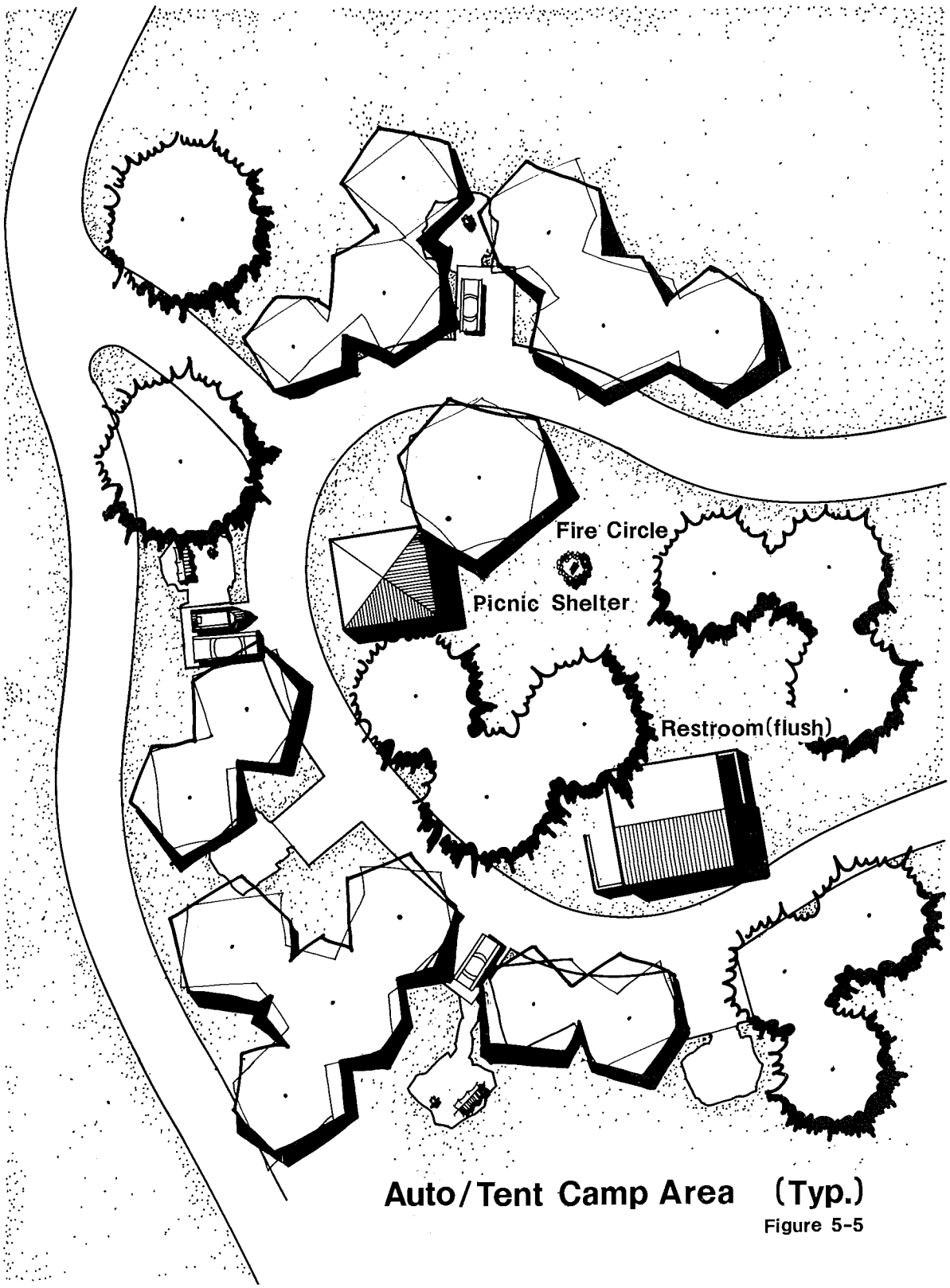
Figure 5-3





Auto/Tent Camp Site (Typ.)

Figure 5-4



Auto/Tent Camp Area (Typ.)

Figure 5-5

5. Design of Facilities

Primitive Camp Areas
5.22

The location of primitive camping and picnic areas, which are accessible only from the water and by trails, will be finalized and developed after the reservoir is filled. All personnel and materials used to develop and maintain many of these areas will be transported by barge in an effort to preserve the natural surroundings.

Picnic Areas
5.23

Picnic facilities are related to day use areas or located in more primitive areas. Typically, a picnic area consists of 3 or 4 tables, each with a fire place consisting of a manufactured metal unit or a concrete box with grill. The tables and benches are of wood with the table and bench tops of 3 inch thick boards. All parts are bolted together with both ends counter sunk to avoid user injury.

Beach Areas
5.24

Swimming and sunbathing are provided for at areas with the following characteristics. They are accessible by boat and by foot; they have slopes less than 10% adjacent to and under the edge of the Lake; most have the possibility of auto parking adjacent to the beach or within a short hike from the beach. Picnic facilities and restrooms are provided adjacent to beach areas.

Design for the Handicapped and Elderly
5.25

All intensive use facilities are designed to meet applicable Federal, State and local building codes as well as guidelines for design for the physically handicapped. Because of the steep terrain at Lake Sonoma, some hike-in facilities will be difficult to reach for the physically handicapped. However, when a major facility is difficult to gain access to, such as the marina, a shuttle van or other conveyance will be used. Trails from parking to facilities such as day use areas and beaches will be paved in asphaltic concrete. Hard surfaced interpretive trails will be appropriate for use by the blind and handicapped. Special programs are provided along some of these trails allowing the blind to gain interpretive experiences.

Planting
5.26

Landscape planting will be done with native plant materials grown in the native plant propagation area. Areas that have been disturbed by grazing and logging are often the project areas of the least slope. These areas are easiest to develop for recreation but they will need trees for shade. Trees should not block existing views to the Lake but should frame them. The vegetation management study, now in progress, will list appropriate species for planting at various site areas. A Feature Design Memorandum will detail placement of the plants.

5.27

Preparation—Site preparation will provide a more favorable environment for the establishment of trees, shrubs and grasses and will improve their chances for survival. In all cases, a well prepared planting bed will be provided. It will be necessary to reduce compacted soil conditions which adversely affect the infiltration of water, the water holding capacity, and the availability of soil moisture to the plants. For severe sites, supplementary irrigation will be necessary. Where extensive planting is to be done, a soil analysis will be made by an agricultural soil testing laboratory in order to accurately determine the soil amendments needed for proper plant growth. Where the existing soil is in a condition which is unacceptable for planting, topsoil will be used to supplement existing soils.

5.28

Fill Slopes—Steep fill slopes on roads and disposal areas require special care to assure their stability. The slopes will be trenched or furrowed on contour, seeded to grass, immediately mulched with straw, and then covered with a netting of heavy jute, held in place by wood stakes.

5.29

Planting Material—When plant materials other than natives are used, they will be harmonious with the native plants in appearance and in cultural requirements. All plants added to the project will appear to be indigenous to the area. Planting will be done at all areas where construction has destroyed the existing vegetation. These areas will be planted with nursery grown plants and then seeded. All areas will be erosion control seeded immediately after the earthwork is completed. In areas to be used immediately, trees should be planted at a 15 gallon minimum size.

5. Design of Facilities

5.30 **Supply of Plant Materials**—All initial landscaping will be accomplished by contracts. These contracts will be let one or two years in advance of the proposed work to assure an adequate supply of native plant materials. If direct seeding is used, a year may sometimes be needed to collect and prepare the seeds. In order to assure a supply of plant materials for replacement, there will be a native plant propagation area established at the project site, below the dam. Seedlings will be purchased from commercial nurseries specializing in native plants and then raised to a one gallon or larger size. Additional personnel with expertise in forestry and horticulture will be employed to operate the native plant area effectively and efficiently. The native plant area will supply replacement plants for both Lake Sonoma and Lake Mendocino. The present area at Lake Mendocino will then be used only as a temporary plant material storage yard.

5.31 **Submerged Plants**—There will be some planting between the flood pool and the water conservation pool where occasional inundation will occur. Ongoing experimentation conducted by the University of California at Davis has indicated that at least fifteen plant species can tolerate inundation for prolonged periods of time. The final selection of the species will be made just prior to planting since continuing research will increase the number of shrubs and trees that can be permanently planted in this area.

5.32 **Reforestation**—Reforestation will be accomplished throughout the project area. Beautification, recreation and development, soil conservation treatment and the development of the wildlife management area all contain elements of reforestation. Even though these items may be done for different specific purposes and by different planting procedures, all activities will be coordinated in order to produce a truly integrated environment.

Design of Utilities

5.33 The many proposed use areas around the Lake, require varying types of utility services directly related to the proposed recreational use. The more intensely used areas will have a greater demand on water supply and waste disposal. Following is a review of potential solutions for each utility. This is followed by the solutions used for each area of development. (Table 5-2)

Water Supply

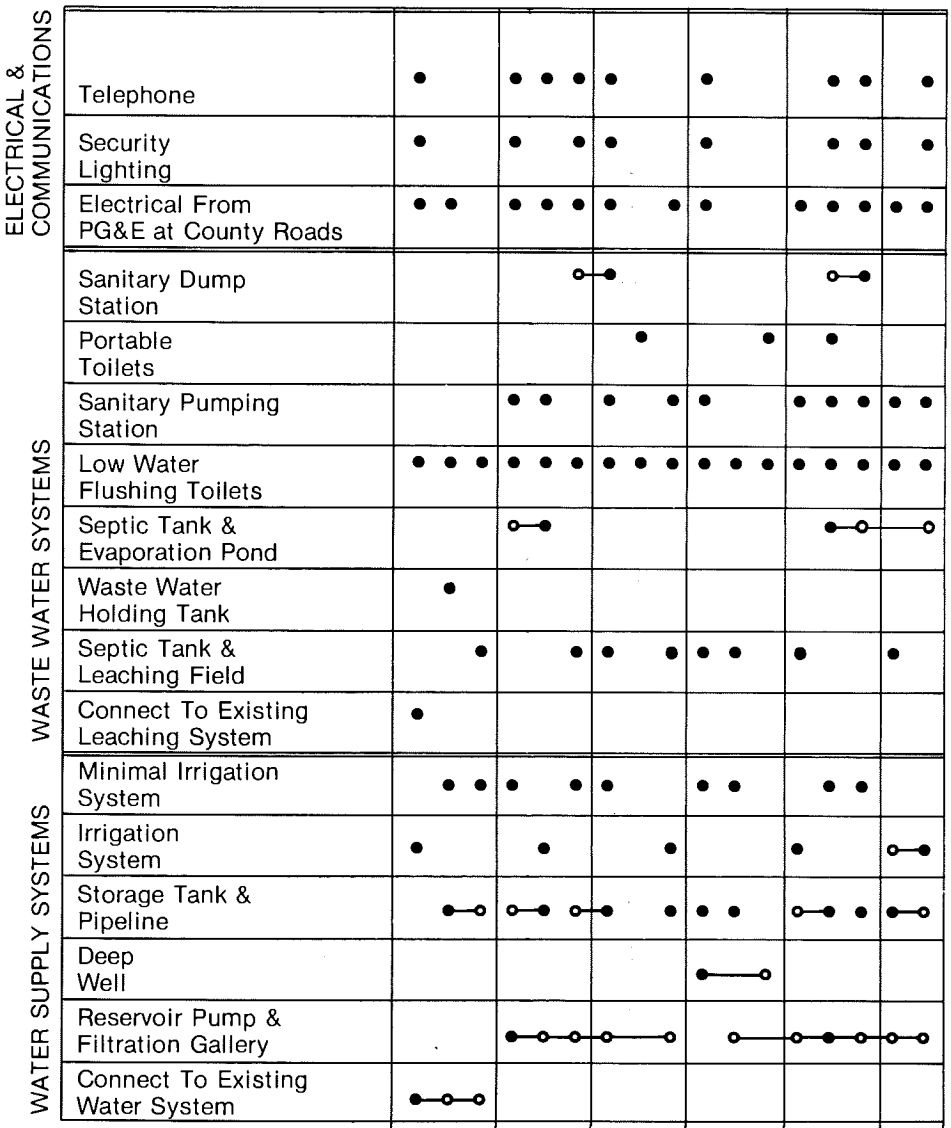
5.34 Based on the data available, as each site has been planned for development, the best source of water supply has been determined. This varies with the required volume for the projected number of users planned for each use area. Several possible sources of supply which have been considered are:

5.35 **Natural Springs**—There are a few existing springs which could possibly be developed to supply individual use areas. Several of these exist in the upper Dry Creek arm of the reservoir near Cherry Creek. There are also some springs along the Warm Springs Creek section of the reservoir. Each spring, when considering its potential for use, will be measured to determine the existing flow and the potential for increasing the yield. In areas where irrigation is a requirement, it is unlikely that spring yields will be large enough for the primary water supply.

5.36 **Wells**—There is the potential for supplying some areas with well water. In a number of cases, the well will be drilled in the reservoir area to draw water that percolates to the groundwater under the reservoir. This type of well will utilize a submersible pump set in the well.

5. Design of Facilities

TABLE 5-2
UTILITY SYSTEMS FOR
RECREATION USE AREAS



• Primary System
o Connection to Nearby System

5. Design of Facilities

5.30 **Supply of Plant Materials**—All initial landscaping will be accomplished by contracts. These contracts will be let one or two years in advance of the proposed work to assure an adequate supply of native plant materials. If direct seeding is used, a year may sometimes be needed to collect and prepare the seeds. In order to assure a supply of plant materials for replacement, there will be a native plant propagation area established at the project site, below the dam. Seedlings will be purchased from commercial nurseries specializing in native plants and then raised to a one gallon or larger size. Additional personnel with expertise in forestry and horticulture will be employed to operate the native plant area effectively and efficiently. The native plant area will supply replacement plants for both Lake Sonoma and Lake Mendocino. The present area at Lake Mendocino will then be used only as a temporary plant material storage yard.

5.31 **Submerged Plants**—There will be some planting between the flood pool and the water conservation pool where occasional inundation will occur. Ongoing experimentation conducted by the University of California at Davis has indicated that at least fifteen plant species can tolerate inundation for prolonged periods of time. The final selection of the species will be made just prior to planting since continuing research will increase the number of shrubs and trees that can be permanently planted in this area.

5.32 **Reforestation**—Reforestation will be accomplished throughout the project area. Beautification, recreation and development, soil conservation treatment and the development of the wildlife management area all contain elements of reforestation. Even though these items may be done for different specific purposes and by different planting procedures, all activities will be coordinated in order to produce a truly integrated environment.

Design of Utilities

5.33 The many proposed use areas around the Lake, require varying types of utility services directly related to the proposed recreational use. The more intensely used areas will have a greater demand on water supply and waste disposal. Following is a review of potential solutions for each utility. This is followed by the solutions used for each area of development. (Table 5-2)

Water Supply
5.34 Based on the data available, as each site has been planned for development, the best source of water supply has been determined. This varies with the required volume for the projected number of users planned for each use area. Several possible sources of supply which have been considered are:

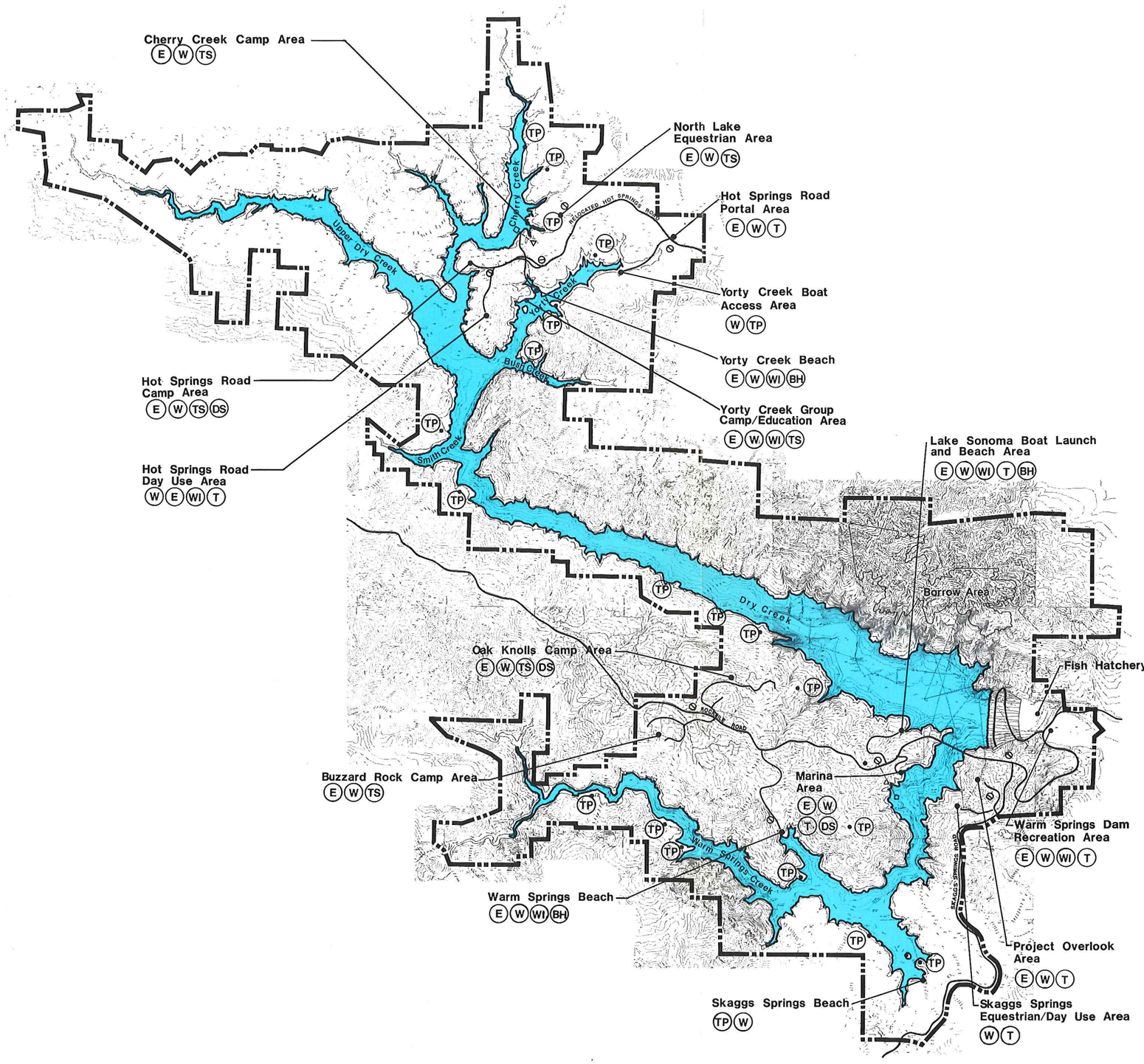
5.35 **Natural Springs**—There are a few existing springs which could possibly be developed to supply individual use areas. Several of these exist in the upper Dry Creek arm of the reservoir near Cherry Creek. There are also some springs along the Warm Springs Creek section of the reservoir. Each spring, when considering its potential for use, will be measured to determine the existing flow and the potential for increasing the yield. In areas where irrigation is a requirement, it is unlikely that spring yields will be large enough for the primary water supply.

5.36 **Wells**—There is the potential for supplying some areas with well water. In a number of cases, the well will be drilled in the reservoir area to draw water that percolates to the groundwater under the reservoir. This type of well will utilize a submersible pump set in the well.

TABLE 5-2
UTILITY SYSTEMS FOR
RECREATION USE AREAS

RECREATION AREAS	WATER SUPPLY SYSTEMS: Connect To Existing Water System	Reservoir Pump & Filtration Gallery	Deep Well	Storage Tank & Pipeline	Irrigation System	Minimal Irrigation System	WASTE WATER SYSTEMS: Connect To Existing Leaching System	Septic Tank & Leaching Field	Waste Water Holding Tank	Septic Tank & Evaporation Pond	Low Water Flushing Toilets	Sanitary Pumping Station	Portable Toilets	Sanitary Dump Station	ELECTRICAL & COMMUNICATIONS: Electrical From PG&E at County Roads	Security Lighting	Telephone
Warm Springs Dam Recreation Area	•				•		•				•				•		•
Project Overlook	o			•		•			•		•				•		
Skaggs Springs Equestrian/Day Use Area	o			o		•		•			•				•		
Marina		•		o		•				o	•	•			•	•	•
Lake Sonoma Boat Launch & Beach Area		o		o	•						•				•		
Buzzard Rock Camp Area		o		o		•		•			•	•		o	•	•	•
Oak Knolls Camp Area		o		•		•		•			•	•		•	•		•
Skaggs Springs Beach		o			•			•			•		•				
Warm Springs Beach		o		•				•			•	•			•		
Hot Springs Road Portal Area			•	•		•		•			•	•			•	•	•
North Lake Equestrian Area		o	o	•		•		•			•						
Yorty Creek Boat Access Area													•				
Yorty Creek Beach Area		o		o	•			•			•	•			•	•	•
Cherry Creek Camp Area		o		•		•				o	•	•	•	o	•	•	•
Hot Springs Road Camp Area		o		•		•				o	•	•		o	•	•	•
Hot Springs Road Day Use Area		o		o	o			•			•	•			•	•	•
Yorty Creek Group Camp/Education Area		o		o	•					o	•	•		o	•	•	•

• Primary System
o Connection to Nearby System



Legend

- E — Electrical Power
- W — Water (Potable)
- WI — Water (Irrigation)
- T — Toilet (Flush)
- TS — Toilet (Flush)/Shower
- BH — Bath House
- TP — Toilet (Portable)
- DS — Sanitary Dump Station
- Electric Water Pump at Lake, Filtration Gallery
- Water Storage Tank

UTILITY PLAN

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

5. Design of Facilities

5.37 Extensive testing will be undertaken to determine the feasibility of conventional wells. If it is determined that wells will yield the estimated volume necessary for specific use areas, these systems will be used providing their installation and operational costs are less than other acceptable systems. In areas where turf irrigation is a requirement, it is unlikely that well yields will be large enough for the primary water supply.

5.38 **Reservoir Supply**—This source of water is developed by use of a pump with the intake set low enough to draw water when the lake level is at its lowest level in that area. A filtration gallery is located at each pump site above the 500 foot level. At this point, treatment is provided to meet the EPA Safe Drinking Water Standards and the Sonoma County Public Health requirements for potable water. Service roads and electrical power are provided to each pump and filtration site. At each pump station which removes water from the reservoir via a filtration gallery, a small package water treatment plant will be provided as required. The treatment will include sedimentation, floculation and chlorination or any other treatment processes necessary to meet the potable water requirements and state and local standards.

5.39 Water storage tanks are provided at appropriate elevations near recreation use areas. These tanks will even out peak use periods, provide limited emergency storage and allow a more continuous pumping system. Booster pumps between tanks are required where there is a rise in elevation.Stand pipes will be located near tanks to permit fire equipment to load their tanks.

5.40 Irrigation water is required at a number of the recreation use areas. Given the volume of water required, the slopes to the lake edge and the cost of maintenance and delivery, for most areas the use of the potable water source will be the most efficient system. Underground irrigation systems will be used where large volumes of water are required for turf areas located near the lake edge. Where non-potable systems are used, hose bibbs, lines, etc., will be clearly labeled.

5.41 **Water Conservation**—In all cases where water is utilized in the waste disposal system, water conservation type fixtures are utilized. This has the dual benefit of reducing the volume of water used and the size of the required disposal system.

Toilet Systems

5.42 Low-volume water flush type toilets operate with a mixture of compressed air and water. They use approximately 30 percent of the water volume of conventional water flush systems. Low-volume systems will be utilized throughout the project. Energy sources are required for operation.

5.43 **Chemical Toilets**—These are utilized where water is in very limited supply and where leach fields are difficult to install. They are particularly in primitive and boat-in camp areas and beaches.

Waste Water Systems

5.44 The methods of providing for wastewater varies with a number of factors. Each of these has been considered in selecting the method of treatment and disposal of the wastewater. These factors include:

Soil capability;
Ground Slope;
Size of the park use area and the anticipated daily volume;
Method of treatment.

5.45 In all cases, the waste disposal system will conform with the requirements of the Regional Water Quality Control Board's Basin Plan for the Russian River and its tributaries, and the Sonoma County Health Department.

5.46 The many types of wastewater treatment systems vary in the degree of treatment and method of disposal. Systems considered follow:

5. Design of Facilities

5.47 **Treatment Plant and Disposal System**—This type of system utilizes a package wastewater treatment plant which provides treatment that is compatible with the method of disposal. If disposal of treated wastewater is by irrigation, the level of treatment must conform with the requirements of the California Department of Health. However, if disposal is by evaporation, a pond of suitable surface area and capacity will be required.

5.48 **Septic Tank Leach Field**—This type of system will be utilized in areas with slopes of less than 25% if the leaching capability of the soils is adequate. Because of the limited area with slopes of less than 25% it may be difficult to find adequate leach areas for this type of system. Development has been planned to make optimum use of areas with less than 25% slope. It is preferable not to combine a camping recreational use with a leaching area and to have a sufficient separation between the lake shore and a leaching system. Where a septic tank and leaching system is used, the septic tank is located so that it is easily accessible for periodic pumping.

5.49 **Septic Tank and Evaporation Ponds or Beds**—This system is similar to the previous system. However, disposal is by evaporation from either an open pond or bed of soild, sand or gravel. The evaporation area is fenced so that there is no public access to the evaporation area. The size of the area is directly related to the volume of wastewater and the climate of the area.

5.50 **Disposal of Holding Tank Waste**—Separate tanks will be provided at all waste dumping stations so that wastewater from RV's, mobile homes and boats will not be disposed on in the several small project disposal systems. These holding tanks will be provided because the chemicals used to retard biological activity and prevent odors in the holding tank adversely affect the waste treatment in small systems such as planned for this project. Periodically, the holding tanks will be pumped and hauled to a disposal plant.

5.51 **Design Criteria**—Waste disposal methods for each of the development areas have been selected based on a preliminary assessment of the site constraints including ground slope, soil conditions and estimated peak day use. Each of these items require further evaluation when the feature design memorandum is prepared for each individual area and comlete waster discharge report will be required for submission to the Regional Water Quality Control Board. Design of each system will be in conformance with the guidelines of the California Regional Water Quality Control Board.

Solid Waste Collection And Disposal
5.52 Each recreational use area will have trash receptacles for the public's use. Solid waste will be collected either by the operating staff or by a contractor and delivered to the County operated Waste Disposal Site. It is the practice of the Corps of Engineers to work with local groups in setting up recycling programs and encouraging the recycling of waste materials.

5.53 **Hazardous Waste Materials**—As part of the operational plans for the reservoir, the Corps of Engineers will prepare a plan of action to control hazardous material which meets the requirements of the California Regional Water Quality Control Board and the Corps' planning directives. Order No. 75-151 of the North Coast Regional Water Quality Control Board specifies the requirements for Contingency Planning and Notification Requirements for Accidental Spills and Discharges. This plan of action would contain two steps during the containment process: 1. Contain and control the hazardous waste from spreading; and 2. Provide for removal of the waste material. If there are spills of petroleum products, toxic chemicals or sewage waste into the water, the first step would be to contain the waste with an oil skimmer flotation device. Removal of wastes would be contracted with a commercial pumping company. Disposal would be at a dump site approved to receive hazardous waste.

Electric and Telephone
5.54 Existing electrical and telephone facilities in the area are limited. There is a relocated overhead electrical line along the Stewarts Point-Skaggs Springs Road

and relocated Hot Springs Road. A new overhead electrical line is required along the Rockpile Road to the Oak Knolls and Buzzard Rock Camp Areas. This line will serve the Lake Sonoma Boat Launch and Beach Area, Warm Springs Beach and the Marina Area. At each recreational use area, service off the PG&E line is by an underground distribution system.

5.55 Camp areas that provide shower facilities which require hot water, utilize electricity for heating. An alternative to this system is a solar water heating system with either propane gas or electricity as a backup source of energy.

5.56 Telephone service follows Rockpile Road and the relocated Hot Springs Road. Public telephones are provided at the entrances to the camp areas, the marina, boat launch areas and information/administrative areas.

Architectural Design Guidelines

Development Theme
5.57 Incorporation of design guidelines into the Master Plan sets a development theme throughout the life of the project. The development theme harmonizes with the forms, color tones, and textures of nature and the indigenous architecture of the rural setting. New structures blend with the setting to minimize physical and visual impacts. Structures are sensitive to the visual aesthetic of the region while accommodating functions being planned, such as recreation and interpretation.

5.58 A design theme has been established based upon a repetitive modular unit, in this case, a shed form which can be used singularly, grouped with other shed forms or combined with other sympathetic geometric forms to express the development theme. Repetitive modular units serve to control construction cost by simplifying architectural detailing among structures of various functions. A design theme expressed in modular units also insures project design integration, even though designs originate from differing sources.

5.59 Typical design recommendations for facilities have been developed based upon the modular shed form and incorporating the architectural style and materials philosophy discussed below.

Architectural Style
5.60 The building style or architectural character contributes to the visitor's initial impression. Compatibility with the environment is the primary goal of the building design. A contemporary interpretation of the vernacular architecture of the region: barns, houses, sheds and farm structures exemplifies a style which is compatible with the setting. Compatibility does not require that structures duplicate existing structures, but that historical sensitivity is maintained. Compatible structures can exhibit contrasting forms, colors and materials when appropriate. A major structure such as the Information/Administration Center expands upon the architectural vernacular of the region by incorporating appropriate ethnological forms or images.

Materials and Colors
5.61 A limited range of materials is appropriate for use in this area. Wood frame buildings with wood board-on-board siding or spaced boards and wood shingle or standing seam metal roofs suggest building materials which are native to the site or which have been, historically, used by residents of the area. Metal panels used for roofing echo the style of barns and out-buildings located throughout the countryside. Framing members of rough wood beams or trusses, connected with large bolts or simply butted together recall the simple, strong, exposed framing of not only barn structures but also Pomo Indian meeting houses. Use of boards at least 2 inches by 6 inches in size, or larger, will discourage removal by vandals for firewood. Weathering steel used for roofs will minimize maintenance and quickly blend the structure into the environment by its naturally weathered appearance. Material selection is related to site and architectural design concept and affects cost and exhibit design.

5.62 Use of color further defines the site structures. Natural colors are most appropriate in this rural setting, and natural weathering of materials gives a patina which "settles" a structure into its environment. Color accent in signs and banners gives a festive quality to recreational areas if carefully handled. Highlights and emphasis can be added to natural materials on structures by judicious use of color accents.

Energy
5.63 Conservation of energy resources has been considered in facility design. Microclimate consideration of natural energy flows at building sites (e.g. sunlight and night sky cooling) reduce heating, cooling and ventilating loads. Plant materials contribute to building climate control. Natural day lighting will be used where possible in satisfying lighting needs. Detailed structure design will consider solar energy or other renewable energy sources to meet energy demands for space heating, cooling and water heating. Building mass for passive heating and cooling and fuel conservation by reducing the need for non-renewable energy, will also be considered.

Climate
5.64 Climate factors influence building design in addition to energy considerations. Since most facilities will be used year round they must function well in cold weather as well as during peak visitor season in the summer. For example, large overhangs where appropriate provide shade and protect openings from rain. Shaded outdoor areas and breezeways provide relief from the summer heat. Sloping roofs allow rain run off.

Building Codes and The Handicapped
5.65 Facilities are designed to meet applicable local, state and national building codes as well as Corps and State guidelines for design for the physically handicapped. All major facilities are accessible to the handicapped for camping, recreation and interpretive experiences.

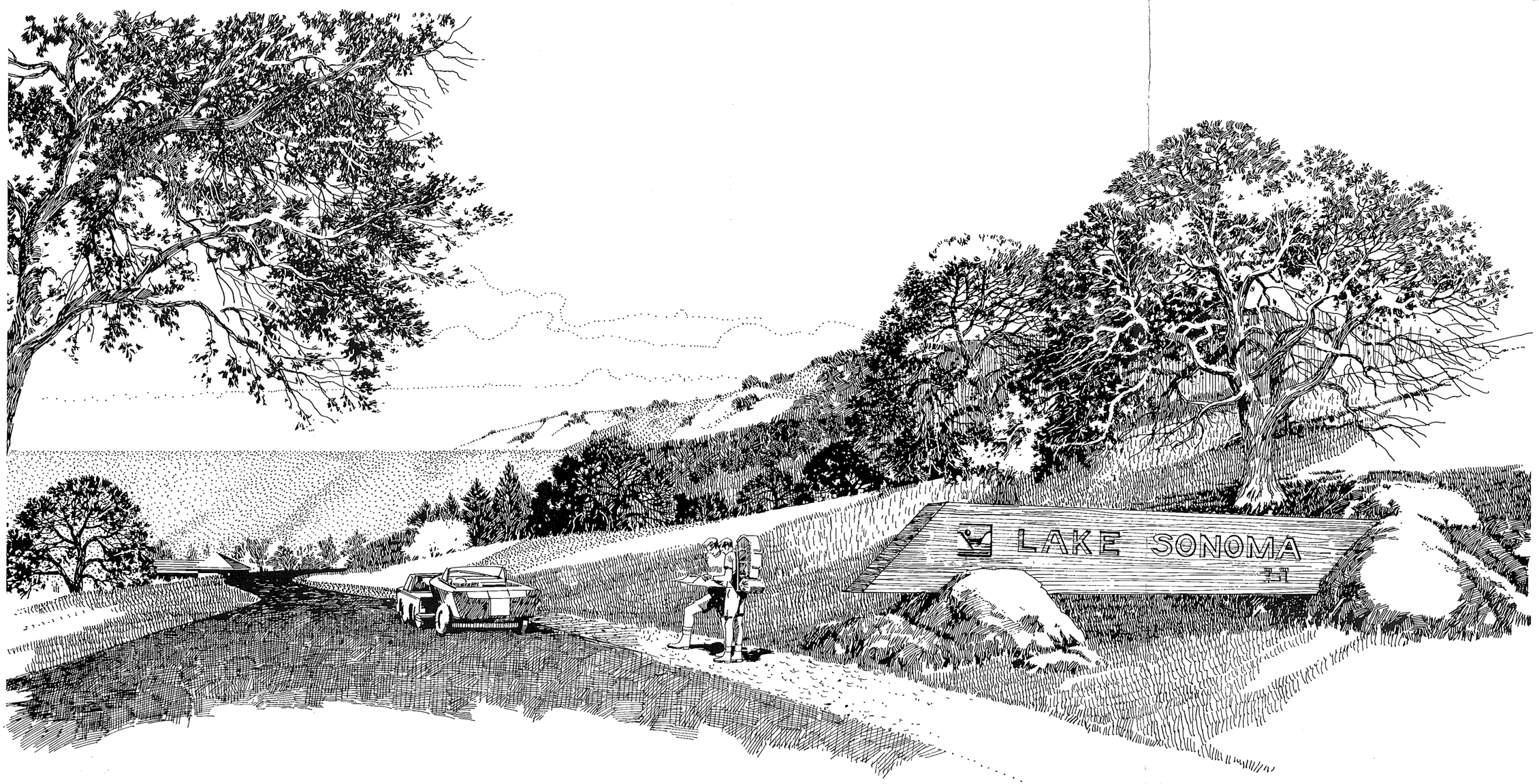
Concessions
5.66 Architectural control over concessionaire structures will be implemented by following the master plan guidelines and architectural theme. By setting a strong standard to be upheld and identifying modular units to be incorporated in various combinations throughout the recreation area, all facilities will have a common expression, regardless of source of design. A design review process should be established whereby any concessionaire's plans must be evaluated and brought into conformance with the master plan architectural theme and siting guidelines.

Project Structures

Fish Hatchery and Visitor Center
5.67 Immediately below Warm Springs Dam lies the fish hatchery and its related ponds and water support systems. Across the pollution control pond, connected with a foot bridge, is the Visitor Center. The style of both buildings is the same with sloping shingled roofs reflecting the slopes of the embankment and adjacent hills. The walls are concrete with heavy timbered framing. Other buildings harmonize with these structures as much as possible.

Corps Project Administration Buildings
5.68 The Corps project administration buildings will be renovated after the completion of the dam construction. Architectural theme guidelines will be applied insofar as possible to blend with the natural setting. The addition of rustic siding screens or trellises will soften the effect of older "functional" structures.

Project Entrance Sign
5.69 Project entrance signs are located on the right hand side of county roads near the project boundaries. These structures are large in scale and constructed of materials that are in the style of the project buildings. As the visitor approaches the sign, lettering clearly designating the project name and agency responsible are evident. On the reverse side, as the visitor leaves the project, the sign notifies the visitor that he is leaving the project lands (Plate 28).



PROJECT ENTRANCE

plate 28

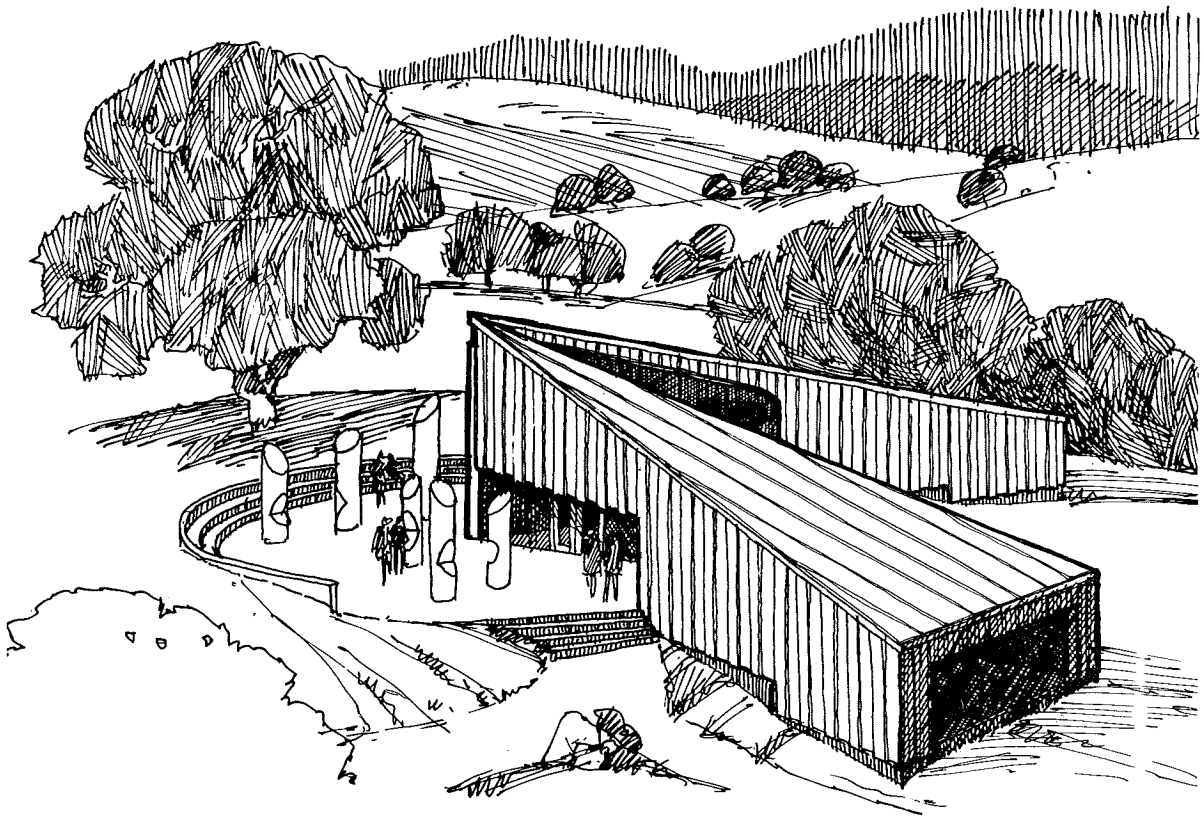
5. Design of Facilities

Information/ Administration Center
5.70

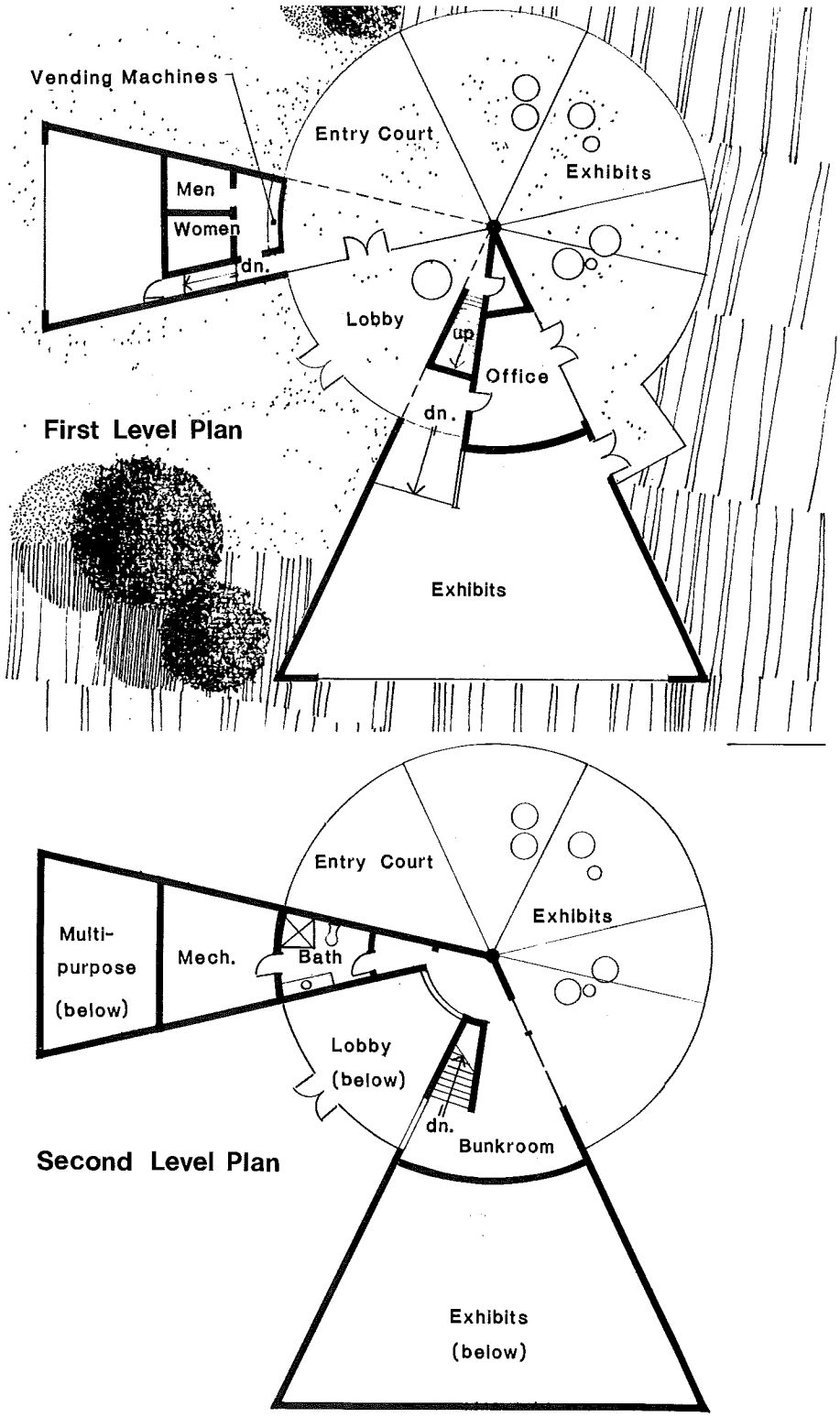
At the Hot Springs Road Portal Area the Information/Administration Center building is located serving the total North Lake area (Figures 5-6 & 5-7). Functions housed in the center include an entrance lobby/recreation area where visitors can obtain information; sales of books, art or artifacts, if the demand occurs; a major exhibit area addressing history, ethnology, archeology, vegetation and wildlife, social development and lake aesthetics; a multi-purpose room which can function as an orientation room, meeting room and theatre; workroom and storage; office and sleeping and bath facilities for the center's staff. Public restroom and mechanical equipment space are also included. This structure is approximately 2,500 to 3,500 square feet in area.

5.71

The structure echoes, in an abstract form the nature of many primitive Indian structures. The courtyard takes on the circular plan reminiscent of ceremonial buildings, such as the traditional Pomo roundhouse. The courtyard circle continues into the interior to become the lobby. At the center of the circle is a large pole complemented by vertical shafts and poles in the courtyard as part of the outdoor interpretive experience. These vertical elements recall the open posts of the Pomo structures. Intersecting the plan circle are two triangular elements housing the functions of the Information/Administration Center. These elements reflect the rural "barn type" character established by the master plan architectural theme, and have rough board-on-board siding and standing seam metal roofs. Large glass areas orient to vistas of the surrounding hillsides.



North Lake Information/Administration Center **Figure 5-6**



Information/Administration Center **Figure 5-7**

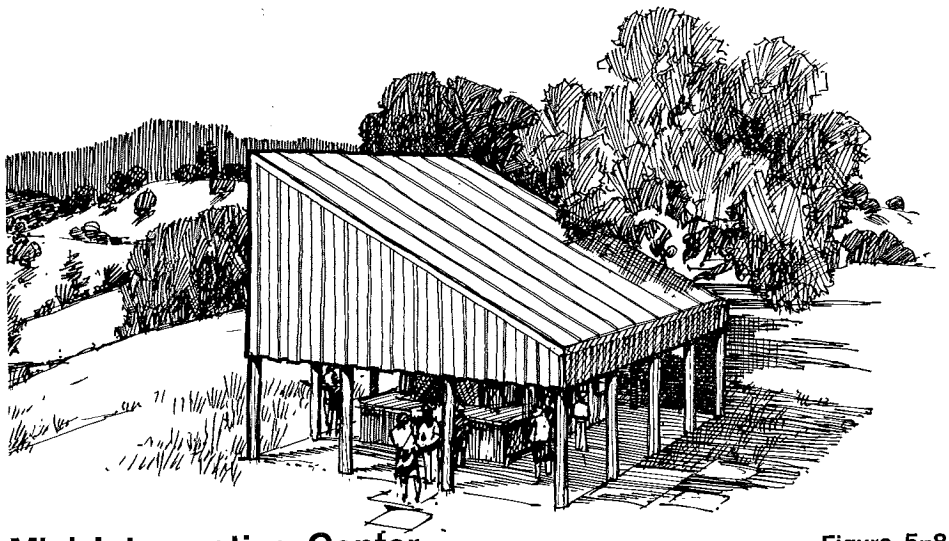
5. Design of Facilities

Mini Interpretive Centers
5.72

Below the dam and in the North Lake area, small interpretive centers focus on specific environmental resource subjects. These mini centers complement the Visitor Center (South Lake) and Information/Administration Center (North Lake) both in scale and in content. Chapter 6, Interpretation, outlines the program in these mini centers.

5.73

The physical appearance of the mini centers (Figure 5-8) reflects the same rural character of the region as expressed in the other site structures. The interpretive structure has a shed roof "floating" on columns. This allows glimpses of the interpretive displays and views into the structure to see people enjoying the displays. Natural ventilation will be accomplished by drawing air through the open structure.



Mini Interpretive Center **Figure 5-8**

Marina Facility Support Structures
5.74

One Marina is designated for the project located on the Warm Springs arm of Lake Sonoma near the north end of Warm Springs Creek Bridge. In addition to the boat slips, several support functions related to marina activities required architectural attention. The marina and support facilities will be concession built and operated. As with other facilities on the Corps lands within the project, these structures reflect the architectural character established by relating to the indigenous building forms historically present in the area. These structures also relfect a harbor motif tempered by the rural quality of the setting.

5.75

Two specific functions are readily identified: one, a bait and marine supply store, including a dock for fuel transfer and a minor maintenance area; another, a small general store where food, beverages and first aid items can be purchased.

5.76

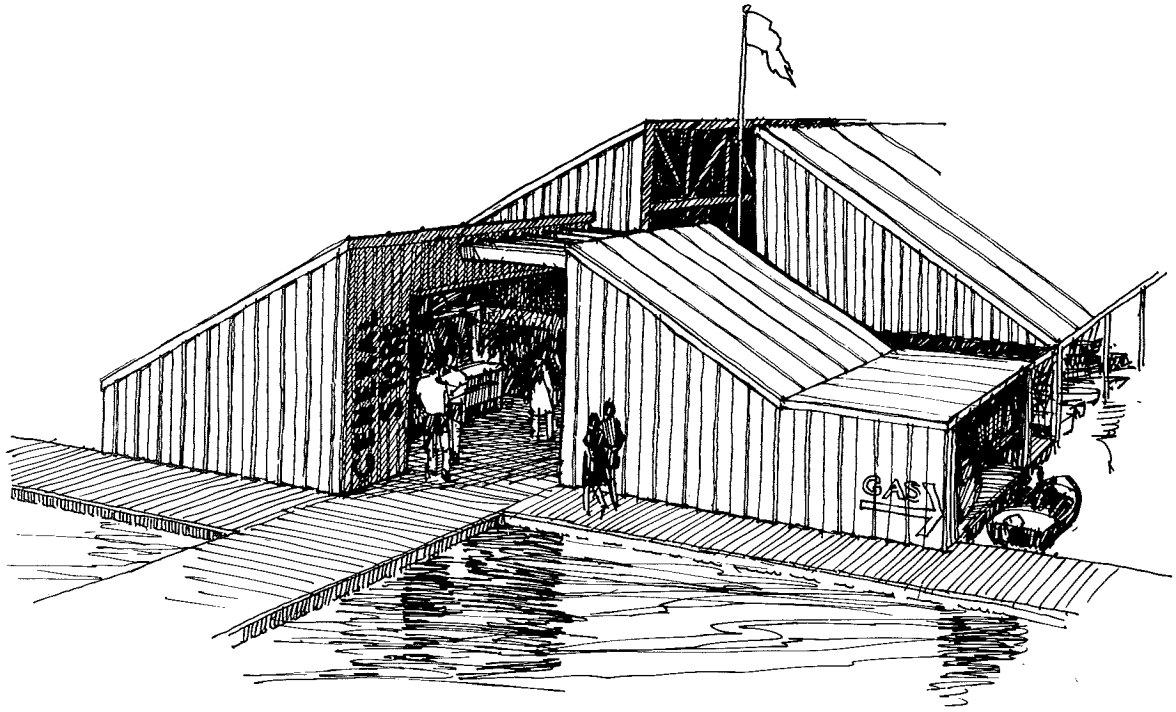
The Mini General Store (Figure 5-9) is a building of 600 to 800 square feet surrounded by a terrace that overlooks the bridge and dam structures. This facility will have snack type food available to meet the needs of day users, campers, hikers and marina users.

5.77

Marina Structures (Figure 5-10) follow the architectural guidelines established for concessionaire facilities. They are light weight and in the style, materials and colors approved by the Corps.

5. Design of Facilities

Mini General Store **Figure 5-9**

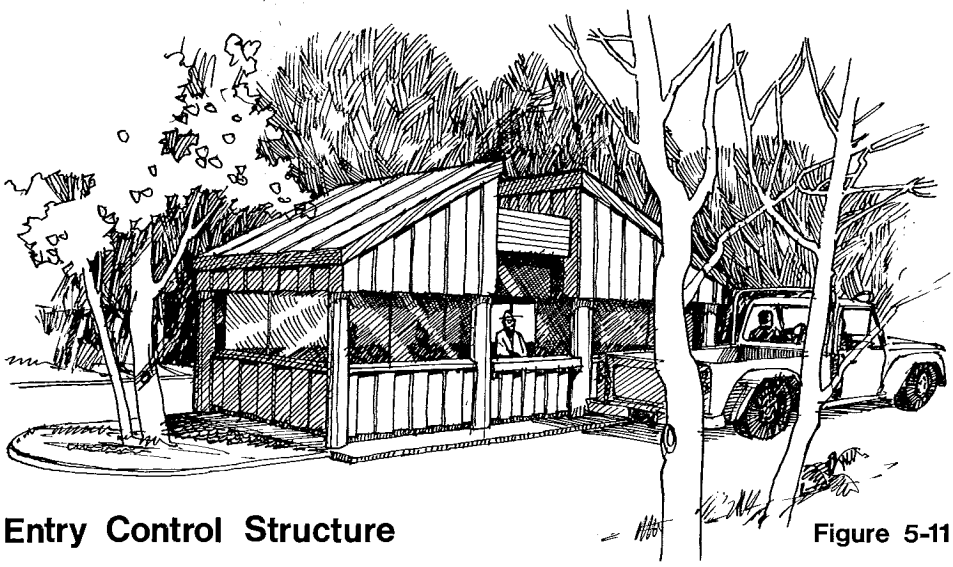


Marina Structures **Figure 5-10**

5. Design of Facilities

Entry Control Structures
5.78

Entry Control Structures are located at the joint entrances to Buzzard Rock and Oak Knolls Camp Areas and just beyond Hot Springs Road Portal Area. These structures are staffed during the recreation season and unstaffed during winter periods. When staffed, visitors will check-in, pay fees and get maps and information from the ranger present. If the station is unstaffed, it is, nevertheless, designed to distribute information, in the form of a map, brochures and/or directional signs. A means of registering or leaving messages is also incorporated.



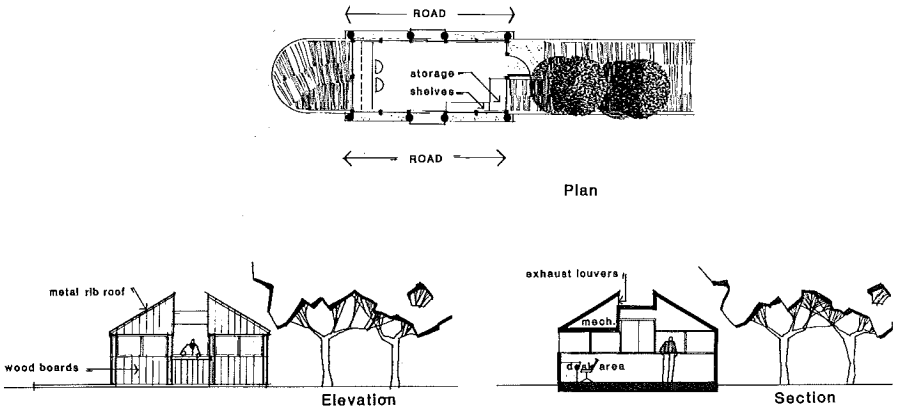
Entry Control Structure **Figure 5-11**

5.79

All such control structures include space for two persons to work and storage space for maps, brochures and emergency first aid supplies. Communication with the main ranger station is provided.

5.80

Architectural style, materials and colors conform to the criteria established. Siding is board-on-board and roofing is standing seam metal. Wall material subject to close contact with automobiles, is metal plate or concrete for safety reasons (Figures 5-11 & 5-12).



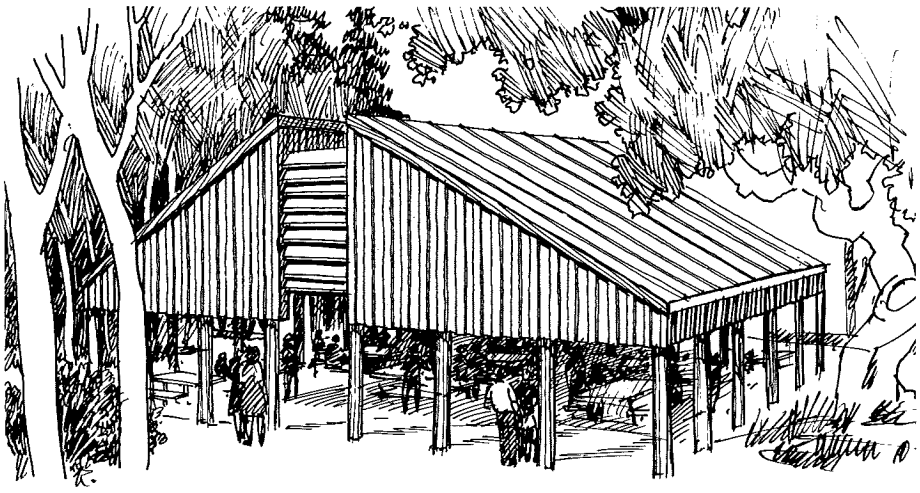
Entry Control Structure **Figure 5-12**

5. Design of Facilities

Sanitary Facilities

5.81 Along with picnic facilities, sanitary facilities receive some of the most intensive use of any structures in the recreation areas. They are durable, vandal-resistant and easily maintained and cleaned. To accommodate varying levels of day, over-night or extended visitor use, a series of sanitary facility prototypes were developed.

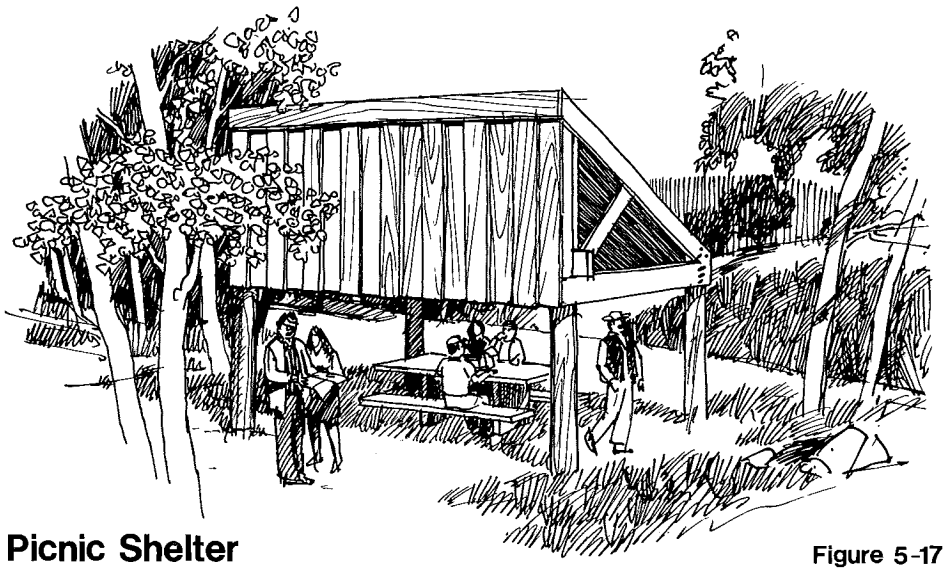
5.82 Restroom buildings with showers accommodate visitors who extend their stay at the Lake overnight. These larger facilities are located at all camp areas (Figures 5-13 & 5-14).



Group Picnic Shelter **Figure 5-16**

5.83 Restroom buildings without showers are more prevalent throughout the recreation areas then those with showers. Such buildings are located at picnic areas, near boating ramps, and adjacent to the marina. Size of these facilities varies depending upon the anticipated number of visitors to a given area.

5.84 Portable restroom facilities are placed in primitive, hike-in camping areas, along trails and at any other locations where construction of permanent facilities is not feasible. In areas where periodic inundation occurs from fluctuation in the water level of the Lake, portable facilities will be used (Figure 5-15).



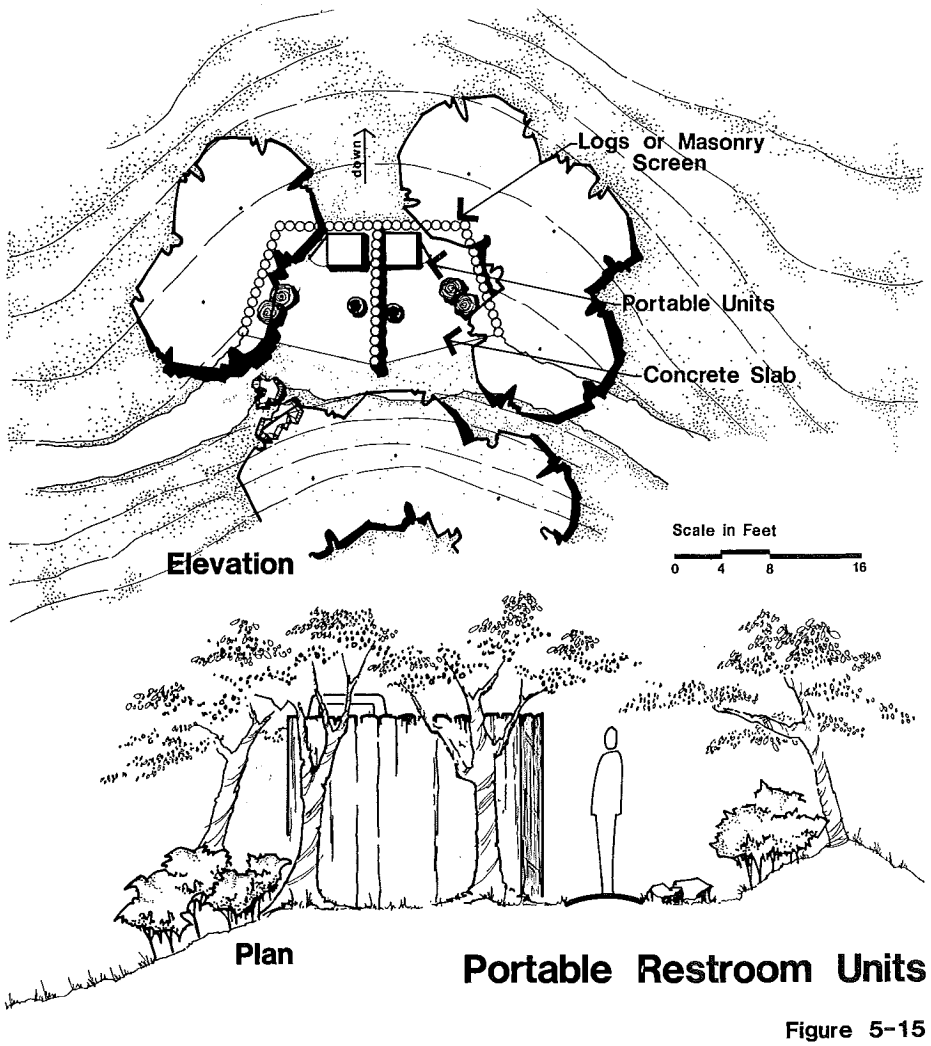
Picnic Shelter **Figure 5-17**

5. Design of Facilities

5.85 All sanitary facilities must withstand heavy use and be resistant to vandalism. Fixtures are vandal-resistant and easily cleaned and maintained. Privacy is accommodated. Durable, low maintenance materials are incorporated in the design, yet a rural, indigenous character, consistent with the architectural theme determined for the entire project predominates.

5.86 The larger restroom and restroom/bath house facilities incorporate interpretive elements (Figure 5-13). Such facilities will be heavily used in camping areas and are an excellent opportunity to present elements of interpretation. For example, a restroom/shower facility has been designed around a courtyard in which interpretive displays are incorporated. Adjacent seating and waiting areas in clude an educational display on wildlife, geology, flora, first aid and other camping-related topics.

5.87 The portable sanitary facilities include privacy screens and enclosures which relate these "basic" toilets to the general architectural theme developed for other structures in the Lake Sonoma area. In areas subject to periodic inundation, the portable toilets must be quickly removed; however the screens and enclosures surrounding them are designed to withstand flooding. It is desirable to take the stigma of "portable toilet" away from these facilities and to blend them with the natural setting, as most will be located in the primitive camping areas and boat-in camp areas.



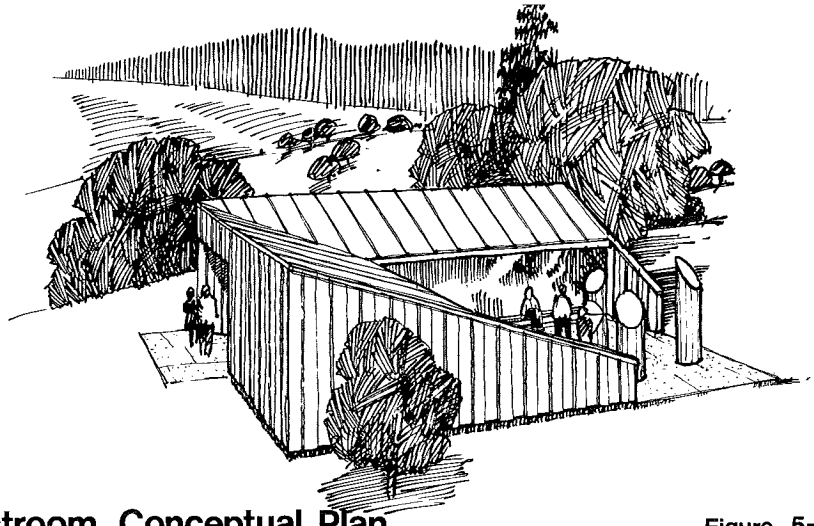
Portable Restroom Units

Figure 5-15

5. Design of Facilities

Group Picnic Shelters
5.88

Group picnic shelters are placed in group camp areas and in areas of high usage where large groups will congregate for day use picnics or family reunions. Such shelters contain 6 to 10 tables and a large fireplace (Figure 5-16).



Restroom-Conceptual Plan **Figure 5-13**

Picnic Shelters
5.89

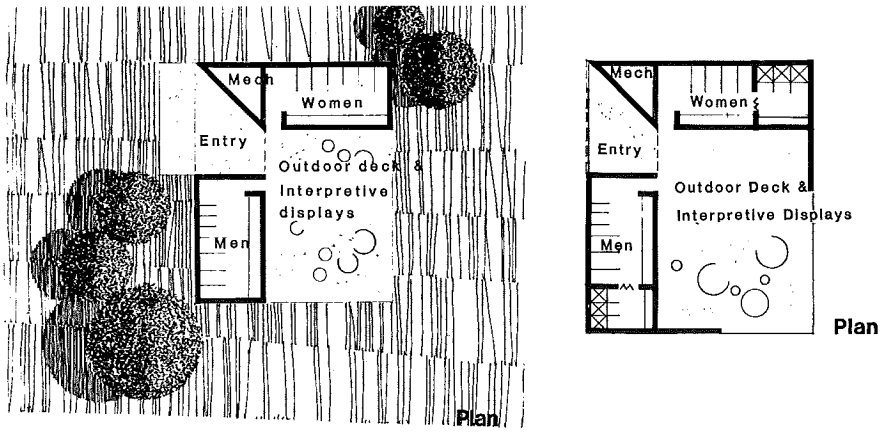
As location and usage of picnic facilities vary around the Lake, several approaches have been taken to developing a family of structures to meet the needs of the users. Environment will vary from sunny to shaded, from windy to calm, from hot to cool, and from Lake-related to remote (Figure 5-17).

5.90

Picnic area shelters are designed to accommodate differing orientations. In some areas, it may be desirable to capture the sun or a breeze; in other areas, to shade the sun's heat or to block prevailing winds. In more dense areas, shelters can provide some measure of privacy or a feeling of community, depending on configuration.

5.91

Each individual picnic shelter accommodates one picnic table, with a refuse container and fireplace nearby. A picnic area, comprised of several shelters, will have a central water supply or several bibbs at convenient locations to serve several tables.



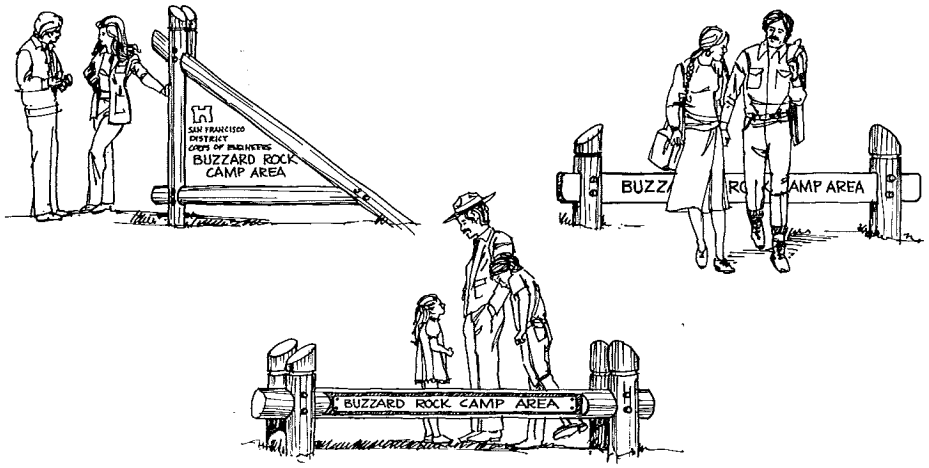
Restroom / Shower Structure **Figure 5-14**

5. Design of Facilities

Signing

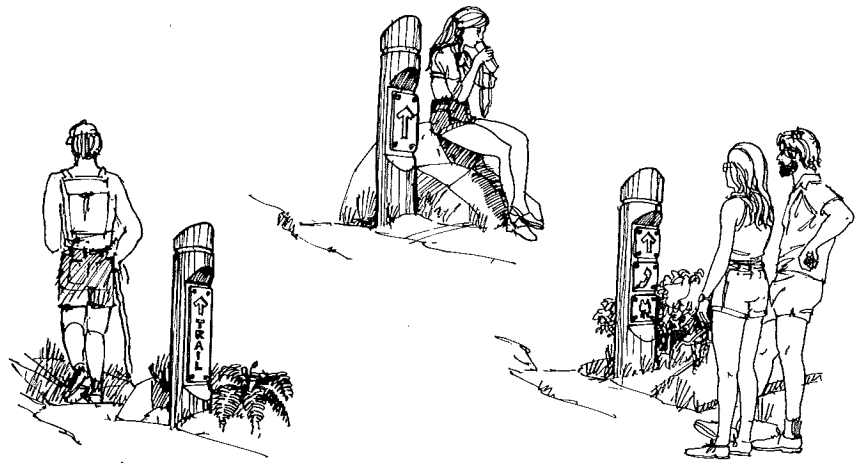
5.92 A major recreational and conservation area such as Lake Sonoma requires an effective signage and information system to best accommodate the visitor while protecting natural areas and fragile habitat. Proper signage forms a unifying link in the project having diverse emphasis of use and dispersed facility locations.

5.93 Informational signage not only gives the visitor facts about the region, Corps activity or history, but also serves to interpret the significance of the factual data. Interpretive signage is a key in the implementation of the Interpretive Master Plan by educating the visitor along a trail adjacent to a shower, at the marina, in a picnic area and other locations throughout the project (Figures 5-18 & 5-19).



Signing and Graphics **Figure 5-18**

5.94 Directional signage is a necessity to move people satisfactorily, to protect fragile habitat areas, for safety of boaters and swimmers on the Lake and to establish a "sense of place" for the visitor. Such signage must be concise and clear, employing strong graphic images which are easily understood by all ages. Directional signs will be located at park entrances and camp area entrances; trail heads and along pedestrian trails, equestrian trails and crossings; boat ramps, swimming areas, fishing areas, bike paths, the marina and in the other special use areas. International sign symbols will be used where applicable.



Signing and Graphics **Figure 5-19**

6. Interpretation

Definition

6.01 Interpretation is the art of explaining, translating or enlightening. Applied specifically to historical, scientific and cultural artifacts or documents, it is the process of adding new dimensions of meaning to otherwise inanimate objects. It is a technique for correlating isolated facts so as to create a meaningful story. Through interpretation, the most modest relic of the past can become an important factor in the pageant of history, and through interpretation, technical, scientific and documentary information can be made exciting and entertaining. Interpretation can also help visitors to better understand management objectives so that their visit will be more harmonious with the environment, other visitors and the project.

6.02 In summary, Interpretation creates a bridge between subject and viewer which transcends simple visual contact.

6.03 An Interpretive Program is a collection of themes or topics for a given facility which are most responsive to the nature or subjects to which the facility is dedicated. Themes within the program are prioritized based on the relative importance of each theme to the total stated objective of the facility.

Introduction

6.04 The Interpretive process applied to the Lake Sonoma Master Plan begins with an assessment of those project resources which best express the natural, cultural and scientific heritage of the area, together with a review of the motivation for and character of the Corps project construction plan.

6.05 It is the objective of this process to yield a system of interpretive events in which a wide range of thematic material is conveyed to the visitor in an interesting, entertaining and thought provoking manner. The configuration of these events should be sympathetic to, and supportive of the planned recreational use of the project and the projected patterns of visitation.

6.06 Of particular significance is the ambition to introduce Interpretation as a subtly integrated component of the master plan, reinforcing the overall objectives of the Corps while expanding the visitor's understanding and appreciation for the inherent values of the region.

Program Areas

The Corps of Engineers

6.07 While the greatest potential for interpretation lies in the character of the project area, it is important to acknowledge at the outset that inspiration for formalizing visitor facilities and site accommodation stems from the construction of the Dam and its consequential impact on the site. It is reasonable, therefore, to assume that the visitor's comprehension of this engineering project, and the organization that planned and implemented it is fundamental to a full understanding of the project.

6.08 The Lake Sonoma Project is constructed in response to the pubilc need for water supply, flood control and recreation. These needs in turn yield many opportunities.

6.09 The history of the Corps of Engineers and its development into a military/civil organization with the expertise to meet the public need for water resource management programs, is an essential component of this story. So too is the legislation and public reaction to the planning of the project.

6. Interpretation

Natural History

6.10 Of further interest is the awareness of and sensitivity to the ecological and cultural impact of the project. This natural history and biology of the site has motivated a wide spectrum of multi-disciplinary studies aimed at describing and preserving the assets of the site.

6.11 The most visible resource of the site is its natural setting, flora and fauna. It is also one which appeals to every sense of the visitor and invites the closest scrutiny.

6.12 Every effort will be made to bring the visitor into direct personal contact with the resource at this level. Short trail experiences offer even the least adventurous an opportunity to establish a rapport with the environment. Camping and wilderness experiences elevate that awareness to a greater level, and seeing the resource through the eyes and experience of a trained guide brings that information into sharpest focus.

6.13 Wherever possible, both plant and animal life should be interpreted in nature. However, where they are essential to an overview of the project conveyed in a remote facility, they may be represented graphically or in artificial environments.

6.14 The land returning to a more natural state and its preservation is a fit subject for interpretation. Evidence of man's abuse in the form of erosion due to overgrazing will be interpreted in areas where this is visible.

6.15 Less apparent yet equally significant to the area's natural history is the geological formation and subsequent evolution of the physical site. In this program element are the underlying influences which have produced the topography, hydrology, climate and thermal activity for which the site is named. This information together with its relationship to wide areas of influence along the California coast provide the visitor with a peripheral view of the resource history and brings into focus the forces which have in the past, and continue to impact upon man's relationship to the land.

Industry

6.16 Although the various techniques employed throughout the history of human occupation devised by man to sustain and support himself are but one aspect of cultural history, they nevertheless merit separate mention as an element of the Interpretive program. The Skaggs Springs resort, mining, timber cutting, sedge basketry associated with the Pomo, wine making, sheep grazing, ranching and agriculture have all left their impact on the site. Wherever the vestiges of this industry remain, lies an opportunity to extend their significance through interpretation.

Cultural Resources

6.17 The Corps has undertaken an extensive cultural resource program. It will delineate and document the significant cultural elements relevant to the site. The resulting information will become a major component of the data base on which interpretation will rely for substantive content. Specific thematic material in this area cannot be accurately defined until the study is completed, however, preliminary data will be available in mid-1979.

6.18 Unquestionably, this program area is fundamental to the visitor's appreciation for the project. Indeed, there is no better method of placing the behavior of modern man in perspective than reflecting on the social patterns of his predecessors.

6.19 Ethnohistory provides a guide to this heritage of human existence. Archaeology supplies clues to occupation, craft, industry and the life styles of these previous site dwellers.

6.20 Where possible, the visitor's attention should be called directly to areas of social and cultural significance. Where such sites may be lost to impoundment, references may be made by aquatic marker, or as part of a greater program in a remote interpretive event.

6. Interpretation

Changes in the Land
6.21

We have, thus far directed our attention to those site resources which are in the natural order of things or stem from utilization of materials native to the land. Yet the most significant physical structures to which the visitor's attention will be drawn are manufactured by man rather than produced by nature. The Dam and the nearby fish hatchery are two obvious examples of contemporary man's presence. These structures, therefore, as well as others which will be erected at various points on project lands represent an opportunity as well as a mandate to communicate with the visitor.

Visitor Goals and Patterns

6.22 As discussed elsewhere in the master plan, the primary attractions of the project for visitors are the available recreational opportunities. In the vast majority, these individuals will be day use visitors with objectives of boating, fishing and sightseeing; another segment of the visiting public will be campers; and a third and smaller group will be sightseers or impulse visitors. Perhaps the least significant group will be those with special scientific or research goals. School groups and organized tours represent yet another visitor category and must be addressed separately.

6.23 In ascribing interpretive significance to these visitor goals, one can only make very general assumptions.

6.24 First, visitor information or interpretive facilities themselves rarely draw large numbers of visitors to a given site. This is particularly true of sites remote from direct access to major vehicular thoroughfares.

6.25 Second, recreation minded visitors, while sensitive to the site and its environment, often are singly directed toward their recreation goals and will, therefore, avail themselves only moderately of visitor or interpretive facilities.

6.26 Finally, the very thought of creating large man made structures with artificially controlled environments would seem on the surface to be counter-productive to the visitor's objectives of enjoying the natural outdoor setting of the site.

Conceptual Approach

Compatability with Other Functions
6.27

Interpretation is one of many considerations of the total project plan. In this regard, Interpretive planning cannot be developed separately from the other project objectives. In fact, wherever possible, interpretation will serve the overall goals of the visitor, supplement the basic recreational experience, enhance and embellish otherwise utilitarian structures and generally add one further dimension to the visitor experience on project lands. In many cases, the detailed interpretive plan developed for the project will direct and inspire many of the architectural elements required to respond to visitor needs.

6.28 Consistent with the initial objectives of interpretation, to inform, to educate and to entertain, the conceptual approach to organizing interpretation for the project identified opportunities and events revealed through many structures, in site, and as reflected by project graphics and service facilities. The basic scheme for relating these diverse elements is illustrated in the accompanying schematic plan entitled "Interpretive System." The schematic configuration of these essential events is arranged to reflect the proposed public use of the project lands.

6. Interpretation

Information/Administration Center Craft Presentation

Figure 6–1

6. Interpretation

6.29 **South Lake Area**—The southeastern section being the most accessible and logically the more heavily attended of the two major project areas is developed within and around that complex of structures comprised by the Dam, the fish hatchery and the Visitor Center.

6.30 The program material which needs to be conveyed to the visitor in this high use area is, however, greater in magnitude than can be supported by the Visitor Center alone. As a consequence, a number of interpretive structures with interspersed interpretive trails negotiable by both ambulatory and non-ambulatory visitors will be situated in the immediate vicinity and incorporate the central visitor facility.

6.31 The Visitor Center structure being the largest of the structures, would provide reception and sanitary facilities as well as interpretive materials.

6.32 The smaller or mini-interpretive centers focus on a major thematic category.

6.33 The trails would be invested with signage and devices appropriate to the immediate character of the area.

6.34 **North Lake Area**—The northern section of the site, projected as less heavily utilized by the visitor, imposes fewer demands on the interpretive program. Therefore, a less intensive program will be provided. Flexibility for seasonal interpretation has been a prime consideration.

6.35 At the Hot Springs Road Portal Area is located a single facility in support of visitor information dissemination and administrative requirements. In addition, the facility will be annotated with evidence of the Pomo culture in such a way as to impart an interpretive character to the more pragmatic missions of the facility (Figure 6-1).

6.36 In addition to interpretation at the portal area, a mini-interpretive center will be located off Hot Springs on a prominent ridge overlooking much of the North Lake Area. Combined with support facilities for a nearby day use area, this mini center will provide opportunity for interpretation of special themes, seasonal living history activities, native flora and wildlife. Two loop interpretive trails will originate from this point.

6.37 Here again interpretive trails embellish the facilities, though in this case the trails may be longer and somewhat more difficult to negotiate than those planned for more general use in the high density segment of the project.

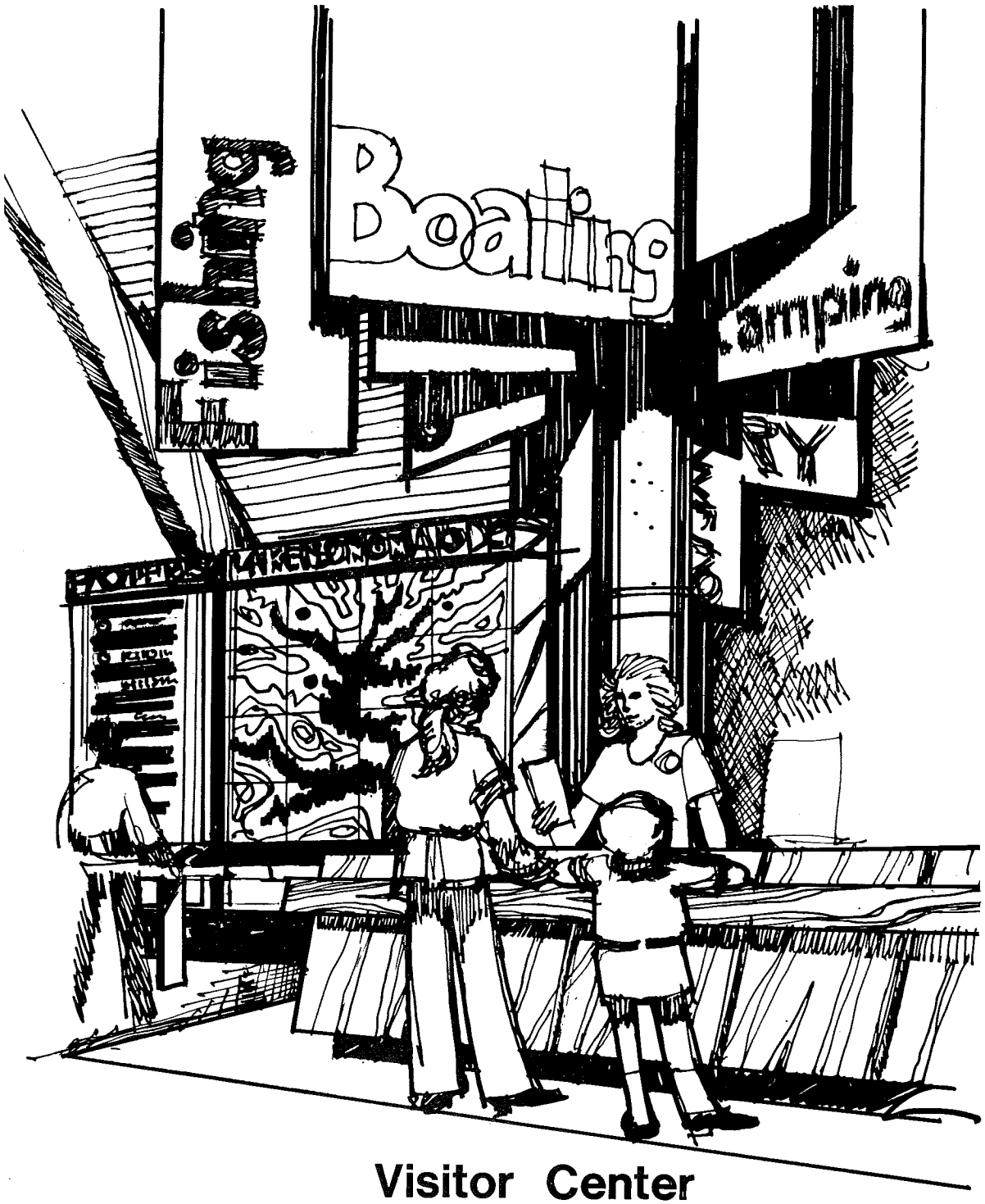
6.38 While the thrust of the interpretive effort is directed toward the above described structures and trails, it is important also that every opportunity be utilized to sustain and reinforce the interpretive objectives. To this end project graphics and sign systems, sanitary structures, restrooms and other recreational facilities should, wherever possible, be invested with graphics and objects reflective of the interpretive program throughout the project.

Thematic Distribution

6.39 In order to provide a balanced program and to attract the visitor to become involved in the site to the greatest extent possible, the interpretive plan distributes potential themes throughout the primary and secondary structures as well as the intervening trails (Plate 29).

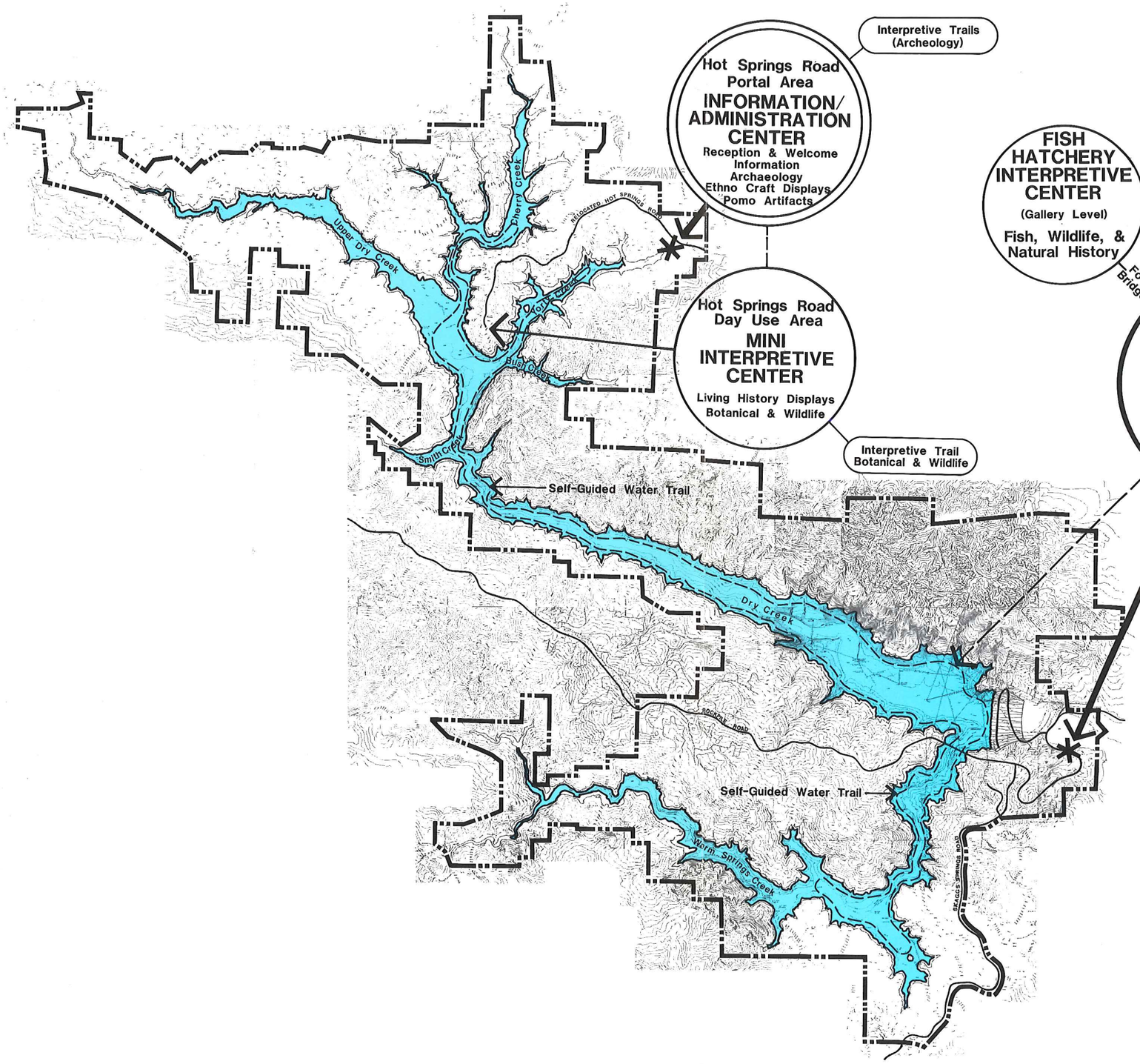
6.40 **The Visitor Center** is logically the best location for an overview of the project, orientation to its features and facilities, and a general introduction to the Corps of Engineers, its civil and military roles and significant National, Divisional and District activities. Here also is the most logical location for a personal greeting from the Corps and an opportunity for the acquisition of project and area information (Figures 6-2 and 6-3). Information will be of a recreational nature (campsite availability, fishing locations, etc.) as well as providing general project orientation and area locations. The inclusion of this number of program elements will more than

6. Interpretation



Visitor Center
Reception and Information

Figure 6-2



Hot Springs Road Portal Area
INFORMATION/ ADMINISTRATION CENTER
Reception & Welcome
Information
Archaeology
Ethno Craft Displays
Pomo Artifacts

Interpretive Trails (Archeology)

Hot Springs Road Day Use Area
MINI INTERPRETIVE CENTER
Living History Displays
Botanical & Wildlife

Interpretive Trail Botanical & Wildlife

Self-Guided Water Trail

Self-Guided Water Trail

FISH HATCHERY INTERPRETIVE CENTER
(Gallery Level)
Fish, Wildlife, & Natural History

Foot Bridge

Warm Springs Dam Recreation Area
VISITOR CENTER
Reception & Welcome
Information
Orientation to Project
- The Corps
- Flood Control
- Water Supply

Short Interpretive Trail

MINI INTERPRETIVE CENTER NO.1
Geology & Physical Science

Short Trail

MINI INTERPRETIVE CENTER NO.2
Social / Cultural History

Interpretive Trail

INTERPRETIVE PLAN

Lake Sonoma Master Plan
Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

6. Interpretation

Visitor Center Orientation and Interpretive Gallery

Figure 6-3

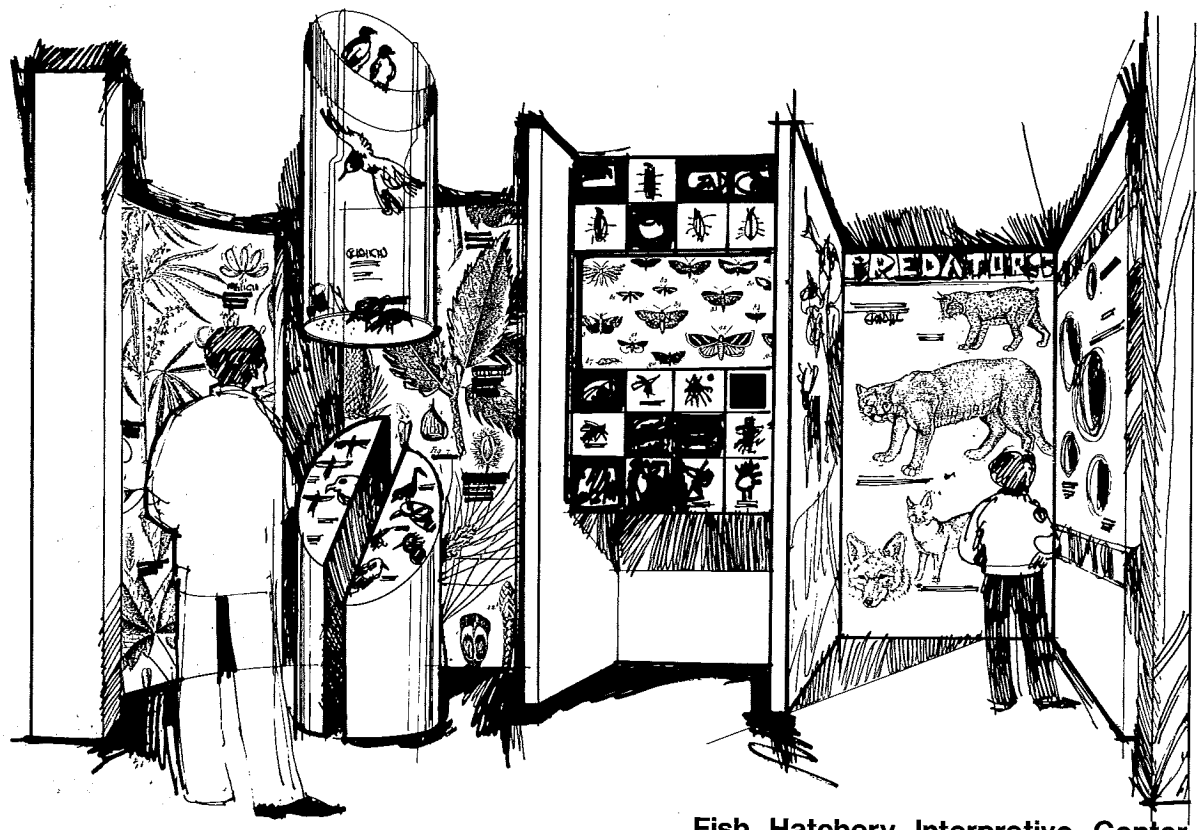
6. Interpretation

occupy the space available in the Visitor Center structure. Yet, there are many aspects of the program which will not have been addressed in detail. These thematic topics are, therefore, the subjects with which the mini-interpretive structures and trails must deal. These topics include:

- An overview of social and cultural history including archeological artifacts.
- Wildlife and natural history including endangered species.
- Geology and physical science with mineral samples and boring cores.
- Industry and craft including sedge basketry.
- The Pomo culture.
- Aesthetics

6.41 **Fish Hatchery Interpretive Area**—The first of the mini-Interpretive programs occupying a space at the second level of the fish hatchery (Figure 6-4) will most logically deal with the fishery, wildlife, and natural history theme. The proximity of the space to live examples of fishes supported by the immediate environment can only help to dramatize the one aspect of that story. Once the frame of reference has been established it, of course, follows that there will be little resistance to an extension of subject matter to a general discussion of birds, mammals, reptiles and insects related to the site. Life cycles, eco-systems and the impact of the project in relationship to these life forms would also be described. This area will provide the opportunity for a program on the Endangered Species Act and specifically a presentation on the American peregrine falcon.

6.42 **Mini-Interpretive Center No. 1** will be given over to an analysis and description of physical site properties (Figure 6-5).



Fish Hatchery Interpretive Center
Fish and Wildlife

Figure 6-4

6. Interpretation

Mini Interpretive Center No.1
Geology and Physical Science

Figure 6-5

6.43 Basic geology would be interpreted through model and graphics explaining how the topography of the area evolved. A discussion of hydrological systems on the project site would help to establish the need for and objectives of the flood control project designed by the Corps.

6.44 These areas of physical science would be related to the paleontological and archaeological surveys accomplished on project lands and would relate these evidences of both human and animal occupation to either of the interpretive themes.

6.45 **Mini-Interpretive Center No. 2**—The chronology of human occupation to which the project area has responded over more than six centuries is a particularly intriguing theme and one which deserves expression in its own self-contained environment. Mini-Interpretive Center No. 2 (Figure 6-6) is devoted to this objective. The program might well include a timeline of events incorporating both Spanish and native American indian occupation; early exploration and settlement by pioneering easterners; and more recent occupation by families and individuals seeking to exploit the land for economic gain. Finally, the timeline would relate to current recreational use and, of course, the Corps project.

6.46 The timeline would be played against events of Statewide and National significance which would help to illuminate the evolution of the project area in terms of the American scene.

6.47 **North Lake Interpretive Areas**—Specific evidence of the rich Pomo culture, will be referenced in many areas both graphically and with symbology text and would constitute the major interpretive theme for the Hot Springs Road Information/ Administration Center. This presentation would feature evidence of the character, language, geneology and life style with which the Pomo is identified. This facility will provide an excellent opportunity for a related archeological trail where the remains of a variety of sites are located. The Hot Springs Road Mini-Interpretive Area will be the location of seasonal living history exhibits, botanical and wildlife trails.

6.48 **Interpretive Trails**—Trails would be located in such a way as to increase visitor awareness of other thematic concepts. For example, trails in the Visitor Center area would touch on sedge basketry where the plant itself grows. Trails near the North Lake Information/Administrative Center would involve archeology.

6.49 The self-guided water born trail may well be the most viable for expressing the aesthetics of the site as well as for identifying a number of site features which will be inundated after impoundment. (Figure 6-7).

6.50 To accommodate these various levels of interest and to respect the goals which each visitor may have, it is important that the interpretive Plan be developed in a series of expanding loops each of which tends to further amplify the interpretive program, as time and interest permits. To meet this objective, the inner most loop of the system must contain *all* of the thematic topics even though many may be treated no more than superficially. In the proposed conceptual plan, that loop would encompass the Visitor Center only and can be accomplished in 30 to 45 minutes.

6.51 The second loop would embrace the Dam and fish hatchery as well as the immediate Mini-Interpretive centers and Interpretive trails. These elements would add an additional 1½ or two hours to the interpretive experience.

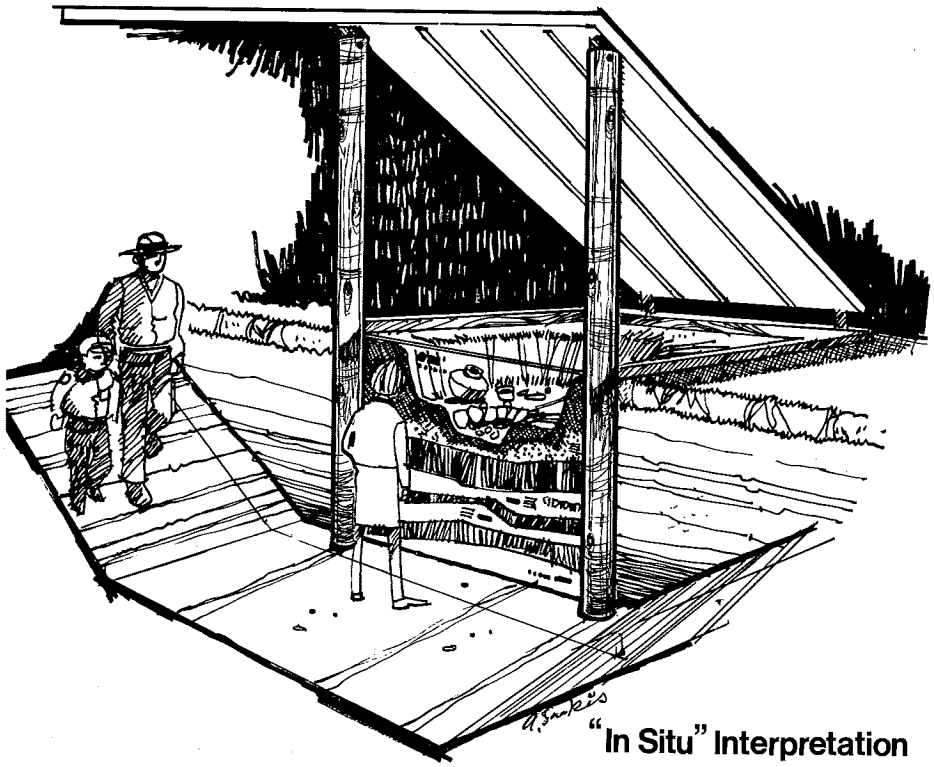
6.52 The final loop in the system would, of course, involve the North Lake area Information/Administration Center and Hot Springs Road Mini-Interpretive Center and their immediate archaeological, vegetation and wildlife trails. Here again two or more hours would not be overly generous to permit appreciation of these segments of the Interpretive plan.

6. Interpretation

6.53 In summary, visitors could grasp the significance of the project and the background of the site in a quick visit to the Visitor Center, yet could expend a full day in detailed contact with all aspects of the program.

Mini Interpretive Center No.2
Cultural History
Figure 6-6

6. Interpretation



"In Situ" Interpretation
Figure 6-7

Media, Materials and Techniques

6.54 Interpretation can be achieved in a great many ways and in many environmental circumstances. A balanced program would incorporate audio and audiovisual programs in light controlled environments, architectural systems in decontrolled environments, participatory devices involving mechanical, electrical and/or electronic systems, live examples of flora and fauna in captive environments where appropriate, live lectures both in artificial and natural environments, and a mixture of publications from a brief general guide to specialized pamphlets or books on selected topics.

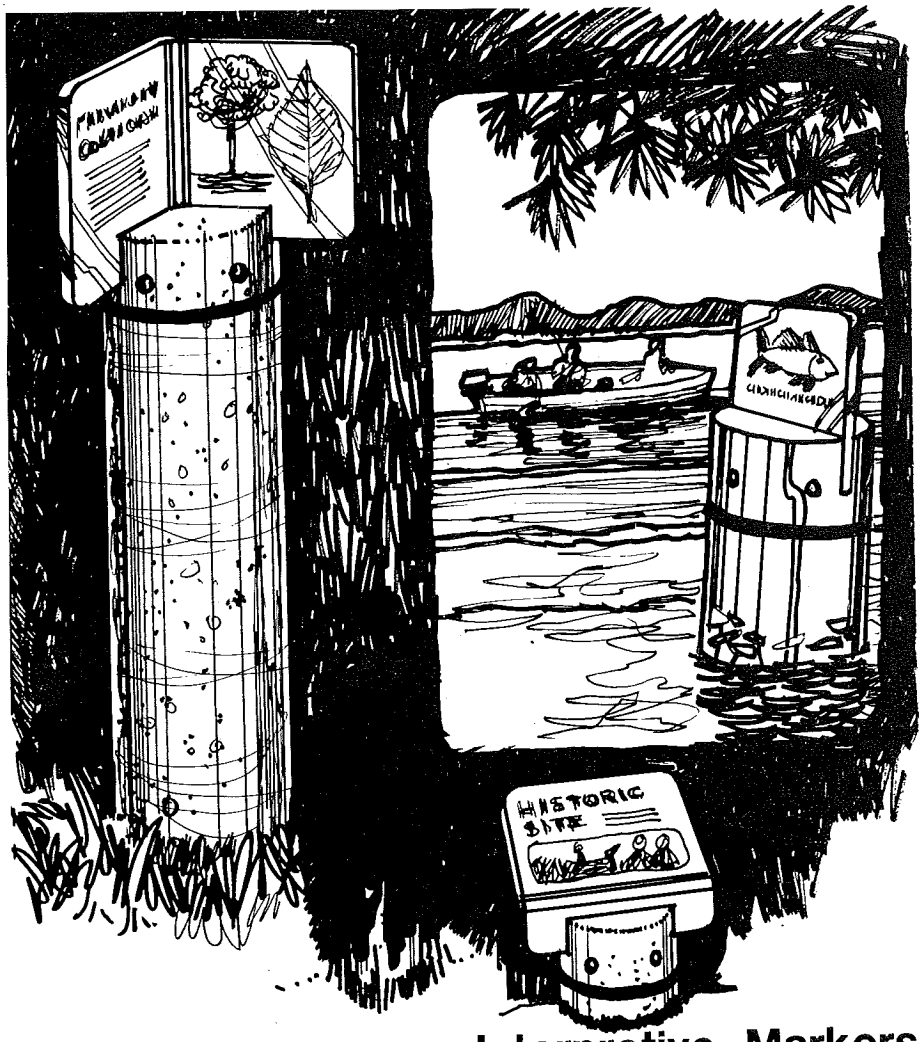
6.55 The assignment of appropriate media to specific thematic program elements should be developed at the prospectus level.

6.56 Regardless of the media selected, materials, hardware and software should be selected in mind of maintenance and operational implications. No single factor is more likely to destroy the benefits of interpretation than non-functioning systems, badly abused surfaces or poorly maintained construction.

6.57 The benefits of the interpretive program will extend beyond the physical limits of the site and will include offsite techniques such as a family of brochures, audio-visual and lecture programs, student environmental projects and interface with regional tourist and other peripheral entities.

6.58 Cooperation with other management agencies at Federal, State, County and Municipal levels should also be sought so that project activities can be interfaced with those at other immediate sites and attractions.

6. Interpretation



Interpretive Markers
Figure 6-8

7. Operations and Management

Concept

7.01 Management of Lake Sonoma will be oriented to achieving the project purposes of flood control, water supply and recreation. While provision of recreation is the primary management objective, project recreation shall be managed so as to be compatible with the sensitivities and carrying capacity of the resource. Management of Lake Sonoma resources will include controlling recreation uses, prohibiting uses which are a detriment to the resource and monitoring of public use areas to remain alert to public attitudes and preferences.

7.02 The following appendices will be developed by the Operations element in cooperation with the Planning, Real Estate and Engineering elements of the District when Lake Sonoma becomes operational.

a. Appendix A—Project Resource Management Plan
b. Appendix B—Forest Management Plan
c. Appendix C—Fire Protection Plan
d. Appendix D—Fish and Wildlife Management Plan
e. Appendix E—Project Safety Plan
f. Appendix F—Lakeshore Management Plan

Resource Management

Wildlife Habitat Management and Enhancement
7.03 Wildlife Resources lost or displaced due to inundation of habitat will be mitigated through the establishment and operation of wildlife management areas totalling some 5,200 acres, and the development and implementation of specific habitat plans (such as erosion control and revegetation). Lands to be managed for fish and wildlife were determined through negotiations with the California Department of Fish and Game.

7.04 Specific wildlife management plans will be aimed at protecting existing habitats and enhancing potential habitats. For example, wildlife management areas will be fenced to exclude domestic livestock and control burning programs will be implemented to improve the availability of food and cover for such species as deer and quail. Control of feral pig populations will minimize disruption of sensitive spring vegetation by these animals. Deer populations will be monitored by the California Department of Fish and Game to avoid overpopulation and resource degradation. Spring development and habitat enhancement will improve conditions for a variety of non-game birds, mammals, amphibians and reptiles, and will provide a food base for predators, including fur-bearing mammals, amphibians and reptiles. Wildlife Management Plans will be developed and implemented by the State of California with the cooperation of the Corps of Engineers.

Development of Reservoir Fishing and Stocking
7.05 Just after reservoir closure and prior to Lake formation, green sunfish and squawfish will be eliminated from the Dry Creek drainage upstream of Warm Springs Dam.

7.06 The Department of Fish and Game's preferenced stocking program is one of providing an inoculum of adult fishes. The source of these varies from hatcheries to captures of opportunity such as seining out a farm pond. Adult fishes planted in the reservoir will be introduced during the fall or early spring, so that they can be

acclimated prior to spawning season. The minimum number of adults to be planted is 200-300; as many as a thousand will be planted if they are available. Following is a preliminary list of species to be planted:

1. Largemouth bass (Florida strain)
2. Smallmouth bass
3. Bluegill (Florida strain)
4. Red-eared sunfish
5. Black crappie
6. White crappie
7. Channel catfish
8. Spotted bass (if available)

7.07 It is possible that threadfin shad and striped bass may be desirable. A "wait and see" attitude toward these species is being taken.

Vegetation and Forest Management
7.08 No timber harvesting on a commercial scale or commercial development of timber will be permitted at Lake Sonoma. Tree cutting will be confined to that needed for management of the resource. Any reforestation will be accomplished with native plant materials. Detailed vegetation and forest management recommendations are presently being prepared in a Vegetation Management Study.

Landscape Management
7.09 A program of landscape management will be carried out in the project area for purposes of enhancing project aesthetics. Effective management requires the application of sound ecological principles to permit the achievement and maintenance of the desired conditions. The basic landscape concept is to preserve the Lake Sonoma area by maintaining native plant communities and by establishing new native plants where landscaping is necessary. A native plant propagation area is provided so the project will have an ongoing supply of native plant materials.

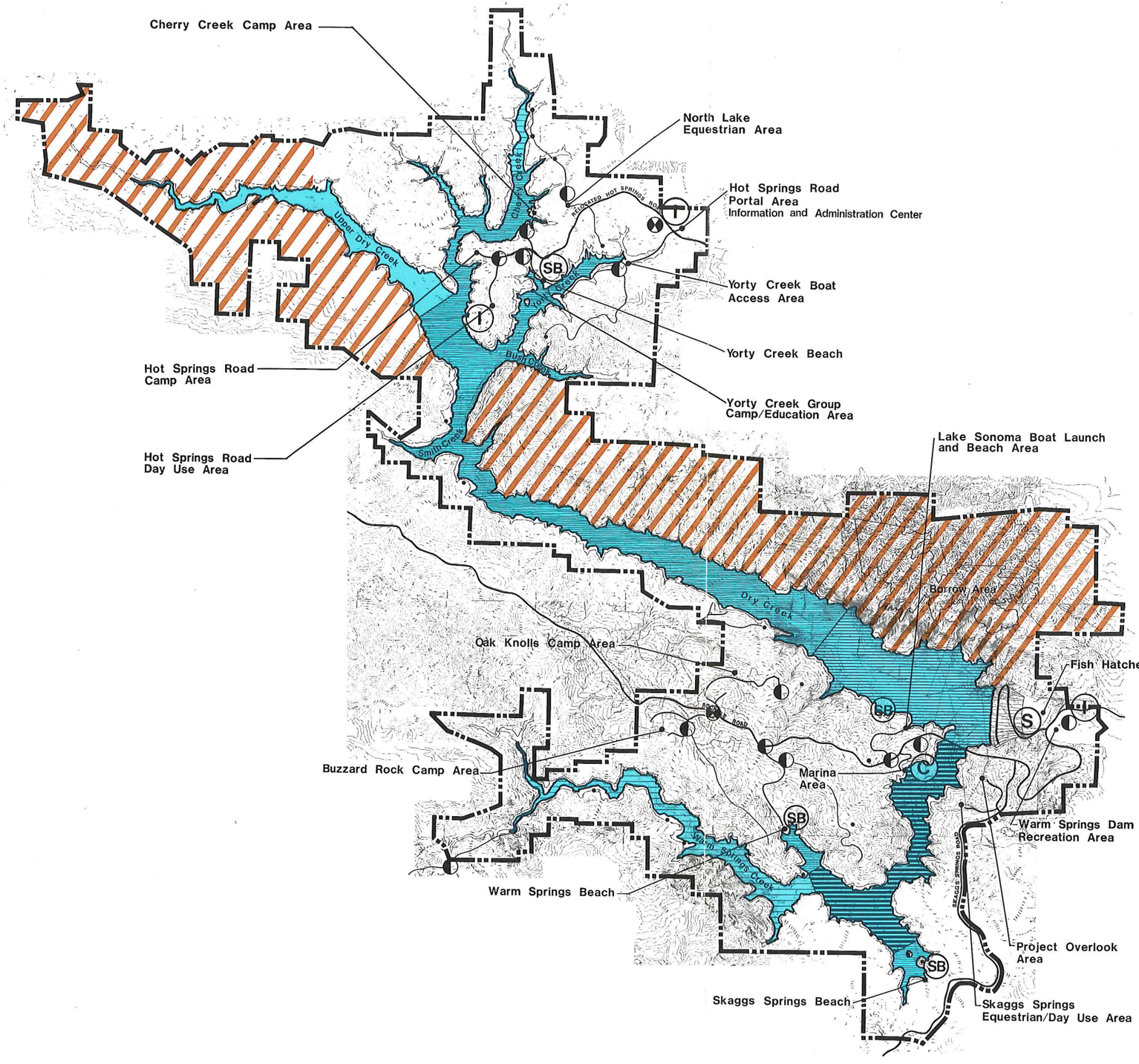
Erosion Control
7.10 High erosion hazards exist over much of the Project Area as a result of steep slopes, unstable soils and past grazing pressures. Erosion is especially prevalent in serpentine areas and on steep slopes converted from timber or brush to grassland. Erosion and sedimentation are largely caused by over grazing and poor management of logging operations. Both grazing and logging have been eliminated at Lake Sonoma.

7.11 To minimize future erosion, selected areas are being seeded, planted and fertilized to hold the soil. Certain areas are also being fenced to exclude livestock from government land.

Fire Hazard Reduction
7.12 Fire is a major hazard on the site because of the prevalence of highly flammable fuels associated with the chaparral/oak/grassland vegetation types. Stringent fire regulations are needed to protect the watershed and minimize wildlife habitat degradation and danger to recreationists. Fire control is best achieved through the development and implementation of a rigorous Fire Reduction and Control Burning Program which will be given a high priority in area management. Specific information on the fire hazard of different parts of the site and the options available to reduce high fire potential while improving habitat for wildlife is currently being developed as part of the Vegetation Management Plan.

7.13 High fire hazard will be relieved by reducing and controlling the amounts of flammable fuels allowed to accumulate, and by imposing user restrictions where appropriate. The potential for fires accidentally started by recreationists is reduced by implementing the following measures:

1. Camping is permitted only at designated sites.
2. Campfires are only permitted in specially provided fire places.
3. Camping and picnic areas except primitive camp areas are provided with adequate fire suppression and control facilities, and protected by firebreaks. Periodic mowing and fuel removal will be necessary in the immediate vicinity of developed campsites. Standpipes will be located near water storage tanks to accommodate fire fighting equipment.



Legend

Water Use Zones:

- No Motor (Electric Motor Permitted)
- 10 MPH/70 dBA Max.
- 70 dBA Max.
- Waterskiing Permitted (70 dBA Maximum)
- Restricted (No Boating)
- Wildlife Management Area (State Fish & Game Operated)
- Control Point (Staffed)
- Control Gate
- Access Road
- Service Road/Vehicular Trail
- (SB) Swimming Beach
- (C) Concession Operated
- (I) Interpretive Management Area
- (S) State Fish & Game Operated

PROJECT MANAGEMENT PLAN

Lake Sonoma Master Plan

Sonoma County, California

U.S. Army Corps of Engineers
San Francisco District

Royston, Hanamoto, Beck & Abey
Landscape Architects and Land Planners

50 Acres
10

North

Scale in Feet
0 500 1000 2000 3000 4000 5000

4. Vehicles operated by the management staff are provided with fire suppression devices.
5. An education program to inform users of the hazards of wild fires (and the benefits of CONTROLLED burning) is part of the interpretation program.

7.14 Once a fires starts, fire control in the project area will be performed in cooperation with the California Department of Forestry. The project area is within the initial attack fire protection area of the Department's Cloverdale Forest Fire Station. Other Department stations are located at Healdsburg and Hopland. The Corps will provide the initial attack on a fire and recede to an assistance role when the Department of Forestry arrives. A comprehensive fire protection plan will be developed by the Corps in cooperation with the Department of Forestry.

Cultural Resources Management

7.15 While a number of historic cultural resources have been identified within the project area, plans for protection, study and interpretation of them will mitigate any adverse impacts of the reservoir project.

7.16 Much of the land within the project area has been designated as part of the Dry Creek-Warm Springs Valleys Archeological District which is listed in the National Register of Historic Places. Placement on the National Register insures that no action that might affect the historic property will be taken by a Federal agency without review by the California State Historic Preservation Officers and the Advisory Council on Historic Preservation. This includes transfer or sale of any project lands.

7.17 During construction of the remaining features of the project a phased cultural resource management program is being implemented. Minor revisions are being made as new information is obtained. The SHPO, the Heritage Conservation and Recreation Service, the U.S. Department of the Interior and other parties are being given the opportunity to comment on the progress of the program.

7.18 Management of sites will follow the 1976 Memorandum of Agreement between the State Historic Preservation Officer, the Department of the Interior Archeological Services Division, the Advisory Council on Historic Preservation and the San Francisco District Corps of Engineers.

7.19 The highest priority in terms of management is being given to the protection of the cultural sites. The most severe impact which the project will have on the sites is wave action and erosion from the reservoir. To minimize anticipated adverse impacts, protective coverings will be placed on some of the most significant sites that will be inundated. In cooperation with the NPS and other agencies which are already participating in a long term inundation study, techniques will be explored to establish controls and monitor effects on inundated sites. An extensive excavation program is also being conducted that will include almost all sites.

7.20 Petroglyphs located in the project area will be preserved in place if possible. In addition to recording details through such means as photographs, sketches, casts, etc., preserving them may entail protecting it from further physical and chemical attack. Some smaller petroglyphs may be moved to higher locations nearby or relocated in or around Pomo interpretive areas.

7.21 Eight sites above flood pool level have existing features with distinct educational, scientific and recreational interests. These include two quarries, two hunting blinds, several middens, a housepit and a petroglyph. These sites will be managed so as to protect and preserve them. They will be incorporated into a planned interpretive program. Two of these sites are isolated and are only accessible by hiking.

7.22 It is staff responsibility to maintain any fences used for the protection of the resource, to patrol sensitive cultural areas and to protect these resources from

damage by the public. During periods of drawdown of the reservoir, the shoreline will be monitored to insure that archaeological sites have not been exposed.

Vector Control
7.23

Mosquito Control: Mosquitoes are important vectors which will be affected by the project. Adequate preparation of the reservoir basin, which will include clearing, final conditioning of the fluctuation zone and marginal drainage, is fundamental to the achievement of satisfactory mosquito control after the reservoir is filled. The overall objective of these measures is to prevent or minimize the development of favorable mosquito producing habitat which would include: shallow water areas in the upper reaches of the reservoir, seepage areas below the dam, and ponded water in borrow pits, behind road fills or in other undrained areas. Excessive emergent vegetation, debris, flotage or other obstructions in any drainage ditch or channel which would result in sluggish flows would also provide excellent mosquito habitat. All pools which would occur in the fluctuation zone and any borrow area which would not be permanently inundated will be made to be self-drainage and seepage areas that develop below the dam and will be adequately drained or otherwise controlled to prevent mosquito breeding. "Hard" insecticides such as DDT will not be used. Only those insecticides will be used which conform to the guidelines of the EPA. In general, it is anticipated that the proposed flood prevention measures and channel improvements will be of benefit in controlling mosquitoes by reducing the flooding of the low land area. No significant mosquito production would be expected where the reservoir has steep shorelines, or where the water level recedes from the vegetated shoreline during the summer.

7.24

Terrestrial Vectors: Vectors of terrestrial origin, including arthropods, such as ticks, mites, fleas and flies; and rodents, such as ground squirrels, chipmunks, rats and mice may be a source of public health problems at recreation sites. In addition to the irritation, discomfort and annoyance caused by the arthropod bites, the presence of these vectors could induce certain human diseases. In order to control the terrestrial vectors, proper storage, collection and disposal of refuse will be practiced. In addition all buildings in recreation areas will be rodent-proofed. Brush along paths, trails, and roadways and weeds from other areas of frequent use will be removed to reduce the occurrence of tick infestations.

Visitor Relations

Visitor Assistance and Law Enforcement
7.25

Lake Sonoma land and water areas are regulated under the concurrent jurisdictions of the State of California and its various agencies, the County of Sonoma and the Federal Government. The Corps of Engineers has jurisdiction for those items coming under Federal Regulations, specifically, the Code of Federal Regulations, Title 36 (Parks, Forests and Public Property) Chapter 3 (Corps of Engineers) Part 327 (Rules and Regulations) spells out the Corps' authority. The code is administered by rangers who interpret the Federal regulations and who have authority to cite an offender but not to detain or arrest the person.

7.26

The California Department of Fish and Game enforces State fish and game laws. The California Highway Patrol and the Sonoma County Sheriffs Department enforce local and State laws.

Visitor Protection
7.27

An ongoing program will be established for the protection and safety of visitors and staff while at Lake Sonoma. All areas of the project are reviewed periodically for hazards and safety measures taken as necessary. Trails are regularly maintained for the safety of visitors and equestrian users. The visitor information program will include information and regulations relating to fire protection and safety.

7.28

Regular programs are being established to eradicate poison oak from all visitor use areas as well as to control rodents and insects.

7. Operations and Management

Visitor Education and Interpretation

7.29 Of prime importance to project management are programs aimed at informing the public of project facts and educating them in related areas, such as conservation, nature interpretation, safety, etc. Such knowledge enhances an individual's visit to the Lake and renders his enjoyment of the area more complete.

7.30 **Public Relations:** Contact with the public happens both through the media and on the project site. During the recreation season, fishing, boating, and camping reports are given to a local radio station for presentation. These reports, including weather conditions, are broadcast numerous times throughout the day. Various education programs are reported by area newspapers.

7.31 On site, campfire talks involve campfire type gatherings conducted by the Rangers and include such subjects as nature interpretation, courteous boating practices and safety. Movies and slides are effectively used in this program. Programs are also arranged in cooperation with local schools to involve students in programs relating to Lake Sonoma. Tours of the recreation areas and the dam are conducted by the Rangers for these schools and for civic groups. Data about the Lake and features of the site are discussed throughout the tour.

7.32 Rangers, on patrol, collecting campground fees, or on duty in any capacity, take full advantage of all opportunities to inform the public. A ranger carries with him brochures of the area, booklets containing regulations, and litter bags for distribution.

Recreation Area Management

7.33 **Reservations and Restrictions:** Reservations will be accepted for group use only. Groups (camping, picnic or other) may reserve a camp area or day use area which is designated for group use. Groups conducting special events may reserve a section of the project if the use will not interfere with normal project operations. Such uses as public and private school groups, field study classes, equestrian trail rides, boating club events, and Boy Scout outings are examples of such events. Recognized educational groups will be encouraged to use the group camp facilities during normal school periods to supplement their educational programs. All other project recreation facilities are available on a first come-first served basis including camp areas.

7.34 **Closing:** Camp areas are controlled by staffed control stations. When camp areas are filled, no additional campers will be admitted until normal turnover frees a campsite. A maximum stay of 14 consecutive days is allowed in both the fee and non-fee camp areas. Day use areas are equipped with gates which are closed after normal hours to protect the resource.

7.35 **Area Preservation:** While no one will be denied access to Lake Sonoma, the sensitivity of the resource limits how many people may use the site at any one time. To insure that project resources are not depleted, carrying capacities of the project will not be exceeded. Overflow parking is not planned in areas of high intensity development since numbers of spaces provided corresponds to the capacity of the provided facility. Peak use established for a given facility will not be exceeded merely to satisfy demand at the expense of the resource. Once capacities are met, facilities will be closed to additional use or until normal turnover permits additional visitations.

7.36 **Fees:** Fees are collected only in camp areas. Fee levels are based on current engineering regulations and are collected during the recreation season at the staffed entrance to camp areas. One free camp area is provided.

Off-Road Vehicles

7.37 The potential for use of the Lake Sonoma site by off-road vehicles has been studied. There are no areas appropriate to off-road vehicle use at Lake Sonoma due to the steep slopes and erosion potential of the soils.

7. Operations and Management

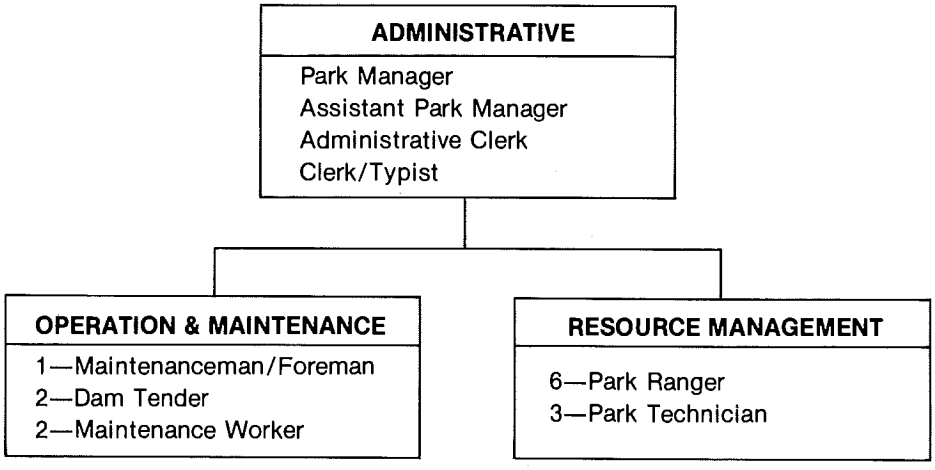
Project Operations and Maintenance

Staffing
7.38

The three major obligations of staff are to the project visitor, the resource and to assure the capability of the project to provide water and handle floods. The ranger's responsibility is to the visitor and natural environment. Figure 7-1 illustrates the Lake Sonoma organization of staff and the number of staff required at each position. Specific duties are as follows:

1. Visitor assistance.
2. Interpretation of the resource to the visitor.
3. Protection of the environment.
4. Protection of Government property.
5. Visitor orientation.
6. Visitor physical protection (safety).
7. Coordination with the Federal, State and County agencies at Lake Sonoma.
8. Perform small emergency repairs to the physical facilities.
9. Check the project boundary lines for encroachment into Government property.
10. Staff the visitor center.
11. Contract administration includes and is not limited to the following:
    a. resource management contracts.
    b. maintenance of physical structures:
        • clean restrooms
        • clean buildings (visitor center, administration building, information center).
    c. trash disposal.
    d. staffed control stations.
    e. marina

Figure 7-1
Organization Chart
Lake Sonoma



7. Operations and Management

Concession Activities
7.39

The only major concession at Lake Sonoma is the marina and marina support facilities, including a small general store carrying basic food and sundry items. The marina will be built by the concessioner to Government guidelines after a market analysis shows the feasibility of the concession. Interpretive related concessions are also provided.

Water Based Operations
7.40

Both the Corps of Engineers and Sonoma County will have boats at Lake Sonoma. They will be housed in a covered structure adjacent to the outlet works. The structure is designed according to the architectural theme utilized at the marina.

7.41

Two types of operational boats will be utilized at Lake Sonoma. Patrol boats operated by the Corps and County, will be used for the safety and protection of people using the Lake. Work barges will be used for maintenance only, including transport of fire vehicles, debris pickup and maintenance of boat-in camp areas.

Water Surface Zoning
7.42

The Lake Sonoma water surface has been divided into various zones (Plate 30). Each zone has restrictions as to the type of boat use permitted. Portions of the lower Dry Creek and Warm Springs Creek have been designated for power boating and water skiing with speed and decibel (dBA) restrictions enforced. The maximum allowable noise level will be 70 dBA which is approximately equivalent to a typical automobile passing at 50 feet. Boats with motor and speed restrictions will be allowed in most of the small arms and coves of the Lake. All boating and public access will be restricted in Upper Dry Creek west of the confluence of Cherry Creek.

Encroachments
7.43

Agricultural Trespass: Agricultural trespass is the unauthorized use of Federal lands for the purpose of producing farm crops, and the grazing of livestock. This type of encroachment may occur to a varying degree on some Federal lands. It is primarily the responsibility of the rangers to make frequent patrols of all project lands and to be alert for this type of encroachment. Rangers will be thoroughly familiar with the boundaries of all fee land. Experience has shown that field personnel advising the person involved of the violation and pointing out the boundary is usually sufficient to stop the encroachment.

Structure Trespass: Structure trespass is the unauthorized placing, or construction of any type of building, earthwork, or other structure on lands of the Corps of Engineers. It is primarily the responsibility of the rangers to observe and report possible incidents of structure trespass to the Park Manager. Rangers will be thoroughly familiar with all fee and easement boundaries and will keep informed on all current construction permits involving project lands.

Coordination Between Agencies
7.44

There are many Federal, State, County and local agencies that may play a part in the operation of Lake Sonoma. Coordination of information and programs as well as cooperation between agencies will result in the efficient operation of Lake Sonoma.

Project Maintenance
7.45

Maintenance of facilities and grounds will be to a standard above that normally expected in a public area. It has been shown that a clean, well-maintained area will receive better care by the public, and less litter and vandalism than a poorly maintained area. At Lake Sonoma recreation areas, some maintenance is performed by Corps staff. Whenever possible, contracted maintenance will be used. The maintenance foreman inspects the work continually to assure a clean, attractive recreation area. Highly visible ranger patrols during times of peak recreational use also assist in holding down vandalism and reducing litter. Recreationists at other Corps projects have indicated that the quality of the facilities and high standard of maintenance were among the most important reasons for revisiting these projects.

7.46

Major areas requiring maintenance are testing and control of potable water, sewage collection and sanitation, and maintenance of all roads. Dam operations are coordinated with project maintenance and operations.

8. Cost Estimate

General
8.01

Costs for development described by the Lake Sonoma Master Plan are summarized in Tables 8-1, 8-2 and 8-3. The construction cost shown are for price levels in October, 1979, with an ENR index for the San Francisco Area of 3623. No allowances for cost escalation have been made in these estimates.

Summary of Costs By Accounts
8.02

TABLE 8-1

Account 03	Dam & Appurtenant Facilities	$ 460,000
Account 08	Roads, Railroads & Bridges	4,163,000
Account 14	Recreation Facilities	19,248,000
Account 19	Buildings, Grounds & Utilities	1,605,000
Account 30	Engineering & Design	3,821,000
Account 31	Supervision & Administration	3,056,000
	TOTAL	$32,353,000

Summary of Costs By Areas
8.03

TABLE 8-2

Warm Springs Dam Recreational Area	$ 3,084,000
Project Overlook	666,000
Skaggs Springs Equestrian/Day Use Area	544,000
Marina	2,114,000
Lake Sonoma Boat Launch & Beach Area	3,575,000
Buzzard Rock Camp Area	3,495,000
Oak Knolls Camp Area	3,379,000
Skaggs Springs Beach	215,000
Warm Springs Beach	1,011,000
Hot Springs Road Portal Area	1,756,000
North Lake Equestrian Area	675,000
Yorty Creek Boat Access Area	692,000
Yorty Creek Beach	931,000
Cherry Creek Camp Area	2,656,000
Hot Springs Road Camp Area	2,418,000
Hot Springs Road Day Use Area	1,060,000
Yorty Creek Group Camp/Education Area	772,000
Miscellaneous Project Facilities	3,310,000
TOTAL	$32,353,000

8. Cost Estimate

TABLE 8-3
8.04
Cost Estimate of Each Major Use Area

Area/Facility	Unit	Unit Cost	Quantity	Cost
WARM SPRINGS DAM RECREATION AREA				
Site Grubbing & Clearing	LS	—	—	17,000*
Site Grading	CY	2.00	80,000	160,000*
Road Surfacing & Base (AC) (22 ft. width)	LF	32.00	2,250	72,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	75,000	120,000
Pedestrian Underpass	EA	125,000	2	250,000
Trails/Walkways (AC Surfaced) (6 ft. avg)	LF	9.5	6,000	57,000
Restroom (f)	EA	80,000	2	160,000
Group Picnic Area	EA	45,000	4	180,000
Picnic Areas	EA	2,500	10	25,000
Mini Interpretive Center Structures	EA	40,000	2	80,000
Interpretive Assembly Area	LS	—	—	25,000
Fire Circle	LS	—	—	2,000
Interpretive Area	LS	—	—	30,000
Alterations to Corps Buildings	LS	—	—	200,000*
Trash Receptacle	EA	150	40	6,000
Signing & Graphics	LS	—	—	20,000*
Fencing	LF	10.00	6,000	60,000*
Control Gates	EA	2,000	1	2,000*
Landscaping (Trees, Shrubs & Turf)	AC	12,000	24	288,000*
Irrigation	AC	15,000	12	180,000*
Potable Water Supply	LS	—	—	80,000
Sewage Disposal System	LS	—	—	52,000
Electrical Service (Underground)	LS	—	—	36,000*
Security Lighting	LS	—	—	10,000*
Subtotal				$2,112,000
Contingencies - 15%				317,000
Subtotal				2,429,000
Engineering Design—15%				364,000
Supervision—12%				291,000
TOTAL				$3,084,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
PROJECT OVERLOOK				
Site Grubbing & Clearing	LS	—	—	2,000*
Site Grading	LS	—	—	9,000*
Trails/Walkways	LF	9.50	740	7,000
Plaza Paving & Walkways (Concrete)	SF	3.80	6,600	25,000*
Retaining Walls	LF	125	320	40,000*
Plaza Sunshade Structure	SF	20.00	2,000	44,000
Overlook Tower & Bridge	LS	—	—	140,000*
Restroom (f)	EA	80,000	1	80,000
Picnic Area	EA	2,500	1	2,500
Benches	EA	500	1	500
Trash Receptacle	EA	150	6	1,000
Signing & Graphics	LS	—	—	2,500*
Control Gate	EA	2,000	1	2,000*
Landscaping (Trees & Shrubs)	LS	—	—	7,500
Irrigation	LS	—	—	2,000
Potable Water Supply System	LS	—	—	53,000
Prorate pumping system from dam sit tank, distribution lines, storage tank and appurtenances)				
Sewage Disposal System	LS	—	—	23,000
(Holding Tank and piping system)				
Electrical Service (Underground)	LS	—	—	15,000
Subtotal				$456,000
Contingencies—15%				68,000
Subtotal				524,000
Engineering & Design—15%				79,000
Supervision & Administration—12%				63,000
TOTAL				$666,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
SKAGGS SPRINGS EQUESTRIAN/DAY USE AREA				
Site and Roadway Grubbing & Clearing	LS	—	—	10,000*
Site and Roadway Grading	LS	—	—	30,000*
Road Surfacing & Base (AC) (22ft. width)	SF	32.00	160	5,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	30,000	48,000
Trails/Walkways (Non-Surfaced)	LF	1.80	3,600	6,500*
Restroom(f)	EA	80,000	1	80,000
Group Picnic Areas	EA	45,000	1	45,000
Trash Receptacles	EA	150	6	1,000
Signing & Graphics	LS	—	—	1,000
Control Gate	EA	2,000	1	2,000
Landscaping (Trees, Shrubs & Turf)	LS	—	—	12,000
Irrigation	LS	—	—	7,500
Potable Water Supply System	LS	—	—	90,000
(Prorate pumping system from dam site tank, distribution lines, storage tank and appurtenances)				
Sewage Disposal System	LS	—	—	35,000
(Septic Tank & Leach Field)				
Subtotal				$373,000
Contingencies—15%				56,000
Subtotal				429,000
Engineering & Design—15%				64,000
Supervision & Administration—12%				51,000
TOTAL				$544,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
MARINA				
Site and Roadway Grubbing & Clearing	LS	—	—	46,000*
Site and Roadway Grading	LS	—	—	180,000*
Road Surfacing & Base (AC) (24ft. width)	LF	35.00	2,250	79,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	64,650	103,500
Retaining Walls	LF	100.00	1,300	130,000
Trails/Walkways (AC Surfaced) (6ft. avg.)	LF	9.50	3,750	35,500
Trails/Walkways (Unpaved)	LF	1.80	2,000	3,500
Restroom(f)	EA	80,000	2	160,000
Mini General Store & Terrace		—	—	
Marina Land Support Structures		—	—	
Marina (150 Slips)		—	—	
Marina (150 Slips)		—	—	
Picnic Areas	EA	2,500	4	10,000
Trash Receptacles	EA	150	15	2,500
Signing & Graphics	LS	—	—	3,000
Control Gates	EA	2,000	2	4,000
Landscaping (Trees & Shrubs)	LS	—	—	20,000
Irrigation	LS	—	—	20,000
Potable Water Supply System	LS	—	—	350,000
Pumping system from lake, storage tank, distribution lines and appurtenances)				
Sewage Disposal System	LS	—	—	225,000
(Prorate of Evaporation Pond Cost, Collection lines, Pumping Stations and Force Main)				
Electrical Service (Underground)	LS	—	—	60,000
Security Lighting	LS	—	—	15,000
Subtotal				$1,447,000
Contingencies—15%				217,000
Subtotal				1,664,000
Engineering & Design—15%				250,000
Supervision & Administration—12%				200,000
TOTAL				$2,114,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
LAKE SONOMA BOAT LAUNCH AND BEACH AREA				
Site and Roadway Grubbing & Clearing	LS	—	—	46,000*
Site and Roadway Grading	LS	—	—	350,000*
Road Surfacing & Base (AC) (24ft. width)	LF	35.00	3,200	112,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	124,000	198,000
Trails/Walkways (AC Surfaced) (6ft. avg.)	LF	9.50	3,000	28,500
Trails/Walkways (Non-Surfaced)	LF	1.80	10,000	18,000
Bath House	EA	100,000	1	100,000
Restroom (f)	EA	80,000	3	240,000
Boat Launch Ramp (5-15 ft. lanes) (grading and concrete ramps—3 ramp extends to elev 350; 5 ramps to elev 400)	SF	10.00	60,000	600,000*
Courtesy Pier	LS	—	—	5,000
Picnic Areas	EA	2,500	20	50,000
Beach Area	SF	1.00	12,000	12,000
Swimming Float Platform	LS	—	—	1,000
Swimming Buoys	LS	—	—	1,000
Trash Receptacles	EA	150	12	2,000
Signing & Graphics	LS	—	—	2,500
Control Gates	EA	2,000	2	4,000
Landscaping (Trees, Shrubs & Turf)	AC	12,000	4	48,000
Irrigation	AC	15,000	4	60,000
Potable Water Supply System (Prorate of pumping system at Marina, storage tank, distribution lines and appurtenances)	LS	—	—	200,000
Sewage Disposal System (Prorate of evaporation Pond cost, collection lines, pumping stations, manholes, Force Main and appurtenances)	LS	—	—	275,000
Storm Drainage System	LS	—	—	60,000*
Electrical Service (Underground)	LS	—	—	35,000
Subtotal				$2,448,000
Contingencies—15%				367,000
Subtotal				2,815,000
Engineering & Design—15%				422,000
Supervision & Administration—12%				338,000
TOTAL				$3,575,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
BUZZARD ROCK CAMP AREA—75 UNITS CLASS A				
Site and Roadway Grubbing & Clearing	LS	—	—	46,000*
Site and Roadway Grading	LS	—	—	125,000*
Rockpile Road Underpass	LS	—	—	250,000*
Connector Ramp at Rockpile Road	LF	26.00	500	13,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	30,000	48,000
Road Surfacing & Base (AC) (Acces Roads 22 ft. width)	LF	32.00	5,000	160,000*
Road Surfacing & Base (AC) (Circulation Roads 18ft. width)	LF	26.00	6,000	156,000
Trails/Walkways (Non-Surfaced)	LF	1.80	2,000	3,500
Restroom(s)	EA	100,000	4	400,000
Camp Sites (RV) (Parking Pad, Camp Site, Table, Fireplace &Bollards)	EA	6,000	75	450,000
Group Picnic Area	EA	45,000	1	45,000
Control Booth	LS	—	—	20,000
Amphitheater	LS	—	—	20,000
Fire Circles	EA	1,500	2	3,000
Trash Receptacles	EA	150	20	3,000
Signing & Graphics	LS	—	—	3,000
Control Gates	EA	2,000	5	10,000
Landscaping (Trees & Shrubs)	LS	—	—	37,500
Irrigation	LS	—	—	25,000
Potable Water Supply System (Prorate of pumping system at Marina, storage tank, distribution lines and appurtenances)	LS	—	—	350,000
Sewage Disposal System (Septic Tank & Leach Field at each restroom)	EA	35,000	4	140,000
Sanitary Disposal Station (with holding tank)	EA	25,000	1	25,000
Electrical Service (Underground)	LS	—	—	60,000
Subtotal				$2,393,000
Contingencies—15%				359,000
Subtotal				2,752,000
Engineering & Design—15%				413,000
Supervision & Administration—12%				330,000
TOTAL				$3,495,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
OAK KNOLLS CAMP AREA—128 UNITS CLASS A				
Site and Roadway Grubbing & Clearing	LS	—	—	72,000*
Site and Roadway Grading	LS	—	—	180,000*
Road Surfacing & Base (AC) (Access Roads 22ft. width)	LF	32.00	3,500	112,000*
Road Surfacing & Base (AC) (Circulation Roads 18ft. width)	LF	26.00	9,000	234,000
Parking Lot Surfacing & Base (AC)	SF	1.60	12,000	19,000
Trails/Walkways (Non-surfaced)	LF	1.80	2,000	3,500
Restrooms (S)	EA	100,000	4	400,000
Camp Sites (Car/Van)	EA	5,000	128	640,000
(Parking Pad, Camp Site, Table and Bollards)				
Amphitheater	LS	—	—	20,000
Fire Circle	EA	1,500	2	3,000
Trash Receptacles	EA	150	30	4,500
Signing & Graphics	LS	—	—	3,000
Control Gates	EA	2,000	4	8,000
Landscaping (Tree & Shrubs)	LS	—	—	30,000
Irrigation	LS	—	—	20,000
Potable Water Supply System	LS	—	—	375,000
(Prorate of pumping system at Marina, storage tank, distribution lines and appurterances)				
Sewage Disposal System	EA	35,000	4	140,000
(Septic Tank and Leach Field at each restroom)				
Electrical Service (Underground)	LS	—	—	50,000
Subtotal				$2,314,000
Contingencies—15%				347,000
Subtotal				2,661,000
Engineering & Design—15%				399,000
Supervision & Administration—12%				319,000
TOTAL				$3,379,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
SKAGGS SPRINGS BEACH				
Site Grubbing & Clearing	LS	—	—	15,000
Site Grading	LS	—	—	25,000
Parking Lot Surfacing & Base (AC)	SF	1.60	10,000	16,000
Trails/Walkways (AC Surfaced) (6 ft. avg.)	LF	9.50	3,000	28,500
Trails/Walkways (Non-Surfaced)	LF	1.80	1,600	3,000
Restroom (p)	EA	4,000	2	8,000
Picnic Areas	EA	2,500	4	10,000
Beach Area	SF	1.00	12,000	12,000
Swimming Float Platform	LS	—	—	1,000
Swimming Buoys	LS	—	—	1,000
Trash Receptacles	EA	150	4	500
Signing & Graphics	LS	—	—	1,000
Control Gates	EA	2,000	1	2,000
Potable Water System (Water tank, distribution system)	LS	—	—	25,000
Subtotal				$148,000
Contingencies—15%				22,000
Subtotal				170,000
Engineering & Design—15%				25,000
Supervision & Administration—12%				20,000
TOTAL				$215,000

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
WARM SPRINGS BEACH				
Site and Roadway Grubbing & Clearing	LS	—	—	20,000*
Site & Roadway Grading	LS	—	—	85,000*
Road Surfacing & Base (AC) (Access Road 22ft. width)	LF	32.00	5,500	176,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	20,000	32,000
Bath House	EA	100,000	1	100,000
Picnic Areas	EA	2,500	8	20,000
Beach Area	SF	1.00	20,000	20,000
Swimming Float Platform	LS	—	—	1,000
Swimming Buoys	LS	—	—	1,000
Trash Receptacles	EA	150	10	1,500
Signing & Graphics	LS	—	—	1,500
Control Gates	EA	2,000	1	2,000
Landscaping (Trees, Shrubs & Turf)	AC	12,000	1	12,000
Irrigation	AC	15,000	1	15,000
Potable Water Supply System	LS	—	—	150,000
(Prorate of pumping system at Marina, storage tank, distribution lines and appurtenances)				
Sewage Disposal System	LS	—	—	35,000
Electrical Service (Underground)	LS	—	—	20,000
Subtotal				$692,000
Contingencies—15%				104,000
Subtotal				796,000
Engineering & Design—15%				119,000
Supervision & Administration—12%				96,000
TOTAL				$1,011,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
HOT SPRINGS ROAD PORTAL AREA				
Site Grubbing & Clearing	LS	—	—	6,000*
Site Grading	LS	—	—	45,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	28,000	45,000*
Pedestrian Underpass	LS	—	—	125,000
Control Booth	LS	—	—	20,000
Trails/Walkways (AC Surfaced) (6ft. avg.)	LF	9.50	2,000	19,000
Information/Administration Center (Bldg.)	LS	—	—	300,000*
Interpretive Area	LS	—	—	55,000
Maintenance Building & Yard	LS	—	—	100,000*
Trash Receptacles	EA	150	10	1,500
Signing & Graphics	LS	—	—	12,500
Fencing	LF	10.00	1,000	10,000*
Control Gates	EA	2,000	2	4,000*
Landscaping (Tree & Shrubs)	LS	—	—	15,000
Irrigation	LS	—	—	12,000
Potable Water Supply System (Gravel Pack Well Pumping System, storage tank and appurtenances)	LS	—	—	250,000*
Sewage Disposal System Septic Tank & Leach Field with collection system, pump station and Force Main)	LS	—	—	150,000*
Electrical Service (Underground)	LS	—	—	21,000*
Security Lighting	LS	—	—	12,000*
Subtotal				$1,203,000
Contingencies—15%				180,000
Subtotal				1,383,000
Engineering & Design—15%				207,000
Supervision & Administration—12%				166,000
TOTAL				$1,756,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quanity	Cost
NORTH LAKE EQUESTRIAN AREA				
Site and Roadway Grubbing & Clearing	LS	—	—	6,000*
Site and Roadway Grading	LS	—	—	30,000*
Road Surfacing & Base (AC) (22ft. width)	LF	32.00	500	16,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	30,000	48,000
Trails/Walkways (Non-Surfaced)	LF	1.80	10,000	18,000
Restroom (s)	EA	80,000	1	80,000
Group Picnic Shelter Unit	EA	45,000	1	45,000
Trash Receptacles	EA	150	6	1,000
Signing & Graphics	LS	—	—	1,000
Control Gate	EA	2,000	1	2,000
Landscaping (Trees & Shrubs)	LS	—	—	10,000
Irrigation	LS	—	—	5,000
Potable Water Supply System	LS	—	—	150,000
(Prorate of pumping system at Cherry Creek Camp Area, storage tank, distribution lines and appurtenances)				
Sewage Disposal System (Septic Tank & Leach Field)	LS	—	—	35,000
Electrical Service (Underground)	LS	—	—	15,000
Subtotal				$462,000
Contingencies—15%				69,000
Subtotal				531,000
Engineering & Design—15%				80,000
Supervision & Administration—12%				64,000
TOTAL				$675,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
YORTY CREEK BOAT ACCESS AREA				
Site and Roadway Grubbing & Clearing	LS	—	—	10,000*
Site and Roadway Grading	LS	—	—	25,000*
Road Surfacing & Base (AC) (22ft. width)	LF	32,00	4,300	138,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	55,000	88,000
Boat Launch Ramp (2-15ft. lanes)	SF	10.00	12,000	120,000*
Courtesy Pier	LS	—	—	5,000
Trails/Walkways (Non-Surfaced)	LF	1.80	6,800	12,000
Restroom (p)	EA	4,000	2	8,000
Picnic Areas	EA	2,500	8	20,000
Trash Receptacles	EA	150	8	1,000
Signing & Graphics	LS	—	—	2,000
Landscaping (Trees & Shrubs)	LS	—	—	10,000
Irrigation	LS	—	—	5,000
Potable Water Supply System (Water Supply from Portal Area, pipeline and appurtenances)	LS	—	—	30,000
Subtotal				$474,000
Contingencies—15%				71,000
Subtotal				545,000
Engineering & Design—15%				82,000
Supervision & Administration—12%				65,000
TOTAL				$692,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
YORTY CREEK BEACH				
Site and Roadway Grubbing & Clearing	LS	—	—	18,000*
Site and Roadway Grading	LS	—	—	95,000*
Road Surfacing & Base (AC) (Access Road 22ft width)	LF	32.00	1,800	57,500*
Bridge	LS	—	—	90,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	16,000	25,500
Bath House	EA	100,000	1	100,000
Picnic Areas	EA	2,500	8	20,000
Beach Area	SF	1.0	20,000	20,000
Swimming Float Platform	LS	1,000	1	1,000
Swimming Buoys	LS	1,000	1	1,000
Trash Receptacles	EA	150	10	1,500
Signing & Graphics	LS	—	—	1,500
Control Gates	EA	2,000	1	2,000
Landscaping (Trees, Shrubs & Turf)	AC	12,000	2	24,000
Irrigation	AC	15,000	2	30,000
Potable Water Supply System	LS	—	—	80,000
Prorate of pumping system at Cherry Creek Camp Area, storage tank, distribution lines, and appurtenances)				
Sewage Disposal	LS	—	—	45,000
Electrical Service (Underground)	LS	—	—	25,000
Subtotal				$637,000
Contingencies—15½				96,000
Subtotal				733,000
Engineering & Design—15%				110,000
Supervision & Administration—12%				88,000
TOTAL				$931,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
CHERRY CREEK CAMP AREA—45 UNITS CLASS A				
Site and Roadway Grubbing & Clearing	LS	—	—	25,000*
Site and Roadway Grading	LS	—	—	85,000*
Road Surfacing & Base (AC) (Access Roads 24ft. width)	LF	35.00	1,000	35,000*
Raod Surfacing & Base (AC) (Service Road 10ft. width)	LF	20.00	2,500	50,000*
Low Level Bridges	LS	—	—	165,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	48,000	77,000
Boat Launch Ramp (2-15ft. lanes)	SF	10.00	12,000	120,000*
Courtesy Pier	LS	—	—	5,000
Trails/Walkways (AC) (6ft avg.)	LF	9.50	800	7,500
Restroom (s)	EA	100,000	3	300,000
Restroom (p)	EA	4,000	2	8,000
Camp Sites (Camp Site Pad, Table & Fireplace)	EA	4,000	45	180,000
Amphitheater	LS	—	—	20,000
Fire Circle	EA	1,500	3	4,500
Trash Receptacles	EA	150	20	3,000
Signing & Graphics	LS	—	—	4,000
Control Gate	EA	2,000	2	4,000
Landscaping (Tree & Shrubs)	LS	—	—	35,000
Irrigation	LS	—	—	20,000
Potable Water Supply System	LS	—	—	310,000
(Prorate of system from lake, storage tank, distribution lines and appurtenances)				
Sewage Disposal System	LS	—	—	300,000
(Prorate of evaporation ponds, collection lines, pumping stations and force main)				
Sanitary Disposal Station (with holding tank)	LS	—	—	25,000
Electrical Service (Underground)	LS	—	—	35,000
Subtotal				$1,818,000
Contingencies—15%				273,000
Subtotal				2,091,000
Engineering & Design—15%				314,000
Supervision & Administration—12%				251,000
TOTAL				$2,656,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
HOT SPRINGS ROAD CAMP AREA—50 UNITS CLASS A				
Site and Roadway Grubbing & Clearing	LS	—	—	60,000*
Site and Roadway Grading	LS	—	—	180,000*
Road Surfacing & Base (AC) (Access Road 22ft. width)	LF	32.00	2,500	80,000*
Road Surfacing & Base (AC) (Circulation Road 18ft. width)	LF	30.00	500	15,000
Parking Lot Surfacing & Base (AC)	SF	1.60	35,000	56,000
Trails/Walkways (Non-Surfaced)	LS	1.80	2,800	5,000
Restroom (s)	EA	100,000	3	300,000
Camp Sites (Car/Van) (Camp Site Pad, Table & Fireplace)	EA	5,000	50	250,000
Amphitheater	LS	—	—	20,000
Fire Circle	EA	1,500	3	4,500
Trash Receptacles	EA	150	20	3,000
Signing & Graphics	LS	—	—	3,500
Control Gates	EA	2,000	2	4,000
Landscaping (Tree & Shrubs)	LS	—	—	30,000
Irrigation	LS	—	—	20,000
Potable Water Supply System	LS	—	—	325,000
Prorate of pumping system at Cherry Creek Camp Area, storage tank, distribution lines, and appurtenances)				
Sewage Disposal System	LS	—	—	250,000
Prorate of evaporation ponds, collection lines, pumping stations and Force Main)				
Electrical Service (Underground)	LS	—	—	50,000
Subtotal				$1,656,000
Contingencies—15%				248,000
Subtotal				1,904,000
Engineering & Design—15%				286,000
Supervision & Administration—12%				228,000
TOTAL				$2,418,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
HOT SPRINGS ROAD DAY USE AREA				
Site and Roadway Grubbing & Clearing	LS	—	—	18,000*
Site and Roadway Grading	LS	—	—	36,000*
Road Surfacing & Base (AC) (Access Road 22ft. width)	LF	32.00	2,800	90,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	16,000	25,000
Trails/Walkways (Non-Surfaced)	LF	1.80	10,000	18,000
Mini Interpretive Center	LS	—	—	40,000
Restroom (f)	EA	80,000	1	80,000
Overlook Area	LS	—	—	20,000
Group Picnic Area	EA	45,000	1	45,000
Picnic Areas	EA	2,500	10	25,000
Trash Receptacles	EA	150	15	2,000
Signing & Graphics	LS	—	—	1,000
Control Gates	EA	2,000	1	2,000
Landscaping (Trees, Shrubs & Turf)	AC	12,000	4	48,000
Irrigation	AC	15,000	4	60,000
Potable Water Supply System (Prorate of pumping system at Cherry Creek Camp Area, storage tank, distribution lines, and appurtenances)	LS	—	—	150,000
Sewage Disposal System (Septic Tank & Leach Field)	LS	—	—	35,000
Electrical Service (Underground)	LS	—	—	30,000
Subtotal				726,000
Contingencies—15%				109,000
Subtotal				835,000
Engineering & Design—15%				125,000
Supervision & Administration—12%				100,000
TOTAL				$1,060,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
YORTY CREEK GROUP CAMP/EDUCATION AREA				
Site and Roadway Grubbing & Clearing	LS	—	—	7,000*
Site and Roadway Grading	LS	—	—	30,000*
Road Surfacing & Base (AC) (Access Road 22ft. width)	LF	32.00	1,400	45,000*
Parking Lot Surfacing & Base (AC)	SF	1.60	14,000	22,500
Trails/Walkways (Non-Surfaced)	LF	1.80	2,500	4,500
Restroom (s)	EA	100,000	1	100,000
Group Picnic Shelter Unit	EA	45,000	1	45,000
Amphitheater	LS	—	—	20,000
Trash Receptacles	EA	150	10	1,500
Signing & Graphics	LS	—	—	1,000
Control Gate	EA	2,000	1	2,000
Landscaping (Trees & Shrubs)	AC	12,000	1.5	18,000
Irrigation	AC	15,000	1.5	22,500
Potable Water Supply System (Prorate of pumping system at Cherry Creek Camp Area, storage tank, distribution lines, and appurtenances)	LS	—	—	75,000
Sewage Disposal System (Prorate of evaporation ponds, collection lines, pumping stations and force main)	LS	—	—	110,000
Electrical Service (Underground)	LS	—	—	25,000
Subtotal				$529,000
Contingencies—15%				79,000
Subtotal				608,000
Engineering & Design—15%				91,000
Supervision & Administration—12%				73,000
TOTAL				$772,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

8. Cost Estimate

Area/Facility	Unit	Unit Cost	Quantity	Cost
MISCELLANEOUS PROJECT FACILITIES				
Rockpile Road Overlook & Parking	LS	—	—	50,000*
Trail Systems				
Hiking Trails	MI	9,000	18	162,000
Equestrian	MI	3,000	64	192,000
Primitive Camp Areas (8/Camp)	EA	17,000	14	238,000
Boat-in Camp Areas	EA	17,000	12	204,000
Service Roads (12ft. width)	MI	80,000	6	480,000*
Corps and County Service Boat Storage Facility & Docks	LS	—	—	100,000*
Project Utility Systems				
Rockpile Road Overhead Electrical Service	LS	—	—	250,000*
Project Interpretive Programs				
Visitor Center & Fish Hatchery Interpretive Area	LS	—	—	230,000
Mini Interpretive Centers	LS	—	—	140,000
Information & Administration Ctr.	LS	—	—	145,000
Trail Graphics & Objects/In Situ	LS	—	—	75,000
Subtotal				$2,266,000
Contingencies—15%				340,000
Subtotal				2,606,000
Engineering & Design—15%				391,000
Supervision & Administration—12%				313,000
TOTAL				$3,310,000

*Line items that are all or partially included in Accounts other than Account 14 (Recreation Facilities).

Cost of Operations And Maintenance
8.05

The annual cost of operating and maintaining the Lake Sonoma recreation facilities is estimated at $0.55 per anticipated recreation day. At 1,520,000 projected annual visitation (See Appendix E), the estimated operations and maintenance cost is $836,000.

9. Special Problems

User Generated Traffic

9.01 County plans for access to the project site have been consistent with early recreational schemes developed by the Corps. The majority of the existing access routes have been upgraded by the county in preparation for the completion of the dam and recreational areas and plans tentatively have been set for development of a signing system which will direct local and regional traffic from U.S. Highway 101 with a minimum of interference to residents in the area.

9.02 Generally, user traffic will be directed along one of two primary access routes. In the northern portions of the project plans under consideration include the development of Kelly Road from Cloverdale, intersecting relocated Hot Springs Road via a new right-of-way of approximately a half-mile in length. Access to the dam and the southern recreational areas will be predominantly along Canyon Road and the northernmost segment of Dry Creek, from the intersection of Canyon Road at U.S. Highway 101.

9.03 On the basis of current plans, the facilities included as part of the reservoir area will have an actual daily capacity of approximately 12,250. With a reduction factor of 20 percent, this would mean that on a typical day during the peak recreational season, approximately 9,800 persons are expected to visit the area. This translates into about 2,700 automobiles entering and leaving the area each day. Of this number approximately 800 would be expected in the northern portion of the area, utilizing the Cloverdale access route; the remaining larger proportion would enter the site via one of the southern access routes, primarily Canyon Road. With the anticipated improvement of Kelly Road, user-generated traffic volumes will be well within the capacity of existing access routes.

Secondary Growth Near Project

9.04 Secondary growth, as a local private response to increased visitation in the area, will likely be limited to municipalities in the area. Based on current zoning, the Agricultural Exclusive and Primary Agricultural designations prohibit most forms of commercial development. This zoning is consistent with County General Plan recommendations which propose that most future commercial development in the County should occur in or near urban areas. With respect to Lake Sonoma, local commercial development, if it occurs, would be expected in the Cloverdale, Geyserville, and Healdsburg areas.

9.05 Two specific recommendations are included in the County's General Plan:

1. Any proposed development along access routes to Lake Sonoma should be located in the environmentally suitable areas and should not generate a strip-development effect; and,
2. Productive agricultural lands along access routes to the lake should be retained in large parcels.

9.06 The County's Cloverdale Planning Area, one which will be affected by the recreational area, is expected to experience an approximate doubling of population by the year 2000. The County's General Plan indicates that this growth could be accommodated within the City's existing boundaries, making further annexation unnecessary. The area to the south of the project, the Dry Creek Valley, lies within the general area associated with the Healdsburg Planning Area and is currently recommended to remain in agricultural.

9. Special Problems

9.07 During the public comment and response period, the County raised concerns regarding potential adverse growth-inducing impacts of the project. These included:

1. Provision of access to remote, environmentally sensitive areas.
2. Attraction of additional population on a seasonal and annual basis with a demand for additional second home and permanent home development.
3. Impacts on the existing population.
4. Impacts on the local and regional road systems.
5. Impacts on the agricultural and timber resource base of the area.
6. Impacts on the peregrine falcon, and endangered species.
7. Demand for additional commercial and recreational facilities.
8. Costs to the local taxpayer.

9.08 It was recognized that the control of these potential impacts is a County responsibility. However, the Master Plan has been developed in such a manner as to minimize potential adverse impacts while maintaining a high quality recreation area. As a result of Sonoma County's request to abandon the relocated Hot Springs Road west of Cherry Creek, this segment of the road was re-evaluated and eliminated from the plan. Alternative arrangements for access will be made for the two land owners serviced by this road.

Upstream Drainage

9.09 Land use in the upstream watersheds of the Warm Springs and Dry Creek arms of Lake Sonoma is devoted to grazing, harvesting of timber, and open space. There is very little residential activity in these areas. Except during extreme climatic conditions these activities tend to balance each other. Therefore the change in runoff would be relatively minor.

9.10 When a new area is harvested for the timber crop the runoff increases for several years until new growth in the form of grasses and brush become established. This cycle continues in a relatively uniform pattern so that as one area is harvested other areas are recovering their protective vegetative growth.

9.11 The most severe runoff condition will occur as a result of forest and/or grassland fires. This opens extremely large areas to potential erosion. Because the soils and geologic characteristics of the watershed area are generally unstable, this factor combined with the fire hazard makes the upstream area susceptible to extreme erosion, thus introducing large volumes of sediment into the reservoir area. This will also result in increased volumes of debris carried into the lake.

9.12 Because of the relatively low recreational use during the winter these conditions will have little direct effect on the recreational user. However, increased volumes of sediment and debris will have to be removed to eliminate boating hazards. Sediment will build up at the upper ends of the two arms of the lake. Because of the long narrow characteristics of Lake Sonoma this sediment build up will probably only affect the very upper reaches of the Lake. Turbidity of Lake water is potentially a problem during periods of high runoff. However, these periods normally occur in the season of least recreational use and water will be passed through filtration galleries as part of the purification process, thereby eliminating the problem.

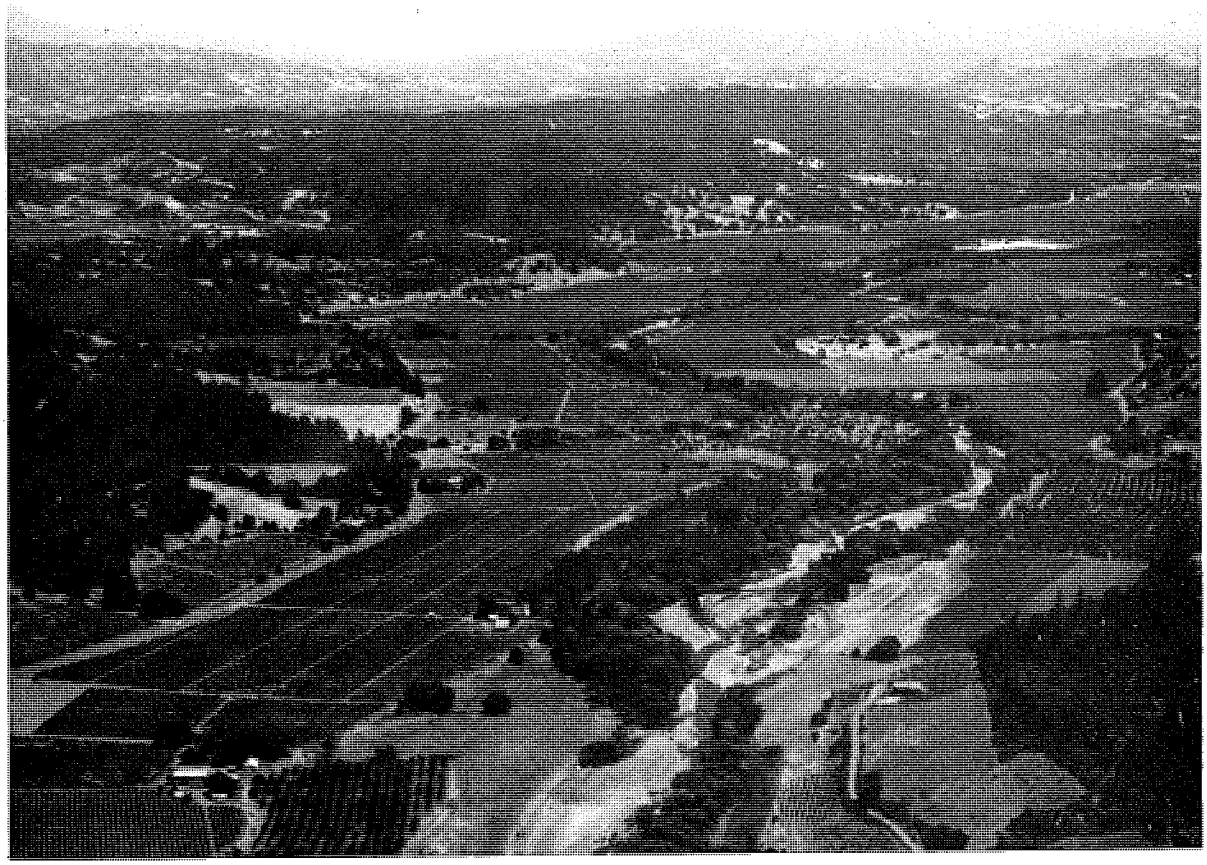
9.13 In summary the most severe upstream watershed conditions will result from a heavy rainfall season following a season of forest and grassland fires. Continued diligence in controlling fires is the best cure for this problem.

Downstream Program

9.14 Proposals for treatment of Dry Creek and its banks from the downstream limits of Corps' property to the Russian River have been discussed in a series of workshops held concurrently with the Lake Sonoma master planning process.

9. Special Problems

9.15 Based on public input and agency review, there will be no land acquisition for public access to Dry Creek in connection with the project and the streambed will not be acquired by the government. It appears that the protection of existing riparian habitat along the stream is desirable. A committee has been established by local interests to investigate alternative methods for preserving riparian vegetation. Prior to any kind of riparian habitat acquisition by the Corps, it would be necessary to secure Congressional authorization through a Post Authorization Change Report.



Endangered Species

9.16 Critical habitat zones for the American peregrine falcon, within and near the project lands, were proposed in 1976 and finalized on August 11, 1977. A new nesting area associated with the Upper Dry Creek arm of the reservoir was later located. This new area is now considered to be a candidate critical habitat zone and is disignated as such within the Master Plan.

9.17 Upon review of the draft Master Plan by the U.S. Fish and Wildlife Service, formal consultation was requested by the Corps pursuant to Section 7 of the Endangered Species Act of 1973 as amended in 1978. A number of opinions and alternatives were issued relating to the existing and candidate critical habitat zones within and near project lands. The major impact concerned the development of recreation facilities and proposed land and water uses along the western section of the proposed relocated Hot Springs Road. The Master Plan, as now revised, does not preclude the implementation of alternatives presented in the Biological Opinion. These alternatives are being assessed and evaluated with the cooperation of the U.S. Fish and Wildlife Service prior to recommendation for implementation.

10. Implementation

Plan Implementation

General
10.01

Implementation of the Master Plan will be phased over several years. Detailed construction drawings and construction will be sequenced to conform with construction of the dam itself. The majority of the dam related facilities will be scheduled for completion prior to the filling of the reservoir. However, most recreation facilities including the fish hatchery and visitor center will be operational by 1983.

Development Priorities
10.02

Planting: The first priority in the construction and implementation of recreation facilities at Lake Sonoma must be the extensive planting of trees and other vegetation in the recreation areas. This planting will begin in 1979. In their present barren condition, it is unlikely that people will use many of the recreation areas because of the intense summer heat accentuated by a lack of shade. Many of the areas must be planted at least five years before they can be opened.

10.03

Facilities: The first priorities for the construction of facilities will include boat launching ramps, swimming beaches and other features which are below the flood pool and must be constructed before the reservoir is filled. In addition, maintenance facilities will be constructed to service areas as they are built. The first areas to be opened to the public will be the Overlook Area, followed by the boat launches and associated day use facilities. The Warm Springs Dam Recreation Area is now being used as the dam contractor's staging area. Recreation facilities at this site will be developed as soon after dam construction is completed as possible.

10.04

In the Warm Springs Dam area the visitor center will be constructed in conjunction with the fish hatchery and may be in operation before closure of the dam. The Overlook Area will be constructed to let the public view the construction of the dam. The Rockpile Road group day use area will be constructed to provide a staging area. The campground and picnic areas will be developed as the tree growth provides shade for the areas. The boat access camping/picnic areas will be developed after the reservoir is filled.

Ongoing Planning

Process is Ongoing
10.05

While the majority of the major facilities are scheduled for detailed planning and construction within the next five-year period, the activites and programs sponsored in conjunction with recreational areas periodically will be reviewed and updated. Adjustments and modifications to operational procedures are anticipated as experience is gained from actual operation of the facility. As the demand for specific types of recreational activities and/or facilities is gauged from operating experience, changes will be possible. It is required that planning associated with the recreational facilities and programs at Lake Sonoma be an ongoing process.

Need for Continuing Input
10.06

In conjunction with the ongoing planning process there will be a continuing need for public and agency input. During the detailed planning and design phase the interested public will be a valuable resource. Many special interest groups have already participated in the planning process and expressed interest in providing further input. As detailed plans for specific types of facilities are developed, and as administrative procedures and operating guidelines are prepared, input from the public prior to actual implementation should be a valuable guide to planners and administrators.

10.07

The same need exists regarding related agencies. A variety of Federal, State, and local agencies will have both direct and indirect interest in the project. As with the public and special interest groups, the inclusion of agency input to the ongoing planning process will be essential.

II. Conclusions and Recommendations

Conclusions

11.1 The Master Plan presents the specific guidelines and plans necessary to provide a basis for designs of recreation facilities at Lake Sonoma. The sensitivity of the project lands and the amount of development possible while maintaining the land's integrity has provided the foundation for the Plan recommendations. Environmental considerations have been balanced with human needs as expressed by recreation demand and public desires. This balance has insured that the resource will be used to its optimum capability and that the ecology of the site will be maintained.

11.2 The Master Plan is the basis upon which future decisions can be made. It sets the tone and scope of the project providing recommendations for design of facilities, architectural theme, layout of public use areas and appropriate uses and use intensities for different sites in the project. It recommends that the Corps maintain control of all construction and design of facilities. It suggests control of recreation areas with a minimum of staff.

11.3 Planting of trees for provision of shade in public use areas and for buffers between uses will be the first priority. Other priorities will be those developments necessary for public safety and to provide recreation as soon as the designated public use areas are available for construction. The last developments will be water edge campgrounds and these will be located and developed as soon as the lake is filled.

11.4 Finally, the Master Plan is part of an ongoing process and must be reviewed and updated as new information becomes available. Continuing public and agency input will keep the plan current and will result in the completed project most responsive to both the site and public desire.

Recommendation

11.5 It is recommended that this Master Plan be approved as the basis for development and management of all facilities at Lake Sonoma. It is further recommended that this Master Plan serve as the basis for development of feature design memoranda, detailed construction drawings and specifications.

Bibliography

City of Healdsburg, *Healdsburg General Plan,* 1978.

City of Cloverdale, *Cloverdale General Plan,* February 1978.

David, J.T. and J.S. Hughes. 1971. Effects of standing timber on fish populations and fisherman success in Bussey Lake, Louisiana. *In* Reservoir Fisheries and Limnology. G.E. Hall (ed.). Amer. Fish. Soc. Spec. Publ. No. 8, pp. 255-268.

Harper, J.A., J.H. Harn, W.W. Bentley and C.F. Yocom. 1967. The status and ecology of the Roosevelt Elk in California. Wildl. Monographs No. 16 49 pp.

Leopold, A.S. 1978. The California Quail. University of California Press, Berkeley.

MacDonald, Roderick & Elizabeth Honeysett, *An Ecological Survey of the Warm Springs Archeological Project Area.* A report to Baumhoff & Orlins for use in their study of the Mahilkaune Pomo. Submitted 11/18/75.

McCullough, D.R. 1969. The Tule Elk: Its history, behavior and ecology. Univ. Calif. Publ. Zool. Vol. 88: 1-209.

Metropolitan Transportation Commission, *Regional Transportation Plan,* Revised April 1977.

Moyle, P. 1976. Inland fishes of California. University of California Press, Berkeley.

Sonoma County, Regional Parks Department, *Russian River Recreation Study,* September 1976.

Sonoma County, *Sonoma County General Plan,* June 1978.

_____, *County of Sonoma Zoning Ordinance,* updated August 1977.

State of California, Department of Fish & Game. *A Public Access Plan Proposal for Dry Creek, Sonoma County, Below the Warm Springs Project, and Its Fishery Enhancement Benefits.* By Alan Baracco, May, 1977.

State of California Department of Finance, *Series E-150,000 Population Projections.*

State of California, California Division of Mines and Geology, *Erosion Along Dry Creek, Sonoma County, California,* Special Report 134, 1977.

_____, Department of Parks and Recreation, *Park and Recreation Information System,* November 1966.

_____, Department of Parks and Recreation. *Visitor Origin Patterns at Outdoor Recreation Sites in California—1965 to 1970.* Recreation Technical and Information Paper by Ralph B. McCormick & Rick Tolley, December, 1973.

Taber, R.D. and R.F. Dasmann. *The blacktailed deer of the chaparral: its life history and management in the North Coast Range of California.* Calif. Dept. of Fish and Game, Game Bulletin No. 8, 163 pp, 1958.

Thelander, C.G. 1977. The breeding status of peregrine falcons in California. Masters thesis, San Jose State University. 112 pp.

U.S. Dept. of Agriculture. *Conservation Treatment of the Dry Creek Watershed.* Prepared for the U.S. Army Corps of Engineers, February, 1966.

U.S. Fish and Wildlife Service. 1978. Warm Springs Dam and Lake Sonoma Project. Unpublished report to District Engineer, Corps of Engineers dated 24 July 1978. 17 pp.

U.S. Army Corps of Engineers District, *Estimating Initial Reservoir Recreation Use, Technical Report No. 2.* Sacramento, October, 1966.

U.S. Army Corps of Engineers, San Francisco District, *Russian River Basin Study: Sonoma and Mendocino Counties, California, Phase I, Study Report,* December 1976.

_____, *Preliminary Master Plan, Warm Springs Dam, Lake Sonoma, Russian River, California:* Design Memorandum No. 1, January 1966.

_____, _____: Design Memorandum No. 3, September 1967.

_____, _____: Relocations Phase 2, Design Memorandum No. 10, September 1967.

_____, _____: Relocations Phase 2, Design Memorandum No. 10, Supplement No. 1, March 1968.

_____, _____: Relocations Phase 2, Design Memorandum No. 10, Supplement No. 2, March 1970.

_____, _____: Fish and Wildlife Facilities, Design Memorandum No. 12, December 1972.

_____, _____: Fish and Wildlife Facilities, Design Memorandum No. 12, Supplement No. 1, December 1974.

Bibliography

U.S. Army Corps of Engineers, Office of the Chief of Engineers, *Final Environmental Impact Statement: Warm Springs Dam and Lake Sonoma Project, Russian River Basin, Sonoma County, California,* Parts I and II, November 1973.

_____, _____: Supplement to Final Environmental Impact Statement, September 1976.

_____, _____: Supplement to Final Environmental Impact Statement, Appendix D—Comments, September 1976.

U.S. Congress, House Document No. 547, *Russian River, Dry Creek Basin, California,* September 12, 1962.

U.S. Department of Health, Education and Welfare, *Water Quality Control Study, Russian River, Dry Creek Basin, California, Warm Springs Dam and Lake Sonoma Project,* Public Health Service, Region IX, San Francisco, California, March 1965.

Urban Research Development Corporation. *Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity.* Prepared for the U.S. Bureau of Outdoor Recreation, January, 1977.

APPENDICES

A. Public Involvement Program

1. Purpose

The purpose of the public involvement program was to identify public and agency interests in the Lake Sonoma Master Plan and to facilitate the incorporation of these interests in the completed plan. Included in the involvement program were several sessions devoted to a review of the current U.S. Fish and Wildlife Service proposals for the downstream area below the project along Dry Creek. The intention was to include the public and concerned agencies from the outset of the process, insuring that all interested parties would have the opportunity to influence the plan as it developed.

2. Format

The principal vehicle for public involvement was a series of workshops, conducted in both Healdsburg and Santa Rosa and scheduled to provide the opportunity for regular information exchange during the course of the study.

a. Mailing list/preliminary interviews

In preparation for the first public meeting a mailing list was compiled from listings of participants maintained by the Corps of Engineers, the California Department of Fish and Game, and other agencies, special interest groups and individuals with a history of involvement in the project. This listing was supplemented by personal interviews with local agency personnel and representatives of private and public organizations interested in the project. The practice of conducting field interviews was continued throughout the course of the project as specific interest groups were identified or as the need for information or contact was identified.

During the process the initial mailing list was updated a number of times; all participants in the public workshops were regularly included in the mailings, as were representatives of the public agencies involved in the study.

b. Public forum

Prior to the series of workshops, a public forum was held in Santa Rosa for the purpose of gauging the initial public interest in the upcoming study and outlining the scope of the study as it had been planned by the study team. The Forum consisted of two separate meetings. An afternoon session was held for agency personnel involved in the study, and an evening session was conducted with the public.

c. Workshops

In addition to the Public Forum, three workshops were conducted. In preparation for each, a workbook was assembled outlining the topics to be discussed and including background information relevant to the workshop activities. These workbooks were mailed at least one week in advance of each workshop to serve as an announcement of the upcoming meeting and to prepare those who planned to attend for the discussions.

While the format of the workshops varied, depending on the nature of the subject and the work to be accomplished, each was an all-day session beginning in the morning and lasting through the afternoon. In most cases discussions were conducted in several small groups of 15-20 persons, randomly assigned as the participants convened. Each workshop included preliminary assemblies for the purpose of opening presentations by the planning team. Concluding large-group sessions also were held for the purpose of individual summary presentations by the discussion groups. Written conclusions of the discussions and findings were recorded by a member of each discussion group. In addition, the results of each workshop were summarized and reported to the participants in a separately mailed feedback report. The succession of workshops and feedback reports provided participants as well as newcomers the opportunity to review and comment on the conclusions of the previous meetings. In addition, through cooperation of the local

press, workshop activities were promulgated to a wide audience, thereby generating substantial additional interest and participation.

As indicated above, the subject matter and format of the workshops varied. The process was one of translating general goals and guidelines into more specific alternatives, and then finally into a single set of development recommendations. To clarify the manner in which the workshops were conducted, each of the three workshops is summarized in the following sections.

3. Workshop I

The purpose of the first workshop, conducted in Healdsburg, 22 July, 1978, was to discuss the general goals and guidelines for the recreational development associated with the Warm Springs Dam and Lake Sonoma Project. Additionally, the workshop addressed the proposals and issues raised by the U.S. Fish and Wildlife Service Report on the area downstream from the dam along Dry Creek.

For purposes of discussion the workshop was divided into separate morning and afternoon sessions. During the morning discussion focused on the recreational goals and guidelines associated with the reservoir area. The afternoon session was devoted to the somewhat separate concerns related to the downstream area. Each session was conducted utilizing a small group discussion format, with a member of the Corps' consulting firm serving as facilitator and elected members of the groups serving as moderator and recorder. At the conclusion of the afternoon discussion session the groups were reconvened for the purpose of summary presentations by each of the discussion groups.

a. Recreational guidelines

As summary of the discussions regarding recreational guidelines for the master plan, the participants generally concluded that: 1) recreational development planned for the lake should be limited in its scope and should not attempt to serve all types of recreational activity; 2) emphasis should be placed on day-use and less-intensive forms of recreation, minimizing commercial concessions; and 3) the development planned for the lake area should conform to the existing natural qualities and rather severe natural constraints posed by the topography of the area.

As will be indicated in the discussion of subsequent workshops, participants at the first workshop suggested rather specific limitations on certain types of activity; the restrictions on powerboating, for example, were later modified by participants of the second workshop.

In other areas of concern, participants made recommendations relating to access, reforestation and preservation of vegetation, control of pollution, and fire protection measures. Specific guidelines were discussed for the amount and type of camping facilities to be provided, and the need for coordinated hiking and equestrian trails throughout the project lands.

A questionnaire, listing a number of recreational activities, was distributed to all participants for the purpose of gauging individual attitudes regarding the appropriateness of specific types of activities and facilities. The questionnaire was designed to include a rating system, using a scale of one to five to indicate a range of "least desirable" to "most desirable." The results were later tabulated and utilized as a guide for further discussion of the recreational facilities.

b. The Dry Creek area downstream

Perhaps the two most important points made regarding the downstream area were: 1) *that public access, in any form, be denied;* and 2) *that current patterns of private ownership be maintained.* Both of these received nearly unanimous support of the individuals in attendance. Related to these recommendations were a number of other considerations regarding the measures used to control erosion, the

commercial extraction of gravel from the streambed, the preservation of riparian vegetation, and the hatchery operation at the base of the dam.

For the purpose of presentation, these topics are presented below along with the proposals of various study groups.

i. Bank and streambed stabilization

With respect to the measures required for controlling erosion, there was general agreement that any measures which are undertaken by the Corps should not include acquisition—of either the streambed or adjacent banks. There was not as clear a consensus as to the specific measures which would be required:

1. Several groups expressed the feeling that adjacent landowners, because of their on-going efforts to control the erosion problem should be consulted before any actions were undertaken.
2. There were several proposals to discontinue the removal of gravel from the streambed; various alternatives were proposed for stabilizing the streambed including the incorporation of check dams as part of the stabilization efforts to halt or slow the downstream movement of gravel.

There was some feeling that the need for erosion control would be greatly reduced after the dam is complete—with controlled flows the natural vegetation itself would have the opportunity to stabilize the banks, thus eliminating the need for more elaborate control measures. While not all groups addressed the question of easements for channel and bank stabilization, several groups indicated that limited easements for erosion control would be acceptable to most landowners if they are specifically required for erosion control measures to be carried out.

ii. Riparian vegetation

With respect to protecting or preserving the natural vegetation along the stream banks, a number of examples were given of efforts by present landowners to replant vegetation that has been lost. One group proposed that the preservation of existing vegetation should be included in a local ordinance in accordance with the county zoning regulations. With respect to bank clearing in general, one group indicated that any such activity which might be proposed should be subject to the advice of a committee of property owners.

Fencing the riparian vegetation as a means of protecting it, a topic addressed at the first public forum, was not the subject of discussion in many groups. At previous meetings, this measure had been severely criticized by landowners. Those groups which did discuss the need for fencing disapproved.

iii. Hatchery

At least four groups discussed the location of the fish hatchery at the base of Warm Springs Dam and questioned the feasibility of alternative locations, either at the base of Coyote Dam or at the juncture of Dry Creek and the Russian River. Several groups recommended a feasibility study be conducted to determine the potential for relocating the hatchery elsewhere. Those groups which did not question the present plans for the hatchery at Warm Springs Dam seemed to conclude that the location would be appropriate provided that the Dry Creek area downstream be closed to fishing and managed as a spawning and nursery stream.

4. Workshop II

The second public workshop was held in Santa Rosa, 19 August, 1978. This workshop was devoted exclusively to the developing master plan for the recreational facilities associated with the reservoir. The primary emphasis of the meeting was the range of recreational alternatives which had been identified by the planning team for the lake and lake area.

a. Recreational master plan alternatives

Based on the planning team's analysis of site constraints, further investigation of the potential to accommodate various types of recreational activity, and the results of the first public workshop, three recreational master plan alternatives were presented at the second workshop. The alternatives were purposefully developed to represent a range of development intensities, from relatively high to relatively low intensity. Each of the alternatives was, however, felt to be feasible and each conformed to the rather specific constraints and limitations posed by the natural characteristics of the site. The variation in the three schemes, in keeping with the range in overall visitor capacity, was based on variation in the types of facilities provided and the number of each type developed. Site constraints tended to limit the alternative locations available for the various activities and facilities to be accommodated.

The alternatives which were presented at the workshop displayed a range in the number of campsites, the number of day use areas, the miles of trails, and the number of potential beach areas. In addition, specific types of activities and facilities were eliminated in the lower intensity alternatives; for example, campsites for recreational vehicles, marina facilities, auto/tent campsites near the lake, were not included in the lower intensity alternative.

b. Method of evaluation

Each of the alternatives was, as indicated earlier, considered equally feasible. The purpose of the second workshop was to gauge public reaction to the range of choices available. To accomplish this, a format of small group discussions was again utilized. Each group was asked to first select an alternative most closely corresponding to the type of recreation considered appropriate by the group and then work together to modify the various features included, if such modification was considered necessary. Workshop participants were asked to consider the demand for and desirability of the various types of activity, their compatibility with the site, and their compatibility with each other, and the alternatives for locating the activities and facilities on the site itself.

c. Workshop results

The most significant results of the second workshop stemmed from the wider range of recreational interests represented. While there was a general consensus regarding the overall level of development appropriate for the project, new interest was expressed in the water use plan. Unlike the representation at the first workshop, a significant proportion of persons attending the second workshop expressed interest in a higher intensity use of the water. Previous restrictions on horsepower and speed which were considered desirable by the majority of persons at the first workshop, effectively eliminated recreational powerboating and water skiing. As a result of the second workshop, alternative arrangements were discussed to incorporate these activities in the master plan.

The results of the workshop indicated a wider range of recreational interests, including powerboating and water skiing. In addition, certain other aspects of the development were adjusted, including facilities for recreational vehicles, staging areas for equestrians, and facilities for educational uses. In general the range and intensity of use most closely conformed to the mid-range alternatives with variations in particular types of facilities both higher and lower than that originally included in the alternative.

5. Workshop III

The third and final workshop in the series was held in Healdsburg, August 26, 1978 and was directed to the U.S. Fish and Wildlife proposals for the area along Dry Creek downstream from the dam.

a. Workshop format

The format for the third workshop varied somewhat from that used previously. Representatives of the public agencies and local organizations involved in the study presented their particular interests in some detail and discussed them in panel format before the entire group. Representatives of the State Water Resources Control Board, the Sonoma County Water Agency, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the Corps of Engineers were included on the panel as well as representatives of two local organizations, the Dry Creek Center of the Farm Bureau and the Dry Creek Valley Association.

Following the morning session, which was devoted entirely to the panel discussion, discussions of the proposals for the downstream area were held in the afternoon, concluding with a general presentation of the discussion group findings.

b. Workshop results

As in the case of each of the preceding workshops, preparation for the third workshop included the development of a workbook. The workbook, as a study guide, included a discussion of the U.S. Fish and Wildlife Report on the downstream area, as well as a point-by-point discussion of the major issues which evolved during the course of the public meetings. The majority of persons attending the workshop, by virtue of their participation in previous workshops and their receipt of the workbook prior to the meeting, were well prepared to discuss the points included in the U.S. Fish and Wildlife Service Report. A number of resolutions were introduced during the course of the meeting, reflecting considerable preparation for the meeting by the variety of local organizations interested in the proposals. On some issues specific alternative actions were introduced for consideration.

The workshop reflected an increased awareness on the part of agency personnel as well as landowners along Dry Creek of the basis for the differing points of view regarding public acquisition and access along the stream. With some important exceptions, the reaction of the workshop participants to public acquisition and access to the stream was unchanged from that which was expressed at previous workshops. The exceptions stem from concern on the part of the landowners for the need to protect the natural environment of the stream. While there was disagreement as to the measures which should be taken, there was general agreement that some means should be sought for insuring the preservation of the riparian habitat.

In summary, the results of the workshop reflected general disapproval of: 1) opening the stream to year-round fishing; 2) public acquisition and development of access to the stream; and 3) any form of public purchase in fee, of either the streambed or the riparian vegetation along the stream. It was recognized that recommendations for the protection of the streambed and riparian habitat reflect concerns of the majority of landowners along Dry Creek, although alternatives to public acquisition of easements, such as local ordinances, local preservation districts, or conservation easements managed as a local public trust were generally favored. With respect to recommended increases in the minimum flows to accommodate the fishery, the majority of participants approved.

6. Public Comment And Response

The Lake Sonoma Draft Master Plan was submitted for public and agency review on December 27, 1978. The initial two month review period was extended with final comments being received on July 10, 1979.

Issues were raised during the review which focused on anticipated impacts of the project. These included comments on the lands and communities surrounding the project as well as the project lands and specific recreation facilities. The issues generally dealt with growth-inducing impacts, critical habitat zones and endangered species, the downstream program (Dry Creek from the Dam to the Russian River), county road improvements, project management plans and overall project related costs.

A. Public Involvement Program

The major issues relating to project lands were centered around two areas. One was the Warm Springs Dam Recreation Area immediately below the dam and the other was the general area surrounding Upper Dry Creek west of Cherry Creek. Concern was expressed that intensive recreational facilities in the Warm Springs Dam Recreation Area would encourage access to the creek resulting in potential damage to adjacent private properties. The plan was revised to eliminate the creekside beach, swimming area, bath house and children's play area. Reductions were made in the numbers of picnic areas, group picnic areas, play fields, and parking spaces. The ethno-botanical and riparian interpretive area was extended to include the entire area adjacent to the west side of the creek.

Sonoma County expressed concern regarding growth-inducing impacts, road improvements, critical habitat zones located within and near project lands, and cost impacts. A large portion of these comments were directed at the upper Dry Creek area. As a result of the County's request to abandon the relocated Hot Springs Road west of Cherry Creek, the segment of the road was re-evaluated and eliminated from the plan. Alternative arrangements for access will be made for the two land owners serviced by this road. Two camping areas and two small boat access areas with car and trailer parking were developed in locations between Hot Springs Road Portal Area and the east side of Cherry Creek to replace the facilities proposed west of Cherry Creek in the draft Master Plan. These areas and facilities are described in Chapter 4, FACILITY DEVELOPMENT PLANS.

The draft Master Plan was reviewed by the U.S. Fish and Wildlife Service. In addition, formal consultation pursuant to Section 7 of the Endangered Species Act of 1973 as amended in 1978 was requested to evaluate the effect of implementing the draft Master Plan on the American peregrine falcon. The Biological Opinion concluded that implementation of the draft Master Plan and associated accumulative impacts would likely jeopardize the continued existence of the peregrine falcon and would likely adversely modify its critical habitat. The Biological Opinion offered a number of alternatives which, if implemented, would remove jeopardy to the species. This revised Master Plan does not preclude implementation of the alternatives contained in the Biological Opinion.

Coordination with the U.S. Fish and Wildlife Service is ongoing.

The state of California Resources Agency made comments regarding boating and fishing; slope stability; water quality and treatment; and waste disposal. Issues raised but not resolved in this plan will be addressed in feature design memoranda and management plans to be prepared in the future.

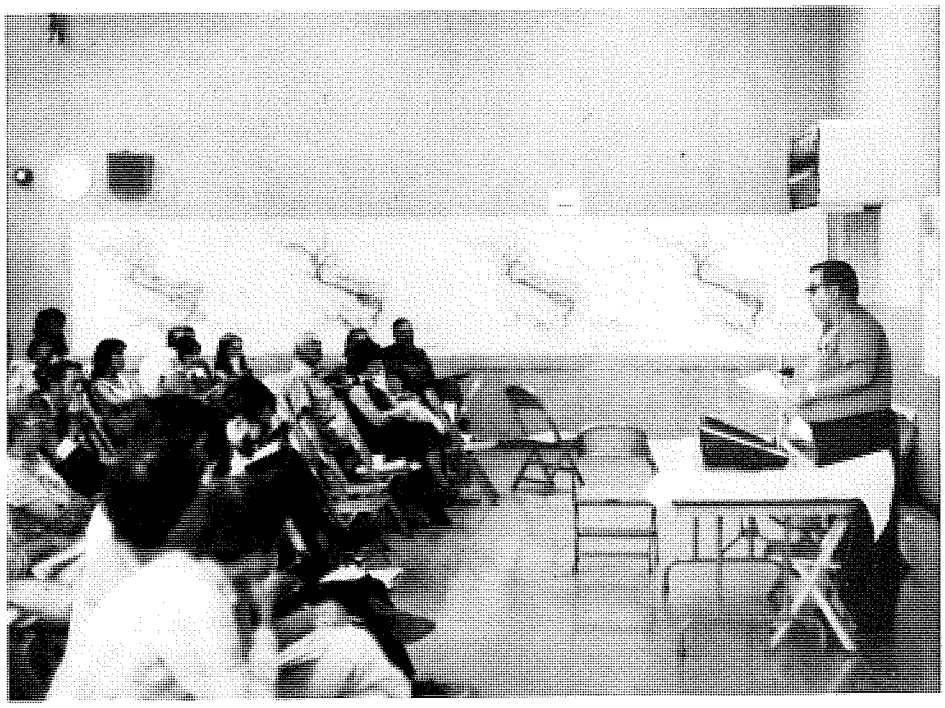
7. Summary of the Public Involvement Program

During the course of the public meetings and workshops a total of 400 to 500 persons were directly involved in the planning process. Some persons participated in the entire series, while others attended only one or more of the meetings which were of particular individual interest. A number of persons corresponded directly with the planning team as reviews of the workshop results were reported by the local news media. Thus while the attendance at each workshop ranged between 80 and 100 persons, approximately 300 persons were maintained on the study's mailing list and were kept informed of the study findings via regular reports of the workshops.

A. Public Involvement Program

Approximately 500 copies of the draft Master Plan were made available for public review. Citizens attending the workshops received copies as well as all involved agencies. Ample opportunity was given for review and comments. All comments were carefully considered and appropriate adjustments were made to the Master Plan based on the best information available.

The importance of the public involvement cannot be overestimated; the workshops provided valuable input to the planning team at such time that decisions regarding recreational development alternatives and project-related actions downstream were being formulated. The public review and comment period was a natural final element in the design process for the Master Plan.



B Laws Applicable to Resource Development and Management

The federal statutes that are listed below are those pieces of legislation that are applicable and determined to have a major impact with respect to the development and management of federal reservoirs according to the intent of the Congress of the United States and the executive office.

Public Law 59-209 June 1906

Public Law 59-209, the Antiquities Act of 1906 (34 Stat.255), 8 June 1906, provides for the preservation and protection of antiquities on public lands. This includes archeological remains and historic sites.

Public Law 534 1944

The 78th Congress Flood Control Act of 1944 provides authority for the Corps of Engineers to develop and maintain power and recreation facilities of water resources projects. Section 4 of Public Law 534 was amended in 1962 by Section 207 of Public Law 87-874. Section 1 of this 1944 law and section 1 of Public Law 14, Seventy-Ninth Congress, known as the River and Harbor Act of 1945, specify coordination with state agencies in planning for flood control and watershed development.

Public Law 85-624 12 August 1958

The Fish and Wildlife Coordination Act, Public Law 85-624, 12 August 1958, provides for integration of fish and wildlife programs with Federal water resource developments. Subsequent legislation has added to and modified the basic act somewhat.

Public Law 86-817 6 September 1960

Public Law 86-817 provides for the protection and improvement of forest cover for reservoir areas under the jurisdiction of the Secretary of the Army and the Chief of Engineers.

Public Law 86-665 1966

The National Historic Preservation Act of 1966 declares that the historical and cultural foundations of the country must be preserved as a living heritage of our background and development. It provides for Federal assistance to state and local governments, private organizations, and individuals for historic preservation projects.

Public Law 91-190 1969

The National Environmental Policy Act of 1969, Public Law 91-190, declares a National Environmental Policy for protection and enhancement of the environment and established a Council on Environmental Quality, and set forth the requirement for an environmental impact statement on any federal action significantly affecting the environment.

Executive Order 11593 13 May 1971

This Executive Order, Protection and Enhancement of the Cultural Environment extends an act legislated in 1966 by providing that projects on federally owned lands must be reviewed to assure protection and upgrading of our cultural surrounding.

Public Law 93-205 28 December 1973

The Federal Law repeals the Endangered Species Act of 1969. Public Law 93-205 is presently referred to as the Endangered Species Act of 1973. This act is concerned with the development and management of any endangered species of fish, wildlife or plant within federally owned or operated land, and stipulates that any proposed developments allow for the protection of threatened species and species of a wide range of influence, such as migratory waterfowl and fish.

Additionally, there are numerous Federal Laws, Executive Orders, and interagency agreements that may also be applicable including:

Federal Laws cited in EM 1120-2-101, 12 December 1964 detailing policies and procedures discussing Corps of Engineers coordination with other federal agencies.

Public Law 87-77 22 July 1961

Federal Water Pollution Control Act, 1961, amends the Federal Water Pollution Control Act of 1956 to provide for a more effective program of water pollution control and for other purposes by extending Federal authoirty and increasing construction grant authority.

B. Laws Applicable to Resource Development and Management

Public Law 89-234
1965

The Water Quality Act of 1965, amends previous laws establishing the Federal Water Pollution Control Administration and transfers administration to the Department of the Interior.

Public Law 89-80
22 July 1965

The Water Resources Planning Act establishes the National Water Resources Council to bring together and coordinate the variety of activities of Federal, State and local government agencies concerned with water resources development.

Public Law 89-72
9 July 1965

The Federal Water Project Recreation Act of 1965, provides for the participation of non-federal public agencies in project recreation financing and administration. Since the project was funded for advance engineering and design prior to FY 1966 and since recreation was specifically authorized in the project document, recreational development, cost allocations and cost-sharing provisions will be in accordance with the policy and procedures specified in the authorizing document. The Report of the Board of Engineers and Harbors, contained in the Project Document and concurred with by the Chief of Engineers, states that: "It finds that the recommended improvements are needed and economically justified, but that no cash contribution for recreational purposes should be required." Therefore, there are no requirements of local cooperation or cost sharing for recreation.

Public Law 93-291
1974

The Preservation of Historic and Archeological Data Act permits the expenditure of to one percent of the amount appropriated for a Civil Works project for survey, recovery, analysis and reporting of important (scientific, historical, archeological and paleontological) data which may be lost as the result of Civil Works under Corps jurisdiction, including non-Federal lands provided by local interests for certain types of projects. The authorities of P.L. 93-291 apply to operating projects as well as those in the planning and design stages.

C. Previous Design Memoranda

No.	Title	Dates Submitted to: Dist. Eng. / Div. Eng.	Date Approved
1.	Preliminary Master Plan	31 January, 1966 29 March, 1966	19 July, 1966
2.	Hydrologic and Hydraulic Analysis	28 June, 1967 14 July, 1967	27 September, 1967
3.	General Design Memorandum	29 September 1967 19 October, 1967	25 March, 1968
4.	Relocation, Phase I	14 July, 1967 14 December, 1966	4 April, 1967
	Relocation, Phase I Supplement	14 July, 1967 17 August, 1967	29 September, 1967
5.	Real Estate Parcel	2 December, 1966 12 December, 1966	14 April, 1967
6.	Cemetery Relocation Parcels	20 January, 1966 6 February, 1967	7 June, 1967
7.	Real Estate, Final	30 June, 1967 3 August, 1967	6 June, 1968
8.	Cemetery Relocation Final	27 July, 1967 15 August, 1967	4 December, 1967
9.	Geologic	15 September, 1967 16 October, 1967	27 November, 1967
10.	Relocations, Phase II	22 September, 1967 13 October, 1967	12 December, 1967
	Supplement No. 1—Warm Springs Creek Bridge and Cherry Creek Bridge	25 March, 1968 23 April, 1968	22 July, 1968
	Supplement No. 2—Utilities	12 March, 1970 22 April, 1970	28 May, 1970
11.	Administrative Facilities	25 January, 1968 21 February, 1968	15 March, 1968
12.	Fish and Wildlife Facilities	22 December, 1972 16 May, 1973	13 December, 1973
	Supplement No. 1	13 May 1974	11 July, 1974
13.	Spillway and Outlet Works	25 May, 1970 1 July, 1970	21 September, 1970
	Supplement No. 1	14 January, 1972 21 March, 1972	15 June, 1972
	Supplement No. 2	12 June, 1972 1 September, 1972	27 October, 1972
14.	Master Plan		
15.	Soils, Construction Materials and Dam Embankment Design	30 October, 1970 10 December, 1971	14 January, 1971
16.	Instrumentation	30 October, 1970 10 December, 1970	25 January, 1971
17.	Reservoir Clearing	12 January, 1973 26 March, 1973	2 May, 1973
18.	Channel Improvements		
19.	Concrete Aggregate Investigation	13 April, 1970 29 April, 1970	20 July, 1970

D. Potential Visitation

For the purpose of determining potential visitation, a 100 mile road distance from the project is used as the zone of influence (See Figure 8). Specifically, when the largest city (centroid) of a given County is within 100 road miles of the project, the entire County is included in the Zone of Influence and used in determining potential visitation. Fourteen Counties fall within the 100 mile radius as defined above; they are Sonoma, Marin, San Francisco, San Mateo, Alameda, Contra Costa, Solano, Sacramento, Napa, Yolo, Mendocino, Colusa, Lake and Glenn.

The total estimated population (1) of these Counties in 1977 was 4,859,200. Projected population for 1985 (the project is due to open in 1983) is 5,076,200 and projected population for 2020 is 6,747,600. Table D-1 illustrates these figures.

1. Population statistics from the California Department of Finance, Series E-150,000 Projections.

TABLE D-1 **Population of Counties within a 100-Mile Radius of Warm Springs Dam**

County	1977 Population[1]	County Centroid	Distance From Project (Road Miles)	County Population Projections[1] 1985	2020
Sonoma	256,700	Santa Rosa	26	316,300	565,500
Marin	221,400	San Rafael	60	242,300	318,800
San Francisco	662,700	San Francisco	80	633,200	664,000
San Mateo	584,600	San Mateo	100	620,000	660,300
Alameda	1,092,900	Oakland	90	1,140,600	1,300,500
Contra Costa	598,700	Concord	85	678,700	935,600
Solano	197,500	Vallejo	70	249,300	540,200
Sacramento	706,300	Sacramento	95	813,900	1,146,100
Napa	92,700	Napa	60	112,800	200,200
Yolo	106,000	Davis	80	120,900	171,100
Mendocino	60,200	Ukiah	40	72,800	129,800
Colusa	12,750	Colusa	80	13,900	18,900
Lake	26,850	Lakeport	50	38,000	64,700
Glenn	20,000	Willows	100	23,500	31,900
	4,667,450	—	—	5,076,200	6,747,600
Obers Projection				(5,106,400)	(6,573,800)

1. From Series E-150,000 Projections, California Department of Finance
Source: California Department of Finance

A comparison between the State Series E-150,000 and OBERS Series "E" population projections for the fourteen counties associated with Lake Sonoma shows that the OBERS 1985 projected population exceeds the State projection by about 30,000 while for the year 2020 the State population projection is about 171,000 greater than the OBERS. A more detailed comparison based on the following county cluster of Alameda, Contra Costa, Lake, Marin, Mendocino, Napa, San Francisco, San Mateo, Solano, and Sonoma reveals that the State projections are less than the OBERS projections for both 1985 and 2020. A comparison of the four county cluster of Colusa, Glenn, Sacramento, and Yolo reveals that the State population projections are significantly greater than the OBERS projections for the projected time periods.

D. Potential Visitation

The annual recreation visitation which might be expected at the Lake Sonoma project was estimated using the method and data in Technical Report No. 2, dated October, 1962[2]. Three Corps reservoirs with known patterns of visitation were selected for their relative similarity to the proposed Lake Sonoma in characteristics and location relative to population centers.

The reservoirs chosen are: Toronto, Black Butte and Detroit. Table D-2 compares some characteristics of these three reservoirs with Lake Sonoma:

2. Estimating Initial Reservoir Recreation Use, Technical Report No. 2. Prepared by the U.S. Army Engineer District, Sacramento, October 1969.

TABLE D-2 Comparison of Lake Sonoma with Similar Reservoirs

Recreation Pool	Warm Springs	Toronto	Black Butte	Detroit
Surface Acres	2,700	2,800	2,845	3,708
Shoreline Miles	53	51	25	36.5
Access Areas	3	5	5	11
Facilities				
Tent & Trailer Spaces	306	50	37	394
Day Use Capacity	9,030	3,800	10,000	8,000
Launch Lanes	7	6	7	7
Overnight Use (%)	20%	19%	6%	21%
Competing Areas (Acres)				
0-25 miles	0	2,450	1,310	0
25-50 miles	60,000+	11,330+	3,900	3,700

Utilizing the regression curves (from Technical Report No. 2) representing day use at the three comparable reservoirs, we can arrive at an expected curve for Lake Sonoma which shows potential day use given distance from the project (See Figure D-1). Thus, to determine the probable initial day use of the project, the population of the fourteen counties with most of their population in the zone of influence was projected to 1985 and the amount of visitation that each county would probably contribute to the project was calculated according to the distance in road miles of the population centroid of the County from Lake Sonoma. See Table D-3 for projected visitation using this method.

D. Potential Visitation

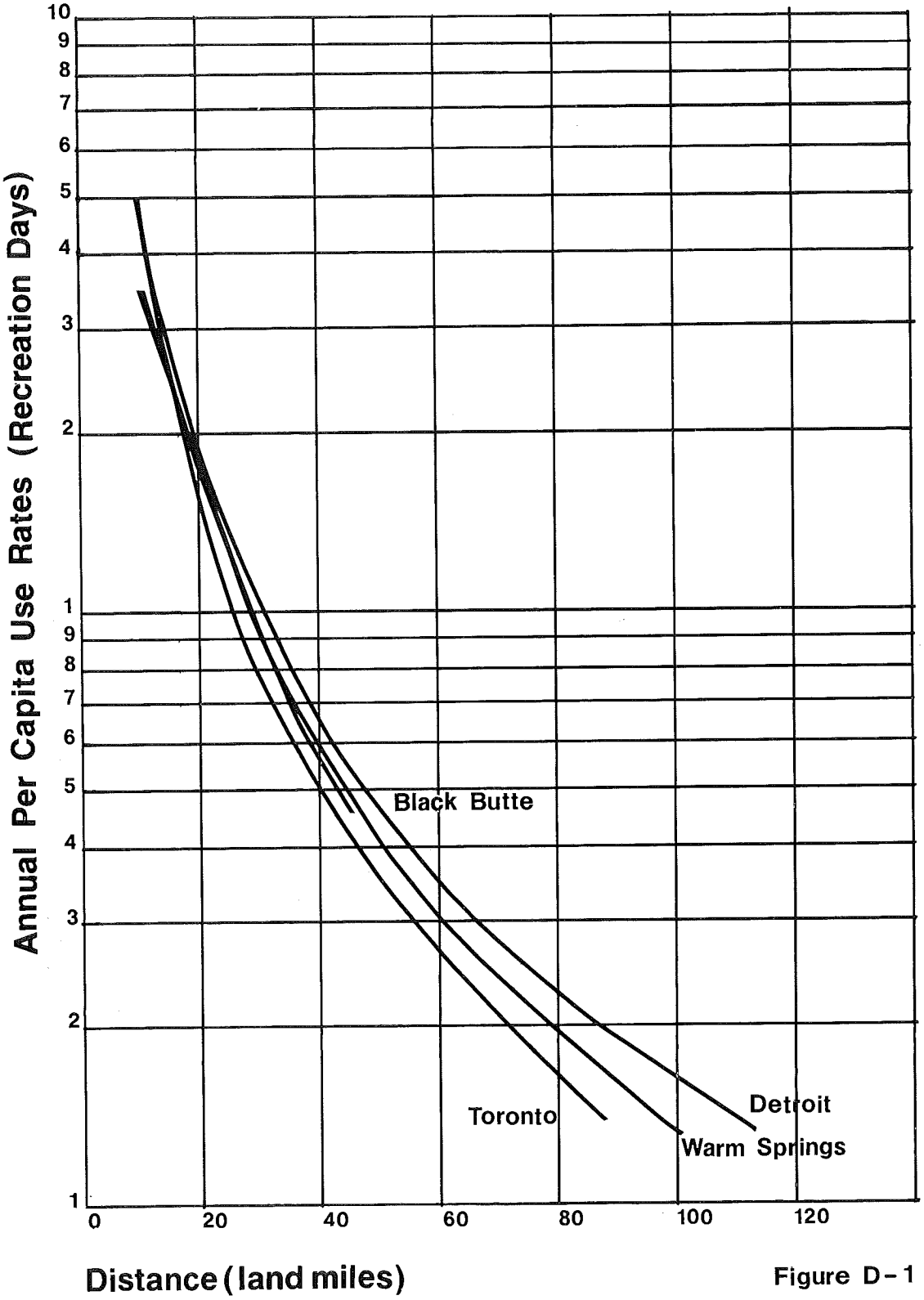


Figure D-1

D. Potential Visitation

TABLE D-3

Lake Sonoma 1985 Project Potential Visitation

County	Distance (Centroid to Project)	Per Capita Use Factor	Population	Visitation
Sonoma	26	1.25	316,000	395,400
Marin	60	0.30	242,300	72,700
San Francisco	80	0.19	633,200	120,300
San Mateo	100	0.13	620,000	80,600
Alameda	90	0.16	1,140,600	182,500
Contra Costa	85	0.175	678,700	118,800
Solano	70	0.24	249,300	56,800
Sacramento	95	0.14	813,900	113,900
Napa	60	0.30	112,800	38,800
Yolo	80	0.19	120,900	23,000
Mendocino	40	0.58	72,800	42,200
Colusa	80	0.19	13,900	2,600
Lake	50	0.40	38,000	15,200
Glenn	100	0.13	23,500	3,100
		Subtotal:		1,268,900
		+ 10% (out of area)[3]		1,395,800
		+ 10% (overnight)		1,695,000
		TOTAL VISITATION		1,695,000

TABLE D-4

Lake Sonoma 2020 Projected Potential Visitation

County	Distance (Centroid to Project)	Per Capita Use Factor	Population	Visitation
Sonoma	26	1.25	565,500	706,900
Marin	60	0.30	318,800	95,600
San Francisco	80	0.19	664,000	126,200
San Mateo	100	0.13	660,300	85,800
Alameda	90	0.16	1,300,500	208,100
Contra Costa	85	0.175	935,600	163,700
Solano	70	0.24	540,200	129,700
Sacramento	95	0.14	1,146,100	160,500
Napa	60	0.30	200,200	60,100
Yolo	80	0.19	171,100	32,500
Mendocino	40	0.58	129,800	75,300
Colusa	80	0.19	18,900	3,600
Lake	50	0.40	64,700	25,900
Glenn	100	0.13	31,900	4,100
		Subtotal		1,878,000
		+ 10% (out of area)[3]		2,066,000
		+ 20% (overnight)		2,479,000
		TOTAL VISITATION		2,479,000

3. California Department of Parks and Recreation, *Visitor Origin Patterns at Outdoor Recreation Sites in California—1965 to 1970.* Recreation Technical and Information Paper by Ralph B. McCormick & Rick Tolley, Dec. 1973.

E. Carrying Capacity and Projected Visitation

Carrying Capacity and Projected Visitation Based on the Master Plan and Environmental Factors

Utilizing the resource base information (Chapter 2) and the Site Opportunities and Constraints diagram (Plate 10), the Master Plan was developed which established recreation use locations and the size of each use area. Based on experience at Lake Mendocino and other similar environments, ideal densities of development were determined and, applying density to acres and facilities allotted, daily capacities were determined. Table E-1 illustrates these capacities and arrives at a total *potential* dialy capacity/use of 12,334 activity days for an average day in the peak month.

All project recreation facilities would not be in daily operation at any one time due to necessary maintenance, repair, and other operational conditions. A factor of 0.90 has been applied to potential daily capacity/use to arrive at an average daily capacity/use of 11,100 activity days. An "activity day" is defined as the use of one facility or activity by one person during a 24 hour period.

The average daily capacity/use is based on use at all of the project facilities during any 24 hour period. In some cases, a visitor will be using more than one facility during this period. In order to determine the actual number of daily visitors or visitation, a conversion factor of 0.80 has been applied to the average daily carrying capacity to arrive at an *Estimate Daily Visitation* of 8,880 recreation days. A "recreation day" is defined as one user's day at the project participating in one or more activities.

It is known that there will be days during the recreation season that visitation will actually be higher than the carrying capacity of this project. These "peak" days would occur on the Memorial Day and Fourth of July holidays and/or on Sundays occuring near these holidays and during the month of June. Estimated "peak" day visitation will be 14,600 recreation days.

Seasonal climatic conditions and water fluctuation will account for the facilities being highly used in the spring and summer months and less frequently used in the fall and winter. Based on visitation records at Lake Mendocino, it can be expected that the actual use of facilities will average approximately 46% of capacity for each day of the year. Applying this factor to Estimated Daily Visitation, the projected average daily visitation is 4,085 and a projected Annual Visitation of 1,500,000.

A check of these figures was calculated as follows: The percentage of the total visitation occuring each month at Lake Mendocino was determined. These percentages were applied to the capacity of Lake Sonoma as determined by the environmental factors and the estimate daily visitation of 8,880. Table E-2 summarizes this data arriving at a projected Annual Visitation of 1,520,000.

Using the higher of the two projections just illustrated, the anticipated Annual Visitation to the Lake Sonoma Project is 1,520,000.

E. Carrying Capacity and Projected Visitation

TABLE E-1
Estimated Project Daily User Carrying Capacity
Based on Master Plan, Environmental Factors and Use Standards

Facility	Unit	Quantity	Capacity Per Unit	Instantaneous Capacity	Turnover Factor	Average Daily Use	Use on Peak Day
Warm Springs Dam Recreation Area							
Visitor Center/Fish Hatchery	Allowance			400	5	2000	3,200
Interpretive Area	Allowance			200	4	800	1,400
Day Use Area	Acres	12	50	600	1.25	750	1,200
Project Overlook	Parking	34	3	102	6	612	1,225
Skaggs Spr. Equestrian/Day Use	Parking	40	1.5	60	1	60	60
Marina	Boat Slips	150	2.8	420	1.5	630	840
Lake Sonoma Boat Launch/Beach Area							
Boat Ramp (5 Lanes)	Trailer Park	120	3.33	400	1.75	700	800
Beach Area	Acres	0.9	150	135	2	270	405
Day Use Area	Acres	5	50	250	1.25	312	500
Buzzard Rock Camp Area							
RV Camping	Campsites	75	4	300	1	300	300
Group Camping	Allowance			200	1	200	200
Oak Knolls Camp Area	Campsites	128	4	612	1	612	610
Skaggs Springs Beach	Acres	0.75	100	75	1.5	112	150
Warm Springs Beach	Acres	1.25	150	188	1.5	281	375
Hot Springs Road Portal Area	Allowance			40	3	120	240
North Lake Equestrian Area	Allowance			40	1	40	40
Yorty Creek Boat Access Area	Trailer Park	80	2.75	220	1.5	330	440
Yorty Creek Beach Area	Acres	2	150	300	1.5	450	600
Cherry Creek Camp Area							
Walk-In/Boat-In Camping	Campsites	45	3.5	158	1	158	158
Boat Ramp	Trailer Park	40	3	120	1	120	180
Hot Springs Road Camp Area	Campsites	50	4	200	1	100	200
Hot Springs Road Day Use Area							
Interpretive Area	Allowance			50	3	150	300
Day Use Area	Acres	6	50	300	1.25	375	600
Yorty Creek Group Camp Area	Allowance			180	1	180	180
Miscellaneous Uses							
Trails	Miles	82	6	492	1	492	737
Primitive & Boat-In Camping	Campsites	208	2.5	520	1	520	520
Shoreline Fishing	Allowance			280	2	560	840
General Sightseeing	Allowance			1,000	1	1,000	2,000
POTENTIAL TOTALS (Activity Days)				7,842		12,334	18,300
Operational Reduction Factor						0.90	1.00
Average Daily Capacity/Use (Activity Days)						11,100	18,300
Multi-Visit Conversion Factor						0.80	0.80
ADJUSTED ESTIMATED DAILY VISITATION (Recreation Days)						8,880	14,600

E. Carrying Capacity and Projected Visitation

TABLE E-2

Projected Monthly and Annual Visitation

Based on Master Plan, Environmental Factors, Use Standards and an Estimated Average Daily Visitation of 8,880.

Month	Per Cent of Year	User Days per Month	
January	3.0	46,000	
February	4.0	61,000	
March	4.0	61,000	
April	8.0	122,000	
May	14.0	213,000	
June	17.75	270,000*	(Peak Month)
July	17.0	257,000	
August	16.25	246,000	
September	5.0	76,000	
October	4.0	61,000	
November	4.0	61,000	
December	3.0	46,000	
Projected Annual Visitation	100%	1,520,000	

*8,880 x 365/12 = 270,000 ±
270,000 ÷ .1775 = 1,520,000 ±

F. Consulting Team Staff

ROYSTON, HANAMOTO, BECK & ABEY—Prime Consultant, Landscape Architure, Planning

Robert N. Royston	Principal
Louis G. Alley	Principal in Charge
Robert S. Sena	Project Director
Robert T. Batterton	Associate: Design
Barbara D. Lundburg	Associate Project Director
Graphics	*Staff*
Sarah Kneeland	Beth Horsfield
Sarah Sutton	Thelma Holly
Sherman Hom	Lyle Smith

ROBERT IRONSIDE & ASSOCIATES—Regional Planning & Public Involvement

Robert L. Ironside	Principal
Roy Craun	Project Associate
Margaret Warne Monroe	Associate Planner

BIOSYSTEMS ANALYSIS, Inc.—Biology

Jack Elder	Principal
Rodney Jackson	Wildlife Biologist
Carl Thelander	Wildlife Biologist

PROMONTORY PARTNERSHIP—Architecture & Resource Interpretation

Harry Rodda	Principal: Architecture
Barry Howard	Principal: Interpretation
Linda Mathews	Associate: Architecture
John Moy	Associate: Interpretation
Brian Peters	Architectural Graphics

CREEGAN & D'ANGELO—Engineering

Stanley Kulakow	Senior Civil Engineer
James Turturici	Junior Civil Engineer

JOHN KENNETH DECKER—Recreation

CANNON PRESS—Lithography

Sonoma

SPKED-D (17 Jan 84)
SUBJECT: Lake Sonoma Marina Concession

TO: Chief, C-O Division FROM: Chief, Engineering Div DATE: 1 May 1984 CMT 2
SILLER/3288/lw

1. Reference SPKED-F Memo to File dated 25 Apr 84, Subject: "Geotechnical Reconnaissance of Proposed Access Road, Parking Lot, and Marina Site at Warm Springs Dam, California".

2. The proposed marina as shown in the Master Plan (DM No. 14) is not feasible to build due to the steep slopes transversed by the access road from the General Store to the marina land support facilities. Geology recommends not building in this area because the cut slopes would be unstable and part of the area is overlaid with uncompacted wasted material from Rockpile Road. An alternative access to the marina is proposed in the Boat Launch and Beach Area, Marina Area, Warm Springs Beach, Feature Design Memorandum (FDM No. 22, not approved). This road crosses an area where the cut slopes are more favorable, but its grade would be up to 18 percent. The road is constructible, but its grade should be restricted to a maximum of 12 percent.

3. A second marina as mentioned in the Market Analysis for Marina Concession for Lake Sonoma is located at the end of the abandoned Skaggs Spring Road detour. This site appears more suited for a marina and marina support facilities. The grade on the existing road varies, with a maximum of 10 percent occurring in short reaches. Soft spots exist in several locations, caused by water, under the road, and would require rehabilitating. The marina and marina support facilities are constructible at this site and cost would be reduced since an existing access road is present.

4. The information in this DF was discussed between Messrs. Joseph Holmberg, C-O Div, and George Siller, Utilities Sec, on 1 May.

1 Incl
SPKED-F Memo to File dtd 25Apr84

GEORGE C. WEDDELL
Chief, Engineering Division

cc:
Ops Br (Adv cy)
Sonoma Lake
Civ Des Br
Util Sec

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
SPKCO-O	Lake Sonoma Marina Concession

TO Chief, Engr Div FROM Chief, C-O Div DATE 17 Jan 84 CMT 1

HOLMBERG/bs/2797

1. Reference: 4 January 1984 Market Analysis for Marina Concession facilities for Lake Sonoma prepared by SPKRE-A (copy provided to Engr Div).

2. A marina concession is included in the approved Lake Sonoma minimal plan. However, its inclusion was predicated on the concessionaire providing all facilities including such non-revenue generating facilities as roads, parking, sanitation and water supply and distribution. The referenced market analysis indicates that the operation of a marina with the constraint of installing and maintaining extensive, non-revenue generating facilities would not be profitable but, if the government installed and maintained the non-revenue generating facilities, a marina concession would be very successful. The market analysis recommends that the concessionare be required to provide between 1.5 and 2.0 million dollars of the support facilities which would still enable good profitability. The analysis also suggests relocating the marina facilities directly across the Warm Springs Arm of the lake which would possibly reduce costs of support facilities.

3. You are requested to determine the constructability of both the marina support facilities shown in the Master Plan (DM 14) and marina support facilities located near the alignment of the now abandoned Skaggs Springs Road detour which originates near the project overlook. To permit timely preparation of a request for proposals for the marina concession, this constructability determination should be completed by 1 May 1984. The work should be charged to Construction-General.

D. A. DENNIS
Chief, Construction-Operations Division

cc:
Sonoma
Ops Br

SPKED-F

1 May 1984

MEMO FOR FILE

SUBJECT: Geotechnical Reconnaissance of Proposed Access Road, Parking Lot, and Marina Site at Warm Springs Dam, California

1. On 12 and 13 April 1984, Messrs. G. Siller from Utilities, J. Holmberg from C-O Division, two of the dam personnel, and the undersigned visited the site for the purpose of evaluating several proposed alignments of the access road and marina site.

2. An alternate route briefly inspected extended from the edge of the proposed parking lot for the boat ramp to the marina as located in Feature Design Memorandum Number 22. Since this route would cross one small slide area (as delineated by J.H. Kleinfelder & Associates) downslope and to the east of the proposed General Store and also have to traverse a heavily wooded steep slope to the south of the Store it was considered to be not feasible to construct an access road in this area.

3. The second route investigated is the one shown on Plates 10 and 11 of DM #22 (see inclosed map). The slope on either side of the gully has a slightly hummocky appearance indicative of an old slide area or an area of active soil creep. The slightly benched area just below Rockpile Road is probably fill emplaced during road construction. At station 1+50 along the road centerline there is approximately 12 to 14 feet of fill with no apparent bedrock at the bottom of the gully. This material will have to be removed down to bedrock prior to any construction and this may make the upper slope of the road too steep. At station 3+10 there is at least 5 feet of overburden and highly weathered rock that would have to be removed in order to get to bedrock. At elevation 650 the main gully is 6 to 8 feet deep and has highly weathered bedrock at the base. At elevation 600 there is firm bedrock at the base of the gully.

The material along the route from station 0+15 to 2+00 will not be stable enough to stand on the uphill roadcut without being engineered. The material from station 2+00 to ± 9+00 will have to be excavated to some unknown depth to get out of the highly weathered material and into firmer rock that can be used for the roadbase. The overburden in the entire area may continue to creep and ravel along the roadcuts during periods of prolonged rainfall.

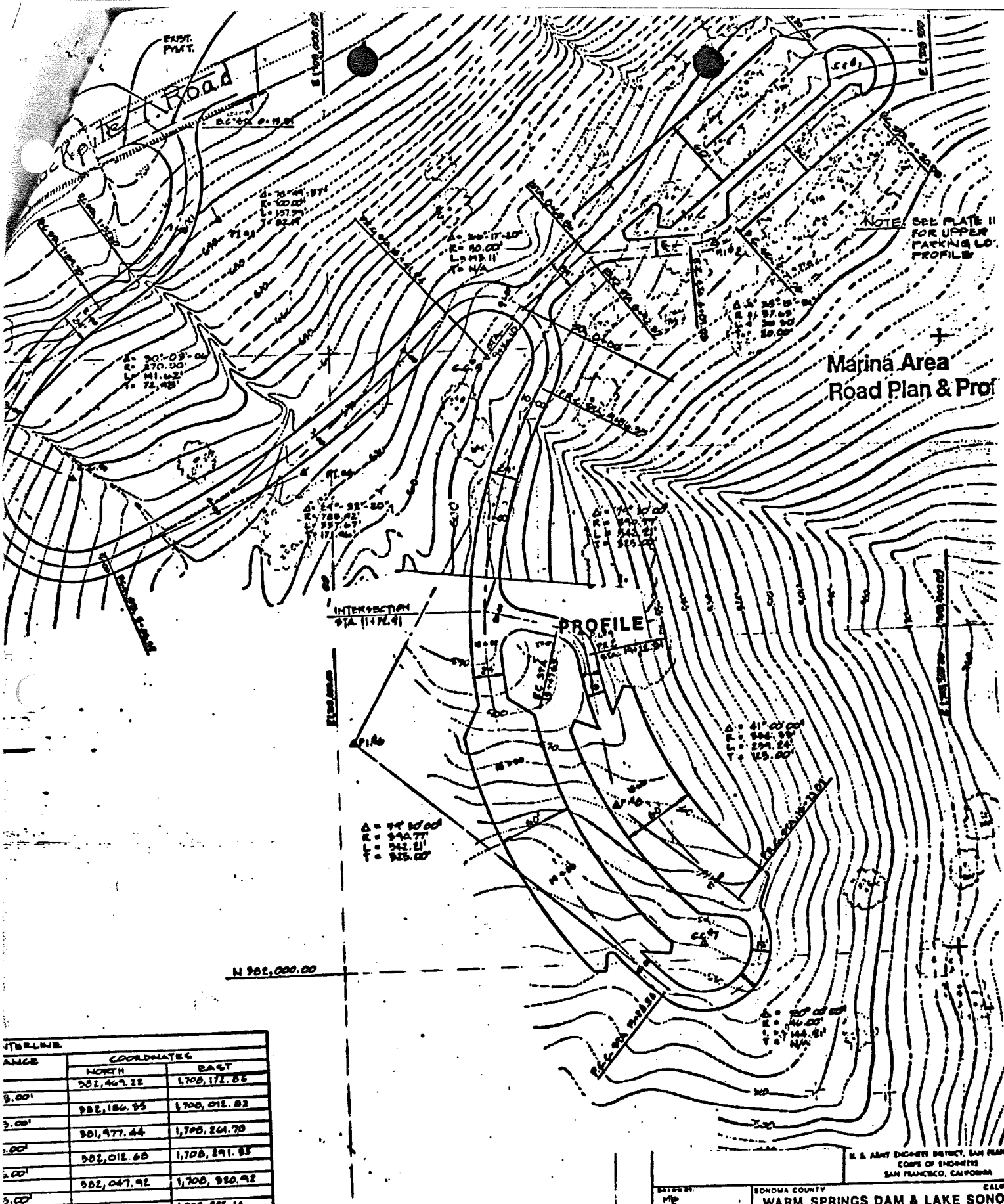
There are outcrops of Fransiscan sandstone (graywacke) along the nose from elevation ± 585 down and this area should provide a suitable base for the parking lot and marina site.

4. There is an existing road on the east side of Warm Springs Creek opposite the proposed marina site. It was used as egress from Skaggs Spring Road during construction of the dam and thus subject to heavy traffic. It is in some disrepair now but it could be brought back into good condition without an extensive exploration program to prove the access route. A location for the marina and parking lots could probably be found on this side of Warm Springs Creek at a considerable saving of costs.

J. J. Gewerth Jr.

J. J. GEWERTH JR.
Geologist

c.c. Geotech
Geol
Utilities (Siller)



...TERLINE ...ANCE	COORDINATES	
	NORTH	EAST
0.00'	982,469.22	1,708,172.86
0.00'	982,186.85	1,708,012.82
.00'	981,977.44	1,708,261.78
0.00'	982,012.66	1,708,291.85
0.00'	982,047.92	1,708,320.92
0.00'	982,118.57	1,708,275.16
2.	982,271.48	1,708,202.40
32.46'	982,291.44	1,708,192.47

U. S. ARMY ENGINEER DISTRICT, SAN FRANCI
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

SONOMA COUNTY CALIFO

WARM SPRINGS DAM & LAKE SONOM
RECREATIONAL DEVELOPMEN
BOAT LAUNCH/BEACH AREA,
MARINA AND WARM SPRINGS BEACH

PREPARED UNDER THE DIRECTION OF
PAUL BAZELON, JR.
COLONEL, C.E., DISTRICT ENGINEER

DRAWING NUMBER
M-C1 | 61.1 | 34 | 1

LAKE SONOMA MASTER PLAN
DESIGN MEMORANDUM NUMBER 14
SUPPLEMENT NUMBER 1
JANUARY 1985

MARINA

4.17 A marina, to be operated by a concessioner, has been located at a site protected from wind (Plate 14a). Due to steep slopes behind it which continue well below elevation 451, this location is minimally affected by lake fluctuation. Access will be essentially by following the alignment of the old Skaggs Springs detour road connecting with Stewarts Point Road near the entrance to the project overlook. Parking for 275 vehicles is located near elevation 451.

4.18 Additional concessioner operated recreational facilities to be provided on the Stewarts Point Road side of the Warm Springs Creek arm of the lake include swimming beach, launch ramp, water ski beach, dry boat storage, a 46 unit campground, and an equestrian livery.

4.19 Concessioner operated recreational facilities to be provided at a Hilltop Activity Center located south of Rockpile Road a third of a mile west of Warm Springs Bridge include general store, delicatessen, game room, landromat, boat sales and chandlery, parking and a 70 unit recreational vehicle park. The Hilltop Activity Center is sited at elevation 700 on a promontory which affords excellent views of the lake, Warm Springs Bridge and Warm Springs Dam.

4.20 The marina itself has 250 slips for storage of private and rental boats. A gas dock, delicatessen, marina office, fishing center, water-ski school and boat service area is located on the marina landing adjacent to the boat storage berths. The marina fluctuates with the water level and changes minimally in horizontal position.

WARM SPRINGS PROJECT
RECREATIONAL DEVELOPMENT PRIORITY

Area		D.M. 14 Cost
Minimal Level		
1. Lake Sonoma Boat Launch and Beach Area (less boat ramp).		$2,900,000
2. Buzzard Rock Camp (less underpass and group picnic)		3,100,000
3. Miscellaneous Project Facilities (boat access camping only, using self composting toilets)		200,000
4. Skaggs Springs Equestrian Area		500,000
5. Warm Springs Dam Recreation Area (less pedestrian underpasses, mini-interpretive areas and assembly area)		2,600,000
6. Marina (all facilities including roads and utilities by concessionaire)		- 0 -
7. Miscellaneous Project Facilities (trails in dam area only)		300,000
	SUBTOTAL	$9,600,000
Adequate Level		
8. Oak Knolls Camp		$3,400,000
9. Hot Springs Road Portal (maintenance yard and control gate only)		200,000
10. Yorty Creek Boat Access Area		700,000
11. Yorty Creek Beach		900,000
12. North Lake Equestrian Area		700,000
13. Cherry Creek Camp Area (boat launching facilities only)		700,000
14. Hot Springs Road Camp Area		2,400,000
15. Yorty Creek Group Camp		800,000
16. Buzzard Rock Group Camp		100,000
17. Miscellaneous Project Facilities (Trails in North Lake area only)		200,000
	SUBTOTAL	$10,100,000

Optimal Level

18.	Cherry Creek Camp (boat-in camping facilities)		$2,000,000
19.	Hot Springs Road Portal (administration and interpretive facilities)		1,600,000
20.	Hot Springs Road Day-Use Area		1,100,000
21.	Miscellaneous Facilities (primative camping and interpretive facilities)		2,700,000
22.	Warm Springs Beach		1,000,000
23.	Skaggs Springs Beach		200,000
		SUBTOTAL	$ 8,600,000
		TOTAL	$28,300,000

Reconciliation to DM 14

Area		D.M. 14 Cost
Marina		$2,100,000
Underpasses		1,000,000
Sonoma Launch Ramp		1,000,000
	TOTAL	$ 4,100,000
	GRAND TOTAL	$32,400,000

DM 14 = $32,353,000

WARM SPRINGS (LAKE SONOMA) RECREATION FACILITIES
CONSTRUCTION SCHEDULE

CORPS	YEAR	CONCESSIONAIRE
OVERLOOK VISITOR CENTER FISH HATCHERY PARK OFFICE	COMPLETED FACILITIES	NONE
BOAT-IN CAMPGROUNDS TRAIL SYSTEM BOAT RAMP EQUESTRIAN STAGING AREA	1985	100 BOAT SLIPS MARINA SUPPORT FACILITIES BOAT RAMP
DOWNSTREAM RECREATION AREAS	1986	75 ADDITIONAL BOAT SLIPS DELICATESSEN RENTAL BOAT FLEET FISHING CENTER MARINE SERVICE CENTER SEWAGE PUMPOUT SYSTEM DRY BOAT STORAGE
BUZZARD ROCK CAMPGROUND	1987	75 ADDITIONAL BOAT SLIPS 20 UNIT BUOY FIELD TOUR BOAT EQUESTRIAN OFFICE, BOARDING STABLES, TACK ROOM, RIDING RING, HORSE RENTALS, CORRALS AND SHELTERS
NONE	1988	RECREATIONAL VEHICLE PARK EAST AND WEST MARINA DAY-USE AREAS
BILL MCCOY ADDED YORTY CREEK PLAN IN HERE		
NONE	1989	MARINA CAMPGROUND