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EEL RIVER BASIN, CALIFORNIA

INTERIM REPORT
ON
WATER RESOURCES DEVELOPMENT
FOR
MIDDLE FORK EEL RIVER

APRIL 1968

APPENDIX D

RECREATION, FISH AND WILDLIFE

INTRODUCTION

D-1. PURPOSE

The purpose of this appendix is to present an evaluation of existing and needed recreation and fish and wildlife development in the Dos Rios Project, Middle Fork Eel River. Important factors peculiar to the area and considered in the evaluation of this complex project involve the large water surface, proximity to a large population center, relocation of a community, tourist travel routes, Indian cultural center potential, and natural resources of the area.

D-2. SCOPE

The three levels of development considered essential for proper evaluation of this project are as follows:

a. National Recreation Area Plan

b. 1965 Recreation Act Plan

c. Minimum Development Plan (recreation not a project purpose)

On each of the above plans consideration was given to provide the Indian community an opportunity to participate in the recreation development and ultimate operation of facilities on Indian land. The maximum recreation potential of this project area and facility requirements to meet this potential were determined for each of these levels of development. Recreation use projections were developed to determine monetary benefits along with facility and other project costs related to recreation development.

To present a complete evaluation of these concepts, limitations and restraints were evaluated to provide a realistic and current status of existing conditions in the project area. Consideration was given to current visitation trends, climate, access to the area, reservoir drawdown during the recreation season, topography and attractiveness of the immediate and surrounding area, travel time from urban centers, competition from other areas and other factors which may be considered limiting in nature. An evaluation of these concepts has resulted in the selection of a level of development which, considering certain constraints, would be financially feasible, would aid materially in providing needed recreation facilities, and would protect for the future an area of outstanding recreation potential.

D-3. DESCRIPTION OF PROJECT AREA

The proposed reservoir project would be located in northern Mendocino County, California, less than 150 miles north of San Francisco Bay Area-Sacramento complex and within 20 road miles of U.S. Highway 101 the main north-south route of California. Dos Rios damsite would be on the Middle Fork Eel River about three miles upstream from its confluence with the Main Eel River. The proposed multiple-purpose Dos Rios Reservoir would be provided by a rockfill dam approximately 730 feet in height and extending approximately 2,000 feet between abutments. The reservoir at elevation 1587 (top of water supply pool) would provide 38,500 acres of surface area, 7,000,000 acre-feet of water storage and would flood approximately 25 square miles of the valley floor in Round Valley. The reservoir, at the above elevation, would extend over 30 miles upstream of the damsite on the Middle Fork and approximately 10 miles upstream of the confluence of Elk Creek with the Middle Fork. The terrain providing for the reservoir is diversified to the extent that the 6-by-9 mile expanse of water with gentle side slopes of Round Valley will contrast with deep gorges of the river channel with 25 to 70 percent side slopes and one-half to two-mile widths. Vegetation in the project area, heavily wooded in some sections, consists of 75 percent grassland, most of which is in Round Valley and subject to inundation by the reservoir. The balance of vegetative cover consists of 15 percent pines, firs and other evergreens, six percent chaparral and four percent hardwoods.

D-4. DESCRIPTION OF AREA OF INFLUENCE

The primary zone of recreational influence for the reservoir comprises the area within a 50-mile radial distance from the center of the project. This zone of influence will include portions of eight California counties: Mendocino, Trinity, Humboldt, Tehama, Glenn, Colusa, Lake and Shasta. Plate No. D-1 shows zones of recreational influence of 50-, 100- and 150-mile radii.

FACTORS INFLUENCING RECREATION DEVELOPMENT

D-5. GENERAL

Current recreational needs and demands in northwestern California are being only partially satisfied by existing facilities. The State of California indicated its report for the Resources Agency Conference of March 17 through 19, 1966 on Progress Trends in the Park and Recreation Program 1960-1966 that "in 1963, from February through November, there were 394,000 families turned away from our State parks." The highest month was August with 201,692 turnaways, and a total of 1,575,000 campers turned away from our parks in that year. Present trends show that although facilities are continually being enlarged and supplemented by various local, State and Federal efforts the rate of expansion is unable to match the burgeoning requirements for outdoor recreation. It has been estimated that 60 percent of all recreation use in California is water-associated. Existing projects within the Eel River Basin are inadequate to satisfy the future demand for this type of recreational opportunity.

D-6. The major factors influencing the public demand for more recreation facilities are increases in population, per capita income, mobility and leisure time. The booklet Outdoor Recreation Trends, compiled by the U.S. Department of Interior, Bureau of Outdoor Recreation states that by the year 2000, participation in the major forms of summer outdoor recreation activities will be four times greater than it was in 1965. An example of the increased use of water-oriented recreation areas is recorded at Lake Mendocino near Ukiah, California, a Corps of Engineers' project in operation for eight years. This project is rapidly approaching its full potential towards meeting the growing demands for more developed water-oriented recreational facilities within the Dos Rios sphere of influence.

D-7. Water is the focal point of outdoor recreation. The majority of people presently seeking outdoor recreation desire swimming, fishing, water skiing, skin diving, sightseeing, and boating opportunities. The planners of future water installations and related facilities must fully recognize this growing socio-economic force for water-oriented living.

D-8. POPULATION

The 50-mile radius zone around Dos Rios (see Plate D-1), containing a population of approximately 70,000, would be classified primarily as a day-use zone of influence with some weekend or holiday usage. The 50- to 100-mile radius zone, which includes the urban areas of Santa Rosa, Ukiah, Willits, Fort Bragg, Willows, Oroville,

Chico, Red Bluff, Redding, and Eureka, would contribute to weekend or vacation usages from an estimated population of 760,000. Within the 150-mile radius lie such metropolitan areas as San Francisco, Oakland, and Sacramento. These metropolitan areas would be expected, also, to contribute on weekend and vacation usages. Additional weekend and vacation usage is expected to originate from other metropolitan areas located within and just beyond the 150- to 300-mile radius. A large number of visitations is also expected to originate from out-of-state as the proposed reservoir would be part of a major recreation complex which would tie the project to the recreation use along the coast and in the redwood forests.

D-9. RECREATION ACTIVITIES IN NORTHERN CALIFORNIA

The major form of recreation activity in Northern California is associated with educational and sightseeing pursuits. More than three million recreationists from throughout the world are attracted yearly by the world-famed giant redwood stands and the beautiful coastal and inland terrain of northern California. This high visitation is being accommodated at private and State park facilities. National forests provide limited campsites, most of which are occupied primarily by hunters and fishermen. Water-oriented recreation is restricted due to limited facilities, cool coastal climate, and unpaved limited access roads.

D-10. POTENTIAL FOR DEVELOPMENT

Endowed with outstanding physical features, the development potential for this area is principally limited by financial resources. The trend for water-oriented development is on the increase as evidenced by increases in sunbathing and swimming along the coastal beaches even though water temperatures and climatic conditions are not conducive to such activities. National interest in the scenic qualities and unique ecology of the redwood forest environment has become increasingly popular. The proximity of these two major factors, coastal beaches and redwood forest, combines with the recreational potential of the reservoir development and the opportunity for development of an Indian historical museum and cultural center to make this conducive as an area of national importance.

EXISTING NEED AND DEVELOPMENT

D-11. EXISTING NEEDS AND PROBLEMS

The location of major metropolitan centers to the project area makes the problem of considering day-use facilities one of less significance. However, the heavy day-use of facilities being

experienced at State parks by vacationists traveling along U.S. Highway 101 generates demand for more roadside development, especially in the redwood areas. Existing overnight facilities are seriously taxed, presenting one of the most critical recreation problems within the 50-mile zone of influence of the project. Another critical shortage in the immediate vicinity of the project is a lack of water surface capable of meeting the public lake-oriented recreation demand. Plate D-1 shows considerable water areas within the immediate zones of influence; however, factors of limited access roads, undesirable climate, crowded conditions and inaccessibility of water to the general public due to private ownership are retarding recreation development from meeting the needs of the general public and reaching its ultimate potential. Many of these conditions are being corrected as resources permit. Inaccessibility to water is not critical in recent State and Federal developments outside the Eel River Basin primarily due to new legislation protecting the natural resource from private encroachment.

D-12. PUBLIC USE RECREATIONAL AREAS

Public recreation facilities in the northwestern coastal area are primarily provided by the State and the U.S. Forest Service. The development of these parks has been oriented toward the redwood groves and coastal beaches since these natural features have been and continued to be worthy of exploration. In recent years the public has shown a strong trend toward combining visual experience with physical recreation activities while away from home. This has entailed the use of more personal sophisticated equipment which, in turn, has required that modern onsite facilities be provided. Although the old standbys of swimming, fishing and boating, etc., are still basic activities, they are taking on a new meaning and popularity in the search by the public for something new or different which widens the horizon of recreation possibilities.

D-13. The State of California has provided, and continues to provide, residents and visitors from out-of-State with many recreational opportunities and the chance to enjoy many natural wonders of the State; however, the tremendous projected demand by the public, including a high tourist impact, may preclude State resources from meeting such a demand. Figures D-1 and D-2 show existing water-oriented recreation and picnicking and campsite areas. The National Forests of northern California play a major role in providing the public with a wilderness type of outdoor recreation experience. With adequate access to and within the zone of influence of the Dos Rios project, Six Rivers and Trinity National Forests provide the recreationist with formal camping units, spaces for trailers and sanitary facilities. In addition, there are unimproved trail and roadside camping sites with rustic improvements and limited facilities.

D-14. EXISTING RECREATION FACILITIES WITHIN THE 50-MILE ZONE

There are six State operated and controlled inland water-oriented recreational areas and two Corps of Engineers' projects located within the 50-mile zone of influence. Also included within this zone are three State operated and controlled recreational beaches located along the Pacific Coast.

a. Lake Mendocino, California. The U.S. Corps of Engineers constructed a multi-purpose reservoir on the East Fork of the Russian River at Coyote Valley. The reservoir of 1,700 acres of water surface was opened for public recreational use in June 1959. The Corps of Engineers initially provided a boat-launching ramp and parking area in the vicinity of the dam and fire-protection access road and later developed much more extensive facilities. Non-Federal interests constructed a water supply system, picnic and camp sites, sanitary facilities, boat docking and launching ramps, parking areas, roads, and trails along portions of the reservoir shoreline. The moderate climate of the region assures extended recreational use of the reservoir area. Public visitation to all areas amounted to 550,000 recreation days in 1964 and 670,000 recreation days in 1965. Public use in 1966 reached 1,100,000 recreation days. Federal facilities planned for construction as the first phase of recreational development at Lake Mendocino are designed to accommodate 1,500,000 visitors annually. The trend in visitation increase for Lake Mendocino indicates that the capacity of 1,500,000 visitors per year will probably be reached before 1970. Planned developments of facilities at Lake Mendocino, including those constructed in 1966, are approximately 50 percent complete, indicating an overuse of 33 percent. The ultimate potential of this reservoir is estimated at three million recreation days.

b. Black Butte Reservoir, California. The U.S. Corps of Engineers constructed this reservoir of 4,560 surface acres on Stony Creek (a tributary of Sacramento River) about nine miles upstream from Orland. Initial public recreational development at this project comprised an observation point and parking area and three public use areas. Additional public use areas will be developed as the need arises and funds become available. The trend in visitation is such that the existing recreational facilities will be inadequate by 1970. Capacity visitation to this project is estimated at one million. The 1966 attendance reached 215,000 recreation days.

c. Clear Lake, California. This is the largest body of fresh water lying entirely in California, and together with volcanic Mount Konocti on the South Shore, it dominates adjacent natural features.

It is located within the Klamath-Siskiyou Mountains, the foothills of the coastal mountains, and the valley's recreation region. Approximately one-third of the shoreline has remained relatively undeveloped because of the steep terrain. For many years Clear Lake has offered 40,000 surface acres of warm water for recreationists. The California Division of Parks and Beaches, operating recreation areas on the shores of this lake, provides camping, picnicking, swimming, and fishing opportunities. Most recent attendance figures at this State Park area was 116,000 recreation days in 1966. Public-controlled recreation potential on Clear Lake is limited because of private ownership and commercial development adjacent to its shores. Other difficulties confronting this lake are an algae problem, which is under study, and the lack of tree cover. Recreation attendance figures for Clear Lake, both at public and private facilities, were estimated in a 1958 study at 2,300,000 visitors.

d. Other Parks, Wilderness and Recreation Areas. There are a number of State parks located within the 50-mile zone of influence. Some of these parks offer water-oriented recreation with facilities on and adjacent to the Eel River. Among these are: Hendy Woods, Admiral William Standley, Standish-Hickey Richardson Grove, and Benbow Lake. Recent visitation data indicate that these areas are inadequate to meet the rising needs of the future. Four areas which utilize the Pacific Ocean are State operated and controlled. They are MacKerricher Beach, Westport-Union Landing Beach, Russian Gulch Beach and Van Damme Beach. All offer some water-oriented recreation; however, these facilities are limited to sunbathing, camping, picknicking and fishing. Such elements as fog, cold ocean water and hazardous ocean currents limit further participation in water-oriented recreation. Attendance at these beaches totalled 508,000 in 1966. The Forest Service has developed camping sites with improvements immediately adjacent to the Dos Rios project in the Covelo District of the Mendocino National Forest at five different locations. These sites provide accomodations for visitors to the wilderness area of this forest via an unpaved roadway (reference Plate D-4).

e. Other Reservoirs. Four locally-operated and controlled reservoirs are also within the 50-mile zone. Three of these are East Park Reservoir, Stony Gorge Reservoir and Ruth Reservoir. Recreation facilities for the general public are limited due to shoreline private development and limited access. Lake Pillsbury, with 2,280 water surface acres owned and operated by the Pacific Gas and Electric Company, has, in coordination with the U.S. Forest Service, developed four public recreation sites. This lake is reached by an 18-mile mountain road and has been experiencing a steady increase in recreation attendance. In 1960 over 130,000 recreation days were recorded at Lake Pillsbury and visitation figures for 1965 totalled 162,000, an increase of 25 percent.

D-15. PROPOSED RECREATION FACILITIES WITHIN THE 50-MILE ZONE

The State of California Department of Water Resources Bulletin No. 136 reveals proposals for future reservoir construction at the enlarged Ruth Reservoir on the upper Mad River and at the Eaton and Larabee Valley sites on the upper Van Duzen River. Plans by the Corps of Engineers for the development of the Butler Valley Reservoir on the lower Mad River, currently under preparation, are pending authorization and funding and, in addition, a reservoir site (Anderson Ford Reservoir) between the Butler Valley project and the existing Ruth Reservoir is under consideration. Reservoirs on the Mad River beyond that considered at Butler valley would depend upon water export requirements of the future from this basin. Also within 50 miles of Dos Rios Dam the U.S. Bureau of Reclamation is planning for the English Ridge Reservoir on the upper main stem of the Eel River. Some 20 miles downstream from the latter site, the Corps of Engineers is studying plans for Yellow Jacket Dam and Upper Sequoia Reservoir, about 10 miles west of Dos Rios Dam. Recreation use at these reservoirs in the year 2080 is estimated to be over 11 million recreation days.

D-16. The projected capacity for existing and future reservoirs within the 50-mile zone is estimated to be 18,700,000 recreation days. The recreation demand for the Eel River Basin projected in the Corps' Economic Base Study, dated July 1962, is about 69,000,000 visitor-days by year 2060. Of this total, 57 million are considered from outside the basin, indicating a very high tourist usage. Water-related usage considered for this basin has been projected at approximately 47,000,000 recreation days as ultimate reservoir recreation use. The Dos Rios Reservoir would be capable of providing approximately one-sixth of the total Eel River Basin water-oriented recreation potential.

D-17. EXISTING AND PROPOSED RESERVOIRS WITHIN THE 150-MILE ZONE

Within the 150-mile zone of influence, approximately seven million recreation days are being spent annually at existing major lake and reservoir areas. The ultimate recreation capacity of these projects plus those being planned are estimated at 50 million recreation days annually. Approximately one-third of this water-related recreation potential is located between the San Francisco-Sacramento population complex and the proposed Dos Rios Reservoir with Lake Mendocino located about 40 air-miles to the south. Other important water-oriented recreation areas average 60 to 70 miles distance. The following is a summary of significant completed and planned water projects having a potential for recreation development.

a. Corps of Engineers Projects. Dry Creek (Warm Springs Dam and Lake Sonoma) project in the Russian River Basin, located approximately 70 air-miles south of the proposed Dos Rios Reservoir, is presently under construction. This reservoir will provide 3,700 water-surface acres and has a potential for 1.5 million annual recreation days. Another Corps project in the Russian River Basin, within 85 air-miles, is the Knights Valley Reservoir with a potential recreation capacity of 7.5 million recreation days. This project has been authorized but as of this date funds have not been appropriated for design or construction. Other Corps projects under study are Big Sulphur Reservoir on Big Sulphur Creek, a tributary of the Russian River (65 miles to the south with a potential of 600,000 annual recreation days) and Butler Valley on the Mad River (75 miles to the north) which could develop two million annual recreation days. Staying within the 150-mile zone and located 140 air-miles to the east on the Yuba River, about 13 miles northeast of the city of Marysville, the multiple-purpose Marysville Dam and Reservoir Project has been authorized. Ultimately, recreation here is estimated to reach six million recreation days annually. Folsom Reservoir within 130 miles of the project has a ten million annual recreation day potential.

b. State of California. The largest earthfill dam in the world is at the Oroville Reservoir, whose recreation capacity is estimated at 5.2 million annually.

c. Other Water Areas of Significance. Clear Lake in Lake County within 60 miles of the project and Lake Berryessa in Napa County 40 miles further south are two very popular recreation lakes. Private development has made recreation-use estimate difficult to determine although at Clear Lake, 116,000 recreation-days were reported at the State Park during fiscal year 1966. To the north, approximately 75 air-miles, lies the Shasta-Trinity-Whiskey Town National Recreation Area under the National Park Service. In 1966 approximately 900,000 visited these reservoirs.

FACTORS CONSIDERED IN RECREATION USE PROJECTIONS

D-18. NATIONAL RECREATION TRENDS

Analysis of past national trends reveals substantial increases in both water-based and other forms of recreation. Attendance at reservoirs operated by the U.S. Army Corps of Engineers increased 43 percent between 1960 and 1964 or an average of about ten percent per year. Attendance at national parks has been increasing at a rate of about seven percent per year since 1960. This rate of increase is far above those experienced in population, income, wages or productivity for the nation as a whole. The U.S. Department of

the Interior estimated the increase in participation in water-oriented recreation at 39 perdent for the period 1960 to 1965, and somewhat less than a 51 percent increase in all outdoor recreation. A review of the expected outdoor recreation participation, as projected in the Outdoor Recreation Resources Review Commission (ORRRC) for 1960, forecasts a 26 percent increase by 1965, however, the Bureau of Outdoor Recreation (BOR) report of 1966 indicates an actual increase of 51 percent. Forecasts on recreation demands in the past by various agencies have indicated growth proportions in keeping with those projected in the ORRRC report which was considered by many as being too optimistic. From the foregoing the ORRRC report projections have proven conservative in light of the growth now being experienced in this field. The Department of the Interior predicts further substantial increases in outdoor recreation participation through year 2000.

D-19. ANALYSIS OF COMPARABLE RESERVOIRS

Eight comparable reservoirs were selected to determine the ratios of attendance to population in selected radial zones of influence. These ratios were applied to the three zones of influence of the Dos Rios Reservoir at three different time periods to provide three points from which a curve could be established to project recreation use. The existing reservoirs studied provide a comparable recreation pool, shoreline miles, location in relation to population centers, existence of nearby competing reservoirs, provision of similar facilities, scenic qualities and reasonably similar climate. The reservoirs used for comparison are presented in Table D-2.

D-20. ASSUMPTIONS

The following assumptions were made as a basis for evaluating the ultimate potential recreation visitation at the Dos Rios Reservoir:

a. The population of the State of California would increase as indicated in Appendix A, "Economic Environment of the Eel River Basin."

b. Access roads to the site from the north, east and especially the south would be constructed of sufficient capacity to handle all visitors.

c. The attendance of a large number of visitors would not impair the enjoyment of facility users by overcrowding.

d. The drawdown of the reservoir during the recreation season would not be sufficient to seriously impair enjoyment of facilities.

D-21. ANALYSIS OF POPULATION WITHIN ZONE OF INFLUENCE

Population projections for radii of 50, 100 and 150 miles from the proposed reservoir were made for 1980, 2030 and 2080, based upon data published by State agencies to 2020 and extended to 2080 by the Corps of Engineers. Population projections within the zone of influence, as shown in Table D-3, were used to derive the potential water-oriented recreation days in the zone of influence as shown on Table D-4. The average per capita rate of recreation use frequency was based on data compiled from 1946 to 1959 by a California Department of Water Resources Survey and showed an increase from 1.9 to 2.9 recreation days per person. These data were then converted to a trend curve and projected to show how the per capita rate would increase during the 100-year life of the project. By the year 2080 these rates had risen to approximately 9.0 annual recreation days per person. Since 60 percent of all recreation in California is considered water-oriented, it follows that the potential water-oriented recreation use would be determined by multiplying 60 percent of the population by the per capita rate. This potential is shown on Table D-4.

D-22. POTENTIAL RECREATION USE

Based upon the foregoing factors the ultimate recreation use potential of the Dos Rios Reservoir was determined to be 7,000,000 recreation days annually. However, in considering the existing roads and present modes of transportation to the proposed project as a limiting factor, the projections were reduced for the purpose of using a conservative attendance estimate in project formulation. The maximum capacity of the existing access road, after planned improvement by the State, would accommodate 2,000,000 visitors a year. Recreation-use projections under various levels of development are given on Table D-5.

POTENTIAL PLANS OF DEVELOPMENT

D-23. GENERAL

The future demand for water-oriented outdoor recreation opportunities is growing at a higher rate than can be accommodated through the development of planned facilities. An analysis of population trends, the existing and planned water-oriented recreation development and the public's demand for recreation facilities in northern California reflects this increasing demand and also shows that this area has the potential to satisfy more than its reasonable share. Through the Federal Water Project Recreation Act of 1965 (Public Law 89-72), which authorizes the consideration of recreation

as a project purpose at all water resource projects, an opportunity exists to substantially aid in meeting this need. The Dos Rios project has the recreation potential to be considered under this authority and meets the essential criteria through various development plans including ultimate development as a National Recreation Area. The paragraphs that follow discuss recreation plans in detail, which would provide facilities for the Dos Rios project under the established criteria for a National Recreation Area, the 1965 Recreation Act Plan, a Minimum Development Plan, an Indian Recreation Development Plan and a Selected Plan of Development.

D-24. NATIONAL RECREATION AREA PLAN

As previously indicated, certain criteria must be met to qualify an area for consideration as one of national significance. Table D-1 compares the Dos Rios project potential with the criteria established for National Recreation Areas as outlined in Circular No. 1 of the President's Recreation Advisory Council.

D-25. The proposed reservoir has national significance potential, encompassing an area of about 100,000 acres of land and water. This area is capable of providing the public every type of water-related recreation, as well as recreational opportunities on the land adjacent to the proposed publicly owned reservoir. Located far enough from metropolitan areas to make overnight use one of major significance, the planned recreational development would stress camping as basic to most other uses. The visiting public would enjoy all types of water-related activities planned for this second largest inland body of water in California, as well as the convenience of a base from which to explore the nearby redwood forests, ocean beaches, wilderness areas of national forest and other reservoirs and lakes in the vicinity. This 38,500 acres of water surface, inclosed by 240 miles of shoreline, would have a high recreational capacity.

D-26. Four considerations combine to attribute a national import potential to the project: First, the location is unique, situated centrally to California's redwood forests, wilderness areas and ocean beaches; second, the temperate climate is more favorable when compared with the cooler coastal reaches to the west and the hot central valley plains to the east; third, the lake would become the second largest inland body of water in California; and lastly, the most singular outstanding feature pertaining to national significance would be its relation to the American Indian of the West Coast, since a substantial portion of the project area is now the home of the Covelo Indian Community located in and around Round Valley. Reference is made to Plate D-2 showing the Bureau of Indian Affairs land in this vicinity.

D-27. At present the California Indian period of history is limited in the public's knowledge, as compared to the more publicized warlike eastern and southwestern tribes. Although the Indian's domination of California ended over a century ago, it was statewide at one time as ten percent of all American Indians lived in California. Most of the Indian settlements were concentrated in the lower land near water and food and therefore near enough to our present cities to be covered by present day structures. Substantial historical data have been lost and with further expansion of civilization the record of the Indian is further threatened. The proposed project would afford an opportunity to commemorate the West Coast Indian tribes by providing an opportunity to centralize and to preserve the culture which once dominated the far western part of the nation. Due to the presence of the Indian community in the project area and the details involved in the resettlement and mitigation of an income resource, discussion of the possible recreation development for the Indians is included and will be found in a later section of this report.

D-28. Based upon the Dos Rios project being developed as a recreation area of national significance and assuming that adequate road or other types of access would be furnished, the ultimate potential plan of development would provide facilities for seven million recreation days annually including 1.8 million recreation days on Indian land. Facilities under this plan of development would expand the development of facilities proposed under the "1965 Recreation Act Plan." The ultimate cost of the facilities planned for this development exclusive of the possible Indian development, totals $31,600,000. The construction of the facilities would be phased over a period of years paralleling the recreation demand. The cost of the initial facilities is approximately $10,900,000, to be followed by additional construction about 10 years later at an estimated cost of $8,450,000. As presently visualized the remaining facilities would be staged at approximate 10-year intervals. A detailed estimate of cost, including the facilities to be provided at each of the stages, is shown in Tables D-7, D-8 and D-9. The equivalent average annual separable cost is $1,760,000, including $1,040,000 for operation, maintenance and major replacement. Equivalent average annual benefits are estimated at $2,560,000 as shown on Table D-6. On this basis it can be concluded that the staged construction of the ultimate facilities can be economically justified.

D-29. 1965 RECREATION ACT PLAN (PUBLIC LAW 89-72)

Under a non-Federal cost sharing development of recreation facilities, one-half of the separable costs for recreation would be borne by non-Federal interests. In this event it is anticipated that the Dingman Ridge area would not be as fully developed as in the National Recreation Area program described above. Facilities

included in the 1965 Recreation Act Plan would be access roads, with one bridge; boat-launching facilities; swimming beaches with change shelters; an overlook facility; picnic and camping facilities. These facilities would provide for an ultimate of six million annual recreation-days. The ultimate cost of facilities planned for this development, exclusive of the possible Indian development, totals $28,000,000. The construction of the facilities would be phased over a period of years paralleling the recreation demand. The cost of the initial facilities is approximately $10,900,000 to be followed by additional construction about 10 years later at an estimated cost of $8,450,000. As presently visualized the remaining facilities would be staged at approximate 10-year intervals. A detailed estimate of cost, including the facilities to be provided at each of the stages, is shown in Tables D-11, D-12 and D-13. The equivalent average annual separable cost is $1,590,000, including $946,000 for operation, maintenance and major replacement. Equivalent average annual benefits are estimated at $2,520,000 as shown on Table D-10. On this basis it can be concluded that the staged construction of ultimate facilities can be economically justified. While the cost of initial facilities under this plan and under the National Recreation Area Plan are the same, the differential in the ultimate facility costs of $3,600,000 under the National Recreation Area Plan would provide for additional facilities during the later stages of development.

D-30. INCIDENTAL RECREATION USE PLAN

For purposes of information and to evaluate possible effects on other project features, a determination was made of the facilities which would be provided for public health and safety under the assumption that recreation would not be a project purpose. It is recognized that some recreation use will be made of the project area and, therefore, public safeguards would need to be provided. The minimum facilities required for public health and safety would be provided at access points on the existing roads into the project. In the Dos Rios project three such access points would each have a turnaround and vault type toilet facility. Near the proposed site for relocation of the town of Covelo would be located an operational boat launching ramp. At Elk Creek another boat launching ramp would be constructed to provide access to Bureau of Land Management lands. Near Dos Rios Dam an overlook facility with terrace, flush type toilet facility and parking lot would be required. At the proposed fish hatchery, provision would be made for a flush type toilet facility and safety walks for visitors. For a projected attendance of 300,000 visitors, the estimated costs of minimum facilities shown in Table D-14 would total $580,000.

D-31. INDIAN RECREATION DEVELOPMENT

Construction of Dos Rios Dam and Reservoir would remove a portion of the Indians' means of livelihood by inundating their farm lands. Income from the use projections for operating the facilities developed on Indian lands as shown in Table D-5 may partially replace the income lost to the Indian people by construction of the reservoir. These possible income-producing facilities would include launching facilities, a swimming beach with bath-house facilities, and camping and picnic sites. It is estimated that approximately one million recreation visitors would utilize the Indian facilities initially and is considered to be an equivalent substitute economy to mitigate income losses due to the relocation. With proper road access and added facilities an estimated additional 800,000 visitors could be attracted to the Indian development. The initial cost of facilities as shown in Table D-15 would total $4,210,000. These costs represent funds which may be required to create a substitute source of income for the Covelo Indian Community.

PLAN OF DEVELOPMENT

D-32. SELECTED LEVEL OF DEVELOPMENT

Limitations on present types of vehicular traffic imposed by the access road, California State Legislative Route 261, place a visitation ceiling of approximately two million on recreation use of this project. Due to the road constraints and existing means of transportation, a limited plan of development is proposed for construction on project lands under a single-stage construction period. Table D-19 covers the recreation facilities for a development to accommodate one million recreation days occurring on non-Indian lands.

D-33. As stated in the previous paragraph it was assumed that catering to the recreation public could serve as a substitute source of income for the Indian community and that the facilities being considered would accommodate about one million recreation days. The one million level of development has been selected for the project formulation with recreation as a purpose.

D-34. It is recognized that if as many technological advances are made in the next 50 years as have been made in the last 50 years, there will exist modes of transportation that are presently unconceived. Thus, there has been included in the plan of development sufficient land areas to accommodate the ultimate capacity of seven million recreation days. Facilities included under the adopted plan would provide a balanced recreation program by making possible the public's

enjoyment of the major outdoor activities normally related to water-oriented projects including swimming, boating and fishing. Accommodations for overnight and day-use would be provided by camping and picnicking areas and selected viewpoints. The cost of specific facilities as shown on Table D-20 for this plan would total $4,000,000 at an average annual cost of $135,000 indicated on Table D-21. The average annual benefits are $1,210,000 and are shown on Table D-16.

DESIGN CRITERIA

D-35. GENERAL

The level of recreational development was determined by evaluation of recreational use projection and various physical factors which include climate, availability of developable lands, the pool fluctuation, and road accessibility limitations. The methodology used to evaluate the above factors is described in the following paragraphs.

D-36. CLIMATE

The Dos Rios Reservoir area is located within a climate zone described as "Mediterranean Warm Summer" (summers 90°-100° and winters 10°-20°) as based on 1959 office report by the Department of Water Resources, "Classification of Climate in California." The climate is considerably milder and drier than most of the North Coastal area. The mean minimum temperature at Covelo is 30°F. for the coldest month, January. The mean maximum temperatures are 95°F. and 94°F for July and August, respectively. Average annual seasonal precipitation is about 40 inches for the project area. Wind is not of such magnitude as to interfere with recreation activities. The warmer climate in this area would permit the recreation season to average from 100 days to 120 days. The 120-day recreation season was used in determining the number of facilities required to accommodate the expected visitation. (See Figure D-3.)

D-37. DEVELOPABLE LANDS

Land sufficiently close to the reservoir, permitting water-oriented recreation, was studied for each level of development, reference Plate D-3. The following acreages would satisfy the projected recreation visitation for the various levels of development.

Level of Development	Projected Visitation	Recreation Land Acres
National Recreation Area Plan	6,000,000 1/	14,800
1965 Recreation Act Plan	5,000,000 1/	14,800
Incidental Recreation Use Plan	300,000	None 2/
Selected Level of Development	1,000,000	800

1/ Excludes one million recreation days considered as mitigative measures by providing a substitute economy for the Indian community.
2/ General public visitation would be provided for on project lands.

D-38. Under the selected level of development approximately 14,000 acres of land would also be purchased and held in reserve for a period of not less than ten years, in accordance with the Federal Water Project Recreation Act of 1965, at which time the potential for further recreational development can be better ascertained.

D-39. The studies made to determine suitable recreation lands utilized enlarged United States Geological Survey maps and resulted in a finding of approximately 3,000 acres of land on ten percent slopes or less and 10,000 acres on ten to twenty-five percent slopes. These areas were contiguous to or within easy reach of the reservoir shoreline. Using generally accepted planning concepts, the project boundary was established to include the land that would satisfactorily support an ultimate potential of seven million recreation days.

D-40. POOL FLUCTUATION

The adopted plan includes two million acre-feet of inactive storage, five million acre-feet of water supply and fish release storage and 600,000 acre-feet of flood control storage. The top of the water supply pool would be at elevation 1,587 feet mean sea level and the minimum pool at elevation at 1,425 feet mean sea level. The estimated supplemental water available for export, based on assumptions described in Appendix B, "Hydrology and Hydraulics," is 660,000 acre-feet of annual firm yield at the site and is equivalent to 900,000 acre-feet as measured at the Sacramento-San Joaquin Delta Pool, the concept of which is explained in the main report. In extremely dry periods of extended duration, the water surface is expected to be drawn down to minimum pool elevation. The rate of drawdown would be relatively slow and span a period of about seven years for the reservoir to drop from the top of the water supply pool to the minimum pool. Under these extreme conditions and without an augmenting water supply, drawdown to minimum pool would create

mudflats detrimental to the recreation usage of the project. To offset the necessity for this possible drawdown, consideration is being given to supply the Dos Rios Reservoir with additional water from the proposed Upper Sequoia Reservoir as part of the State Water Project. This arrangement would require the Upper Sequoia Reservoir to bear the brunt of the drawdown since this reservoir, with its steep side slopes, could only provide for a limited recreation development. Information contained in Appendix B determined that the yearly pool fluctuaion, during the recreation season, would be in the range between 20 and 25 feet on the average. This fluctuation is not considered to be significantly detrimental to recreation and would be further reduced if augmented as indicated above.

D-41. ACCESSIBILITY

The existing and proposed access roads were studied to determine the expected local and recreation traffic capacity. These routes are shown on Plate D-4.

D-42. Highway access from the west to the proposed project area connects U.S. Highway 101 at Longvale and continues to the town of Covelo. Beyond Covelo, the road continues in an easterly direction to the town of Willows in the Central Valley on U.S. Highway 99W (Interstate Route 5). The portion from Covelo to Willows is presently an unpaved two-lane road with good vertical and horizontal alignment. The route from Longvale to Willows is currently planned to be improved by the State and the U.S. Forest Service and is presently designated as California State Legislative Route 261. Improvement of this road is expected to be completed prior to completion of the dam. The capacity of this road, as a State highway, would accommodate two million visitors during the 120-day recreation season. Because additional road locations and improvements other than State Route 261 are indefinite, the selected plan of development will provide for facilities to accommodate 1,000,000 recreation days. The other 1,000,000 recreation days are considered to be accommodated by the facilities which have been included as mitigative measures as a substitute economy for the relocated Indian community. The capacity of an improved California State Legislative Route 261 is expected to be reached by 1990.

D-43. Another route is a narrow two-lane gravel road with poor vertical and horizontal alignment extending from U.S. Highway 101 at Laytonville to Dos Rios and intersecting with California State Legislative Route 261. To accommodate an increased visitation, additional road improvements would have to be furnished as described on Table D-22 at an eventual cost in the range of $80,000,000 to $90,000,000.

D-44. The Preliminary Report on California Parkways, presenting a plan for a State parkway system, dated June 1967, reference Plate D-5, indicates consideration of this route as part of this system; designated as the Steelhead Parkway. Due to the preliminary nature of this planning, the additional capacity, normally expected from such a parkway, has not been included in the overall road carrying capacity of the area. The project can be reached from the south (Lake Pillsbury-Potter Valley-Redwood Valley area) over existing gravelled dirt roads (reference Figure D-4). These roads are privately owned and maintained for agricultural purposes or are provided by the U.S. Forest Service in the Mendocino National Forest. This existing road net, of limited capacity, provides adequate fire routes to most southerly areas of the project and would form the basis for future road access development.

D-45. Technical advances being made in methods of transportation continually reduce the time to reach the more remote areas. This project, with airport facilities nearby, would be subject to extensive use by a public visitation not requiring elaborate ground level access facilities.

D-46. RECREATION FACILITY REQUIREMENTS METHODOLOGY

a. Areas suitable for recreational development as shown on Plate D-4 are broadly classed into day-use and overnight-use. Day-use areas primarily provide for such activities as picnicking, fishing, boating, swimming and sight-seeing. Overnight-use areas are oriented to requirements of the camper, hunter, and fisherman, including access to the reservoir for boating and fishing. The methodology used to determine the number of facilities and lands required for recreation development involves several basic steps. An analysis was made of the projected attendance to determine the percentage of use by activity. This was done by comparing activity-use at existing Corps' reservoirs and State parks. Adjustments, based on judgment, were made to compensate for varying conditions between the Dos Rios Reservoir project and these comparable reservoir and park areas.

b. The number of recreation facilities by type, i.e., camping, picnicking, etc., to support the expected annual recreation visitation was determined by applying the following basic data to the formula indicated below:

AV - Number of annual visitors (Recreation Days)
P - Percent of each activity use of the total use
WD - Weekdays in recreation season (50% use of facilities)
WE - Weekend days and holidays in recreation season (100% use of facilities)
D - Design-day (Number of visitors for which facilities would be provided)

Formula: $D = AV(P)/.5WD + WE$

Basic assumption: Length of recreation season for the Dos Rios Project is 100 days in year 1980.

c. The design-day was determined, as shown on Table D-17 for year 1990, to establish the number of expected visitors engaged in a particular basic activity, recognizing that they would also participate in other activities part of the time. For example, sufficient latitude in available facilities has been considered to permit a camper to also use other public use areas of the project.

d. To maximize the use of this project consideration has been given to extending the recreation season. One hundred-twenty days, i.e., 15 May to 15 September, was considered the length of the recreation season for this area by the year 1990. The anticipated increased numbers of retired people, a shorter work week and the possibility of staggered school vacations, resulting from continuing the school year through the summer months, are the major considerations in justifying such maximization. The effect an extended recreation season would have on the basic design-day has evolved a "Design-Day Factor" by using the formula $f = D/AV(P)$ which increases the recreation season and is shown on decades on Table D-18. The usage of the design-day factor reflected on Table D-17 is applied to the basic recreation season visitation for each activity to arrive at the extended design-day. The resulting design-day is then used as a basic tool in determining the required facilities as shown on Table D-19.

e. The lands required for facilities were estimated by utilizing standards developed by the Corps of Engineers and other Federal and State Recreation planning agencies.

D-47. DERIVATION OF RECREATION-DAY VALUE

The value for a recreation day is based on the net benefit to the individual recreationist. The two factors having a major effect on these benefits are (a) the variety and quality of the available recreation opportunities and (b) the aesthetic qualities of the site.

Other factors such as proximity of the site to population centers and competition with other similar recreation areas are more related to total use than to the benefits accruing to the individual. In determining the level of recreation excellence of these factors, the following were considered in this evaluation:

a. Variety and quality of recreation includes analysis of the potential activities of the area; quality of experience expected; and the quantity and quality of development, operation and maintenance of the facilities and area. Activities to be considered include bathing, picnicking, camping, boating, fishing, sightseeing, water skiing, hiking, riding, cycling and scientific-historic appreciation. Level of ratings for each of these points of consideration is guided by the following:

(1) Good quality is equal to or above National Park Service or State Beaches and Parks standards of variety, facility design and operation; includes excellent support facilities to make experience more pleasing (concessions, boat dock, etc.); and produces above normal returns to the recreationist.

(2) Fair quality is somewhat below National Park Service or State Beaches and Parks standards of variety, facility design and operation; supports minimum facilities necessary to protect health and safety; and produces reasonable returns to the recreationist.

(3) Poor quality does not prohibit recreation but is limited by lack of support facilities; restricts maximum accommodations; and produces below reasonable returns to the recreationist due to the uncontrolled environment.

b. Aesthetic qualities of the site includes fluctuations in the water surface elevation through drawdown to meet operational and mitigation requirements; geologic-topographic; vegetative cover; climate and other environmental influences affecting the appearance of the site. The rating levels for these considerations is guided by the following:

(1) Good quality permits a relatively small reduction in water surface during the recreation season minimizing exposure of mudflats and/or withdrawal of water from shoreline facility development; unusually clear water; geology and topography suited for varied uses; superior vegetative cover; good climate; minimum of obnoxious noise, odors, unsightly works; and opportunities for seclusion.

(2) Fair quality provides normal reduction in water surface during the recreation season creating some mudflats and/or some separation of facilities from water surface, water with normal sediment

load; geologic, climate and vegetative elements of a standard nature; i.e., useful and pleasant, but not outstandingly so; little opportunity for seclusion; and possible presence of distractions from unrelated activity, e.g., noise, unpleasant works visible, etc.

(3) Poor quality provides large reduction in water surface during the recreation season with resultant large mudflat expanse and/or undesirable separation of facilities from the water surface; vegetative cover deficient in shade or variety or character; geologic, topographic and climate below standard; and little or no opportunity for seclusion or escape from evidence of distracting activity.

c. Point scores of these factors were established as follows:

Factors 1/	Rating	Point Score Range	Range Value 2/
Variety and Quality of Recreation	Good	5	$0.50
	Fair	3	0.30
	Poor	1	0.10
Aesthetic Qualities of the Site	Good	5	0.50
	Fair	3	0.30
	Poor	1	0.10

1/ The value of all projects will basically begin at the $0.50 level with those factors providing an increase.
2/ Each point is valued at $0.10.

The point scores resulting from factor evaluation would be added to, and the unit value of a recreation day derived from within, the range of $0.50 to $1.50 values, as prescribed by Supplement No. 1 to Senate Document No. 97, 87th Congress, 2nd Session, "Evaluation Standards for Primary Outdoor Recreation Benefits."

d. A recreation-day value for the Dos Rios Reservoir was determined by assuming the following reservoir conditions at the beginning of the recreation season:

(1) Top of Water Supply Pool, elevation - 1,547 feet mean sea level;

(2) Area of Reservoir Water Surface - 38,500 acres.

Point scores for the development of facilities under the National Recreation Area Plan and the 1965 Recreation Act Plan are five points for variety and quality and four points for aesthetic qualities or

a $1.40 recreation-day benefit (i.e., 5 + 4 = 9 x $0.10 = $0.90 + $0.50 minimum value for recreation-day or $1.40). If developed with minimum facilities the assigned total point score would be four points for aesthetic qualities and none for variety and quality resulting in a $0.90 recreation-day benefit value.

D-48. AESTHETIC CONSIDERATIONS

In accordance with current policy to give full consideration to aesthetic factors, the following would be given special consideration in the planning and carrying out of this project:

a. Land Acquisition. Sufficient lands would be acquired to serve as a buffer between the project and contiguous lands which have a potential for private development.

b. Road Locations. Location of roads would be site-planned to conform to contours of the terrain and to exploit scenic views. (See Plate D-6.) Recreation development would take advantage of early road construction and would be initiated in the area of the dam and fishery mitigation work. This would include public use facilities to permit over view of this construction. Plate D-7 presents a schematic potential for the area.

c. Town Relocation. The relocation of the town of Covelo is briefly presented here as only one possible concept. This concept locates the town on those lands indicated as desirable by the residents of Covelo.

(1) The new location would be site-planned to assure a view of the lake and of the distant mountain ridges beyond the farther reservoir shore. The basic utilities and streets for the town would be site-designed in consonance with contemporary civic planning concepts. In order to express the character of the region, its historic background, choice of construction material, color range, etc., should be considered in determining the style of architecture.

(2) The relocated site plan is shown on Plate D-7. This plan concentrates areas of use in order to conserve open space as shown in the residential cluster concept and by centralizing the educational, civic and commercial usage into a relatively dense structural area. This concentration of activity would counteract the feeling of small town deadness and would provide a tourist attraction, which, through design, could be unusual, picturesque and one of a kind.

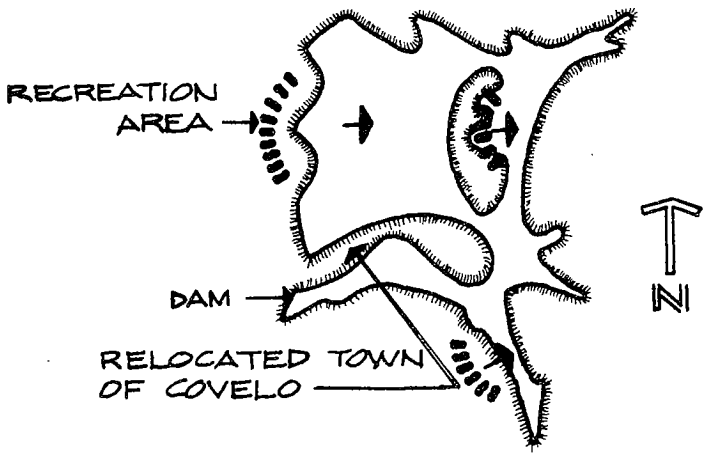
(a) Open Space. This concept permits the unification of residential, commercial, civic and educational areas unto themselves

as well as into one integrated development. By clustering residences each would be assured of its own privacy, yet capable of enjoying the public open space. Planting in the greenway-esplanade would serve the residential need, screen out unsightly mudflats, and prevent bank erosion. Sufficient open space could remain near the residential areas for the growing of harvestable crops.

(b) Relationship of Areas. The town, sited on a neck of sloping land separating Round Valley from the Middle Fork, Eel River and near the terminus of roads from the west and north, would have a natural harbor on the Round Valley portion of the reservoir. Enlargement of this harbor by extending the land would provide a protected, deep water frontage for commercial and marina development. An urban park, connecting the civic and educational centers, would provide the setting for a multi-purpose auditorium for town and school functions. The residential areas, within walking distance of this compact activity center, extend along the shoreline between greenways in neighborhood groupings. Industrial development, which presently consists of a sawmill and allied wood fabricating activities, would be effectively separated through location over the hill, southeast of the town proper.

(c) Circulation. Access to the town would be via a divided secondary parklike road from the main parkway which traverses the high ground of the town site. The in-town street pattern would be planned to provide vehicular access to residential areas and parking facilities in the commercial area without interfering with planned pedestrian malls to shops and the marina.

d. Recreation Areas. To preserve the natural settings of the project as seen from the three major recreational developments, and from scenic roads of the area, intervening ridges will be utilized to conceal these features from each other as illustrated by the following sketch.



e. Vegetation. The loss of native tree and shrub vegetation through the flooding and subsequent pool fluctuations of the project will be minimal. The valley is primarily grass and cropland and the area of tree-covered slopes, measured horizontal, along the steep canyon walls of the river channel would be minor.

f. Structures. In harmonizing manmade structures with nature consideration has been given to the choice of materials, their design and their location. The following are a few specifics in this regard:

(1) Architectural designs of comfort stations, shelters, gates, signs, water tanks, fences and other items of wood construction shall specify wood stain in the color range from browns to olive green.

(2) Cor-Ten, a self-oxidizing steel will provide a brown finish for guard rails.

(3) Chain link fence, used within the public view will be vinyl clad to blend in with its surroundings. Areas where this may occur are the administration area and in the vicinity of utility construction such as a sewage lift station, treatment plant and water tanks.

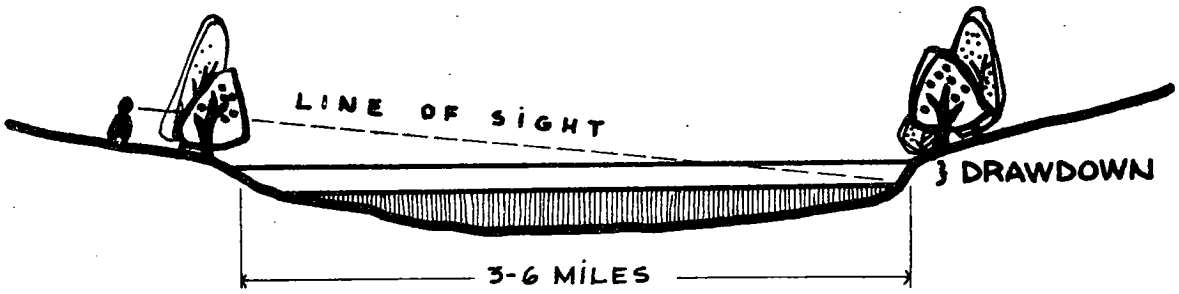
(4) Construction of the Intake Tower facade will be of textured concrete with shadow patterns. Headwalls of drainage culverts integrated within the public view shall have color integrated with the mix.

(5) Electric light poles, power lines and fixtures will be designed to blend with the surroundings to be inconspicuous during the day. Routing of poles shall follow the contours and be off the skyline.

(6) Road alignment for both recreation roads and county relocated routes will blend into the land form. On county roads some selected cuts will be daylighted for vista points.

g. Drawdown Consideration. Drawdown will have the greatest detrimental effect on gradual sloping shorelines whereas steep slopes will entail a minimum exposure. Considered undesirable during the

recreation season, releases of reservoir water would be held to a minimum if compatible with water supply and flood control requirements. Extensive exposed areas near the viewer would be concealed in large measure through massing vegetation along the shore as indicated in the following sketch.



h. Beautification Consideration. Cut and fill slopes on roadways would be planted with seeds of plants native to this region of California. Contractor work areas, quarries, borrow pits and spoil areas would be located so as to leave minimum scars on the landscape. Upon completion of the total project or any portion thereof all such areas would be landscaped to restore the natural appearance.

D-49. RECREATION CONSTRUCTION

Initial construction of recreation facilities under all plans of development would be implemented by the Corps of Engineers on all project lands except those Indian lands falling within the project boundary. Possible initial and future construction on Indian lands, including the lodge and museum complex, would be by the Round Valley Indian Community under the supervision of the Bureau of Indian Affairs. Construction of the damsite overlook would be completed prior to the beginning of dam construction. Launching ramps are scheduled for completion prior to raising of the reservoir to minimum pool level. Installation of other recreation facilities would be completed prior to the establishment of the conservation pool. It is anticipated that recreation facilities furnished by the Round Valley Indians would be constructed on a schedule similar to that followed by the Corps of Engineers. Future construction on other lands, under the National Recreation Area or 1965 Recreation Act Plan, would be accomplished by the respective operating agency. All initial and future facilities would be constructed in accordance with plans cooperatively developed and approved by the Corps of Engineers and the operating agency.

D-50. RECREATION ADMINISTRATION

Pursuant to the provisions of the Federal Water Project Recreation Act, Public Law 89-72, the responsibility for the administration of project land and water areas for recreation will vary in accordance with the selected type of development.

a. Under the 1965 Recreation Act Plan and the Selected Plan; administration by the sponsoring non-Federal public agency, except on Indian Reservation land.

b. As a National Recreation Area; administration by the Corps of Engineers or through joint administration with another Federal agency, except on Indian Reservation land.

c. Minimum basic facilities; administration by the Corps of Engineers.

d. Development of the Indian Recreation Plan; subject to the approval and administration of the Indian community.

D-51. Administrative conflicts between Federal agencies managing recreation facilities would be minimal since standards for development and operation by all Federal agencies follow a common level of excellence. Individual development sites would be significantly separted geographically.

D-52. Recreation administrative facilities would be provided through the conversion of the Project Construction Office and work areas upon completion of this phase of the work. Domiciles for project operating personnel would rest with the individual in the nearby communities and the relocated town of Covelo.

FISH AND WILDLIFE RESOURCES

D-53. EXISTING FISHERY

The Bureau of Sport Fisheries and Wildlife and the California Department of Fish and Game in their studies prior to 1967, of the basin indicate the Eel River is one of California's most important anadromous fish streams, ranking second in silver salmon and steelhead trout production and third in King salmon production. The aforementioned agencies are continuing studies to provide additional information on the fish and wildlife resources of the Eel River Basin. Present day runs of anadromous species of fish above Alderpoint in the main Eel River system include runs of 36,000 Chinook salmon, 3,000 Coho salmon and 54,000 steelhead. Present-day fishery of

the Middle Fork Eel River is made up of a fall run of Chinook salmon and spring and winter runs of steelhead trout. A trout fishery consisting of native rainbow trout and yearling steelhead is also present. Average numbers of Chinook salmon, estimated by the Bureau of Sport Fisheries and Wildlife, equal 13,000 spawners and 23,000 steelhead trout spawners. A small run of summer steelhead utilizes the Middle Fork drainage, but spawning numbers are not known. Fishery studies on the Middle Fork did not include detailed work on the native trout fishery. The majority of the Middle Fork fishery is based on fishing pressure to the anadromous fishery at sea and as it passes through the lower reaches of the Main Eel River. Sport fishing in the Middle fork is limited due to the poor access along the river. Summer fishing is limited to the headwater streams due to the warm water conditions in the lower reach of the river. Present-day fishery values, estimated by the Corps of Engineers from basic data of the Bureau of Sport Fisheries and Wildlife and California Fish and Game Department reports, are shown in Table D-23. It is estimated by the Corps of Engineers that, without the project, adult Chinook salmon would support 16,000 days of fishing for both ocean and inland sport fishing in 1980 increasing progressively to 63,000 fisherman-days by year 2030. Adult steelhead trout would support 16,000 days of fishing in 1980, increasing progressively to 94,700 fisherman-days by year 2030. The summer trout season fishery, mostly for young steelhead, is estimated to be 9,000 fisherman-days in 1980, remaining constant due to poor access and the warm summer conditions of this drainage. The fisherman-day use of adult salmon and steelhead is expected to remain constant after year 2030. Increased angler-day use under conditions without the project in future years will be due mainly to the increase in numbers of fishermen, based on population increases, and to increased numbers of fishing trips per fisherman. Actual numbers of fish in the river are not expected to increase. The values indicate an existing average annual uniform equivalent fisherman days of 52,000 for salmon, 70,000 for adult steelhead, and 9,000 for young steelhead and native trout--a total average annual uniform equivalent of 131,000 fisherman-days during the 100-year project life. Values for the above angler days are in Table D-24.

D-54. EXISTING WILDLIFE

Principal wildlife game species found in the Middle Fork Eel River drainage basin include black-tailed deer, which spend approximately 270,000 deer-use days in the reservoir area. A deer-use day is the amount of range use equivalent to that ordinarily required by one deer on the range for one day. This does not indicate the number of animals using the reservoir site, but indicates the number of days an unknown number of animals use the reservoir site. Hunting in the drainage is mostly on Forest Service lands upstream

of the proposed Dos Rios Reservoir site. There are approximately 23,000 hunter-days per year spent deer hunting on Forest Service land in the Middle Fork drainage above the project area. About 7,000 hunter-days are attributed to lands included in the proposed reservoir area. Another big game animal common to the area, the black bear, receives approximately 100 hunter-days of use in the proposed Dos Rios Reservoir area. Other game animals considered common-to-abundant in the reservoir area include band-tailed pigeons, blue grouse, California and mountain quail, mourning doves, gray squirrels and rabbits. There is also a small population of ring-necked pheasants in the Round Valley area which receives limited hunting. Under present conditions waterfowl use is principally limited to the bays, river delta and estuaries along the coast. There is a small population of wintering geese and local ducks in the Middle Fork drainage area, mostly confined to the Round Valley area. Big game hunting over the 100 year analysis period without project conditions are expected to equal 10,500 hunter-days annually for deer and 320 hunter-days for black bear. Upland-game species are expected to receive about 2,500 hunter-days annually. Waterfowl hunting-use is not expected to increase in the project area. Bald eagles utilize the proposed project area, during winter months to feed along tributaries where salmon spawn. Little change in use is anticipated over the 100 year analysis period.

PROJECT EFFECTS ON FISH AND WILDLIFE

D-55. FISHERY

Construction of Dos Rios Dam will block access to upstream spawning and rearing areas affecting all but 2-1/2 miles of the Middle Fork Eel River Basin. The project would result in a loss of approximately 100 percent of the anadromous fishery contributed by the Middle Fork Eel River Basin. The summer trout fishery would also suffer a loss due to the lack of yearling steelhead trout and to the loss of 28 miles of river inundated by Dos Rios Reservoir. This loss would amount to about 3,000 angler-days annually as indicated on Table D-25. A new sport fishery would develop in the reservoir provided by the construction of the Dos Rios Dam. The reservoir could provide both coldwater and warmwater fishing. It was estimated by the California Department of Fish and Game in its report, "Fish and Wildlife Evaluation of Alternative Conveyance Routes from the Upper Eel River Development Projects," February 1967, that a reservoir of 3,800 surface areas (average storage) at the Dos Rios location could support expected angler use by natural reproduction. However, because of its size and increased angler use, the proposed reservoir of 38,000 surface

acres would require supplemental fish stocking and intensive fishery management to maintain a desirable reservoir fishery. Initial cost of stocking of the reservoir would total about $12,000. Maintenance stocking would also be required, however, cost of such stocking has not been determined. The reservoir fishery would be managed and maintained by an agency other than the Corps of Engineers. Even with the reservoir fishery, the anadromous fishery for steelhead and salmon would not be replaced. Therefore, mitigative measures are recommended for consideration of conclusion in the proposed project.

D-56. WILDLIFE

The Bureau of Sport Fisheries and Wildlife indicated the construction of Dos Rios Dam would adversely affect large numbers of game animals, lesser numbers of waterfowl and furbearers, and many species of non-game wildlife. Hunter use-days contributed to the reservoir area would also be lost. The Dos Rios Reservoir, approximately 38,500 surface acres, would inundate habitat lands along the Middle Fork Eel River including most of the Round Valley area. Wildlife species which presently use the proposed reservoir lands during winter or summer dry season would be forced to move and use higher ground, and thereby compete with already present populations of wildlife. Losses to deer habitat would occur mainly outside the Round Valley portion of the Reservoir. Competition with domestic livestock, ranching and urbanization under present conditions limit deer use in this area. Deer herds in the area are both resident and migratory in nature. The resident deer herds move around within the project area from riparian habitat during the dry summer months into the adjacent hills when the forage is green from winter rains. During snowfall periods, the migratory herds move from the higher elevations of the Forest Service lands down into the proposed project lands, but drift back as soon as the snow melts. Deer hunting access could be increased due to reservoir lands being open to the general public. The hunting season for deer in tthe Dos Rios project area in generally from July to August for archers and from August to September for rifle hunters. To take advantage of the new hunting lands special restrictions would have to be enforced due to the anticipated increases in water-oriented recreation during the summer months. Hunting seasons for upland game species are generally scheduled after the summer recreation season, hence would not conflict with other recreation uses. Waterfowl hunting takes place during the winter months so there is very little conflict with other types of recreation use. Some increase in waterfowl hunting may be expected, but due to the lack of feeding areas ducks and geese are not expected to remain at the reservoir.

D-57. FISH MITIGATIVE FEATURES

To mitigate damages to the anadromous fishery the Bureau of Sport Fisheries and Wildlife Service recommends construction and operation of a permanent hatchery below the Dos Rios damsite to maintain the fish runs. On the basis of preliminary estimates, it also recommends minimum water releases, required to maintain fish and wildlife downstream from the proposed dam, 350 second-feet Oct 1-May 31, and 200 second-feet June 1-September 30. These releases would be from a multi-level outlet structure to provide for adequate temperature and quality of water for the hatchery and downstream rearing areas. It was recommended project funds be made available to mechanically remove landslides or other debris downstream from the dam which would affect anadromous fish passage since these are now normally removed by floodwaters which would be substantially reduced with the project in operation. To mitigate damages to the fishery resources, fish hatchery facilities would be included as part of the project costs and subject to allocations among purposes. Interim hatchery facilities would be provided to maintain the anadromous fish runs until permanent hatchery facilities were completed. The use of channel improvement and/or artificial spawning channels has been considered as alternatives to other mitigative measures. However, the studies by the fish and wildlife agencies have not sufficiently progressed at this time to arrive at definite conclusions as to the effectiveness of such alternatives. It is expected that this matter will be considered during post-authorization planning in arriving at a balanced hatchery-channel flow releases program. Also hatchery size should be considered as to stocking for future reservoir fishery, pending the ultimate visitation for 7,000,000 recreation-days. For the present, the hatchery capacity is considered adequate to overcome adverse channel conditions. Downstream flows would be provided by releases from the reservoir in the amounts of 200 cubic feet per second during the four-month summer period and 350 cubic feet per second the remainder of the year, and totalling about 217,000 acre-feet annually. A minimum pool of 2,000,000 acre-feet is proposed to provide sedimentation in the reservoir, landslides, aesthetics and recreation which would maintain the fishery resource of the reservoir. Reservoir clearing should be done in such a manner as to provide suitable habitat for a reservoir fishery. This can be accomplished either by constructing brush-shelters in connection with the clearing contract or by leaving desirable trees and brush standing in areas that would not be hazardous to boating or reservoir operations.

D-58. WILDLIFE MITIGATIVE FEATURES

The Bureau of Sport Fisheries and Wildlife recommends that land units of sufficient size and capable of development be acquired to form

management areas to mitigate wildlife losses. The total aggregate area of these lands should be 16,000 acres and should be set aside specifically for wildlife management. The 16,000 acres would be set aside for wildlife management and it is considered desirable that these lands be administered and managed by the Bureau of Land Management, the U.S. Forest Service or some agency other than the Corps of Engineers in accordance with terms of a General Plan that would be developed cooperatively by that agency, the Corps of Engineers and the Bureau of Sport Fisheries and Wildlife. Reservoir lands not used for recreation or other project purposes would be left undeveloped and allowed to return to native plant species. These lands would be used by wildlife in addition to the wildlife management area and would help mitigate loss of aesthetic and other values associated with displacing wildlife from the reservoir area.

COST OF MITIGATIVE FEATURES

D-59. FISHERY

The mitigative measures for fish, as proposed by the fish and wildlife agencies and as tentatively adopted for this report, require construction of a fish hatchery and minimum flow releases from the reservoir totalling 217,000 acre-feet, annually. It is considered, however, that not all of these releases constitute mitigative measures but that some of the runoff is contributing to present, or potential, beneficial use in the absence of the proposed Dos Rios project. To arrive at a reasonable estimate of this beneficial use, it was considered that the Middle Fork runoff during the three-month winter period of January, February and March is excess to the Eel River because of the large amounts of inflows from the other tributaries. For the remainder of the year, and based on the fact that the maximum monthly flow during the critical dry year was less than 200 cubic feet per second, a flow of 200 cubic feet per second was adopted as the base for determining runoff which would be excess to beneficial uses in the absence of the project. Routings were then made in which inflow or flow up to 200 cubic feet per second, whichever was less during the 9-month period, was assumed to be released down the Middle Fork, with the excess being available for storing in the reservoir. All runoff during the remaining three-month period was considered as available for storing. The results of these routings indicated that for the same water supply yield from the proposed reservoir, 3,500,000 acre-feet of storage would be required as compared with the 5,000,000 acre-feet which includes the releases for fish mitigative measures. The difference of 1,500,000 acre-feet, therefore, represents the additional storage which would be provided as a fish mitigative measure. Without the releases for the fish, hydropower facilities would not be economically justified, and benefits from hydropower production would not be realized. Taking

into consideration all these factors, the cost of providing features to mitigate fish losses in the Middle Fork is the difference in cost between the multiple-purpose project without hydropower as a purpose and a reservoir with a gross fixed storage capacity of 6.1 million acre-feet in which the hatchery, hatchery water supply line, game management area and the hydropower facilities have been eliminated and would result in a dam approximately 40 feet lower in height. Storage allocations would be: 2,000,000 acre-feet for sedimentation, slide storage and a minimum pool; 3,500,000 acre-feet for water supply; and, 600,000 acre-feet for flood control. The estimated first cost of such a project would be $221,000,000. The incremental cost of the fishery mitigative measures for the proposed project then would be $20,000,000, which includes $4,000,000 for construction of a 20,000,000 egg hatchery and a water supply pipeline. The annual separable cost of adding the fish and wildlife mitigation facilities would be $960,000.

D-60. WILDLIFE

The mitigative feature required for wildlife losses consists of establishing 16,000 acres of wildlife management area. If the Dos Rios wildlife management area consisted entirely of private lands, the cost of acquiring 16,000 acres of private lands in fee title based on Corps of Engineers land cost estimate would be about $4,000,000. Estimated development costs would be about $120,000; and costs of maintaining developments would be about $12,000 annually. These costs are included in the figures given in paragraph 48 above.

D-61. JUSTIFICATION OF MITIGATIVE MEASURES

Comparison of the annual cost of the mitigative features with the annual value of the resource damage incurred indicates a degree of justification. Monetary values assigned in this report to recreational type fish and wildlife benefits are based on criteria contained in Supplement No. 1 to Senate Document No. 97. The $6.00 value per fisherman-day reflects the net benefit of participating in salmon and steelhead fishing. Stream trout fishing is assigned a value of $2.00 per angler day. The commercial value of Chinook salmon is figured at an average of $5.22 per fish. The angler-use value attributed to the anadromous fish produced in the Middle Fork Eel River during the 100-year analysis period 1980-2080 without project effects would equal about $592,000 based on an average annual value at 3-1/4 percent interest. Commercial fishery value during the same 100-year analysis period would equal about $167,000. Therefore, the total fishery value based on the 100-year analysis period equals a total of $759,000 without project conditions. With project conditions for the same 100-year period the fishery, consisting of only that portion of the trout fishery remaining above the reservoir, but excluding the entire anadromous fishery that would be lost due to the construction of the Dos Rios Dam equals an average annual uniform equivalent value of $13,000 with

project conditions. This indicates a loss of $746,000, annually, to the Middle Fork Eel River fishery due to construction of the dam. If the game management area is not provided, the following wildlife losses are incurred: 10,500 annual hunter days for deer, 320 annual hunter-days for bear, and 2,500 annual hunter-days for upland game. Total wildlife loss is therefore estimated to be about 13,000 annual hunter-days. Using an average value of $6.00 per hunter-day for deer and bear and $2.00 for upland game, this indicates an average annual damage value of $70,000 to the wildlife resource. The loss to the fishery of $746,000 and $70,000 to the wildlife gives a total of $816,000 which is an indication of the value of the fish and wildlife resource that would be lost. The average annual cost of $960,000 for mitigation, and the average annual loss of $816,000 shows the degree of justification necessary to mitigate the estimated losses. Considering the tentative valuation assigned to fishery losses and to other possible intangible considerations due to the type of fishing involved, it is considered that the measures for mitigating fishery losses proposed as part of the project can be justified.

CONCLUSION

D-62. As described under Recreation Use Projection, the estimated demand exceeds the existing and planned facilities; however, this reflects only the visitation attributed to the 150-mile zone of influence. With the tourist visitation already making tremendous gains only one-fourth of the recreationists will be accommodated in the year 2080, unless the facilities visualized for this area are heavily augumented. The study of the Dos Rios project indicated an ultimate potential for seven million recreation days annually; however, due to existing road constraints and based upon existing modes of travel only two million recreation days can adequately be accommodated. The plan selected for project formulation reflects this visitation along with an incidental recreation plan of development. It is proposed to offer the Indian Community the opportunity to provide for one-half of the potential visitation with the Corps of Engineers providing for the balance. In the event the Indian Community rejects this offer, facilities required to meet the needs of the visiting public would be provided by the Corps of Engineers and/or non-Federal interests. Recreation use, benefits, cost of facilities and operation, maintenance and replacement costs are included for each of the development schemes. These include the National Recreation Area Plan, the 1965 Recreation Act Plan, the Incidental Recreation Plan, the Indian Recreation Development Plan and the plan selected for project formulation purposes. First costs under the selected plan for specific recreation facilities, excluding the cost for recreation facilities on Indian lands, total $4,000,000 and an additional $4,000,000 for lands to be held for a minimum of ten years after completion of project construction. The estimated cost also is $4,000,000. The costs for recreational facilities on the relocated

Indian lands are charged to the project as mitigation of the loss of the Indian Community's source of income. In view of the potential of this project, sufficient land would be acquired to meet its maximum needs in keeping with the provisions of Public Law 89-72.

TABLE D-1

CRITERIA FOR SELECTION OF A NATIONAL RECREATION AREA

PRIMARY CRITERIA	DOS RIOS PROJECT AS A NATIONAL RECREATION AREA
Application of the following seven primary criteria shall be mandatory for all proposals:	
(1) National Recreation Areas should be spacious areas, including within their perimeter an aggregate gross area of not less than 20,000 acres of land and water surface, except for riverways, narrow coastal strips, or areas where total population within a 250-mile radius is in excess of 30 million people.	(1) Approximately 100,000 acres of land and water.
(2) National Recreation Areas should be located and designed to achieve a comparatively high recreation carrying capacity, in relation to type of recreation primarily to be served.	(2) Centralized location to California's redwood forests, wilderness areas and ocean beaches and within 150 miles of San Francisco and Sacramento metropolitan areas. Capacity - 7 million recreation days.
(3) National Recreation Areas should provide recreation opportunities significant enough to assure interstate patronage within the region of service, and to a limited extent should attract patronage from outside of the normal service region.	(3) Far enough from metropolitan areas to make overnight use one of major significance. Second largest body of inland water in California. All types of water-oriented recreation serve as "base" while visiting nearby attractions - redwoods, seashore, etc.
(4) The scale of investment, development, and operational responsibility should be sufficiently high to require either direct Federal involvement, or substantial Federal participation to assure optimum public benefit.	(4) Estimated project cost $390 million with $30 million for recreation, 7 million ultimate visitation, relocation of the town of Covelo and the Indian Community.

TABLE D-1

CRITERIA FOR SELECTION OF A NATIONAL RECREATION AREA (Cont'd)

PRIMARY CRITERIA	DOS RIOS PROJECT AS A NATIONAL RECREATION AREA
(5) Although nonurban in character, National Recreation Areas should nevertheless be strategically located within easy driving distance, i.e., not more than 250 miles from urban population centers which are to be served. Such areas should be readily accessible at all times, for all-purpose recreational use.	(5) Within 150 miles of the San Francisco Bay Area - Sacramento Complex on. The project area is accessible at all times via U.S. Highway 101 (Redwood Highway) and route 261. The State plans to construct, as part of a parkway system, the Steelhead Parkway from Laytonville through and beyond Covelo via Dos Rios. Reference Plate D-2.
(6) Within National Recreation Areas, outdoor recreation shall be recognized as the dominant or primary resource management purpose. If additional natural resource utilization is carried on, such additional use shall be compatible with fulfilling the recreation mission, and none will be carried on that is significantly detrimental to it.	(6) Primary use of project is for water supply, however, the drawdown expected and outflows for downstream augmentation will not be detrimental to exploiting the full recreation potential of the project. The relocated town of Covelo would be recreation-oriented.
(7) National Recreation Areas should be established in only those areas where other programs (Federal and non-Federal) will not fulfill high priority recreation needs in the foreseeable future.	(7) Due to the rapid population growth and increase in per capita use it is not expected that other programs meet growing recreational needs. Study of water-oriented projects discloses that they would not have the capability or the capacity to provide for the expected need of this type of reservoir.

TABLE D-1

CRITERIA FOR SELECTION OF A NATIONAL RECREATION AREA (Cont'd)

SECONDARY CRITERIA FOR SELECTION OF NATIONAL RECREATION AREAS	DOS RIOS PROJECT AS A NATIONAL RECREATION AREA
Application of the following six secondary criteria will be given weight in situations where they bear a meaningful relationship to a specific proposal:	
(1) Preference should be given to proposed National Recreation Areas that:	(1)
a. Are within or closely proximate to those official U.S. Census Divisions having the highest population densities;	a. Within 150 miles of San Francisco Bay Area and Sacramento.
b. Are in areas which have a serious deficiency in supply of both private and public outdoor recreation areas and facilities as determined by the National Recreation Plan;	b. The National Recreation Plan is not available.
c. Are in areas which have a comparatively low amount of Federally provided recreation carrying capacity;	c. Two Corps' projects within 50-mile zone of influence would have reached capacity by 1970.
d. Show an optimum ratio of carrying capacity to estimated cost.	d. The optimum ratio of average annual benefit to cost, including land, would be 1.5 to 1.
(2) National Recreation Areas may be based upon existing or proposed Federal water impoundments where it can be shown that significant increases in the scale of recreation development are required, beyond the level normally justified under standard multiple-purpose project development, in order to assure that full recreation potential is provided for projected needs.	(2) 60 percent of all recreational use in California is water-associated. Existing projects in Eel River Basin are inadequate.

TABLE D-1

CRITERIA FOR SELECTION OF A NATIONAL RECREATION AREA (Cont'd)

SECONDARY CRITERIA FOR SELECTION OF NATIONAL RECREATION AREAS	DOS RIOS PROJECT AS A NATIONAL RECREATION AREA
(3) National Recreation Areas may include within their boundaries scenic, historic, scientific, scarce or disappearing resources, provided the objectives of their preservation and enjoyment can be achieved on a basis compatible with the recreation mission.	(3) Within scenic and historic Redwood area and the Covelo Indian Reservation. Would protect the ecology of the Redwood areas by relieving existing camping pressures through providing alternate recreation opportunities.
(4) National Recreation Areas should be in conformity with the National Recreation Plan prepared by the Bureau of Outdoor Recreation and shall take into consideration State, regional, and local comprehensive plans.	(4) The National Recreation Plan is not available. Coordination with applicable agencies has been effected.
(5) Whenever possible, National Recreation Areas should be selected, developed, and managed to provide maximum compatibility with the recreation potential of adjacent rural areas in private ownership.	(5) Dos Rios would complement other recreation areas, such as Mendocino National Forest wilderness area.
(6) Preference should be given to areas within or proximate to a Redevelopment Area as officially designated by the Department of Commerce and deemed significant in the economic improvement of such a Redevelopment Area.	(6) Would have favorable economic impact upon the Indian community and upon the county which is classified by the Department of Labor as one of persistent unemployment.

TABLE D-2

COMPARABLE RESERVOIRS

Project Name	Shoreline (Miles)	Recreation Pool Surface Acres (1,000's)	Population (1,000's) Attendance (1,000's)	0-50 Miles	0-100 Miles	0-150 Miles
Dos Rios Reservoir						
1980	240	38.5	0	80	860	4,600
2030			5,000	120	1,400	8,900
2080			7,000	180	1,800	11,600
Existing Reservoirs						
Lake Cumberland (Ky.)	1,085	50.2	3,700 1/	280	2,500	5,500
Table Rock (Mo. & Ark.)	745	43.1	2,900	270	690	2,327
Lake Ouachita (Ark.)	690	40.1	2,400	170	1,000	1,900
McNary Lock & Dam (Ore.)	198	38.8	1,200	150	430	1,000
Lake Texoma (Texas)	580	91.2	8,200	220	2,600	4,000
Lake of the Pines (Texas)	144	20.0	4,300	220	2,600	4,000
Lake Sidney Lanier (Ga.)	540	40.0	8,300	1,400	2,000	7,000
Clark Hill Reservoir (Ga. & S.C.)	1,060	71.5	3,700	456	2,500	6,400

1/ The following are 1964 recreation attendance figures.

TABLE D-3

POPULATION OF ZONE OF INFLUENCE

	U.S. Census 1960	1965	Projections 1980 1/	2030	2080
50-mile zone	64,000	70,000	80,000	120,000	180,000
100-mile zone	442,000	760,000	860,000	1,400,000	1,800,000
150-mile zone	2,168,000	3,100,000	4,600,000	8,900,000	11,600,000

1/ Based upon County population projections by State Department of Finance to 1985; extended to year 2020 by State Department of Water Resources and further extended by the Corps of Engineers (Army Engineer District, San Francisco) to year 2080.

TABLE D-4

POTENTIAL WATER-ORIENTED RECREATION DAYS IN ZONE OF INFLUENCE

	1980	2030	2080
50-mile zone	210,000	540,000	940,000
100-mile zone	2,240,000	6,400,000	9,400,000
150-mile zone	12,000,000	40,000,000	56,000,000

TABLE D-5

RECREATION-USE PROJECTIONS [1/]
(Recreation Days In Thousands)

Year	Ultimate Potential (No Road Limitations)	Selected Level of Development (Road Limitations)	Minimum Development (Public Health and Safety)
1980	0	0	0
1990	2,000	2,000	150
2000	3,000	2,000	270
2010	3,800	2,000	300
2020	4,500	2,000	300
2030	5,000	2,000	300
2040	5,500	2,000	300
2050	5,900	2,000	300
2060	6,300	2,000	300
2070	6,700	2,000	300
2080	7,000	2,000	300

[1/] Recreation days on Indian lands are included in the projections of the ultimate potential and selected level on this table. Refer to discussion on Indial Development Plan and Table D-15.

TABLE D-6

NATIONAL RECREATION AREA PLAN
AVERAGE ANNUAL BENEFIT

Year	Net Attendance due to Project Recreation Days	Benefit Value (Each)	Recreation Benefit (Total)	Average Annual Equivalent Factor 1/ (3-1/4%)	Average Annual Recreation Benefit (100 years)
1980	0				
1990	1,000,000	$1.40	$1,400,000	.2476	$ 347,000
2000	1,400,000	1.40	1,960,000	.1798	352,000
2010	2,000,000	1.40	2,800,000	.1306	366,000
2020	2,700,000	1.40	3,780,000	.0949	359,000
2030	3,200,000	1.40	4,480,000	.0689	309,000
2040	3,700,000	1.40	5,180,000	.0500	259,000
2050	4,100,000	1.40	5,740,000	.0363	208,000
2060	4,500,000	1.40	6,300,000	.0264	166,000
2070	4,900,000	1.40	6,860,000	.0192	132,000
2080	5,200,000	1.40	7,280,000	.0084	62,000
		Total, Average Annual Benefit			$2,560,000

1/ Factors may only be used as a complete series for 50- or 100-year periods.

TABLE D-7

COST ESTIMATE - NATIONAL RECREATION AREA PLAN
(No Road Limitations)

Facilities	Quantity	Unit	Unit Price	Cost
Roads, access (including one bridge)	25.8	Mile	$150,000	$6,420,000 1/
Boat-launching areas	30	Lane	36,000	1,080,000
Swimming areas	3	Job	L.S.	1,500,000
Picnic sites	570	Each	1,500	860,000
Camp sites	1,500	Each	2,700	4,060,000
Subtotal				$13,920,000
Contingencies				2,780,000
Total, construction cost				$16,700,000
Engineering and design				831,000
Supervision and administration				1,169,000
Lands and damages, including acquisition costs				4,200,000
Total Cost, for National Recreation Plan				$22,900,000 2/

1/ Bridge cost estimated at $2,550,000.

2/ Level of development is shown on Plate D-2.

TABLE D-8

NATIONAL RECREATION AREA PLAN
FACILITY COSTS

Year	Cost of Facilities	Present Worth Factor	Present Worth
1980	$ 8,000,000 1/	1.0000	$ 8,000,000
1990	300,000 2/	.7263	220,000
2000	1,050,000	.5275	550,000
2010	1,230,000	.3831	470,000
2020	2,100,000	.2782	580,000
2030	1,270,000	.2021	260,000
2040	4,550,000 3/	.1468	670,000
2050	1,540,000	.1066	160,000
2060	1,460,000	.0774	110,000
2070	1,400,000	.0562	80,000
Total	$22,900,000		$11,100,000
Average Annual Facility Cost (0.0339) 4/			$ 376,000

1/ Includes $4,000,000 cost for land and damages to be acquired initially to permit construction and development of future facilities.

2/ Expansion of existing areas requires minimum road and utility development in addition to extended recreation season applying to previously constructed facilities.

3/ Includes $2,550,000 bridge cost.

4/ Capital Recovery Factor at 3-1/4 percent over 100-year period.

TABLE D-9

NATIONAL RECREATION AREA PLAN
OPERATION, MAINTENANCE AND REPLACEMENT COSTS

Year	Operation, Maintenance and Replacement 5% of Facility Cost	Present Worth Factor	Present Worth
1980	$200,000 1/	29.51	$5,902,000
1990	15,000	21.09	320,000
2000	53,000	14.97	790,000
2010	62,000	10.53	654,000
2020	105,000	7.31	770,000
2030	64,000	4.96	320,000
2040	233,000	3.28	160,000
2050	77,000	2.02	160,000
2060	73,000	1.13	83,000
2070	70,000	0.47	33,000
Total			$9,792,000
Average Annual Operation, Maintenance and Replacement Cost (0.0339) 2/			$ 332,000

1/ Lands excluded.

2/ Capital Recovery Factor at 3-1/4 percent over 100-year period.

TABLE D-10

1965 RECREATION ACT PLAN (Public Law 89-72)
AVERAGE ANNUAL BENEFIT

Year	Net Attendance due to Project Recreation Days	Benefit Value (Each)	Recreation Benefit (Total)	Average Annual Equivalent Factor 1/ (3-1/4%)	Average Annual Recreation Benefit (100 years)
1980	0				
1990	1,000,000	$1.40	$1,400,000	.2476	$ 347,000
2000	1,300,000	1.40	1,820,000	.1798	327,000
2010	1,800,000	1.40	2,520,000	.1306	329,000
2020	2,400,000	1.40	3,360,000	.0949	319,000
2030	2,900,000	1.40	4,060,000	.0689	280,000
2040	3,500,000	1.40	4,900,000	.0500	245,000
2050	4,000,000	1.40	5,600,000	.0363	203,000
2060	4,100,000	1.40	5,740,000	.0264	152,000
2070	4,200,000	1.40	5,880,000	.0192	113,000
2080	4,200,000	1.40	5,880,000	.0084	49,000
			Total, Average Annual Benefit		$2,364,000

1/ Factors may only be used as a complete series for 50- and 100-year periods.

TABLE D-11

COST ESTIMATE - 1965 RECREATION ACT PLAN
IN PUBLIC LAW 89-72

Facilities	Quantity	Unit	Unit Price	Cost
Roads, access (including one bridge)		Mile	$150,000	$5,840,000 1/
Boat-launching areas	25	Lane	36,000	900,000
Swimming areas	3	Job	L.S.	1,280,000
Picnic sites	455	Each	1,500	680,000
Camping sites	1,220	Each	2,700	3,300,000
Subtotal				$12,000,000
Contingencies				2,400,000
Total, construction costs (rounded)				$14,400,000
Engineering and design				700,000
Supervision and administration				1,000,000
Lands and damages, including acquisition costs				4,200,000
Total cost, for 1965 Recreation Act Plan				$20,200,000

1/ Bridge cost estimated at $2,550,000.

TABLE D-12

1965 RECREATION ACT PLAN (Public Law 89-72)
FACILITY COSTS

Year	Cost of Facilities	Present Worth Factor	Present Worth
1980	$ 8,000,000 1/	1.0000	$ 8,000,000
1990	270,000	.7263	200,000
2000	740,000	.5275	390,000
2010	890,000	.3831	340,000
2020	1,820,000	.2782	510,000
2030	1,070,000	.2021	220,000
2040	4,340,000	.1468	640,000
2050	1,260,000	.1066	130,000
2060	1,050,000	.0774	80,000
2070	860,000	.0562	50,000
Total	$20,300,000		$10,560,000
Average Annual Facility Cost (0.0339) 2/			$ 358,000

1/ Includes $4,000,000 cost for land and damages.

2/ Capital Recovery Factor at 3-1/4 percent over 100-year period.

TABLE D-13

1965 RECREATION ACT PLAN (Public Law 89-72)
OPERATION, MAINTENANCE AND REPLACEMENT COSTS

Year	Operation, Maintenance and Replacement 5% of Facility Cost	Present Worth Factor	Present Worth
1980	$200,000 1/	29.51	$5,902,000
1990	14,000	21.09	300,000
2000	37,000	14.97	550,000
2010	45,000	10.53	470,000
2020	91,000	7.31	670,000
2030	54,000	4.96	270,000
2040	217,000	3.28	710,000
2050	63,000	2.02	130,000
2060	53,000	1.13	60,000
2070	43,000	0.47	20,000
Total			$9,082,000
Average Annual Operation, Maintenance and Replacement Cost (0.0339) 2/			$ 308,000

1/ Lands excluded.

2/ Capital Recovery Factor at 3-1/4 percent over 100-year period.

TABLE D-14

COST ESTIMATE - INCIDENTAL RECREATION USE PLAN

To provide for the public health and safety and operational requirements related thereto

Facilities	Cost
Overlook	$100,000
Ends of access road (barricades, turnarounds and vault-type toilets)	56,000
Boat-launching areas 1/	277,000
Subtotal	$433,000
Contingencies	87,000
Subtotal	$520,000
Engineering and design	25,000
Supervision and administration	35,000
Total cost	$580,000 2/

1/ Needed for operational access and public safety.

2/ As specified under Public Law 90-72 lands would be acquired and reserved to protect the potential recreation development at an additional cost of $4 million.

TABLE D-15

COST ESTIMATE - INDIAN RECREATION DEVELOPMENT PLAN
(To accommodate one-million recreation days by 1990) 1/

Facilities	Quantity	Unit	Unit Price	Cost
Picnic sites	190	Each	$ 1,500	$ 285,000
Campsites	500	Each	2,700	1,350,000
Swimming areas	Job	-	-	630,000
Boat-launching areas	10	Lane	36,000	360,000
Roads, access	2.5	Mile	150,000	375,000
Subtotal				$3,000,000
Contingencies				600,000
Total, construction cost				$3,600,000
Engineering and design				240,000
Supervision and administration				200,000
Lands and damages, including acquisition costs				170,000
Total, cost for Indian Recreation Development Plan				$4,210,000

1/ To capitalize on the potential of this development the Indian Community should explore the feasibility of developing on Indian land, a Lodge-Cabin Complex, Amphitheatre and Indian Museum. The cost of such development could approximate $3.5 million.

TABLE D-16

SELECTED PLAN
AVERAGE ANNUAL BENEFIT

Year	Net Attendance due to Project Recreation Days	Benefit Value (Each)	Recreation Benefit (Total)	Average Annual Equivalent Factor 1/ (3-1/4%)	Average Annual Recreation Benefit (100 years)
1980	0				
1990	1,000,000	$1.40	$1,400,000	.2476	$ 347,000
2000	1,000,000	1.40	1,400,000	.1798	252,000
2010	1,000,000	1.40	1,400,000	.1306	183,000
2020	1,000,000	1.40	1,400,000	.0949	133,000
2030	1,000,000	1.40	1,400,000	.0689	97,000
2040	1,000,000	1.40	1,400,000	.0500	70,000
2050	1,000,000	1.40	1,400,000	.0363	51,000
2060	1,000,000	1.40	1,400,000	.0264	37,000
2070	1,000,000	1.40	1,400,000	.0192	27,000
2080	1,000,000	1.40	1,400,000	.0084	12,000
			Total, Average Annual Benefits		$1,210,000 (rounded)

1/ Factors may only be used as a complete series for 50- or 100-year periods.

TABLE D-17

SELECTED PLAN
RECREATION DAYS - DESIGN DAYS
(1990)

Percent	Activity	Average Annual Visitation	Design Day 1/ Factor		Design Day
20	Camping	1,000,000 x .20 = 200,000	x .0125	=	2,500
15	Picnicking	1,000,000 x .15 = 150,000	x .0125	=	1,875
20	Swimming	1,000,000 x .20 = 200,000	x .0125	=	2,500
20	Sightseeing	1,000,000 x .20 = 200,000	x .0125	=	2,500
20	Boating	1,000,000 x .20 = 200,000	x .0125	=	2,500
3	Hiking	1,000,000 x .03 = 30,000	x .0125	=	375
2	Fishing	1,000,000 x .02 = 20,000	x .0125	=	250
	Total			=	12,500

1/ Design factor based on facilities utilized at maximum capacity weekend days and holidays and 50 percent capacity week days during a 120-day recreation season.

TABLE D-18

DERIVATION OF DESIGN-DAY FACTOR

Recreation Season

1990	120 days
2000	140
2010	160
2020	180
2030	200
2040	214

Season	Total Days	Weekend Days and Holidays	1/ Week Days	Design-Day Factor
18 May-15 September	120	39	81	.0125
8 May-25 September	140	44	96	.0109
28 April-5 October	160	49	111	.0095
18 April-15 October	180	54	126	.0085
8 April-25 October	200	59	141	.0079
1 April-31 October	214	63	151	.0073

1/ Average week-day use, 50%.

TABLE D-19

SELECTED PLAN
FACILITY REQUIREMENTS CRITERIA
(1990)

Activity	Design Day		People/Site		Turnover		Facilities Required
Camping	2,500	÷	5		-	=	500
Picnicking	1,875	÷	5 = 375 People/car	÷	2	=	190
Swimming	2,500	÷	5 = 500	÷	2	=	250 parking spaces
	100 sq.ft. beach/person 100 x 2,500 = 250,000			÷	2	=	125,000 sq.ft. (5.7 acres)
Sightseeing	2,500	÷	5 = 500	÷	10	=	50 parking spaces
Boating	2,500	÷	5 = 500	÷	2	=	250 parking spaces
			25 spaces/lane			=	10 lanes
			People/mile				
Hiking	375	÷	15 = 25	÷	10	=	2.5 miles
Fishing	250	(use trails for access to shoreline, parking areas provided for other activities expanded for fishermen parking)					

TABLE D-20

COST ESTIMATE - SELECTED PLAN
(To accommodate one million recreation days by 1990)

Facilities	Quantity	Unit	Unit Price	Cost
Picnic sites	190	Each	$ 1,500	$ 285,000
Campsites	500	Each	2,700	1,350,000
Swimming area	1	Job	L.S.	532,000
Boat-launching areas	9 1/	Lane	36,000	325,000
Access roads	2.2	Mile	150,000	341,000
Subtotal				$2,833,000
Contingencies				567,000
Total, construction cost				$3,400,000
Engineering and design				210,000
Supervision and administration				190,000
Lands and damages, including acquisition costs (800 acres required for initial development) 2/				200,000
Total cost of selected plan				$4,000,000

1/ One additional lane would be required for operational purposes.

2/ Additional lands would be acquired and reserved to protect the potential recreation development at an additional cost of $3.8 million in accordance with the requirements of Public Law 89-72.

TABLE D-21

SELECTED PLAN
FACILITY COSTS

Year	Cost of Facilities 1/	Present Worth Factor	Present Worth	Equivalent Average Annual Facility Cost Factor	Equivalent Average Annual Facility Cost
1980	$4,000,000	1.000	$4,000,000	0.0339	$135,000

OPERATION, MAINTENANCE AND REPLACEMENT COSTS

Year	5% of Facility Costs 2/	Present Worth Factor	Present Worth	Equivalent Average Annual Cost Factor	Equivalent Average Annual Operation, Maintenance and Replacement Cost
1980	$200,000	29.51	$5,902,000	0.0339	$200,000

1/ Includes $200,000 land cost.

2/ Excluding lands.

TABLE D-22

RECREATION TRAFFIC ROAD REQUIREMENTS
(To accommodate ultimate potential visitation

Year Road Improvement Needed	Design Day (1,000's)		Road Requirement	Cost (Million Dollars)		
	Recreation	Local Traffic		Laytonville to Dos Rios	Dos Rios to Black Butte River	Total
1970	.2	1.2	2 - 12' lanes	Not needed (use existing road from Longvale)	Existing road to be relocated - 15.4	
1990	5.2	1.6	2 - 12' lanes 1/ 4 - 11' lanes 2/	5.0	63.2	68.2
2030	13.1	2.0	4 - 11' lanes divided	20.7	65.0	85.7
2050	17.3	2.2	4 - 11' lanes with 12'median	22.9	68.5	91.4

1/ Additional two-lane road required from Laytonville to Dos Rios (Included as part of the California Parkway System).

2/ Four-lane road required from Dos Rios to recreation areas. (Based on the present normal recreation season of 120 days).

TABLE D-23

PRESENT DAY FISHERY VALUES [1]

	Ocean		Inland	
	Commercial	Sport	Sport	Subtotal
Chinook salmon	$167,000	$63,000	$19,000	$249,000
Steelhead			56,000	56,000
Trout (rainbow-yearling steelhead)			19,000	19,000
Total				$324,000

TABLE D-24

FUTURE FISHERY WITHOUT PROJECT [1]

	Benefit per Fisherman Day	1980 Value	2030 Value	2080 Value
Chinook salmon, commercial [2]		$167,000	$ 167,000	$ 167,000
Chinook salmon, ocean sport	$6.00	68,000	233,000	233,000
Chinook salmon, inland sport	$6.00	28,000	145,000	145,000
Steelhead	$6.00	96,000	566,000	566,000
Trout (rainbow-yearling steelhead)	$2.00	19,000	19,000	19,000
Total		$378,000	$1,130,000	$1,130,000

Average annual uniform equivalent based on 100-year period 1980-2080 at 3-1/4% = $759,000 as the value of the fishery.

[1] Estimates made by Corps of Engineers using basic data furnished by the Bureau of Sport Fisheries and Wildlife and California Fish and Game Department reports.

[2] From information obtained from the Bureau or Commercial Fisheries it is estimated the commercial catch contributed by the Middle Fork Eel River equals 32,000 chinook salmon at an average value per fish of $5.22.

TABLE D-25

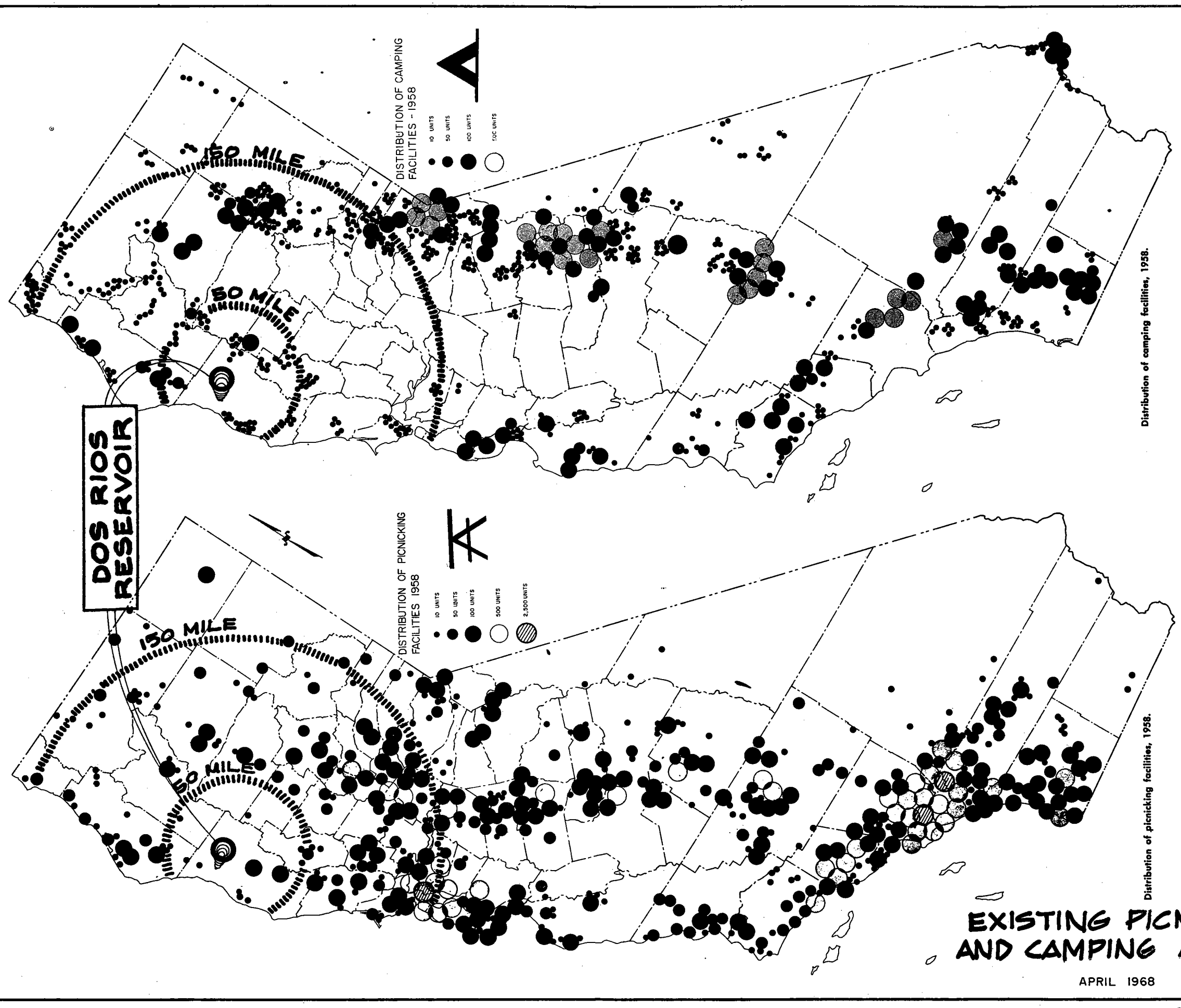
FUTURE FISHERY WITH PROJECT [1]

	Benefit per Fisherman Day	1980 Value	2030 Value	2080 Value
Chinook salmon, commercial		-	-	-
Chinook salmon, ocean sport		-	-	-
Chinook salmon, inland sport		-	-	-
Steelhead		-	-	-
Trout [2]	$2.00	$13,000	$13,000	$13,000

Average annual uniform equivalent based on 100-year period, 1980-2080 at 3-1/4% = $13,000 as the value of the fishery.

[1] This table is the value figured with no fishery mitigation features either in water leases or hatchery facilities.

[2] Trout fishery remaining above the reservoir pool (native trout or land-locked steelhead).



EXISTING PICNICKING AND CAMPING AREAS

APRIL 1968

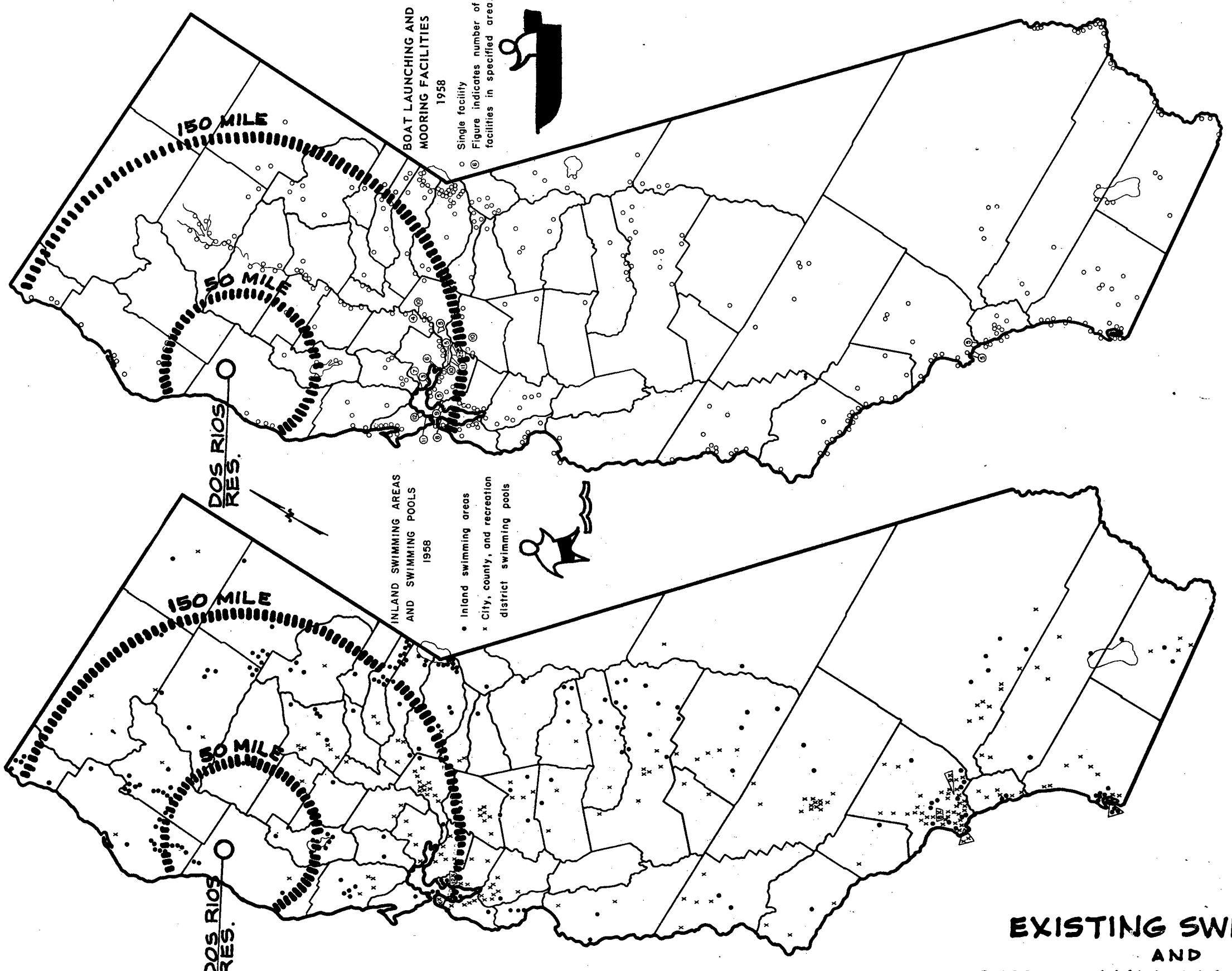
INFORMATION DERIVED FROM CALIF. OUTDOOR RECREATION PLAN, PART II, 1960

FILE NO. 60-34-8

fig D-1

CORPS OF ENGINEERS

U. S. ARMY



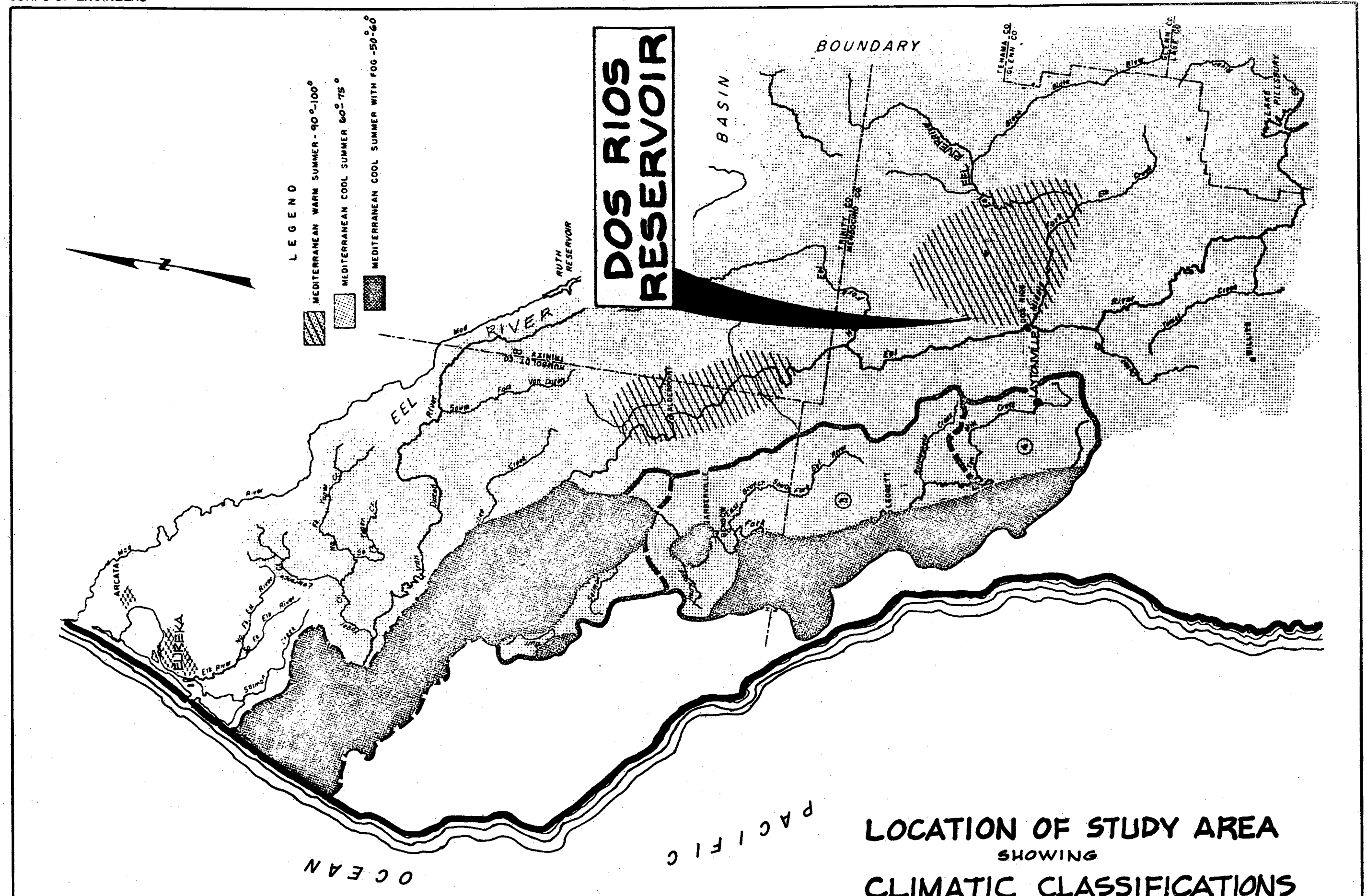
EXISTING SWIMMING AND BOAT LAUNCHING AREAS

APRIL 1968

INFORMATION DERIVED FROM CALIF. OUTDOOR RECREATION PLAN, PART II, 1960

FILE NO. 60-34-8

fig. D-2



LOCATION OF STUDY AREA
SHOWING
CLIMATIC CLASSIFICATIONS

APRIL 1968

FILE NO. 60-34-8 fig D-3

SIX RIVERS NATIONAL FOREST

TRINITY NATIONAL FOREST

YOLLA BOLLY

Shell Mtns.

MIDDLE EEL WILDERNESS

MENDOCINO NATIONAL FOREST

S. Yolla Bolly Mtns.

N

TRINITY CO.
MENDOCINO CO.

DOS RIOS RESERVOIR

Buck Rock

Round Mtn.

Asa Bean Ridge

ROUND VALLEY

20 MILES TO WILDERNESS AREA

Mendocino Pass

TEHAMA CO.
GLENN CO.

Benley Ridge

GRIZZLY FLAT STA.

JOB CORPS CENTER

EDEN VALLEY

MENDOCINO CO.
GLENN CO.

ELK CREEK

STONY GORGE RES.

Hull Mtn. Lookout

Mt. Sanhedrin Lookout

STATE GAME REFUGE

LAKE PILLSBURY

GLENN CO.
COLUSA CO.

EAST PARK RES.

LAKE MENDOCINO

TO UKIAH

CLEAR LAKE

LAKEPORT

CALIFORNIA

MENDOCINO NATIONAL FOREST SOUTH HALF

RECREATION MAP OF THE

MENDOCINO NATIONAL FOREST

U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE - CALIFORNIA

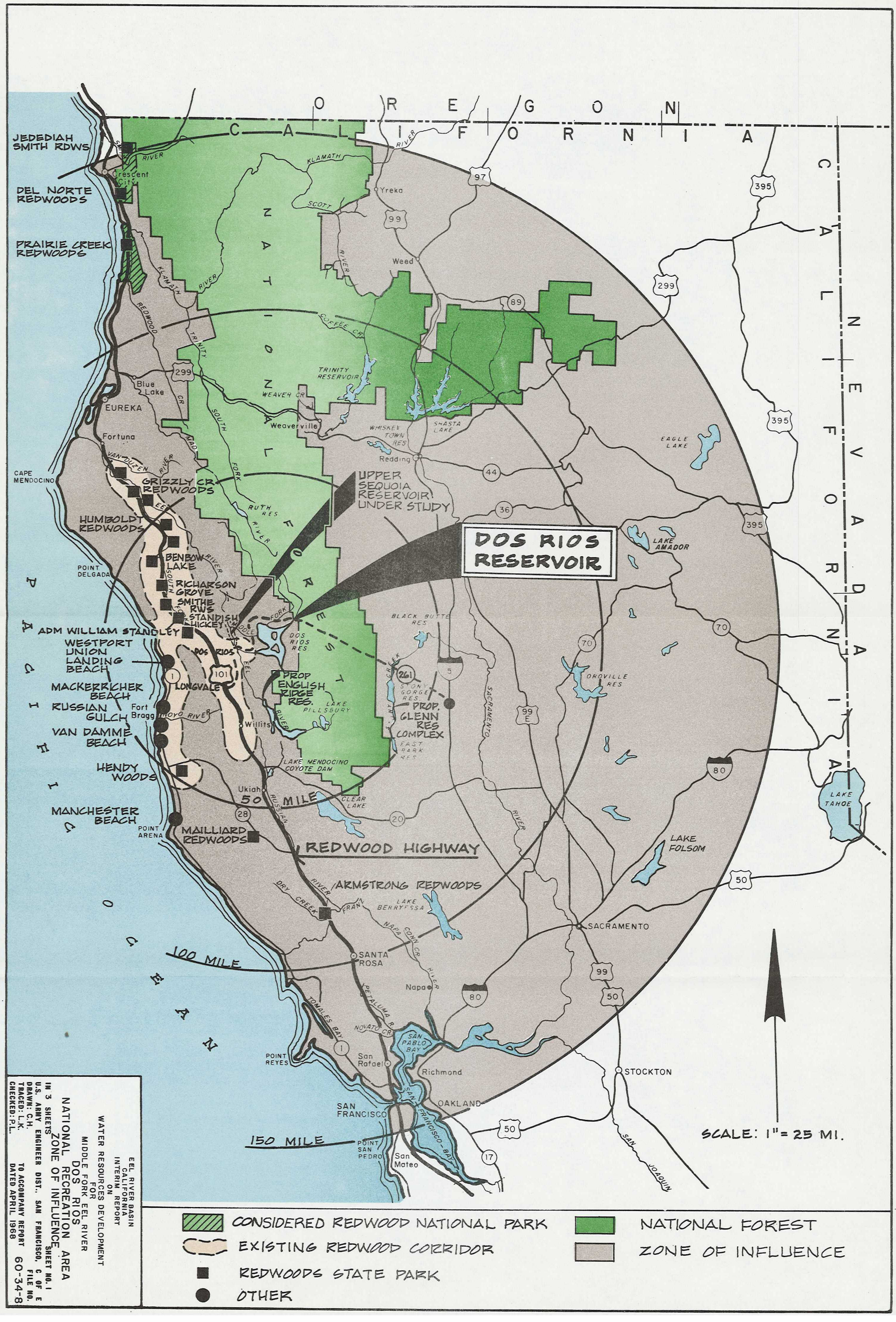
L E G E N D

- ROADS
- TRAILS
- FOREST SERVICE STA.
- GAME REFUGE BDRY.
- CAMP AREA
- IMPROVED CAMP SITE
- RESORT
- WILDERNESS AREA BDRY.

APRIL 1968

FILE NO 60-34-8

FIGURE D-4



EEL RIVER BASIN
CALIFORNIA
INTERIM REPORT
ON
WATER RESOURCES DEVELOPMENT
FOR
MIDDLE FORK EEL RIVER
DOS RIOS
NATIONAL RECREATION AREA
ZONE OF INFLUENCE
IN 3 SHEETS SHEET NO. 1

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: C.H. FILE NO.
TRACED: L.K.
CHECKED: P.L. TO ACCOMPANY REPORT DATED APRIL 1968 60-34-8

PLATE D-1

ROUND VALLEY INDIAN RESERVATION BOUNDARY

UPPER SEQUOIA RESERVOIR UNDER STUDY

Mill Creek

Middle Fork Eel River

EXISTING WILDERNESS AREA

20 MILES TO YOLLA BOLLY MIDDLE EEL WILDERNESS

60 MI. TO INTERSTATE 5

Black Butte River

PRIVATE ROAD (EASEMENT REQUIRED FOR USE)

MENDOCINO

TO LAKE PILLSBURY 28 MILES

NATIONAL

FOREST

TUNNEL TO GRINDSTONE CREEK

STATE

WILDLIFE AREA

Eel River

N.W.P. RAILROAD

ROUTE OF PROPOSED STEELHEAD PARKWAY

DOS RIOS DAM

PROPOSED AIRSTRIP RELOCATED

DOS RIOS

PROPOSED FISH HATCHERY

POSSIBLE RELOCATED SITE OF COVELO

LAYTONVILLE

101

PRIVATE ROAD

Outlet Creek

REDWOOD HIGHWAY

100 MI. TO SAN FRANCISCO

EXISTING PRIVATE ROAD

ENGLISH RIDGE RESERVOIR 12 MILES

LAKE PILLSBURY 28 MILES

Eel River

LEGEND

- RESERVOIR SHORELINE
- PRIVATE LANDS WITHIN PROJECT BOUNDARY
- EXISTING INDIAN TRIBAL AND ALLOTTED LAND
- BUREAU OF LAND MANAGEMENT LAND
- STATE — STATE LAND
- INDIAN RESERVATION BOUNDARY
- PROPOSED LAND ACQUISITION BOUNDARY
- NATIONAL FOREST BOUNDARY
- RECREATION ACCESS ROAD
- PROPOSED ACCESS ROAD
- PRIVATE ROAD
- RELOCATED ROAD
- STATE OR COUNTY ROAD
- U.S. HIGHWAY
- LIMITS OF RECREATION AREA
- SWIMMING
- CAMPING
- BOAT LAUNCHING
- PICNICKING
- OVERLOOK

} POTENTIAL DEVELOPMENT WITHOUT ROAD CONSTRAINTS

- SELECTED RECREATION PLAN

N

EEL RIVER BASIN
CALIFORNIA
INTERIM REPORT
WATER RESOURCES DEVELOPMENT
MIDDLE FORK EEL RIVER
RECREATION PLAN OF DEVELOPMENT
DOS RIOS RESERVOIR

SCALE IN MILES 0 1 2 3

IN 3 SHEETS — SHEET NO. 2

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

DRAWN: C.M.
TRACED: D.H.
CHECKED: P.L.

TO ACCOMPANY REPORT DATED APRIL 1968

FILE NO. 60-34-8

PLATE D-2