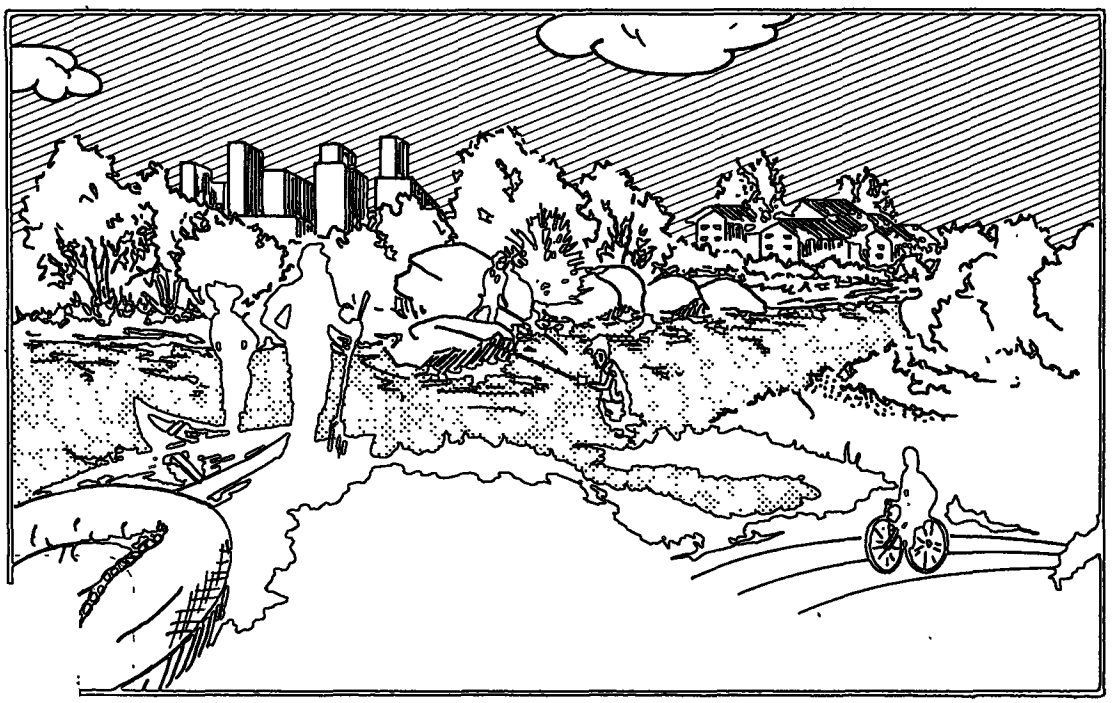
A report submitted to the
U.S. ARMY CORPS OF ENGINEERS

INSTITUTE FOR WATER RESOURCES
KINGMAN BUILDING
FORT BELVOIR, VIRGINIA 22060

# ANALYSIS OF SUPPLY AND DEMAND OF URBAN ORIENTED NON RESERVOIR RECREATION





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# ANALYSIS OF SUPPLY AND DEMAND OF URBAN ORIENTED NONRESERVOIR RECREATION

A Report Submitted to the:

U.S. Army Engineer Institute for Water Resources
Kingman Building
Fort Belvoir, Virginia 22060

by

U.S. Army Engineer District, Sacramento
Sacramento, California

NOVEMBER 1976 IWR RESEARCH REPORT 76-R2

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20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report contains the results of U.S. Army Corps of Engineers research into the supply and demand of urban oriented nonreservoir recreation. It is an interim report on an initial phase of a comprehensive effort underway within the Corps to develop methodologies, procedures, and guidance for the estimation of recreation use and benefits for nonreservoir water resource development projects. The specific objectives of this research were to develop a data base on use and users of urban recreation facilities which

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are water related but not reservoir projects, and to prepare estimating equations which produce reasonable and supportable estimates of recreation use and demand. The analysis models and methodology for use prediction and benefit estimation developed through this phase of research need to be duplicated and validated in other locations to ensure general applicability in recreational water resource planning.

# PREFACE

This report presents the results of a U.S. Army Corps of Engineers research project on the supply and demand of urban-oriented nonreservoir recreation. The research was conducted for the Institue for Water Resources by the Sacramento District in cooperation with the Sacramento County Department of Parks and Recreation.

Richard E. Brown, Dennis Saulque and George D. Fisk of the Sacramento District staff performed the research under the supervision of Fred Kindel. Rick Janecke of the Sacramento County Department of Parks and Recreation assisted in some phases of the project. Technical oversight was provided by Richard Leverty, Office of the Chief of Engineers, and George Antle, Institute for Water Resources.

The objectives were to: (1) develop a data base on use and users of urban recreation facilities which are water related but not reservoir projects, and (2) prepare estimating equations which produce supportable use and demand estimates. The research is one phase of a more comprehensive Corps effort to develop methodologies, procedures, and guidance for estimating the use and benefits for nonreservoir projects. As explained in Appendix B of this report, the analysis and methodology developed through this phase of research needs to be replicated and validated in other locations to ensure general applicability. Follow-on research designed to provide the necessary replication is programmed, but results will not be available for dissemination for perhaps several years. In the interim, the methodology in this research report is potentially applicable in planning situations having similar resource and population characteristics, and other important parameters in recreation use prediction and benefit estimation.

Parts II and III of the report contain a rather detailed account of the data base used in the study, the methods of collecting these data, and the analytical procedures followed in developing various recreation use prediction models. Ordinarily, technical background information of this kind would not be provided in a field manual intended for routine use in water resource planning; however, inasmuch as this report is a technical publication which records interim research results, inclusion of this detailed information is deemed essential. Although Part IV, dealing with the actual application of the models in use prediction and benefit evaluation would be of primary interest to the potential user of the report, some may find the technical background and knowledge of the basic analytical approach used in the study to be of interest.

Comments on the report are encouraged and should be addressed to the Director, Institute for Water Resources.

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## SUMMARY

This report presents a methodology for estimating recreation use and benefits in planning nonreservoir water resources developments. Recreation activity hour-estimating models are developed from data on the American River Parkway, Sacramento, California. A narrative-pictorial and statistical description of the recreation areas is presented. Models' application is illustrated and two approaches to estimating the economic value of a nonreservoir recreation area are demonstrated.

# ANALYSIS OF SUPPLY AND DEMAND OF URBAN ORIENTED NONRESERVOIR RECREATION

## PART I: INTRODUCTION

### General

1. The Flood Control Act of 1944 authorized the Corps of Engineers "... to construct, maintain, and operate public park and recreational facilities in reservoir areas." The Flood Control Act of 1962 broadened the 1944 authority and permitted recreational developments at nonreservoir water resources projects, and full consideration of recreation as a project purpose was directed by Senate Document 97 of 1962. The elevation of recreation to a status equal with other project purposes necessitates an economic evaluation comparable to the benefit-cost analyses of other purposes. Estimating procedures have been developed for evaluating reservoir recreation [1, 2] but not for nonreservoir recreation. These projects which are frequently located within or readily accessible to urban areas, constitute an increasing portion of the Corps' planning effort.

### Purpose and Scope

2. The purpose of this report is to provide Corps of Engineers' recreation planners with an analytical technique for evaluating nonreservoir projects in or near urban areas. A recreation sample survey of the American River Parkway in Sacramento, California was conducted to acquire some credible site-specific measurements. From the parkway estimates, three relatively simple models are generalized for estimating recreational use and benefits at similar nonreservoir projects.

### Existing Approaches to Estimating

3. Currently, three general approaches are used to estimate the quantity of use expected at a nonreservoir project. Benefits are derived from the recreation use estimates, and the precision of the various estimating methods affects the precision of the benefit estimates.

4. Supply creates demand approach. One approach simply assumes demand is far in excess of supply and that whatever developments are made available will be used to capacity. The estimate of use is then an additional assumption of how much the site can sustain and how much crowding the users will tolerate. Although the capacity concept should always be recognized, this approach of simply equating capacity to use without some analysis of expected use has limited legitimate applicability and is not pursued in this study.

5. Population specific use estimates (1972 National Recreation Survey). A second approach to estimating expected use is to multiply available population-specific activity participation rates from general survey data and some proximate population size and then allocate part of that population's expected activities to the particular planned site. National sample recreation surveys have been taken periodically since 1960. Household surveys are conducted on a statewide and county basis.

6. However inappropriate for project planning these data may be, they are being used because they exist. Accordingly, one such data set was examined in an attempt to maximize the usefulness in making site specific estimates. The 1972 National Recreation Survey was conducted by the U.S. Bureau of Outdoor Recreation for use in preparing the National Recreation Plan [3], which was designed to guide policy responsive to recreation needs. A detailed description of the survey may be found in a technical appendix to that report [4]. It was a household survey which produced 4029 interview records. These records include information on recreation activity participation on "outings" during the months of June through August and demographic profiles of the respondents.

7. The use of population-specific estimates in planning site-specific projects is of doubtful validity. Recreation project planning is planning an increase in supply of recreation opportunities. It is assumed that an increase in supply reduces the cost (distance) to a population and that there is a resultant response along a demand schedule and increased total use. Participation rates computed from the national survey, or any other such broad population surveys, reflect an undefined supply of opportunities. Estimates from these participation rates are expected values with or without the existence of any particular park or recreation area. To the extent that the sample respondents reflect the distribution of opportunities available to the population, the participation estimates reflect average supply conditions. This suggests that the rates of consumption which underlie the national survey or other surveys should be adjusted to accommodate other than average supply conditions for consideration in any particular planning project. Assuming such adjustments could be made for the appropriate activity participation rates, the expected participation still must be allocated to the particular site. The allocation is another judgment which cannot be accurate without some data on the recreation use characteristics of particular park sites reflecting competition or the unequal use of other available recreation opportunities.

8. The population survey data are used when there are little or no alternative data available. The rationale is that judicial use of inappropriate data yields estimates which are no worse and are certainly more defensible than estimates based on too little data. The disadvantage of using these data is that they are no better than a judicial, experienced guess; yet, they tend to lend an unreal credibility. The result is a disincentive to acquire better data for project planning.

9. Site specific data analysis. The third approach is to estimate expected use based on observations of use at similar facilities. Ideally, recreation project planning should use site-specific measurements of activity patterns experienced over a range of populations and varying resources and facilities. The National Academy of Sciencies, in a recent assessment of recreation demand, recognized this approach's applicability.

> It is important that site-specific data be made available to planners. Numerous studies have now gathered the data necessary for the travel-cost approach in a variety of sites. If those studies were regularly made available and additional studies done, the inventory of site-specific analysis would give planners an important analytic tool [5, p47].
>
> (It is interesting to note that of the ten recommendations arising from this assessment, six were related to data needs.)

The academy's recommendation refers to the value of the comparable site, travel-cost approach to benefit evaluation, discussed in paragraphs 45-48 below. However, the importance of an inventory of analyses is more essential than that.

10. Quantified, documented experience at recreation sites is crucial in developing sound planning judgment of visitor reaction to the provision of similar recreation opportunities. A credible collection of narrative-pictorial and statistical descriptions provides a means for enlarging the experience of recreation planners. Relating recreation statistics to the social, economic, and physical environments where they occur is an invaluable learning tool. In addition to inventorying available studies of this kind, additional studies are needed that will explore and present more descriptive site-specific data as presented here.

## PART II: THE AMERICAN RIVER PARKWAY

### The Resource

11. Plausible estimates of the number of recreation visitors engaged in selected activities within a well-defined system of opportunities are a prerequisite to any improvement in existing evaluations. To obtain the kind of estimates needed, a sample recreation survey was required at selected park and recreation areas. The American River Parkway in Sacramento County, California was a preeminent candidate for such a survey. The Sacramento County Department of Parks and Recreation had conducted a recreation survey in 1967. Since then, the development and character of the Parkway has changed and its recreational use has increased appreciably. The County recognized its own need for recreation information and informally committed personnel to work with the Corps in collecting mutually beneficial recreational use data. A recreation use survey was conducted during the summer of 1975 which yielded statistics enabling an analysis of the demand for parkway recreation.

12. The American River Parkway in Sacramento County, California typifies the type of recreation development likely in a Corps nonreservoir project in a metropolitan area. The American River, from Nimbus Dam to its confluence with the Sacramento River, flows 23 miles through urban and suburban Sacramento. Nimbus Dam is an after-bay dam, completed by the U.S. Bureau of Reclamation in 1956, to regulate discharge from the hydroelectric power plant at Folsom Dam. Folsom Dam was completed by the Corps in 1956, providing increased flood protection for urban development along the river. About 7 miles of additional levees on the American River were completed in 1958, essentially completing the levee system which extends from the confluence with the Sacramento River 11 miles upstream on the south bank and 17 miles on the north bank. In 1962, Sacramento County adopted a Parkway concept intended to preserve an open space greenbelt along the entire length of the river below Nimbus Dam. A substantial investment has been made in land acquisition, facility development, and a continuing operation and maintenance program, providing an outstanding recreation resource. Today, the Sacramento County Parks and Recreation Department manages over 3,000 acres of river parkway. If a dam and associated levee improvements were under investigation now, the Corps of Engineers would include recreation development among the alternatives to be considered, and this could very well lead to a joint federal and nonfederal program similar to the existing program. In the case of the American River, another federal program was utilized--the Land and Water Conservation Fund--to assist in funding after the federal flood control program was completed.

13. In one sense the Parkway is a singular entity; it is a contiguous acreage of land paralleling the river. However, these 3,000 acres are quite heterogeneous with respect to many of the factors affecting recreation use. Access, vegetation, recreation improvements, management problems and practices, and density of proximate populations vary appreciably for different Parkway areas. Some of the individual areas are well defined, established parks. Others are acreages delineated by recognizable

landmarks. For management purposes, the Sacramento County Department of Parks and Recreation partitions the parkway into 14 separate areas. These areas are described graphically in Appendix A, which is intended to give recreation planners a feel for the distinctiveness of the parkway areas. Their locations along the river are shown in Figure 1. Summary descriptions are given below.

a. Sailor Bar. Just below Nimbus Dam, this 297-acre area on the north (right) side of the river is essentially undeveloped. There is access, a canoe concession, and parking on gold dredger tailings. It is a major launching site for rafts and canoes.

b. Upper Sunrise Park. Across the river from Sailor Bar, this 179-acre area has recently been provided vehicle access and parking as well as a new bicycle trail. Picnic tables are located along the river bank and riding and hiking trails extend throughout.

c. Lower Sunrise Park. Riding, hiking, and bicycle trails continue near the river shoreline past the river crossing at Sunrise Blvd. There are two established picnic areas with restrooms and a third major parking area in this 171-acre park.

d. Sacramento Bar. This 315-acre area, located on the north side of the river, has access and gravel parking areas. Use of the area is concentrated near a low-level bridge which crosses to a Lower Sunrise Park parking area. Abandoned dirt roads are used as riding trails.

e. Rossmoor Bar. The trails from Lower Sunrise continue through this 815 acres past occasional picnic sites on the river bank. In the summer of 1975, a road and a parking lot were paved to increase access to the area.

f. Ancil Hoffman Park. On the north side of the river, this 386-acre area offers a range of recreational activities. There is a 75-acre nature area, a game field, a picnic area overlooking the river, and an 18-hole golf course. The park is developed and managed for intensive recreation use.

g. Arden Bar. This area, just below Hoffman Park, has relatively little access because there is an existing sand and gravel mining operation.

h. C.M. Goethe Park. This 272-acre park on the south bank offers the most extensive unbroken area of natural habitat along the parkway. Riding and hiking trails meander throughout the area and there is access to the bicycle trail upriver. Two picnic areas are developed and managed for intensive use.

i. S.A.R.A. Park. Downstream from Goethe Park is a stretch of river with little public lands or access. There are some orchards on the south bank, but, for the most part, residential development abuts the floodway. Located upstream from the next river crossing at Watt Avenue, this 9-acre area of dense vegetation has numerous informal footpaths down to the river's edge.

j. Watt Avenue South. This 99-acre area, located on the south side of the river, is served by two river crossings, Watt and Howe Avenues. There are access roads, parking, and restrooms located near each river crossing. Most of the area is maintained in a natural state with only pedestrian access.

k. Campus Commons. On the north side of the river is the lower portion of the bicycle trail. The current upstream terminus of the bicycle trail is Rio Americano High School, located about 12 miles upstream. This 8 acres is an easement for the trail. There are occasional picnic tables along the way. There is a pedestrian and bicycle bridge crossing to California State University at Sacramento and a 9-hole golf course between the trail and the river.

l. Woodlake. This area has extensive undeveloped lands not in public ownership. There is an easement for the continuation of the bicycle trail and an occasional picnic site. There are several points of access to the trail.

m. Paradise Beach. This 30-acre area, located on the south side of the river, is undeveloped, but it contains a beach area which is a favorite of swimmers and sun-bathers. The unplanned, intensive use of the area creates a parking conflict in the adjacent residential area.

n. Discovery Park. Located at the confluence of the Sacramento and American Rivers, this 275-acre park marks the downstream end of the parkway. There are boat launching and picnicking facilities and extensive parking. There is a bicycle concourse at the downstream terminus of the bicycle trail.

## The Recreation Use Survey

14. From the recreation use survey of the parkway, activity hour estimates were sought for each park area. There were 12 mutually exclusive activity categories. A careful activity definition is necessary in any recreation use survey. Bicycling, jogging, and horseback riding are unambiguous. Walking excludes persons transiting parking areas. Rafting includes all floatable conveyances and loading and handling at the parks. Fishing includes anglers, nonangler companions and walking with fishing equiptment. Sports and games exclude golf which is also excluded from the total estimates. Picnicking includes only persons consuming food and beverage and not persons who might have picnicked at a different time nor persons consuming only beverages. Relaxing is a general category of passive recreation including sitting, lying, and drinking beverages. Swimming includes persons swimming or wading in the river, regardless of apparel; persons relaxing on the riverbank if in swimsuits; and nude sunbathers. (Although nude sunbathing was lawful during the survey period, a City ordinance has since made this activity unlawful on the Parkway.) Sightseeing includes persons who typically never get very far from their car and also includes those simply sitting in their car. Others includes persons who do not fit in any other category, e.g., milling around in a parking lot.

15. Parkway use was stratified by area and type of day. The areas were those defined in paragraph 13, except that Arden Bar was dropped because of a restricted public access. Sampling days were segregated into weekdays and weekend days including holidays. A Latin square sampling design was used with sequential sampling to assure that the sample counts were taken at different times in all strata. The measurement process for most activities involved four field sampling personnel walking or bicycling through a designated area at a prescribed time and visually counting and recording visitors by the activity categories. Each visitor was counted in one activity only. There was a total of 1,046 area counts. For bicycling on the bicycle trail, the measurements were 20-minute interval counts at points on the trail estimated to be an average of 20 minutes apart. For rafting, the area counts were supplemented by aerial counts of rafters on the river. The sampling, measurement, and estimating process is detailed in Appendix B.

16. In addition to recreation activity hours, additional information about the visitors was required. A subsample of areas and times was selected to collect information describing the visitor groups' characteristics, their origin, the nature of their visit, and their responses to the resources available. The questionnaire and its administration are described in Appendix B. Some 750 useable interviews were conducted at six areas. Limitations in the questionnaire design and quality control of the interviews are described in the discussion of the generalized models (Part III).

17. Survey data collected. The activity hour estimates obtained from the parkway survey are given in Table 1. The daily activity hour estimates are the expected or average amounts occurring for each day type (for each activity segregated by weekdays and weekend days). For example, on an average weekend day or holiday, there is an expected value of 11,190 activity hours rafting; whereas on an average weekday, there is only an expected value of 1,880 activity hours rafting. The percent of activities estimates refer to the percentage participation within a day type. For example, on weekends and holidays, approximately 42 percent of all activity hours are spent rafting, while only 21 percent of weekday activity hours are rafting. The activity hour sums of weekend and weekday estimates may not equal the total because of rounding. In addition, the estimates of rafting for the parkway are greater than the sums of the areas because the rafting estimates on the river among areas are not allocated to any particular area. Tables 2 through 14 give the activity estimates for each parkway area.

18. Some biased downward measurement error exists in the estimates, i.e., to the extent the counts were incorrect, it is more likely that they were undercounts. However, at most areas for most activities, the measurement error is small, relative to the sampling error. A discussion of sampling errors for the park areas and the activities is presented in Appendix B. Measurement errors are likely to rival sampling errors at areas such as Sacramento Bar and Rossmoor Bar, which contain much undeveloped, little used, and relatively unmonitored land away from the river. Two activities

were subject to appreciable measurement error. These were horseback riding and rafting. The additional effort required to compensate the measurement error along the equestrian trails appeared unwarranted by the small percentage of park users on horseback. River rafting, on the other hand, is a significant use of the parkway and warranted substantial effort to minimize the measurement error. The solution was the supplemental aerial counts.

TABLE 1 RECREATION USE STATISTICS
AMERICAN RIVER PARKWAY SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 26922.8 | 100.0 | 753838 |
| | WEEKDAY | 8862.2 | 100.0 | 567179 |
| | TOTAL | 14358.8 | 100.0 | 1321005 |
| RAFTING | WEEKEND | 11193.5 | 41.6 | 313418 |
| | WEEKDAY | 1877.3 | 21.2 | 120148 |
| | TOTAL | 4712.6 | 32.8 | 433559 |
| RELAXING | WEEKEND | 5728.0 | 21.3 | 160383 |
| | WEEKDAY | 1707.0 | 19.3 | 109247 |
| | TOTAL | 2930.8 | 20.4 | 269630 |
| SWIMMING | WEEKEND | 3768.8 | 14.0 | 105526 |
| | WEEKDAY | 1914.7 | 21.6 | 122542 |
| | TOTAL | 2479.0 | 17.3 | 228067 |
| WALKING | WEEKEND | 1055.4 | 3.9 | 29552 |
| | WEEKDAY | 647.8 | 7.3 | 41457 |
| | TOTAL | 771.8 | 5.4 | 71009 |
| FISHING | WEEKEND | 781.3 | 2.9 | 21876 |
| | WEEKDAY | 761.1 | 8.6 | 48709 |
| | TOTAL | 767.2 | 5.3 | 70584 |
| PICNICKING | WEEKEND | 1281.8 | 4.8 | 35891 |
| | WEEKDAY | 312.4 | 3.5 | 19994 |
| | TOTAL | 607.5 | 4.2 | 55886 |
| TRAIL BICYCLING | WEEKEND | 948.3 | 3.5 | 26551 |
| | WEEKDAY | 438.5 | 4.9 | 28063 |
| | TOTAL | 593.6 | 4.1 | 54614 |
| OTHER BICYCLING | WEEKEND | 139.2 | .5 | 3897 |
| | WEEKDAY | 121.5 | 1.4 | 7774 |
| | TOTAL | 126.8 | .9 | 11670 |
| SPORTS / GAMES | WEEKEND | 835.7 | 3.1 | 23400 |
| | WEEKDAY | 359.5 | 4.1 | 23006 |
| | TOTAL | 504.4 | 3.5 | 46405 |
| SIGHTSEEING | WEEKEND | 152.4 | .6 | 4266 |
| | WEEKDAY | 131.5 | 1.5 | 8414 |
| | TOTAL | 137.8 | 1.0 | 12681 |
| JOGGING | WEEKEND | 99.5 | .4 | 2787 |
| | WEEKDAY | 128.0 | 1.4 | 8191 |
| | TOTAL | 119.3 | .8 | 10978 |
| HORSE RIDING | WEEKEND | 64.6 | .2 | 1809 |
| | WEEKDAY | 52.5 | .6 | 3357 |
| | TOTAL | 56.2 | .4 | 5167 |
| OTHER | WEEKEND | 1030.3 | 3.8 | 28848 |
| | WEEKDAY | 443.0 | 5.0 | 28352 |
| | TOTAL | 621.8 | 4.3 | 57201 |

TABLE 2 RECREATION USE STATISTICS
SAILOR BAR AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 362.9 | 100.0 | 10160 |
| | WEEKDAY | 178.8 | 100.0 | 11444 |
| | TOTAL | 234.8 | 100.0 | 21605 |
| RAFTING | WEEKEND | 143.9 | 39.7 | 4030 |
| | WEEKDAY | 19.2 | 10.7 | 1230 |
| | TOTAL | 57.2 | 24.3 | 5260 |
| RELAXING | WEEKEND | 52.8 | 14.5 | 1478 |
| | WEEKDAY | 16.6 | 9.3 | 1063 |
| | TOTAL | 27.6 | 11.8 | 2542 |
| SWIMMING | WEEKEND | 38.0 | 10.5 | 1063 |
| | WEEKDAY | 16.1 | 9.0 | 1029 |
| | TOTAL | 22.8 | 9.7 | 2094 |
| WALKING | WEEKEND | 8.4 | 2.3 | 235 |
| | WEEKDAY | 10.2 | 5.7 | 652 |
| | TOTAL | 9.6 | 4.1 | 886 |
| FISHING | WEEKEND | 86.5 | 23.8 | 2423 |
| | WEEKDAY | 97.5 | 54.5 | 6242 |
| | TOTAL | 94.2 | 40.1 | 8664 |
| PICNICKING | WEEKEND | 7.9 | 2.2 | 220 |
| | WEEKDAY | 2.1 | 1.2 | 137 |
| | TOTAL | 3.9 | 1.7 | 357 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 1.8 | .5 | 50 |
| | WEEKDAY | 1.8 | 1.0 | 113 |
| | TOTAL | 1.8 | .7 | 162 |
| SPORTS / GAMES | WEEKEND | 1.8 | .5 | 51 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | .6 | .2 | 51 |
| SIGHTSEEING | WEEKEND | 4.9 | 1.3 | 136 |
| | WEEKDAY | 6.0 | 3.3 | 382 |
| | TOTAL | 5.6 | 2.4 | 517 |
| JOGGING | WEEKEND | .9 | .2 | 25 |
| | WEEKDAY | 1.4 | .8 | 89 |
| | TOTAL | 1.2 | .5 | 114 |
| HORSE RIDING | WEEKEND | 3.4 | .9 | 96 |
| | WEEKDAY | 1.3 | .7 | 83 |
| | TOTAL | 1.9 | .8 | 179 |
| OTHER | WEEKEND | 12.7 | 3.5 | 356 |
| | WEEKDAY | 6.6 | 3.7 | 424 |
| | TOTAL | 8.5 | 3.6 | 779 |

TABLE 3 RECREATION USE STATISTICS
UPPER SUNRISE AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 442.7 | 100.0 | 12395 |
| | WEEKDAY | 235.4 | 100.0 | 15067 |
| | TOTAL | 298.5 | 100.0 | 27463 |
| RAFTING | WEEKEND | 76.1 | 17.2 | 2130 |
| | WEEKDAY | 11.8 | 5.0 | 754 |
| | TOTAL | 31.3 | 10.5 | 2884 |
| RELAXING | WEEKEND | 111.0 | 25.1 | 3108 |
| | WEEKDAY | 57.8 | 24.5 | 3696 |
| | TOTAL | 73.9 | 24.8 | 6803 |
| SWIMMING | WEEKEND | 96.1 | 21.7 | 2690 |
| | WEEKDAY | 43.5 | 18.5 | 2786 |
| | TOTAL | 59.5 | 19.9 | 5475 |
| WALKING | WEEKEND | 26.2 | 5.9 | 733 |
| | WEEKDAY | 24.5 | 10.4 | 1567 |
| | TOTAL | 25.0 | 8.4 | 2300 |
| FISHING | WEEKEND | 68.8 | 15.5 | 1925 |
| | WEEKDAY | 54.8 | 23.3 | 3509 |
| | TOTAL | 59.1 | 19.8 | 5433 |
| PICNICKING | WEEKEND | 8.5 | 1.9 | 239 |
| | WEEKDAY | 5.2 | 2.2 | 331 |
| | TOTAL | 6.2 | 2.1 | 570 |
| TRAIL BICYCLING | WEEKEND | 8.4 | 1.9 | 234 |
| | WEEKDAY | 2.8 | 1.2 | 177 |
| | TOTAL | 4.5 | 1.5 | 411 |
| OTHER BICYCLING | WEEKEND | 11.2 | 2.5 | 313 |
| | WEEKDAY | 6.7 | 2.8 | 426 |
| | TOTAL | 8.0 | 2.7 | 739 |
| SPORTS / GAMES | WEEKEND | 14.9 | 3.4 | 417 |
| | WEEKDAY | 7.4 | 3.2 | 476 |
| | TOTAL | 9.7 | 3.3 | 893 |
| SIGHTSEEING | WEEKEND | 1.6 | .4 | 46 |
| | WEEKDAY | 2.5 | 1.1 | 159 |
| | TOTAL | 2.2 | .7 | 205 |
| JOGGING | WEEKEND | 2.8 | .6 | 77 |
| | WEEKDAY | 5.9 | 2.5 | 379 |
| | TOTAL | 5.0 | 1.7 | 456 |
| HORSE RIDING | WEEKEND | 1.3 | .3 | 36 |
| | WEEKDAY | 3.4 | 1.4 | 215 |
| | TOTAL | 2.7 | .9 | 251 |
| OTHER | WEEKEND | 16.0 | 3.6 | 448 |
| | WEEKDAY | 9.3 | 3.9 | 593 |
| | TOTAL | 11.3 | 3.8 | 1042 |

TABLE 4 RECREATION USE STATISTICS
SACRAMENTO BAR AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 352.4 | 100.0 | 9866 |
| | WEEKDAY | 181.5 | 100.0 | 11613 |
| | TOTAL | 233.5 | 100.0 | 21478 |
| RAFTING | WEEKEND | 113.2 | 32.1 | 3170 |
| | WEEKDAY | 32.5 | 17.9 | 2080 |
| | TOTAL | 57.1 | 24.4 | 5249 |
| RELAXING | WEEKEND | 42.3 | 12.0 | 1184 |
| | WEEKDAY | 20.1 | 11.1 | 1287 |
| | TOTAL | 26.9 | 11.5 | 2471 |
| SWIMMING | WEEKEND | 99.5 | 28.2 | 2787 |
| | WEEKDAY | 59.3 | 32.7 | 3796 |
| | TOTAL | 71.6 | 30.6 | 6583 |
| WALKING | WEEKEND | 22.1 | 6.3 | 619 |
| | WEEKDAY | 14.9 | 8.2 | 951 |
| | TOTAL | 17.1 | 7.3 | 1571 |
| FISHING | WEEKEND | 27.4 | 7.8 | 767 |
| | WEEKDAY | 31.1 | 17.1 | 1989 |
| | TOTAL | 30.0 | 12.8 | 2756 |
| PICNICKING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 1.2 | .7 | 79 |
| | TOTAL | .9 | .4 | 79 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 1.4 | .4 | 40 |
| | WEEKDAY | 4.2 | 2.3 | 268 |
| | TOTAL | 3.3 | 1.4 | 308 |
| SPORTS / GAMES | WEEKEND | 2.0 | .6 | 56 |
| | WEEKDAY | .8 | .5 | 53 |
| | TOTAL | 1.2 | .5 | 109 |
| SIGHTSEEING | WEEKEND | 9.9 | 2.8 | 276 |
| | WEEKDAY | 1.2 | .7 | 79 |
| | TOTAL | 3.9 | 1.7 | 356 |
| JOGGING | WEEKEND | 1.6 | .4 | 44 |
| | WEEKDAY | .6 | .4 | 41 |
| | TOTAL | .9 | .4 | 86 |
| HORSE RIDING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 2.7 | 1.5 | 171 |
| | TOTAL | 1.9 | .8 | 171 |
| OTHER | WEEKEND | 32.9 | 9.3 | 922 |
| | WEEKDAY | 12.8 | 7.0 | 818 |
| | TOTAL | 18.9 | 8.1 | 1739 |

TABLE 5 RECREATION USE STATISTICS
LOWER SUNRISE AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 1150.5 | 100.0 | 32214 |
| | WEEKDAY | 462.9 | 100.0 | 29627 |
| | TOTAL | 672.2 | 100.0 | 61842 |
| RAFTING | WEEKEND | 235.8 | 20.5 | 6602 |
| | WEEKDAY | 35.8 | 7.7 | 2289 |
| | TOTAL | 96.6 | 14.4 | 8891 |
| RELAXING | WEEKEND | 342.6 | 29.8 | 9592 |
| | WEEKDAY | 111.0 | 24.0 | 7103 |
| | TOTAL | 181.5 | 27.0 | 16695 |
| SWIMMING | WEEKEND | 124.2 | 10.8 | 3478 |
| | WEEKDAY | 87.5 | 18.9 | 5599 |
| | TOTAL | 98.7 | 14.7 | 9078 |
| WALKING | WEEKEND | 57.7 | 5.0 | 1615 |
| | WEEKDAY | 31.5 | 6.8 | 2019 |
| | TOTAL | 39.5 | 5.9 | 3634 |
| FISHING | WEEKEND | 14.5 | 1.3 | 406 |
| | WEEKDAY | 22.1 | 4.8 | 1414 |
| | TOTAL | 19.8 | 2.9 | 1819 |
| PICNICKING | WEEKEND | 34.5 | 3.0 | 967 |
| | WEEKDAY | 3.3 | .7 | 211 |
| | TOTAL | 12.8 | 1.9 | 1179 |
| TRAIL BICYCLING | WEEKEND | 158.1 | 13.7 | 4427 |
| | WEEKDAY | 58.5 | 12.6 | 3746 |
| | TOTAL | 88.8 | 13.2 | 8172 |
| OTHER BICYCLING | WEEKEND | 2.4 | .2 | 66 |
| | WEEKDAY | 15.7 | 3.4 | 1002 |
| | TOTAL | 11.6 | 1.7 | 1068 |
| SPORTS / GAMES | WEEKEND | 46.0 | 4.0 | 1289 |
| | WEEKDAY | 22.4 | 4.8 | 1434 |
| | TOTAL | 29.6 | 4.4 | 2723 |
| SIGHTSEEING | WEEKEND | 8.0 | .7 | 225 |
| | WEEKDAY | 3.7 | .8 | 234 |
| | TOTAL | 5.0 | .7 | 459 |
| JOGGING | WEEKEND | 10.9 | .9 | 306 |
| | WEEKDAY | 5.5 | 1.2 | 349 |
| | TOTAL | 7.1 | 1.1 | 655 |
| HORSE RIDING | WEEKEND | .7 | .1 | 20 |
| | WEEKDAY | 6.0 | 1.3 | 385 |
| | TOTAL | 4.4 | .7 | 405 |
| OTHER | WEEKEND | 115.1 | 10.0 | 3223 |
| | WEEKDAY | 60.0 | 13.0 | 3840 |
| | TOTAL | 76.8 | 11.4 | 7064 |

TABLE 6 RECREATION USE STATISTICS
ROSSMOOR BAR AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 260,1 | 100,0 | 7283 |
| | WEEKDAY | 136,2 | 100,0 | 8718 |
| | TOTAL | 173,9 | 100,0 | 16000 |
| RAFTING | WEEKEND | 26,9 | 10,4 | 754 |
| | WEEKDAY | 13,4 | 9,8 | 858 |
| | TOTAL | 17,5 | 10,1 | 1611 |
| RELAXING | WEEKEND | 66,0 | 25,4 | 1847 |
| | WEEKDAY | 39,5 | 29,0 | 2531 |
| | TOTAL | 47,6 | 27,4 | 4379 |
| SWIMMING | WEEKEND | 42,9 | 16,5 | 1200 |
| | WEEKDAY | 28,3 | 20,8 | 1811 |
| | TOTAL | 32,7 | 18,8 | 3012 |
| WALKING | WEEKEND | 17,0 | 6,5 | 476 |
| | WEEKDAY | 16,6 | 12,2 | 1063 |
| | TOTAL | 16,7 | 9,6 | 1539 |
| FISHING | WEEKEND | 33,5 | 12,9 | 939 |
| | WEEKDAY | 19,4 | 14,3 | 1243 |
| | TOTAL | 23,7 | 13,6 | 2180 |
| PICNICKING | WEEKEND | 12,7 | 4,9 | 355 |
| | WEEKDAY | 3,4 | 2,5 | 217 |
| | TOTAL | 6,2 | 3,6 | 572 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 20,2 | 7,8 | 565 |
| | WEEKDAY | 3,3 | 2,4 | 212 |
| | TOTAL | 8,4 | 4,8 | 776 |
| SPORTS / GAMES | WEEKEND | 7,0 | 2,7 | 197 |
| | WEEKDAY | ,4 | ,3 | 28 |
| | TOTAL | 2,4 | 1,4 | 225 |
| SIGHTSEEING | WEEKEND | 5,5 | 2,1 | 153 |
| | WEEKDAY | 3,3 | 2,4 | 212 |
| | TOTAL | 4,0 | 2,3 | 366 |
| JOGGING | WEEKEND | 9,8 | 3,7 | 273 |
| | WEEKDAY | 4,5 | 3,3 | 286 |
| | TOTAL | 6,1 | 3,5 | 559 |
| HORSE RIDING | WEEKEND | 7,4 | 2,8 | 206 |
| | WEEKDAY | ,3 | ,2 | 19 |
| | TOTAL | 2,4 | 1,4 | 225 |
| OTHER | WEEKEND | 11,4 | 4,4 | 320 |
| | WEEKDAY | 3,7 | 2,7 | 238 |
| | TOTAL | 6,1 | 3,5 | 557 |

TABLE 7 RECREATION USE STATISTICS
HOFFMAN PARK SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 4091.6 | 100.0 | 114565 |
| | WEEKDAY | 1089.1 | 100.0 | 69704 |
| | TOTAL | 2002.9 | 100.0 | 184269 |
| RAFTING | WEEKEND | 486.8 | 11.9 | 13629 |
| | WEEKDAY | 74.3 | 6.8 | 4752 |
| | TOTAL | 199.8 | 10.0 | 18381 |
| RELAXING | WEEKEND | 1841.3 | 45.0 | 51555 |
| | WEEKDAY | 355.5 | 32.6 | 22749 |
| | TOTAL | 807.7 | 40.3 | 74304 |
| SWIMMING | WEEKEND | 279.4 | 6.8 | 7824 |
| | WEEKDAY | 106.6 | 9.8 | 6823 |
| | TOTAL | 159.2 | 7.9 | 14647 |
| WALKING | WEEKEND | 299.0 | 7.3 | 8373 |
| | WEEKDAY | 151.7 | 13.9 | 9709 |
| | TOTAL | 196.5 | 9.8 | 18082 |
| FISHING | WEEKEND | 28.9 | .7 | 810 |
| | WEEKDAY | 22.8 | 2.1 | 1458 |
| | TOTAL | 24.7 | 1.2 | 2268 |
| PICNICKING | WEEKEND | 646.7 | 15.8 | 18108 |
| | WEEKDAY | 121.3 | 11.1 | 7764 |
| | TOTAL | 281.2 | 14.0 | 25872 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 14.3 | .3 | 400 |
| | WEEKDAY | 20.3 | 1.9 | 1299 |
| | TOTAL | 18.5 | .9 | 1699 |
| SPORTS / GAMES | WEEKEND | 324.6 | 7.9 | 9090 |
| | WEEKDAY | 149.8 | 13.8 | 9586 |
| | TOTAL | 203.0 | 10.1 | 18676 |
| SIGHTSEEING | WEEKEND | 19.7 | .5 | 552 |
| | WEEKDAY | 29.3 | 2.7 | 1873 |
| | TOTAL | 26.4 | 1.3 | 2425 |
| JOGGING | WEEKEND | 4.4 | .1 | 123 |
| | WEEKDAY | 9.2 | .8 | 587 |
| | TOTAL | 7.7 | .4 | 710 |
| HORSE RIDING | WEEKEND | 22.9 | .6 | 642 |
| | WEEKDAY | 18.1 | 1.7 | 1160 |
| | TOTAL | 19.6 | 1.0 | 1802 |
| OTHER | WEEKEND | 123.5 | 3.0 | 3459 |
| | WEEKDAY | 30.3 | 2.8 | 1941 |
| | TOTAL | 58.7 | 2.9 | 5400 |

TABLE 8 RECREATION USE STATISTICS
GOETHE PARK SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 2747.9 | 100.0 | 76941 |
| | WEEKDAY | 693.5 | 100.0 | 44381 |
| | TOTAL | 1318.7 | 100.0 | 121323 |
| RAFTING | WEEKEND | 389.9 | 14.2 | 10917 |
| | WEEKDAY | 32.1 | 4.6 | 2055 |
| | TOTAL | 141.0 | 10.7 | 12972 |
| RELAXING | WEEKEND | 1083.1 | 39.4 | 30328 |
| | WEEKDAY | 211.3 | 30.5 | 13525 |
| | TOTAL | 476.7 | 36.1 | 43853 |
| SWIMMING | WEEKEND | 217.1 | 7.9 | 6079 |
| | WEEKDAY | 44.8 | 6.5 | 2865 |
| | TOTAL | 97.2 | 7.4 | 8944 |
| WALKING | WEEKEND | 130.4 | 4.7 | 3651 |
| | WEEKDAY | 52.1 | 7.5 | 3335 |
| | TOTAL | 75.9 | 5.8 | 6985 |
| FISHING | WEEKEND | 95.5 | 3.5 | 2674 |
| | WEEKDAY | 83.2 | 12.0 | 5327 |
| | TOTAL | 87.0 | 6.6 | 8001 |
| PICNICKING | WEEKEND | 342.9 | 12.5 | 9601 |
| | WEEKDAY | 39.8 | 5.7 | 2544 |
| | TOTAL | 132.0 | 10.0 | 12146 |
| TRAIL BICYCLING | WEEKEND | 103.5 | 3.8 | 2898 |
| | WEEKDAY | 48.4 | 7.0 | 3095 |
| | TOTAL | 65.1 | 4.9 | 5993 |
| OTHER BICYCLING | WEEKEND | 5.8 | .2 | 161 |
| | WEEKDAY | 6.8 | 1.0 | 437 |
| | TOTAL | 6.5 | .5 | 598 |
| SPORTS / GAMES | WEEKEND | 157.1 | 5.7 | 4400 |
| | WEEKDAY | 44.4 | 6.4 | 2840 |
| | TOTAL | 78.7 | 6.0 | 7240 |
| SIGHTSEEING | WEEKEND | 43.4 | 1.6 | 1215 |
| | WEEKDAY | 14.9 | 2.2 | 956 |
| | TOTAL | 23.6 | 1.8 | 2171 |
| JOGGING | WEEKEND | 4.4 | .2 | 124 |
| | WEEKDAY | 21.7 | 3.1 | 1387 |
| | TOTAL | 16.4 | 1.2 | 1511 |
| HORSE RIDING | WEEKEND | 6.6 | .2 | 185 |
| | WEEKDAY | 3.0 | .4 | 192 |
| | TOTAL | 4.1 | .3 | 377 |
| OTHER | WEEKEND | 168.1 | 6.1 | 4708 |
| | WEEKDAY | 91.0 | 13.1 | 5821 |
| | TOTAL | 114.5 | 8.7 | 10530 |

TABLE 9 RECREATION USE STATISTICS
S.A.R.A. PARK SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 601.6 | 100.0 | 16845 |
| | WEEKDAY | 302.8 | 100.0 | 19381 |
| | TOTAL | 393.8 | 100.0 | 36225 |
| RAFTING | WEEKEND | 56.6 | 9.4 | 1584 |
| | WEEKDAY | 18.7 | 6.2 | 1198 |
| | TOTAL | 30.2 | 7.7 | 2782 |
| RELAXING | WEEKEND | 153.0 | 25.4 | 4283 |
| | WEEKDAY | 97.2 | 32.1 | 6220 |
| | TOTAL | 114.2 | 29.0 | 10503 |
| SWIMMING | WEEKEND | 187.7 | 31.2 | 5256 |
| | WEEKDAY | 74.5 | 24.6 | 4769 |
| | TOTAL | 109.0 | 27.7 | 10025 |
| WALKING | WEEKEND | 58.0 | 9.6 | 1624 |
| | WEEKDAY | 34.4 | 11.4 | 2202 |
| | TOTAL | 41.6 | 10.6 | 3826 |
| FISHING | WEEKEND | 21.5 | 3.6 | 603 |
| | WEEKDAY | 18.2 | 6.0 | 1164 |
| | TOTAL | 19.2 | 4.9 | 1766 |
| PICNICKING | WEEKEND | .9 | .1 | 25 |
| | WEEKDAY | .4 | .1 | 23 |
| | TOTAL | .5 | .1 | 48 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 9.1 | 1.5 | 254 |
| | WEEKDAY | 22.0 | 7.3 | 1410 |
| | TOTAL | 18.1 | 4.6 | 1663 |
| SPORTS / GAMES | WEEKEND | 2.5 | .4 | 69 |
| | WEEKDAY | 1.4 | .5 | 88 |
| | TOTAL | 1.7 | .4 | 157 |
| SIGHTSEEING | WEEKEND | 9.4 | 1.6 | 264 |
| | WEEKDAY | 4.0 | 1.3 | 256 |
| | TOTAL | 5.7 | 1.4 | 521 |
| JOGGING | WEEKEND | 4.6 | .8 | 129 |
| | WEEKDAY | 5.0 | 1.7 | 322 |
| | TOTAL | 4.9 | 1.2 | 452 |
| HORSE RIDING | WEEKEND | .3 | .0 | 8 |
| | WEEKDAY | .4 | .1 | 25 |
| | TOTAL | .4 | .1 | 33 |
| OTHER | WEEKEND | 98.1 | 16.3 | 2746 |
| | WEEKDAY | 26.6 | 8.8 | 1704 |
| | TOTAL | 48.4 | 12.3 | 4450 |

TABLE 10 RECREATION USE STATISTICS
CAMPUS COMMONS AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 628.4 | 100.0 | 17595 |
| | WEEKDAY | 366.5 | 100.0 | 23454 |
| | TOTAL | 446.2 | 100.0 | 41049 |
| RAFTING | WEEKEND | 17.6 | 2.8 | 492 |
| | WEEKDAY | 6.5 | 1.8 | 417 |
| | TOTAL | 9.9 | 2.2 | 909 |
| RELAXING | WEEKEND | 181.7 | 28.9 | 5087 |
| | WEEKDAY | 80.9 | 22.1 | 5180 |
| | TOTAL | 111.6 | 25.0 | 10267 |
| SWIMMING | WEEKEND | 137.8 | 21.9 | 3858 |
| | WEEKDAY | 79.9 | 21.8 | 5113 |
| | TOTAL | 97.5 | 21.9 | 8971 |
| WALKING | WEEKEND | 52.6 | 8.4 | 1472 |
| | WEEKDAY | 56.5 | 15.4 | 3616 |
| | TOTAL | 55.3 | 12.4 | 5088 |
| FISHING | WEEKEND | 19.9 | 3.2 | 556 |
| | WEEKDAY | 13.9 | 3.8 | 889 |
| | TOTAL | 15.7 | 3.5 | 1445 |
| PICNICKING | WEEKEND | 1.9 | .3 | 54 |
| | WEEKDAY | 5.3 | 1.4 | 338 |
| | TOTAL | 4.3 | 1.0 | 392 |
| TRAIL BICYCLING | WEEKEND | 147.9 | 23.5 | 4142 |
| | WEEKDAY | 68.8 | 18.8 | 4404 |
| | TOTAL | 92.9 | 20.8 | 8546 |
| OTHER BICYCLING | WEEKEND | 20.1 | 3.2 | 562 |
| | WEEKDAY | 5.0 | 1.4 | 318 |
| | TOTAL | 9.6 | 2.1 | 880 |
| SPORTS / GAMES | WEEKEND | 16.7 | 2.7 | 468 |
| | WEEKDAY | 2.4 | .7 | 156 |
| | TOTAL | 6.8 | 1.5 | 624 |
| SIGHTSEEING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 1.6 | .4 | 101 |
| | TOTAL | 1.1 | .2 | 101 |
| JOGGING | WEEKEND | 23.3 | 3.7 | 653 |
| | WEEKDAY | 35.4 | 9.6 | 2263 |
| | TOTAL | 31.7 | 7.1 | 2917 |
| HORSE RIDING | WEEKEND | 5.9 | .9 | 166 |
| | WEEKDAY | 4.4 | 1.2 | 283 |
| | TOTAL | 4.9 | 1.1 | 449 |
| OTHER | WEEKEND | 3.0 | .5 | 84 |
| | WEEKDAY | 5.9 | 1.6 | 375 |
| | TOTAL | 5.0 | 1.1 | 459 |

TABLE 11 RECREATION USE STATISTICS
WATT AVE. SO. AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 1213.1 | 100.0 | 33966 |
| | WEEKDAY | 674.3 | 100.0 | 43156 |
| | TOTAL | 838.3 | 100.0 | 77122 |
| RAFTING | WEEKEND | 33.5 | 2.8 | 938 |
| | WEEKDAY | 8.9 | 1.3 | 571 |
| | TOTAL | 16.4 | 2.0 | 1509 |
| RELAXING | WEEKEND | 231.5 | 19.1 | 6482 |
| | WEEKDAY | 109.7 | 16.3 | 7018 |
| | TOTAL | 146.7 | 17.5 | 13500 |
| SWIMMING | WEEKEND | 593.0 | 48.9 | 16604 |
| | WEEKDAY | 340.5 | 50.5 | 21791 |
| | TOTAL | 417.3 | 49.8 | 38394 |
| WALKING | WEEKEND | 63.6 | 5.2 | 1782 |
| | WEEKDAY | 35.5 | 5.3 | 2272 |
| | TOTAL | 44.1 | 5.3 | 4054 |
| FISHING | WEEKEND | 134.7 | 11.1 | 3771 |
| | WEEKDAY | 101.0 | 15.0 | 6462 |
| | TOTAL | 111.2 | 13.3 | 10234 |
| PICNICKING | WEEKEND | 11.6 | 1.0 | 324 |
| | WEEKDAY | 6.7 | 1.0 | 431 |
| | TOTAL | 8.2 | 1.0 | 756 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 6.4 | .5 | 178 |
| | WEEKDAY | 9.7 | 1.4 | 620 |
| | TOTAL | 8.7 | 1.0 | 798 |
| SPORTS / GAMES | WEEKEND | 18.0 | 1.5 | 504 |
| | WEEKDAY | 4.7 | .7 | 300 |
| | TOTAL | 8.7 | 1.0 | 804 |
| SIGHTSEEING | WEEKEND | 17.0 | 1.4 | 477 |
| | WEEKDAY | 18.7 | 2.8 | 1199 |
| | TOTAL | 18.2 | 2.2 | 1676 |
| JOGGING | WEEKEND | 6.0 | .5 | 169 |
| | WEEKDAY | 5.4 | .8 | 348 |
| | TOTAL | 5.6 | .7 | 517 |
| HORSE RIDING | WEEKEND | 3.1 | .3 | 86 |
| | WEEKDAY | .9 | .1 | 58 |
| | TOTAL | 1.6 | .2 | 144 |
| OTHER | WEEKEND | 94.7 | 7.8 | 2652 |
| | WEEKDAY | 32.6 | 4.8 | 2086 |
| | TOTAL | 51.5 | 6.1 | 4738 |

TABLE 12 RECREATION USE STATISTICS
WOODLAKE AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 654.4 | 100.0 | 18324 |
| | WEEKDAY | 379.6 | 100.0 | 24294 |
| | TOTAL | 463.2 | 100.0 | 42618 |
| RAFTING | WEEKEND | 3.0 | .5 | 84 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | .9 | .2 | 84 |
| RELAXING | WEEKEND | 69.5 | 10.6 | 1946 |
| | WEEKDAY | 68.6 | 18.1 | 4392 |
| | TOTAL | 68.9 | 14.9 | 6338 |
| SWIMMING | WEEKEND | 90.5 | 13.8 | 2533 |
| | WEEKDAY | 42.4 | 11.2 | 2714 |
| | TOTAL | 57.0 | 12.3 | 5247 |
| WALKING | WEEKEND | 23.9 | 3.6 | 668 |
| | WEEKDAY | 19.1 | 5.0 | 1221 |
| | TOTAL | 20.5 | 4.4 | 1890 |
| FISHING | WEEKEND | 22.7 | 3.5 | 636 |
| | WEEKDAY | 30.5 | 8.0 | 1952 |
| | TOTAL | 28.1 | 6.1 | 2588 |
| PICNICKING | WEEKEND | 7.4 | 1.1 | 207 |
| | WEEKDAY | 1.8 | .5 | 116 |
| | TOTAL | 3.5 | .8 | 323 |
| TRAIL BICYCLING | WEEKEND | 389.3 | 59.5 | 10899 |
| | WEEKDAY | 184.3 | 48.6 | 11798 |
| | TOTAL | 246.7 | 53.3 | 22697 |
| OTHER BICYCLING | WEEKEND | 2.1 | .3 | 58 |
| | WEEKDAY | 5.7 | 1.5 | 366 |
| | TOTAL | 4.6 | 1.0 | 424 |
| SPORTS / GAMES | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| SIGHTSEEING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 2.0 | .5 | 131 |
| | TOTAL | 1.4 | .3 | 131 |
| JOGGING | WEEKEND | 25.8 | 3.9 | 721 |
| | WEEKDAY | 15.2 | 4.0 | 971 |
| | TOTAL | 18.4 | 4.0 | 1691 |
| HORSE RIDING | WEEKEND | 11.0 | 1.7 | 307 |
| | WEEKDAY | 7.5 | 2.0 | 483 |
| | TOTAL | 8.6 | 1.9 | 790 |
| OTHER | WEEKEND | 9.5 | 1.5 | 266 |
| | WEEKDAY | 2.3 | .6 | 150 |
| | TOTAL | 4.5 | 1.0 | 416 |

TABLE 13 RECREATION USE STATISTICS
PARADISE BEACH AREA SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 2294.1 | 100.0 | 64234 |
| | WEEKDAY | 1162.3 | 100.0 | 74371 |
| | TOTAL | 1506.6 | 100.0 | 138605 |
| RAFTING | WEEKEND | 9.9 | .4 | 276 |
| | WEEKDAY | 1.7 | .1 | 110 |
| | TOTAL | 4.2 | .3 | 386 |
| RELAXING | WEEKEND | 493.9 | 21.5 | 13830 |
| | WEEKDAY | 127.5 | 11.0 | 8157 |
| | TOTAL | 239.0 | 15.9 | 21987 |
| SWIMMING | WEEKEND | 1429.7 | 62.3 | 40032 |
| | WEEKDAY | 773.7 | 66.6 | 49518 |
| | TOTAL | 973.4 | 64.6 | 89550 |
| WALKING | WEEKEND | 135.3 | 5.9 | 3789 |
| | WEEKDAY | 122.4 | 10.5 | 7831 |
| | TOTAL | 126.3 | 8.4 | 11620 |
| FISHING | WEEKEND | 16.0 | .7 | 448 |
| | WEEKDAY | 15.9 | 1.4 | 1017 |
| | TOTAL | 15.9 | 1.1 | 1465 |
| PICNICKING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 2.6 | .2 | 168 |
| | TOTAL | 1.8 | .1 | 168 |
| TRAIL BICYCLING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER BICYCLING | WEEKEND | 2.4 | .1 | 68 |
| | WEEKDAY | 5.3 | .5 | 336 |
| | TOTAL | 4.4 | .3 | 405 |
| SPORTS / GAMES | WEEKEND | 171.5 | 7.5 | 4803 |
| | WEEKDAY | 96.3 | 8.3 | 6163 |
| | TOTAL | 119.2 | 7.9 | 10966 |
| SIGHTSEEING | WEEKEND | 2.9 | .1 | 81 |
| | WEEKDAY | 2.5 | .2 | 162 |
| | TOTAL | 2.6 | .2 | 243 |
| JOGGING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 7.0 | .6 | 448 |
| | TOTAL | 4.9 | .3 | 448 |
| HORSE RIDING | WEEKEND | 0 | 0 | 0 |
| | WEEKDAY | 0 | 0 | 0 |
| | TOTAL | 0 | 0 | 0 |
| OTHER | WEEKEND | 32.3 | 1.4 | 905 |
| | WEEKDAY | 7.2 | .6 | 461 |
| | TOTAL | 14.9 | 1.0 | 1368 |

TABLE 14 RECREATION USE STATISTICS
DISCOVERY PARK SUMMER 1975

| ACTIVITY | DAYTYPE | DAILY ACTIVITY HOURS | PERCENT OF ACTIVITIES | TOTAL ACTIVITY HOURS |
|---|---|---|---|---|
| TOTAL | WEEKEND | 2568.3 | 100.0 | 71912 |
| | WEEKDAY | 1310.2 | 100.0 | 83852 |
| | TOTAL | 1693.1 | 100.0 | 155764 |
| RAFTING | WEEKEND | 6.0 | .2 | 168 |
| | WEEKDAY | 2.0 | .2 | 126 |
| | TOTAL | 3.2 | .2 | 294 |
| RELAXING | WEEKEND | 1048.4 | 40.8 | 29355 |
| | WEEKDAY | 392.6 | 30.0 | 25129 |
| | TOTAL | 592.2 | 35.0 | 54484 |
| SWIMMING | WEEKEND | 380.0 | 14.8 | 10639 |
| | WEEKDAY | 189.4 | 14.5 | 12120 |
| | TOTAL | 247.4 | 14.6 | 22760 |
| WALKING | WEEKEND | 153.9 | 6.0 | 4308 |
| | WEEKDAY | 65.6 | 5.0 | 4199 |
| | TOTAL | 92.5 | 5.5 | 8507 |
| FISHING | WEEKEND | 185.7 | 7.2 | 5200 |
| | WEEKDAY | 230.6 | 17.6 | 14757 |
| | TOTAL | 216.9 | 12.8 | 19957 |
| PICNICKING | WEEKEND | 205.9 | 8.0 | 5764 |
| | WEEKDAY | 119.3 | 9.1 | 7633 |
| | TOTAL | 145.6 | 8.6 | 13397 |
| TRAIL BICYCLING | WEEKEND | 141.1 | 5.5 | 3952 |
| | WEEKDAY | 75.6 | 5.8 | 4841 |
| | TOTAL | 95.6 | 5.6 | 8794 |
| OTHER BICYCLING | WEEKEND | 29.2 | 1.1 | 818 |
| | WEEKDAY | 8.6 | .7 | 550 |
| | TOTAL | 14.9 | .9 | 1368 |
| SPORTS / GAMES | WEEKEND | 73.4 | 2.9 | 2055 |
| | WEEKDAY | 27.9 | 2.1 | 1783 |
| | TOTAL | 41.7 | 2.5 | 3838 |
| SIGHTSEEING | WEEKEND | 30.1 | 1.2 | 843 |
| | WEEKDAY | 41.5 | 3.2 | 2653 |
| | TOTAL | 38.0 | 2.2 | 3496 |
| JOGGING | WEEKEND | 2.4 | .1 | 67 |
| | WEEKDAY | 4.6 | .3 | 292 |
| | TOTAL | 3.9 | .2 | 360 |
| HORSE RIDING | WEEKEND | 1.3 | .1 | 36 |
| | WEEKDAY | 3.2 | .2 | 205 |
| | TOTAL | 2.6 | .2 | 241 |
| OTHER | WEEKEND | 310.9 | 12.1 | 8704 |
| | WEEKDAY | 149.4 | 11.4 | 9563 |
| | TOTAL | 198.6 | 11.7 | 18267 |

## PART III: THE GENERALIZED RECREATION USE MODELS

### The Observations

19. Two kinds of responses are generally observed from recreation planners when introduced to recreation mathematical models, and both interfere with using models successfully. One is to consider as useless something which requires extensive effort to understand, and the other is to accept as peremptory the estimates from a model. Hope prevails, however, that recreation planners presented with the information described here will avoid rejecting the mathematical applications and will utilize the results with experienced judgment.

> A model is simply an abstraction of the real physical world, incorporating the elements that are relevant to a particular process. Some models are intuitive and simple. Others, such as models used to forecast recreation behavior, are very complex and require mathematical abstraction. Development of models to forecast recreation use includes the search for relevant elements that influence recreation behavior, and structuring the relationships between these elements [6].

Modeling, in this report, involves developing equations which reproduce as nearly as possible the survey estimates of recreation use. It relates a dependent variable, the observations of use, to measurements of a set of independent variables, and develops a way to estimate recreation use based upon available knowledge.

20. An observation unit is defined by an area of origin of recreation use associated with a park area destination. The origins are 40 zip code areas near the American River Parkway. Zip code areas define origins which are small enough to model and are efficient in terms of data collection. The destinations are a subset of the areas described in paragraph 13. A dependent variable is recreation visitation from an origin to a destination. The independent variables, those elements hypothesized as influencing recreation use, fall into three general categories. The first category measures the characteristics of the origin which tend to affect the propensity of that origin to generate recreation use. The second measures the potential of the destination to attract recreation use. The third measures the linkages or relationships between origin and destination which affect recreation use. An observation is the set of values for all variables which is associated with an observation unit.

21. The dependent variables considered included activity hour estimates for the following activities: total, rafting, total less rafting, bicycling, total less rafting and bicycling, fishing swimming, and a combination of relaxing, picnicking, walking, and sightseeing. The independent variables considered were as follows.

a. The origin specific variables were obtained from Census data as discussed in Appendix B.

(1) The size of seven population age categories, by absolute number and as a percentage of total population

(2) The number of families

(3) The average number of children

(4) The percentage below the poverty level

(5) The percentage on public assistance

(6) The percentage of white

(7) The percentage who have a second car

(8) The percentage in owner-occupied dwelling

(9) The median value of housing

(10) The median age of housing

(11) The median rent

(12) The median family income

(13) The median age of the population

b. The destination specific variables are parkway data

(1) The number of acres

(2) The number of acres of tree-shaded, irrigated turf

(3) Length of trails to next destination

(4) Length of available continuous trails

(5) Length of available shoreline

(6) Boating distance to next major put-in, take-out point

(7) Availability of sandy beach area

(8) Availability of picnic and restroom facilities

(9) Thoroughfare traffic flows in view of the destination

c. The origin-destination linkage variables are:

(1) The median road mile distance between zip code and park areas

(2) Indices of the attractiveness of 19 identified comparable alternative destinations.

## Analysis

22. The analysis was a process of searching for relevant variables and structuring an appropriate functional form equation. As a result of numerous trials and examination results, the dependent variables were reduced to three: rafting, trail bicycling, and general recreation which includes everything else. Rafting was modeled separately for three reasons. There are more activity hours spent rafting than any other activity in the parkway. Secondly, it is significant because of the American River's favorable flow characteristics and high water quality which may or may not be available to other areas to be studied by recreation planners. To include it with general recreation would diminish the applicability of the model to a similar project with dissimilar water type. Thirdly, for rafting there is really only one destination, namely the river itself. Trail bicycling was also modeled separately to improve the generality of the model. Since it is dependent on the paved bikeway facility which may or may not exist at a similar project. None of the other disaggregations improved the generality or the statistical precision of the general recreation models.

23. For the general recreation modeling, there are 200 observations, the 40 zip code area origins associated with five park area destinations which were sub-sampled. These park areas are: Lower Sunrise and Sacramento Bar combined, Hoffman Park, Goethe Park, Watt Avenue South, and Discovery Park. For the rafting modeling, there are 40 observations since there is only one destination. For the bicycling modeling, there are only five observations. The bicycle trail was monitored at five parks, but the bicyclists were not detained for interviews. As a consequence, there was not unique allocation of trail bicycling to zip code origins. The five trail bicycling observations are the survey estimates at Lower Sunrise, Goethe Park, Campus Commons, Woodlake, and Discovery Park.

24. The General Form Equations. The initial structuring of the relationships into some appropriate functional form assumed the dependent variables were linear functions of all the potentially plausible independent variables. The straight-forward linear model is given by:

$$V = B_o + B_1X_1 + B_2X_2 + \ldots + B_nX_n + \varepsilon \qquad (1)$$

where V = recreation visitation

each $X_i$ = a function of a variable affecting use

each $B_i$ = a parameter to be estimated

and $\epsilon$ = the error term.

Numerous regressors (the $X_i$ ) were defined in attempts to make the linear hypothesis acceptable. The most successful linear formulations defined the regressors as the product of the ratio of population to distance, times other relevant variables. One such model is given by:

$$V_{ij} = 778.7 + (P_i / D_{ij}) \quad (0.4923 + .0348T_j) \qquad (2)$$

$$R^2 = 0.60 \qquad (55.8) \quad (186.3)$$

where: $V_{ij}$ is total activity hours visitation from origin i to destination j.

$P_i$ is the size of the population in origin i.

$D_{ij}$ is the median road mile distance between origin i and destination j.

and $T_j$ is the number of acres of irrigated turf at destination j.

The coefficient of determination, $R^2$, measures the proportion of total variation about the mean of the observations that is explained by the equation. The numbers in parentheses below the coefficients are F statistics, which for this equation indicate that the coefficients are highly significant.

25. That this simple model works as well as it does should be no surprise. A similar formulation works well for reservoirs [2, 7] and has been employed successfully over regional parks in Canada [8]. The variable, $T_j$, is distinguishable from variables measuring the size of the destinations in similar models. The total size of the park areas is not useful as an explanatory variable, presumably because the visitors regard many acres unuseable. The attractiveness that is measured by $T_j$ is not just a function of so many acres of green grass. Associated with these turfed areas are an abundance of large shade trees; there is drinking water available and generally there are picnic tables about. In addition these areas receive intensive maintenance. In one sense, the $T_j$ is a proxy quality variable measuring the quantity of well managed amenities or the amount of a particular kind of park atmosphere.

26. There are, however, some conspicuously missing variables in (2). As the description of the propensity of the origins to generate recreation, the population size by itself seems incomplete. The quantity-quality variable is certainly rational but measurement of some more general attribute of the destinations appears desirable. Finally, although distance is the most significant linkage between origin and destination, some indication of the effect of an alternative supply on the flow of visits from origin to destination would increase the generality of the model.

27. The General Recreation Model. - The apparent need to incorporate the effect of additional variables prompted a restructuring of the general form of the model. One approach was to take the best linear model and empirically define power functions for the variables, using a non-linear estimating algorithm. For the general recreation activities this yielded

$$V_{ij} = P_i^{0.6089} D_{ij}^{-0.8255} (19.30 + 3.781T_j^{0.6447}) \quad (3)$$

This model had a mean residual of -79, which means that on the average it will overestimate by 79 activity hours. This compares with an average estimate of some 2200 hours. The pseudo coefficient of determination, ($\underline{R}^2$) defined by observed sum of squares, less residual sum of squares, divided by observed sum of squares, is 0.75.

28. The general form of (3) enables some improved precision of the estimates but still did not accommodate any additional explanatory variables. In addition, there is nothing theoretically superior about an additive combination of the terms versus a strictly multiplicative power function. Accordingly, the form of equation (4) was hypothesized,

$$V_{ij} = 21.40\, P_i^{0.5988} D_{ij}^{-0.8720} T_j^{0.3401} \quad (4)$$

The mean residual was -71 and $\underline{R}^2$ was 0.76. In addition, this formulation did allow the inclusion of additional explanatory variables, as indicated by (5).

$$V_{ij} = 53.06\, P_i^{0.5124} D_{ij}^{(-0.8697 + 0.00003Y_i)} T_j^{0.3349} S_{ij}^{-0.0465} \quad (5)$$

However, the addition of other variables does not appreciably improve the residual sum of squares. The $Y_i$ is a normalized income measure for origin i defined by the median family income of zip code i, less the average median family income over all zip codes in the market area. The $S_{ij}$ is an index of alternative supply opportunities. It is defined by the sum of the reciprocal of the distances from origin i to identified substitute park areas k that are closer than the park destination j; i.e.,

$$S_{ij} = \sum 1/D_{ik} \text{ where } j \neq k \text{ and } D_{ik} < D_{ij}$$

An alternative formulation admits some influence of the median age of the origins, $A_i$, in place of the alternative index, as shown in (6).

$$V_{ij} = 109.4\, P_i^{0.5066} D_{ij}^{(-0.8789 + .00003Y_i)} T_j^{0.3346} A_i^{-0.2133} \quad (6)$$

With both the alternative index and median age in the model, the exponent of the alternative variable goes to -0.0036. The rest of the parameters remain approximately as they are given in (6). The gist of these models is that, although some nominal influence of other variables can be demonstrated, the essential ones remain P, D, and T. The exponents of these variables exhibit considerable stability as the other variables are

entered and removed. In addition, it can be shown that visitation plotted over any of the essential variables independently exhibits no discernable functional form, but visitation plotted over a composite variable, using simplified exponents approximating those above, is essentially linear. Hence, the nonlinear modeling leads to the hypothesis that general recreation can be structured as a simple linear function of the regressor

$$X_{ij} = P_i^{1/2} D_{ij}^{-9/10} T_j^{1/3}$$

$$V_{ij} = -207.4 + 65.27 X_{ij} \qquad (7)$$

$$R^2 = 0.64 \quad (345.1)$$

The coefficient of determination, $R^2 = 0.64$, is somewhat lower than its nonlinear counterpart, but the mean residual of the linear model is zero and the simplicity of the exponents should enhance its general applicability 1/. An application of this model is given in Part IV.

29. The Rafting Model.- One difference with modeling rafting has already been mentioned, namely there is only one destination, the river itself. The median distance between origin and destination is measured to the nearest park area from Watt Avenue South upstream; almost all the rafting is on the upper reaches where the flows are swifter. Also, there are no real alternatives available to this market area for rafting. There are no good rafting rivers with any resemblance to the convenience offered by the American River. Therefore, there is no variable measuring alternative supply.

30. It was anticipated that income and median age would be more influential for rafting than for general recreation. The marginal cost of rafting is greater than that for many of the general recreation categories, and the ages of the participants are younger on the average. However, just the opposite effect was achieved with the rafting modeling. Several formulations attempting to incorporate the effects of income and median age indicated only negligible influence from these variables. The recognition of the younger rafting participants did enable improvement in the precision of the rafting model by redefining the population variable. The $P_{ij}$ in (8) is the size of the origins' population aged 10 through 34.

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1/ The coefficient of determination measures the proportion of the total variation of all observations explained by the model. However, it is not the pertinent statistic when measuring the variation over a set of observations associated with a particular work area. Over 12 American River Parkway areas, 90 percent of the variation of activity hours is explained by the model.

$$VR_{ij} = 15.09 \underline{P}_i^{0.7766} D_{ij}^{-0.5425} \quad (8)$$

$$\underline{R}^2 = 0.74$$

As with the general recreation modeling, the non-linear rafting modeling led to a composite variable which linearizes rafting, $X_{ij} = \underline{P}_i^{3/4} D_{ij}^{-1/2}$ and:

$$VR_{ij} = 58.21 + 18.41\ X_{ij} \quad (9)$$

$$R^2 = 0.52 \quad (41.41)$$

31. The Trail Bicycling Model. - The observations of trail bicycling are associated with the destinations where the trail was monitored. However, a model is sought which relates the destinations to the origins. This was achieved by changing the criterion for estimating the parameters. If a unique allocation to the origins were available for trail bicycling, the set of B's for a two-variable model would be estimated such that (10) is a minimum.

$$\sum_i \sum_j \left( B_i P_i^{B_2} D_{ij}^{B_3} - VB_{ij} \right)^2 \quad (10)$$

However, there is no knowledge of the individual $VB_{ij}$. Therefore, the parameters are estimated for the bicycling model such that (11) is a minimum.

$$\sum_j \left( \sum_i B_1 P^{B_2} D^{B_3} - \sum_i VB_{ij} \right)^2 \quad (11)$$

The non-linear algorithm is a numerical approximation technique for estimating the parameters, and there is no guarantee a solution to the minimization problem will be found. The unconstrained solutions to (11) yielded some theoretically implausible results. The exponent of population kept going to zero, implying that the expected quantity of bicycling is independent of population size. However, setting $B_1 = 1$ enables the following result:

$$VB_{ij} = \underline{P}_i^{1.044} D_{ij}^{-2.497} \quad (12)$$

$$\underline{R}^2 = 0.95$$

## PART IV: APPLICATIONS

### Estimating General Recreation Use

32. A Calculation Example. The general recreation use model (equation (7)) describes total activity hours visitation from an origin to a destination as a function of the origin's population size, the size of maintained turf area at the destination, and the median road mile distance between origin and destination. Table 15 displays the values of the observations for two hypothetical parks in "River City", California. The values for population, turf, and distance can be obtained from census files, planning documents, and map measurements, respectively. The values for activity hour visitation are derived from the mathematical operations on the other variables according to the model. For example, the computation of activity hours visitation from zip code origin 1 at "Downtown Park" in Table 15 is accomplished as follows:

$$V_{ij} = -207.4 + 65.27\, P_1^{1/2}\, D_{11}^{-9/10}\, T_1^{1/3}$$

$$= -207.4 + 65.27\, (10{,}000)^{1/2}\, (2.5)^{-9/10}\, (10)^{1/3}$$

$$= -207.4 + 65.27\, (100)\, (0.4384)\, (2.154)$$

$$= 5957$$

33. Annual Recreation Days. The Corps of Engineers evaluates recreation use measured in annual recreation days. Assuming the values of the independent variables can be obtained and the estimates computed from the model for a planned nonreservoir project, the resulting estimate is recreation use measued in June through August activity hours. Therefore, two adjustments are necessary to obtain an annual estimate of recreation days as explained below. In addition, the recreation planner must apply professional judgment to account for any differences there may be between the destinations of the American River Parkway, with their social and physical environs, and a planned project, with its own uniqueness.

TABLE 15

Estimated June-August Recreation Use
for
"River City" Parks (Hypothetical)

| Zip Code Origin | Origin Population | Managed Turf Area | Road Mile Distance | Activity Hours |
|---|---|---|---|---|
| | | "Downtown Park" | | |
| 1 | 10,000 | 10 | 2.5 | 5957 |
| 2 | 20,000 | 10 | 5.0 | 4464 |
| 3 | 30,000 | 10 | 10.0 | 2859 |
| 4 | 20,000 | 10 | 15.0 | 1531 |
| 5 | 10,000 | 10 | 10.0 | 1563 |
| 6 | 25,000 | 10 | 1.3 | 17,350 |
| 7 | 35,000 | 10 | 5.0 | 5973 |
| 8 | 5,000 | 10 | 7.5 | 1414 |
| 9 | 500 | 10 | 7.5 | 305 |
| Sub Total | | | | 41,416 |
| | | "Uptown Park" | | |
| 1 | 10,000 | 5 | 5.0 | 2415 |
| 2 | 20,000 | 5 | 10.0 | 1780 |
| 3 | 30,000 | 5 | 5.0 | 4334 |
| 4 | 20,000 | 5 | 5.0 | 3501 |
| 5 | 10,000 | 5 | 1.0 | 10,954 |
| 6 | 25,000 | 5 | 12.5 | 1610 |
| 7 | 35,000 | 5 | 7.5 | 3198 |
| 8 | 5,000 | 5 | 1.0 | 7685 |
| 9 | 500 | 5 | 3.5 | 601 |
| Sub Total | | | | 36,078 |
| TOTAL | | | | 77,494 |

34. The expansion from summer to annual use of the American River Parkway can be readily accomplished using the 1967 survey data noted in paragraph 14. Activity counts, somewhat similar to those taken in the summer of 1975, were made during the entire year 1967. By making the same assumptions underlying the 1975 estimates, activity hour estimates can be derived from the 1967 counts. The ratio of 1967 annual use to 1967 summer use can then be used to estimate annual use from the models. The ratios of annual to summer use for the general recreation, rafting, and bicycling models are 2.48, 2.40, and 3.80, respectively. The ratio of annual to summer use can be expected to vary by geographic region. Two possible sources of regional data are (a) "Estimating Initial Reservoir Recreation Use," Vol. II of IWR Research Report 74-R1, Plan Formulation and Evaluation Studies - Recreation, June 1974 [1], and (b) "National Recreation Survey," Outdoor Recreation Resources Review Commission, ORRRC Study Report 19, 1962 [9]. If more specific current data for the region are available, they are, of course, preferable.

35. The transformation of activity hours into recreation days requires an estimate of the average length of recreation visit. For the parkway, it was intended that the average length of visit would be derived from the subsample data. However, an examination of these data showed too many vague responses, such as "all day" or "a few hours," given for the length of visit. Consequently, this statistic was taken from a different source. The average hours of participation per activity day category during June-August 1972 are given in [4]. The average length of visit at a particular area is, in general, a function of the activity mix. An average duration for those activities [4] applicable to the American River Parkway is approximately 2.5 hours, and this value is used to transform activity hours into recreation days.

36. In addition to the estimating procedure, with adjustments, applied as above, the planner should make a comparison between the characteristics of park destinations in the American River Parkway and those of the prospective park areas under study for a nonreservoir project. In the case of the American River Parkway, known examples of significant underestimation and overestimation occurred at specific destinations. In one case (Woodlake), the lack of acreage under development and management for recreation was not adequately reflected in the estimate. This site has only easements for the Parkway Trails amounting to two acres or less, where other sites offer upward of 10 acres of useable land for recreation. Thus, a simple application of the model without an adjustment for planning judgment would greatly overstate the known visitation. In another case (Paradise Beach), a unique activity occurring at one site was not accommodated by the variables in the estimator. The site contains a natural beach area suitable for sunning and swimming which enjoys little competition within the market area. The consequence is that use at that site was greatly underestimated. The above are examples of underestimation and over estimation known to occur because of the inability of the variables in the estimator to accommodate all site-specific conditions. As discussed in Part III, no additional variables were found which were generally suited to accommodate site-specific characteristics; hence, it is imperative

that the planner using the estimator acquire and employ knowledge of site specifications to be anticipated at the future park facility in the nonreservoir project under study, where not obviously accommodated within the estimator.

37. For example, refer to the hypothetical "Downtown Park" in Table 15. Like one of the parks on the American River Parkway, it will be developed for intensive recreation use, containing 10 acres of shaded, irrigated turf with picnic tables, some grills, potable water, restrooms, etc. It will be similarly close to the nerve center of the business district, with some of the population origins in close proximity. However, if certain unique features are planned which are not found at the most similar site or other sites in the system from which the estimator was derived, additional incremental amounts of use must be estimated and added to the model results. One such feature could be a food concession which would be centered in the picnic area. Another feature could be a well-developed yacht basin, harboring upwards of 100 yachts and small craft in sheltered mooring slips; the usual fuel and other yachting services and accessories would also be available at the marina. These features are not well accommodated by the estimator, and estimated use should be increased accordingly. Following the "most similar project" concept, if possible projects with similar concessions and marina should be located and should estimate for their activities by using available statistics and some knowledge of how large a portion of use these activities occupy at similar areas relative to the other uses which the estimator accommodates.

38. "Downtown Park" may also differ from the American River situation in other ways. A comparison should be made of the general environmental situation between the American River areas modeled and the site for Downtown Park. In the hypothetical example, "Downtown Park" could be located on a reach of river which is wider, deeper, visibly of lesser quality and has a slower rate of flow. Perhaps this river has a high, unvegetated levee in prominent view, with industrial plants and their emissions highly visible; and the future park site is bordered by a railway and petroleum bulk storage plants which could not be totally hidden from view by landscaping.

39. It is suggested that such considerations of lesser or greater environmental quality be utilized in rounding the model's figures downward or upward to the nearest appropriate figures, e.g., 41,416 could be rounded to 40,000. Too great an adjustment because of environmental disparity should not be made or the utility of the model will be negated. Another compensation because of environmental quality differentials would come later when value estimates are placed on recreation use to obtain estimated benefits.

40. The model yields readily useable estimates, but it is a simplification of the real physical world. The estimates should be used as benchmarks. The planner must not simply apply the general recreation model without applying further data and judgment to modify the resulting estimate to the extent that site characteristics for the potential parks differ from

the American River or from other later survey areas (see Appendix B). The results from the nonreservoir recreation model should be adjusted accordingly.

## Evaluating Recreation Benefits

41. The economic value of recreation as a water resource project output is measured by the willingness to pay for the amount of recreation consumed. Primarily, there are two approaches to benefit evaluation prescribed by federal water resource planning guidelines [10]. The first is the travel cost approach where demand curves are constructed for individual parks from the models using variable travel costs as the proxy for price paid. For a general description of the rationale of the methodology used, see [10] and [11]. The second is the unit value approach, which approximates the willingness to pay with the product of a "unit day value" multiplied by the total number of recreation days estimated to occur at a site. The rationale for this approach is given in [10] and [12]. Both approaches are explicated in the following paragraphs.

42. The Travel Cost Approach. The estimate of recreation use from the general recreation model provides a point on the demand schedule of a given nonreservoir project or the selected site within a project, where applicable. This point is the quantity of recreation demanded at the current market price (zero). In order to derive the demand curve, other points must be estimated. This requires small incremental increases in the price and estimates of each subsequent decreased quantity of use demanded. Since it has been impractical to establish incremental fee charges and survey the resultant use, variable travel costs are used as the proxy for price. The model includes the distance from population origin to recreation destination as an independent variable. Adding small increments to this measure of distance simulates moving the recreation site further and further from the users, necessitating increased travel costs at each increment. The use decreases with increased cost (distance), and the new use estimate generated with each increment yields another point on the demand curve, i.e., the quantities demanded at increasing prices. The price at each of these quantities is determined by computing the costs incurred by the visitors if they were to travel the additional mileage. Variable travel costs of operating an automobile are updated periodically by the U.S. Department of Transportation. The values below are given in [13].

| Variable Cost | Cents Per Mile |
|---|---|
| Repairs and Maintenance | 2.94 |
| Replacement Tires | .38 |
| Gasoline | 3.03 |
| Gasoline Tax | 1.01 |
| Oil | .19 |
| Oil Tax | .01 |
| Taxes on Tires, Tubes, etc. | .03 |
| | 7.59 |

These variable costs reflect out-of-pocket cost per mile required to operate an automobile in the United States. Fixed costs, such as depreciation insurance, etc., are not included. These costs are doubled to account for round-trip mileage and then divided by the load factor, the average number of people arriving in each automobile, to determine the proxy for price per person. The load factor, 2.14, is the median number of persons per vehicle derived from the subsample of interviews obtained on the American River Parkway. The average cost per person per mile is 7.09 cents.

43. If only the variable travel costs are used, the additional time required to travel increased distances is not appropriately considered in the determination of demand. The result is a consistent bias in the demand schedule derived and benefits are understated. In the case of the American River Parkway, a linear tradeoff between time and distance was assumed because of the proximity of the population origins to the recreation sites. A discussion of the rationale for and use of a convex tradeoff formulation is found in [11]. For the linear tradeoff function, the time costs must be evaluated. For this study, the value of time per hour was assumed to be equal to a minimum wage rate of $2.20. The average travel speed was estimated at 40 miles per hour. The average time costs per person per mile is then the $2.20 divided by the average speed and the load factor. The result is 2.57 cents per person per mile. Again, this must be doubled to reflect the round-trip distance. The representative proxy for time cost is then 5.14 cents per person per round trip mile, and when added to the variable travel costs of 7.09 cents per person per mile, the total costs per person per mile are estimated to be 12.23 cents.

44. A routine computer program can be used to estimate the benefits accruing to a particular site or sites under the travel cost approach. For the American River Parkway, a program was used to estimate the incremental benefits and the sum of benefits accruing to each recreation site over the summer period, June-August. A typical calculation of benefits based on users from a particular zip code origin and the distance and time involved is shown below. The benefits equal the area beneath the demand schedule described by the ten points.

| (1) K* | (2) PRICE | (3) USE | (4) $USE_k + USE_{k-1}$ | (5) AVG. USE (4)/2.0 | (6) BENEFITS (5) x 0.1223 |
|---|---|---|---|---|---|
| 1 | $ 0.000 | 1916 | - | - | - |
| 2 | 1.223 | 1096 | 3012 | 1506 | $184.20 |
| 3 | 2.446 | 744 | 1840 | 920.0 | 112.50 |
| 4 | 3.669 | 547 | 1291 | 645.5 | 78.90 |
| 5 | 4.892 | 420 | 967 | 483.5 | 59.10 |
| 6 | 6.115 | 331 | 751 | 375.5 | 45.90 |
| 7 | 7.338 | 265 | 596 | 298.00 | 36.40 |
| 8 | 8.561 | 214 | 479 | 239.5 | 29.30 |
| 9 | 9.784 | 173 | 387 | 193.5 | 23.70 |
| 10 | 11.007 | 140 | 313 | 156.5 | 19.10 |
| TOTAL TO $11.01 | | | | | $589.10 |

*K represents points developed on a demand schedule from incremental adjustments of the price which varies with distance.

45. It is necessary to calculate these benefits for each park destination since the distance variable is a function of both the location of the population origin and the park destination, and the proxy variable for intensive use acreage is a park-specific characteristic. With the rafting model, since the river is the only destination, only one set of aggregated incremental and total benefits is derived.

46. The Unit Value Approach. The unit value approach estimates the recreation benefit as the product of a unit day value multiplied by the estimated total number of recreation days to occur at a site. This approach can be used with any use estimating procedure. Currently, the prescribed bounds on the unit value are $.75 and $2.25 [10]. Given this range, a systematic scaling of the following criteria should be evaluated to determine the appropriate unit value within the specified range of values:

a. Quality of project access and recreation facilities provided.

b. Diversity of recreation activities available.

c. Extent of overcapacity expected or the existence of underutilized competitive alternatives.

d. Aesthetic conditions and planners' "feel" for possible uniqueness.

47. A project's access quality refers to the project's location and the nonproject roads and highways linking the project and the using population. Recreational facilities' quality refers to capital improvements. These may vary from the mere meeting of public health and safety requirements to substantial development. Project quality also relates to the setting and location with respect to resources and population centers, and to the desires of local sponsors under applicable cost-sharing and other local cooperation criteria.

48. The diversity of available recreational activities refers to the number of activities which various members of a party may engage in during a single outing.

49. Because capacity utilization and competitive alternatives are related, they are measured on the same scale. If it is expected that crowding will rarely occur and there are no underutilized alternatives, then the measurement would be the maximum allowable. However, if crowding does not occur because there are existing underutilized competitive alternatives, then the measurement would be a lower value because the willingness to pay would be less, given the alternatives. Similarly, if there are few alternatives and this results in expected crowding, the value of the measurement should reflect the willingness to pay despite the crowded conditions. It should be understood that while it is possible to have average crowding and average competing alternatives, it is logically inconsistent to have both excessive crowding or overcapacity and extensive underutilized competitive alternatives, i.e., if the project is expected

to be crowded and if crowding is accepted as an adverse condition, then if some other facility remains underutilized, it is judged to be not a competing alternative.

50. Aesthetic conditions will, in general, be judged relative to what prevails in similar recreational environments. This scale, more than the others, will reflect the planner's personal values. For this reason and because the rest of the scales cannot accommodate all of the project's distinctiveness, the planners' feel for any uniqueness is explicitly coupled with the aesthetic conditions.

51. The measurement of the preceding four criteria are necessarily judgmental. It is recommended that each criterion be given equal weight on a linear scale of 0-14. Hence, composite scores will range from 0 to 56 and translate into unit values as follows:

| 0-8 | 9-16 | 17-24 | 25-32 | 33-40 | 41-48 | 49-56 |
|---|---|---|---|---|---|---|
| $.75 | $1.00 | $1.25 | $1.50 | $1.75 | $2.00 | $2.25 |

52. The resulting unit value can be used for evaluating initial recreation benefits and for projecting benefits over the project's life. With this procedure, changes in annual benefits over time will usually result from just the expected changes in annual use estimates and will be a function of the use-estimating procedure employed. However, if significant changes in one or more of the above criteria are expected to result over time, a new scaling of those criteria would be appropriate with the re-evaluation of the unit value used where applicable.

53. American River Parkway Benefits. The average benefit for each park on the parkway calculated from the preceding criteria is compared with the travel cost approach in Table 16. The utilization of the criteria for these parks is detailed in Table 17. (The first unit value criterion in Table 17 has been divided into two equal-value subcriteria, "Quality of Access" and "Development and Quality of Facilities.") The use estimates and the average benefit estimates given in Table 16 exclude rafting and trail bicycling. Assuming the average duration of a raft trip is four hours, the travel cost approach gives an average benefit of $4.36 applied to an additional 222,900 annual recreation days. The travel cost approach is inapplicable for bicycling, but if the two hour duration for bicycling given in [4] is used with the average benefit on the parkway, then there are another 103,800 recreation days at $1.84 per day. In summary, using the travel-cost approach, there were an estimated 1,211,000 recreation days in 1975 on the parkway, with an estimated economic value of $2,790,000.

TABLE 16

**American River Parkway General Recreation Use and Benefits**

| Park | Recreation Days | | Average Benefits | |
|---|---|---|---|---|
| | Summer | Annual | Travel Cost | Unit Value |
| Sailor Bar | 8,642 | 27,049 | $ 1.30 | $ 1.25 |
| Upper Sunrise | 10,821 | 33,869 | 1.13 | 1.50 |
| Sacramento Bar | 8,591 | 21,822 | 1.25 | 1.50 |
| Lower Sunrise | 21,468 | 54,529 | 1.25 | 1.75 |
| Rossmoor Bar | 6,400 | 16,256 | 1.22 | 1.50 |
| Hoffman Park | 73,708 | 172,476 | 2.69 | 2.25 |
| Goethe Park | 46,132 | 83,499 | 2.50 | 2.00 |
| S.A.R.A. Park | 14,490 | 47,237 | 1.26 | 1.25 |
| Campus Commons | 13,001 | 27,563 | 1.05 | 1.50 |
| Watt Avenue South Area | 30,849 | 65,399 | 1.16 | 1.25 |
| Woodlake | 7,968 | 21,435 | 0.97 | 1.25 |
| Paradise Beach | 55,442 | 149,139 | 1.61 | 1.25 |
| Discovery Park | 58,788 | 164,019 | 2.05 | 2.00 |
| American River Parkway | 356,300 | 884,292 | 1.84 | 1.71 |

# TABLE 17

## UNIT VALUE APPROACH

| PARK | DESCRIPTION | UNIT VALUE POINTS | UNIT VALUE |
|---|---|---|---|
| 1 - SAILOR BAR | Quality of Access: Vehicle fair but not close to most population, equestrian fair, others poor or non-existent. | 2 | |
| | Development & Quality of Facilities: Undeveloped; parking is only on gold dredger tailings. | 1 | |
| | Diversity & Value of Activities: Fishing, swimming, relaxing and put-in for "rafts" primarily, with little else. | 6 | |
| | Overuse or Oversupply: Occasional overuse during fishing & rafting seasons - not much unused alternative for activities. | 7 | |
| | Aesthetics: Typified by somewhat barren, unsightly dredger tailings - riverview not best, erosion exists, little shade, etc. | 3 | |
| | | 19 | $1.25 |
| 2 - UPPER SUNRISE | Quality of Access: Auto access fair, not close to major population, trails are access for bikes, horses & hikers. | 4 | |
| | Development & Quality of Facilities: Some still under development; bikeway good, horsetrail fair, hiking poor, parking is dirt and with fair maintenance. | 4 | |
| | Diversity & Value of Activities: Primarily fishing, rafting, relaxing & swimming. | 6 | |
| | Overuse or Oversupply: Occasional crowding, a little excess supply at other times. | 7 | |
| | Aesthetics: Occasional pleasant, shaded spots near river, but these are not obvious from accesses. | 5 | |
| | | 26 | $1.50 |
| 3 - SACRAMENTO BAR | Quality of Access: Relatively good to Fair Oaks, Orangevale, Citrus Heights, Carmichael, and Rancho Cordova via footbridge. No bicycle access except footbridge, but good equestrian and fair pedestrian. | 5 | |
| | Development & Quality of Facilities: Virtually no development save footbridge linking with Lower Sunrise which considerably enhances access. | 1 | |
| | Diversity & Value of Activities: Primarily rafting, swimming, and relaxing with some fishing and walking. | 5 | |
| | Overuse or Oversupply: Generally not crowded but possibly an oversupply condition at times. | 9 | |
| | Aesthetics: Some scenic value with natural aspects toward river but unsightly dredger tailings mar view toward bluffs. Unclear whether old roads from gravel operation are asset or liability - nice view of short stretch of Class II water and backwater pool at down river reach of bar. | 7 | |
| | | 27 | $1.50 |
| 4 - LOWER SUNRISE | Quality of Access: Relatively good access to parking off Sunrise Blvd., less to small park area, trails also provide access. | 5 | |
| | Development & Quality of Facilities: Restrooms, water and tables at small park (turf & shade), good rafting access, fair parking. | 5 | |
| | Diversity & Value of Activities: Relaxing, rafting, swimming, trail bicycling, some walking and some picnicking and games at park area. | 10 | |
| | Overuse or Oversupply: Some crowding at put-in point but general condition of excessive supply (unused alternatives). | 6 | |
| | Aesthetics: Again somewhat lessened by tailings, but park atmosphere is pleasing as are some riverbank enclaves, and much of bike way and equestrian trail. | 7 | |
| | | 33 | $1.75 |

## TABLE 17 (Cont'd)

| PARK | DESCRIPTION | UNIT VALUE POINTS | UNIT VALUE |
|---|---|---|---|
| 5 - ROSSMOOR BAR | Quality of Access: Two auto accesses but not adjacent to major thoroughfares; other accesses primarily via bicycle, pedestrian and equestrian trails. | 3 | |
| | Development & Quality of Facilities: Some turf with shade but no water, tables, etc; trails and parking lots (2, paved) | 4 | |
| | Diversity & Value of Activities: Mostly relaxing and swimming, trail bicycling with some walking, fishing, picnicking and other trail activities. | 6 | |
| | Overuse or Oversupply: Generally not crowded with the possible occasional exception on the bike way. Probably a general case of some unused alternative supply. | 6 | |
| | Aesthetics: Park area and bike way generally pleasing, but vast, sparse grasslands and narrow areas of eroded banks shored up with bank protection groins in several areas. | 6 | |
| | | 25 | $1.50 |
| 6 - HOFFMAN PARK | Quality of Access: Two major entrances; accessible to large proximate population; entrance via auto, bike, horse and foot. | 6 | |
| | Development & Quality of Facilities: Selection of virtually all types of developments including specific protection of nature area from development - includes parking, picnicking facilities on shaded turf, trails within park, large turfed playing field, waterborne toilets, water; some undeveloped beach and raft take-out put-in area. | 7 | |
| | Diversity & Value of Activities: Most diverse selection; rafting, fishing, trails, swimming, picnicking, relaxing, walking, jogging, limited nature study and some sightseeing. | 14 | |
| | Overuse or Oversupply: General crowding on peak use days. | 10 | |
| | Aesthetics: Generally good balance - somewhat like urban park in heavy use areas but also generally natural conditions where managed for that purpose. | 12 | |
| | | 49 | $2.25 |
| 7 - GOETHE PARK | Quality of Access: Only one major vehicular access for biking, pedestrian and equestrian use - close to some population but relatively far or across river from most populous areas. | 4 | |
| | Development & Quality of Facilities: Turf, shade, chemical toilets, tables, water, extensive dirt parking, trails - fair to good quality. | 6 | |
| | Diversity & Value of Activities: Relaxing, picnicking, rafting, swimming, games, bicycling and other trail activities. | 11 | |
| | Overuse or Oversupply: Probably occasional crowding but uniqueness of area may preclude significant unused alternative supply. | 12 | |
| | Aesthetics: Generally pleasing and natural environs - residential developments adjoin opposite bank from main intensive use area but development is of custom category and it seems unclear whether it detracts from riverward view, the so-called "Arden Rapids" Class III water are visible from a part of the area; generally pleasing. | 13 | |
| | | 46 | $2.00 |

# TABLE 17 (Cont'd)

| PARK | DESCRIPTION | UNIT VALUE POINTS | UNIT VALUE |
|---|---|---|---|
| 8 - S.A.R.A. PARK | Quality of Access: Vehicle from Watt Avenue off La Riviera Drive only; some access by pedestrians from heavy concentration of single-family and multi-unit dwellings immediately adjacent to levee. | 3 | |
| | Development & Quality of Facilities: Small turf area off a residential access; paved parking in limited quantity. | 2 | |
| | Diversity & Value of Activities: Primarily swimming, relaxing, walking and rafting recovery. | 5 | |
| | Overuse or Oversupply: Not often crowded; some over-supply conditions likely exist. | 6 | |
| | Aesthetics: At this point the parkway is strictly between levees which are not landscaped; water is slow-moving; there is generally ample verdure but much of the area along bank is densely thicketed precluding useful access. | 6 | |
| | | 22 | $1.25 |
| 9 - CAMPUS COMMONS | Quality of Access: Good for biking and pedestrian but not auto access. | 3 | |
| | Development & Quality of Facilities: Virtually nil except trails. | 6 | |
| | Diversity & Value of Activities: Swimming, relaxing, bicycling, and walking mostly - some jogging, games, a little fishing, etc. | 5 | |
| | Overuse or Oversupply: Trails often crowded. | 5 | |
| | Aesthetics: Generally pleasing environs but sub-urban in feel; bridges definitely detract. | 9 | |
| | | 25 | $1.50 |
| 10 - WATT AVENUE SOUTH AREA | Quality of Access: Generally poor except for residents adjacent to levee. | 3 | |
| | Development & Quality of Facilities: Chemical toilets, paved parking at Watt Ave. under and adjacent bridge. | 3 | |
| | Diversity & Value of Activities: Primarily swimming, relaxing, fishing, and walking in area by proximate residents; weekend raft recovery is crowded. | 4 | |
| | Overuse or Oversupply: Not crowded except fishing access during peak season; under utilized alterna-tives exist. Swimming is crowded during summer. | 5 | |
| | Aesthetics: Diverse area when moving away from Watt Ave. (not enjoyed by many other than nearby residents) near levee (unlandscaped) and busy auto bridge detracts. | 9 | |
| | | 24 | $1.25 |
| 11 - WOODLAKE | Quality of Access: Direct access other than on trails severely limited by lack of parking. | 2 | |
| | Development & Quality of Facilities: Trails and occa-sional table. | 3 | |
| | Diversity & Value of Activities: Mostly bicycling, some swimming and relaxing, a little walking, jogging and horse riding. | 5 | |
| | Overuse or Oversupply: Bike trail sometimes crowded; some unused alternative supply. | 7 | |
| | Aesthetics: Low shrubs, view of commercial area, with mostly open space & some view of paradise beach is the general scenario-somewhat low quality aesthetically. | 7 | |
| | | 24 | $1.25 |

## TABLE 17 (Cont'd)

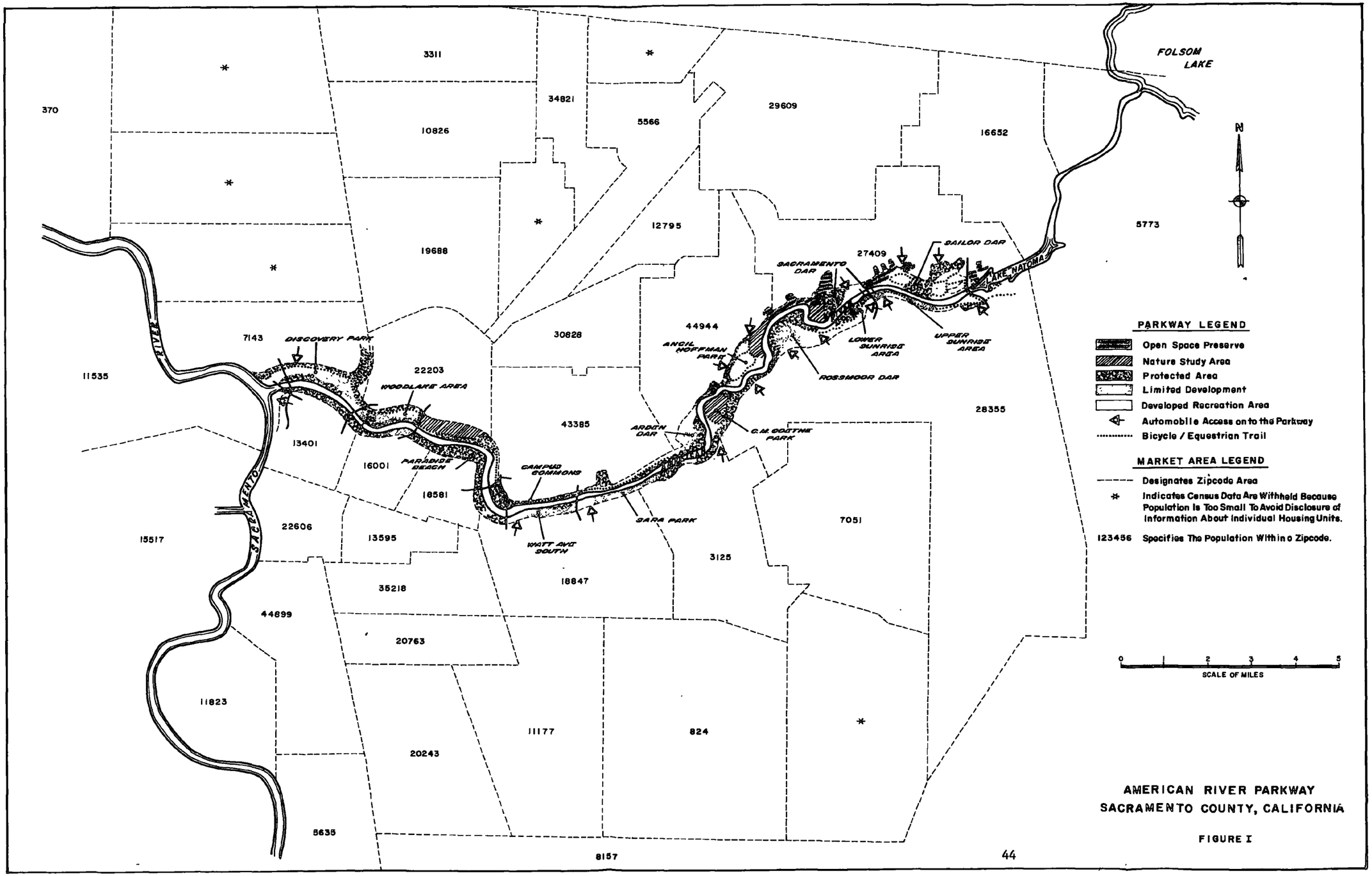
| PARK | DESCRIPTION | UNIT VALUE POINTS | UNIT VALUE |
|---|---|---|---|
| 12 - PARADISE BEACH | Quality of Access: Limited to Carlson Dr. except to nearby residents. (or swim across from Woodlake) | 3 | |
| | Development & Quality of Facilities: Virtually no development; fair maintenance of beach itself. | 4 | |
| | Diversity & Value of Activities: Primarily swimming and relaxing; some games and some walking. | 5 | |
| | Overuse or Oversupply: Often crowded; no substitutes. | 0 | |
| | Aesthetics: View isn't great; beach area is fair. | 7 | |
| | | 19 | $1.25 |
| 13 - DISCOVERY PARK | Quality of Access: Via major highway to 2 main entrances and via trails. | 6 | |
| | Development & Quality of Facilities: Generally well maintained turf, tables, launch ramps, bike concourse; also pedestrian, bike, equestrian trails; temporary boat moorage; adequate parking. | 6 | |
| | Diversity & Value of Activities: Relaxing, picnicking, swimming, boating, sports-games, fishing, trail activities & sightseeing. | 13 | |
| | Overuse or Oversupply: Average crowding but probably little if any unused alternative supply. | 10 | |
| | Aesthetics: Obviously an urban park but landscape buffer is generally effective; only major detraction is I-5 freeway. | 11 | |
| | | 46 | $2.00 |

## PART V: CONCLUSIONS AND RECOMMENDATIONS

54. Conclusions. Recreation use at a nonreservoir water resource development can be effectively modeled. Recreation activity estimators can predict recreation attendance and its distribution over areal origins. The value of the recreation as an economic good can be approximated from activity estimators by using appropriate travel costs as proxy for prices paid by users or by systematically considering the criteria recommended for unit day value determination.

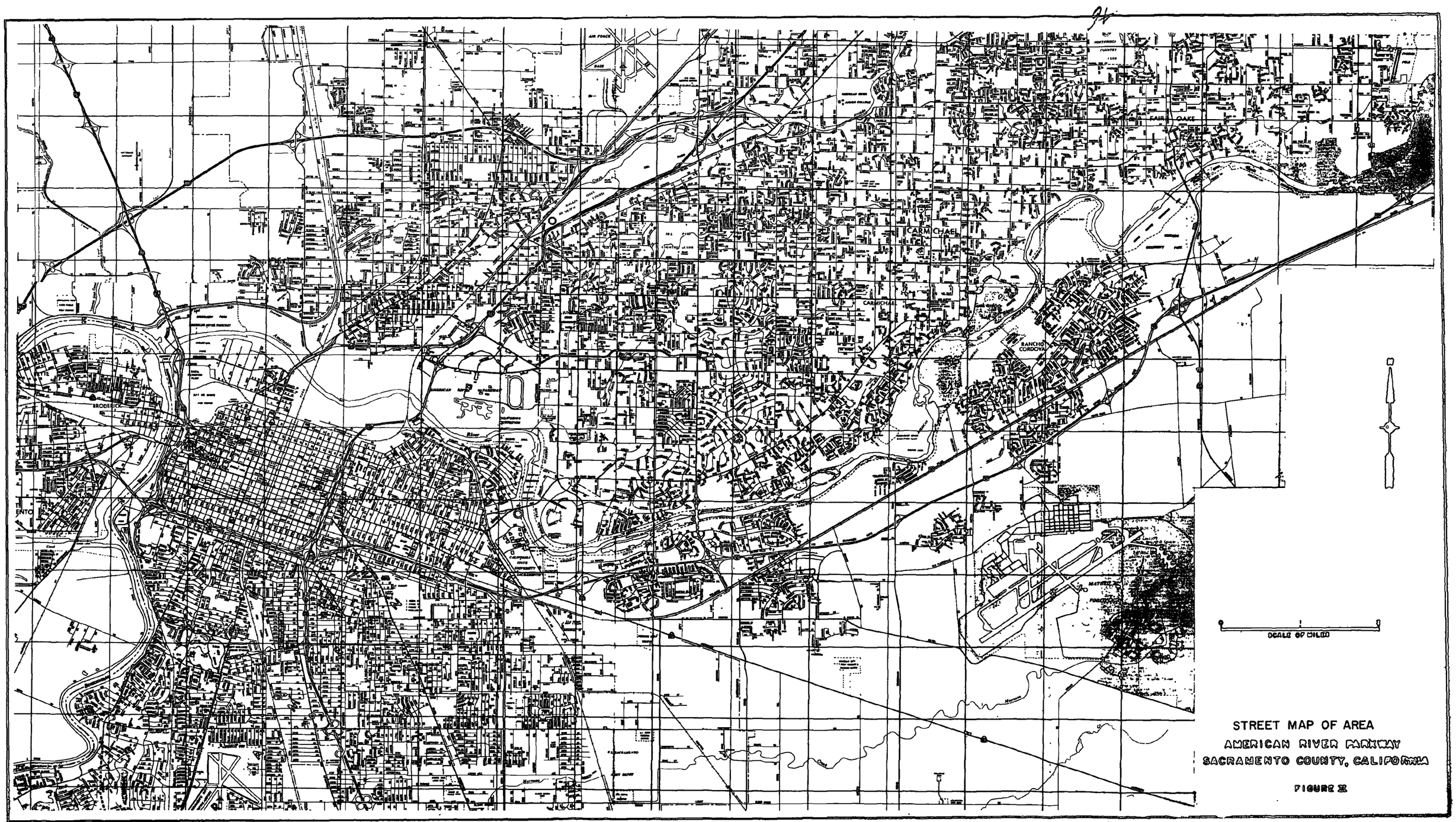
55. The methodology presented in this study is applicable for evaluating nonreservoir recreation and is consistent with the Principles and Standards for Planning Water and Related Land Resources. The methodology can be replicated and assimilated into existing Corps' planning procedures. It could be prescribed for Corps-wide use if the value of greater precision is worth the larger planning costs.

56. Recommendations. It is recommended that the methodology described in this report be tested elsewhere, evaluated, and developed into a standardized procedure for Corps-wide use. Meanwhile, before this is accomplished, it is recommended that the methodology be made available for information to Corps of Engineers' field offices, and others, as appropriate.




AMERICAN RIVER PARKWAY
SACRAMENTO COUNTY, CALIFORNIA

FIGURE I




STREET MAP OF AREA
AMERICAN RIVER PARKWAY
SACRAMENTO COUNTY, CALIFORNIA

FIGURE E

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# ANALYSIS OF SUPPLY AND DEMAND

# OF

# URBAN ORIENTED NONRESERVOIR RECREATION

## APPENDIX A

## DESCRIPTION

## OF

## THE AMERICAN RIVER PARKWAY

NOVEMBER 1976

TABLE OF CONTENTS

## APPENDIX A: DESCRIPTION OF THE AMERICAN RIVER PARKWAY

1. Introduction.- The purpose of Appendix A is to assist the planner in interpreting the data presented in Part III of the report. With the realization that recreation participation is influenced by intangible values, such as perceived aesthetic quality, by factors external to the recreation resources, such as acceptability, and by factors associated with the resource, such as the extent of development, it is vital that the empirical data be interpreted in terms of the universe from which it was derived. Such an understanding is essential before the planner can rationally apply the results of the study to the evaluation of the recreation potential of similar projects. Toward this objective, this Appendix A attempts to develop a visual image of the American River Parkway and its immediate environs. Additionally, a discussion of factors that may have influenced participation rates, and which may not be readily discernible, is provided where indicated.

2. Close coordination with local interests needed in planning.- Nonreservoir projects often represent opportunitites to compliment or enhance existing metropolitan recreation systems. An examination of the interface between the nonreservoir project and the existing systems suggests that it is insufficient to plan for a recreating population; the Corps must plan with the local park and recreation agency. A large proportion of the total recreation costs which will be required for nonreservoir projects are nonfederal costs and will come out of local funds available for a multidimensional recreation program. The project is only a part of the larger recreation package that the local agency supplies to the public. It may be that the biggest problem in planning recreation at urban, nonreservoir projects is an insufficient recognition of the appropriate planning environment. Joint planning with local agencies appears to be mandatory if planning is to be successful. And if the Corps is going to plan effectively with local agencies it must respond to their standards and their perceptions of what is needed.

3. Sailor Bar.- Sailor Bar is 297 acres in area, comprised primarily of mounds of gravel dredge tailings. The landside boundary is formed by an arch of relatively high (about 150 feet) bluffs which reach the water's edge at the upper and lower ends of the park (see photos 1 and 2). Along the majority of the park, the riverbanks rise abruptly to a height of 10-15 feet. The banks support very little vegetation, but there is some sparse riparian vegetation on exposed gravel beds adjacent to the banks (see photo 3). The dredge tailings form a broad almost level plane extending from the riverbanks about 1/4 mile northward to the bluffs. They are vegetated primarily with grasses and shrubs, with scattered alder, cottonwood, and oak trees.

4. There is no recreation facility development, although portable chemical toilets and a few trash containers are provided. A canoe rental concession is located near the east end of the park.

5. The river is fairly shallow along its south bank with gravel bars extending well out into the river. These gravel bars are prime spawning areas for anadromous fish (salmon, steelhead, striped bass, American shad), and, as

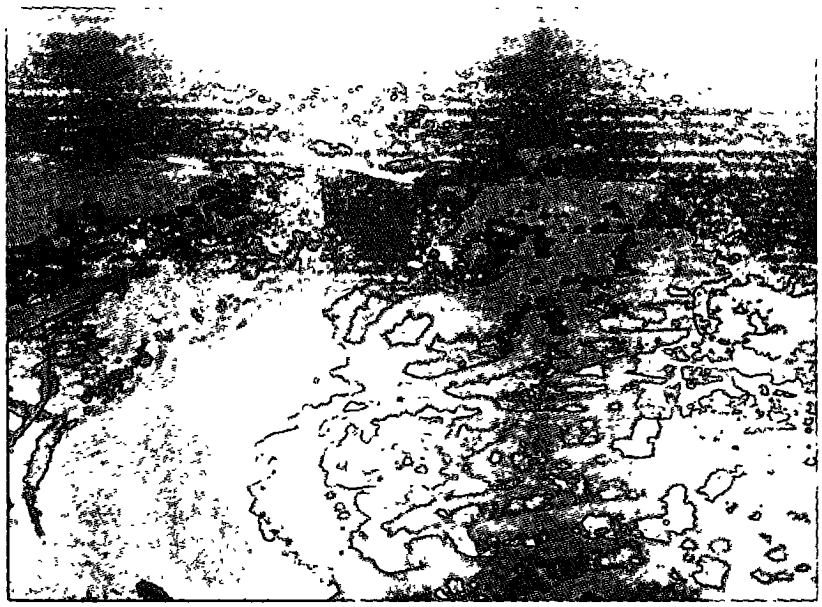

Photo 1. Right bank: Sailor Bar.
Left bank: Upper Sunrise Park.

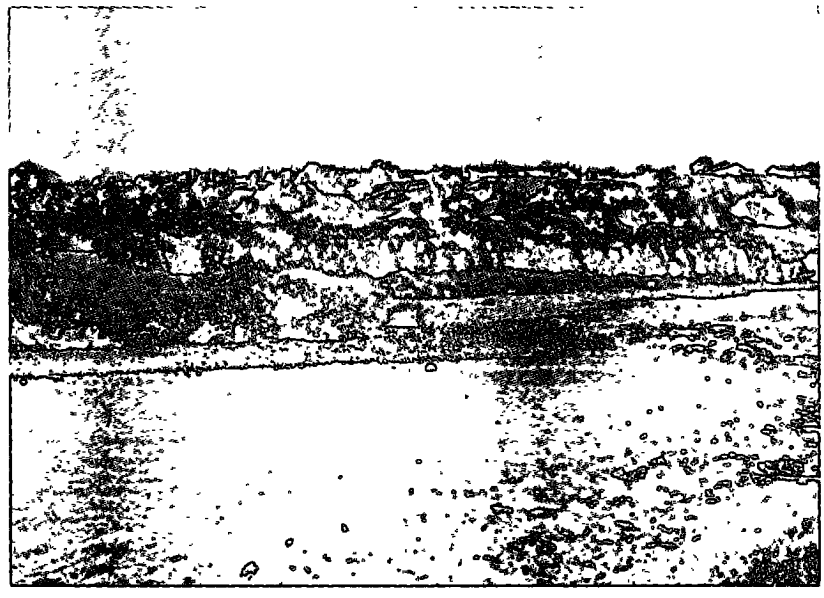

Photo 2. Bluffs bordering Sailor Bar.

Photo 3. East end of Sailor Bar.

such, represent some of the best fishing areas on the river. The water is cold, after release from Nimbus Dam, and the current is swift. Most of the river is rated as Class I with a few short sections of Class II 1/.

6. Sailor Bar is surrounded by a mixture of mature (15 years or older) and new (5 years or less) single family dwellings. Until recently this area was typically rural and sparsely populated. Recent housing expansion has increased the population density; however, homes are typically built on one or more acres and are valued considerably higher than average.

7. There is one well-used vehicle entrance at the east end of the park. This is via a two-lane paved rural road that connects to a thoroughfare (Hazel Ave.) about 1.5 miles from the park entrance. There is a second, less used vehicle entrance from a winding residential street. Internal circulation roads are unimproved. Parking is along the dirt roads or on available level terrain; no formal parking areas exist.

8. Activities at Sailor Bar are influenced by the available resources. In addition to the large amount of fishing encouraged by the excellent fish habitat and ease of angler access, rafting is encouraged by the swift current, riffles, and aethetically pleasing environment. It is interesting to note a tendency toward an inverse relationship between rafting and fishing on weekends and weekdays. The higher percentage of rafting on weekends probably reflects the time required for a raft trip, with the decline in fishing percentage reflecting user competition with rafters. Conversely, on weekdays, most people do not have the time to take a raft trip; however, there is time available for a short fishing trip and there is less competition from the rafters. The low participation rates in the other activities are probably influenced by the lack of supporting facilities (i.e., picnic areas, water, surfaced roads, etc.). Some portion of those activities that do occur are likely in conjunction with rafting or fishing trips.

9. Upper Sunrise. Upper Sunrise Park is 179 acres in area and is largely mounds of gravel dredge tailings. The park is about 500 feet wide and parallels the river.

10. At the east end of the park, the riverbanks rise almost vertically to a height of approximately 50 feet. The banks are sparsely vegetated with some riparian vegetation along the base of the banks where exposed gravel beds exist. (See photo 4.) Downstream, the riverbanks gradually decrease in height to about 10-15 feet and the slope moderates. As the slope of the bank decreases, vegetative cover increases. The rest of the parkland

1/ Class I is smooth running water which can be handled by anybody who can handle a hand boat on a lake.
Class II has standing waves and white water with no physical obstructions that have to be avoided.
Class III has standing waves and rough white water through obstacles, such as rock and logs, that must be avoided or a tip-over is almost certain.

follows the downward slope toward the west. The dredge tailings near the riverbank support a moderately dense growth of oak trees and shrubs. The remainder of the tailings are vegetated with grasses and scattered trees and shrubs.

11. The principal recreation development at Upper Sunrise is a 2.5 mile-long segment of bikeway and equestrian trail, completed in June 1975. The bikeway runs through grassland and oak-grassland habitat. (See photo 5.) Three tree-shaded rest areas overlooking the river have been provided along the bikeway. Each rest area has from one to three picnic tables and trash containers. No drinking water is available. Portable chemical toilets are provided at each end of the park.

12. Near the west end of the park is an old steel truss bridge that has been preserved as a nonvehicular access route connecting the residential areas on the north bank with the Parkway. There is an access ramp connecting the bikeway and bridge.

13. Located at the park's west end adjacent to the access road is a raft rental concession.

14. The river is fairly deep along its south bank at the park's eastern end. Proceeding downstream, the river becomes shallower, with the depth becoming more uniform between the north and south banks. There are occasional gravel bars along the banks and in midriver. The current is relatively swift.

15. Except for a state fish hatchery near the park's east entrance and a gravel mining operation near the west entrance, Upper Sunrise is surrounded by dredge tailings.

16. There are two vehicle entry points, one at each end of the park. At the east end, access is directly off a major thoroughfare (Hazel Avenue). A two-lane paved road that connects to a thoroughfare (Sunrise Boulevard) about 1/2 mile from the park entrance provides access to the west end. During the time the survey was being conducted, a two-lane, paved circulation road that runs almost the entire length of the park was completed and opened for public use. Spaced along the circulation road are several graded and graveled parking areas.

17. Probably the single most influential factor affecting all use of the Upper Sunrise area is its relatively recent recreation facility development. Many parkway users were unaware that the area had been developed and was open for use. This factor certainly influenced the little bicycling recorded.

18. The steep, high banks present throughout much of the area restrain access to the river, thus limiting fishing, rafting, and swimming.

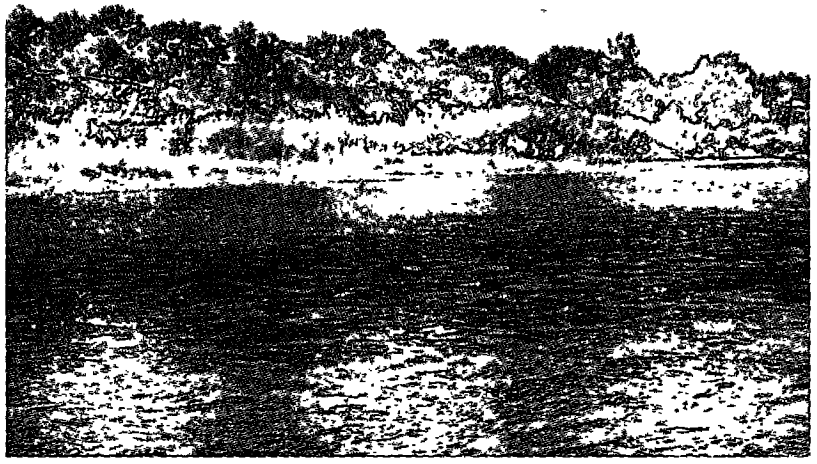

Photo 4. Bluffs along east end of Upper Sunrise.

Photo 5. Bikeway in Upper Sunrise.

19. Sacramento Bar. Sacramento Bar covers 341 acres and is composed of mounds of gravel dredge tailings and dredge pits. Like Sailor Bar, the landside boundary is formed by nearly vertically faced bluffs which rise 75-100 feet above the park's terrain.

20. The riverbank rises quite steeply to heights of 10-15 feet. A moderate amount of riparian vegetation grows on the banks and where exposed gravel beds exist adjacent to the bank. Some trees exist along the top of the bank. From the riverbank the mounds of dredge tailings form a broad, almost level (considering a median elevation between the top and bottom of the mounds) plane extending up to 4,000 feet bank to the bluffs. Vegetative cover of the tailings is similar to that found at Sailor Bar, consisting primarily of grasses with scattered tree cover. (See photos 6 & 7.) Several of the dredger pits have partially filled with water, forming small freshwater ponds and marshes. (See photo 12.)

21. At the downstream end of Sacramento Bar, the river, having previously made a turn northward, runs into the bluffs forming the Bar's boundary and returns to its westerly flow. The exposed gravel beds adjacent to the base of these bluffs support extensive riparian vegetation. (See photo 14.) The bluffs extend from the west end of Sacramento Bar to the east end of Hoffman Park and are not part of the Parkway.

22. There is no recreation facility development. Two portable chemical toilets and a few trash containers are provided in an undeveloped parking area.

23. The upper half of the river is generally shallow, with several exposed gravel bars. The river begins to increase in depth in its lower reaches. Compared to the rest of the river, the current is relatively swift. Most of the river is rated as Class I water, with a few short stretches of Class II. One short section of Class III occurs at the west end of the park where the river changes from a northerly to a westerly flow.

24. There is extensive single-family residential development on the bluffs that form the boundary to Sacramento Bar. These homes are generally 10 or more years old, custom-built, and valued well above the average for the state.

25. There is one vehicular entry point at the east end of the park. Access is by a two-lane rural road which connects with a thoroughfare (Fair Oaks Boulevard) about 1/2 mile from the park entrance. An ungraded dirt area at the end of the access road is used for parking. No vehicle traffic is allowed in the park itself. A 10-foot-wide bridge, previously used by a gravel mining company, connects Sacramento Bar with Lower Sunrise at their eastern end. The bridge is closed to vehicular traffic.

Photo 6. Right bank: Sacramento Bar.
Left bank: Lower Sunrise.

Photo 7. Sacramento Bar.

26. The lack of any recreation facility development and the limited access and parking undoubtedly influence the amount and type of use which occurs at Sacramento Bar; this is especially true when considering the greater recreation opportunities that are available directly across the river at Lower Sunrise.

27. Lower Sunrise. Lower Sunrise (totalling 170 acres) is the oldest and most developed park on the entire south side of the river.

28. The banks of the river rise almost vertically to a height of 10-15 feet and are almost totally obscured by riparian vegetation (see photo 8). The land adjacent to the river is relatively level and heavily wooded with oak trees (see photo 10). Two separate irrigated turf areas about 1 acre each have been established along the river among the oaks (see photo 9). Potable water and flush type restrooms are provided at each turfed area. A few picnic tables are provided at one area. The bikeway and equestrian trail which originated at Upper Sunrise continue through this park, generally paralleling the river. The river is visible from most places along either trail. The concessionaire who operates the canoe service in the Sailor Bar area also provides a raft rental service located in the entrance parking lot at the east end of Lower Sunrise park.

29. The river is fairly shallow with sand and gravel bars extending out from the riverbanks and occasionally occurring in midstream. The current is swift. The river is rated primarily as Class I, having a few short stretches of Class II water.

30. Bordering the park is several hundred acres of undeveloped dredge tailings.

31. There is one vehicular entry point at the east end of the park. Access is directly off a four-lane thoroughfare (Sunrise Boulevard). A large graded and graveled parking area is provided at the terminus of a two-lane paved road. A two-lane, paved circulation road which follows the southern edge of the park provides access to a small direct parking area near one of the turfed areas. Another small parking area at the west end of the park can be reached through the residential area adjacent to Rossmoor Bar. This parking area is located a short walking distance from the second turfed area.

32. There are several factors which could influence the amount of use at this park. Although there is no residential development adjacent to the park, it is within easy access of residential areas to the north and west. It is well established; the existence of the park and facilities are known to many potential users. The turfed areas offer a greater opportunity for some activities, such as picnicking, sports and games, and relaxing. Also, Lower Sunrise is one of only two parks on the entire south side of the river to offer any turfed area. The general aesthetic appeal of a heavily wooded area and the relief from summer heat that its

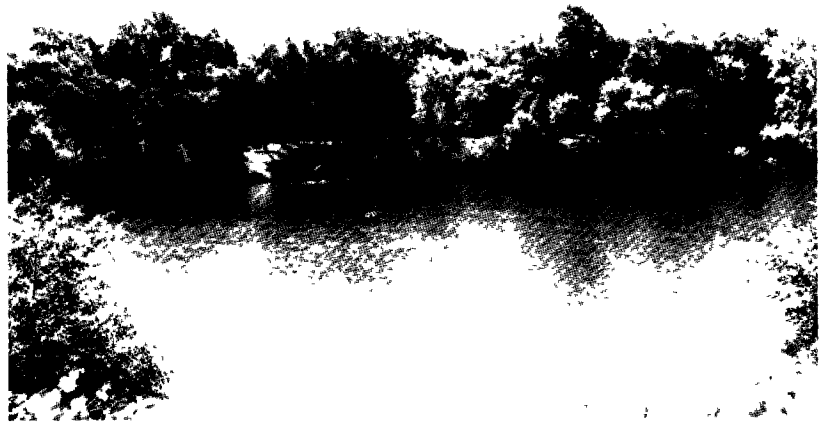

Photo 8. Lower Sunrise.

Photo 9. Lower Sunrise: turf area and bikeway.

Photo 10. Lower Sunrise:
oak - grassland vegetation.

closed canopy provides is an important factor (see photo 10). The relatively swift currents and riffles found in this reach of the river are particularly attractive to rafters. Ample parking and a convenient raft rental service also encourage the use of Lower Sunrise park as a departure point for raft trips.

33. Rossmoor Bar. The 747 acres which comprise Rossmoor Bar were acquired for the Parkway in 1973. However, much of the area had received public use for several years prior to its addition to the Parkway.

34. The riverbanks vary considerably along the bar's five-mile length. On the upstream reach, the banks rise quite steeply to a height of about 25 feet and are generally devoid of vegetation. (See photos 11 & 12.) Extending about 200 feet back from the riverbank, is an area of oak-grassland habitat. Beyond this point, extending approximately 1000 feet, is a relatively level area of open grassland. Proceeding downstream, the banks are composed primarily of moderately sloped mounds of dredge tailings that have revegetated with shrubs and trees. There are a few areas where gravel beds adjacent to the bank extend well out into the river. The land adjacent to the banks is comprised of mounds of gravel dredge tailings that are extensively revegetated with grasses, shrubs, and trees. At the west end of the park, the riverbank rises abruptly 10-15 feet. Vegetative cover is moderate, consisting primarily of grasses with a few shrubs and trees. Exposed beds of gravel adjacent to the banks often support riparian vegetation. Some portions of the banks in this reach have had to be protected against erosion with riprap and groins. There is only a narrow (about 20 feet wide) strip of park land adjacent to these bank on which the bikeway is located. Most of the land in this area is planted in a pear orchard; however, a formal community park (not part of the Parkway) with extensive turf areas and game facilities also fronts on the river.

35. Recreation facilities consist of a continuation of the bikeway, and equestrian trail, with picnic tables located at various points along the bikeway (principally in the wooded area at the upstream portion) to serve as rest areas. No potable water is provided. In the upstream portion of Rossmoor Bar, paralleling the river, the bikeway runs through the relatively open grasslands (see photo 13). The river is visible from the bikeway along this stretch. About 1/3 of the way down the bar, the bikeway departs from the river and winds through the revegetated dredge tailings. The last section of bike trail runs along the narrow strip of land on top of the riverbank.

36. The river increases in depth at the upper reaches and then maintains a moderate depth through the middle reaches. The lower reaches have several submerged gravel bars creating areas of shallow water. Most of the river in this reach is rated as Class I water. There is one short section of the river where it makes a turn to the west from its northward flow that is rated Class III (see photo 15).

Photo 11. Right bank: Sacramento Bar.
Left bank: Rossmoor Bar.

Photo 12. Foreground: Sacramento Bar with fresh water pond. Background: East end of Roosmoor Bar.

37. The park is bordered by a mixture of moderately priced, single-family dwellings and a few multifamily dwellings. Most structures are relatively new, with the average age being approximately ten years.

38. One vehicle entry point is located at each end of the park. Residential streets serve as access roads. These roads do not connect to any major thoroughfares. Two-lane circulation roads run only from the entry points to two parking areas near the river. These roads and parking areas were graded and paved during June 1975.

39. The total activities hours recorded for Rossmoor Bar are low because the sampling procedure did not include a "trail bicycle" count for this area. Part of the 8000 and 6000 activity hours' bicycling attributed to the 2 adjacent areas, Lower Sunrise and Goethe Parks, actually occurred on Rossmoor Bar.

40. Ancil Hoffman Park. Ancil Hoffman Park is an intensively developed 391 acre site that was originally developed as a County park in 1960. Between 1960 and 1967, various parcels of land were added until its present size was reached.

41. The bluffs that form the riverbanks at the west end of Sacramento Bar continue downstream until they reach Hoffman Park proper where they turn inland from the river and form the landside boundary around the park. From the water's edge a gently sloping gravel bar extends from 200-500 feet back to moderately inclined riverbanks that rise to a height of 5-10 feet. From the riverbank the park extends an average of 2000 feet back to the bluffs that form the park's boundary. The area has been developed with a 150 acre, 18-hole golf course, 34 acres of irrigated turf, a portion of which is a tree-shaded picnic area (see photo 17), and a 14-acre nature area of oak-grassland. Other facilities include a riding arena for horseback riding, equestrian trails, picnic facilities, drinking water, and flush-type restrooms (see photo 16).

42. The river becomes narrower and shallower through this reach. Generally, the water can be rated as Class I with a few stretches of Class II.

43. The park is bordered by a mature (15 years or older) residential area of primarily single-family homes of average and upward value. Many of the homes have been built on one or more acres.

44. There are two vehicle entry points. Access is via residential streets which do not connect directly with any major thoroughfares. Internal circulation roads are paved and two lanes wide. There are 4 paved parking lots with a total of 360 parking spaces. A bike lane is provided along the circulation roads.

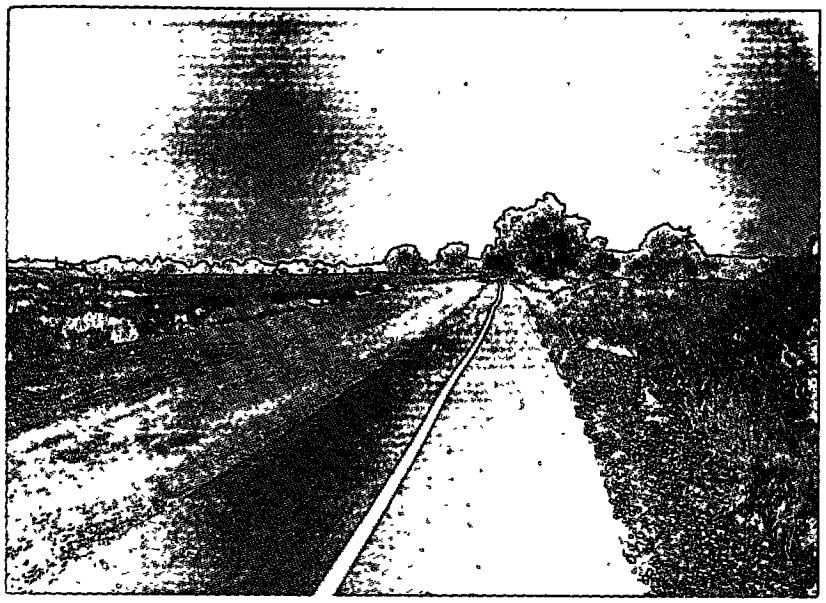

Photo 13. Bikeway at the east end of Rossmoor Bar.

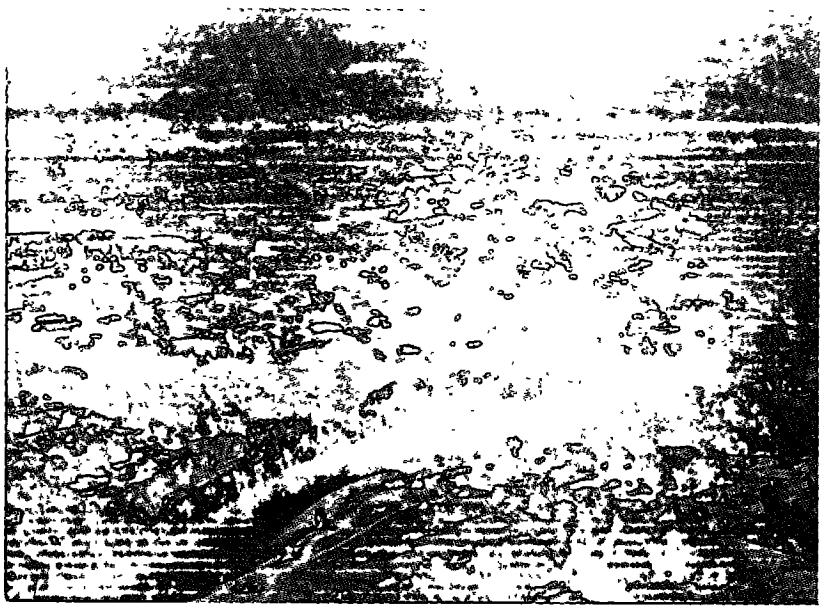

Photo 14. Foreground: West end Rossmoor Bar.
A section of bluffs between Sacramento Bar and Ancil Hoffman Park.

Photo 15. Rafting at Rossmoor Bar

Photo 16. Ancil Hoffman Park.

Photo 17. Hoffman Park picnic area.

42. The use at Hoffman Park is probably significantly influenced by the fact that the park has been in existence for several years, is centrally located to a large number of potential users, and offers a wide variety of recreational opportunities and amenities. The still swiftly flowing river encourages rafting. Additionally, the park is a popular take-out or rest stop for many rafters because of the facilities it offers and because many rafters are ready to "stretch their legs" after the 2 to 2.5 hours it takes to reach Hoffman Park from the Upper and Lower Sunrise area.

43. C. M. Goethe Park. The 272 acres of Goethe Park are located at a bend in the river. The river effectively forms the boundary on three sides of the park. The land side boundary is formed partially by a short section of levee and by a pear orchard. (See photo 18.)

44. From the water's edge, a gently sloping gravel bar extends about 200 feet back to the riverbanks which rise quite steeply to a height of about 20 feet. There is a moderate amount of riparian vegetation growing on the gravel bar, particularly near the water's edge. Only small shrubs and some grass exist on the riverbanks. Beyond the riverbank the land is gently rolling and almost entirely vegetated by oak-grassland habitat.

45. On the north side of the river, across from Goethe Park, is a residential area that is not part of the Parkway. The riverbanks in this area average approximately 15 feet in height and, in most places, have been stabilized with retaining walls constructed by the property owners. Some vegetation grows along the base or cascades over the top of the stabilized banks. The homes located along this section of the river are clearly visible from Goethe Park. (See photo 21.)

46. Near the west end of the park, a formal picnic area has been developed. This area consists of a couple acres of irrigated turf, established among the oak trees, a few picnic tables, drinking water, and portable chemical toilets. (See photo 20.) A second, largely undeveloped, day camp/picnic area has been created near the east end of the park. There is no turf in this area and most of the naturally occurring grass understory has been eliminated by vehicle traffic, since park users are free to drive and park among the trees. A few picnic tables and portable chemical toilets are provided. (See photo 19.)

47. Goethe is the western terminus for the bikeway and equestrian trail on the south side of the river. Since the bikeway is located along the park's southern boundary, it is not visible from the bikeway.

48. The river is relatively shallow in this reach because of extensive gravel bars, and there is a moderate current. Most of this reach is rated as Class I; however, at the west end of the park there is one section of Class III water. (See photos 22 and 23.)

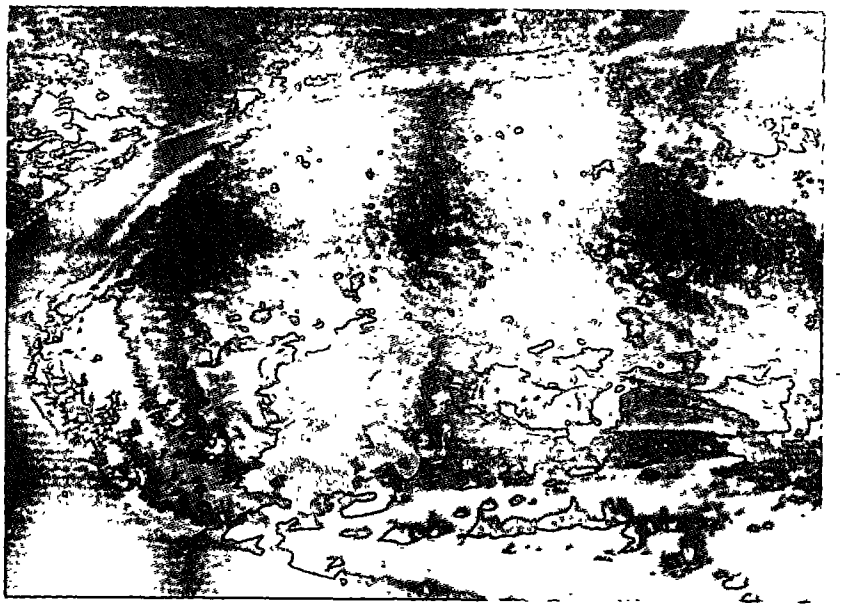

Photo 18. Goethe Park.

Photo 19. Goethe Park undeveloped day camp/picnic area.

49. A considerable portion of Goethe Park is bordered by pear orchards. There are some moderately priced, single-family and multiple-family dwellings adjacent to the west end of the park. This residential area is separated from the park by a short section of levee that forms part of the park's southern boundary.

50. There is only one vehicular entry to the park. Access is by two-lane paved road which intersects with a major thoroughfare (Folsom Blvd.) about 0.7 of a mile from the park entrance. Internal circulation is via one-lane surfaced roads. Graded and paved parking areas are provided where the bikeway ends and at the turfed picnic area.

51. The use that occurs at this park is influenced by the available natural resources. The wide gravel bars attract fishermen and swimmers. The Class III water is very popular with rafters who often make several runs through the rapids. These rapids also mark the last area of really swift currents on the river. Similar to Hoffman, Goethe Park is a popular takeout or rest stop for rafters.

52. S.A.R.A. Park. The levee system on the south side of the river begins at S.A.R.A. Park. There is approximately 2 miles of riverfront between Goethe and S.A.R.A. that is not part of the parkway.

53. S.A.R.A. (Save the American River Association) Park is a narrow strip of land, averaging about 100 feet in width and about 2.5 miles in length that runs between the levee and the river. The riverbank is moderately steep, rising approximately 20 feet from the river. The levee is set back from the top edge of the riverbank about 15 feet and rises about 10 feet above the bank. Dense, almost impenetrable, riparian vegetation of trees and shrubs grows from the water's edge to the levee setback, thus totally obscuring the levee from a river view. (See photos 24 and 25.) There is no development of recreation facilities in this area.

54. The river becomes quite shallow in places because of extensive gravel bars along the river's edge and out in the main river channel. The higher gravel bars in the main channel have become vegetated with dense riparian tree and shrub cover. The river current continues slowing through the reach.

55. The upper reaches of the park are bordered by new, single-family dwellings of generally average value. The lower reaches have a mixture of older (about 10 years) single-family dwellings and new (5 years or less) multiple-living units of average value.

56. There is no vehicular entry to the park. However, there is one small parking area on the south side of the levee located in the residential area near the east end of the park. Also, there is paved parking where the S.A.R.A. Park and Watt Avenue South areas adjoin. (See discussion on Watt Avenue South.)

Photo 20. Goethe Park developed picnic area.

Photo 21. Northbank of river across from Goethe Park.

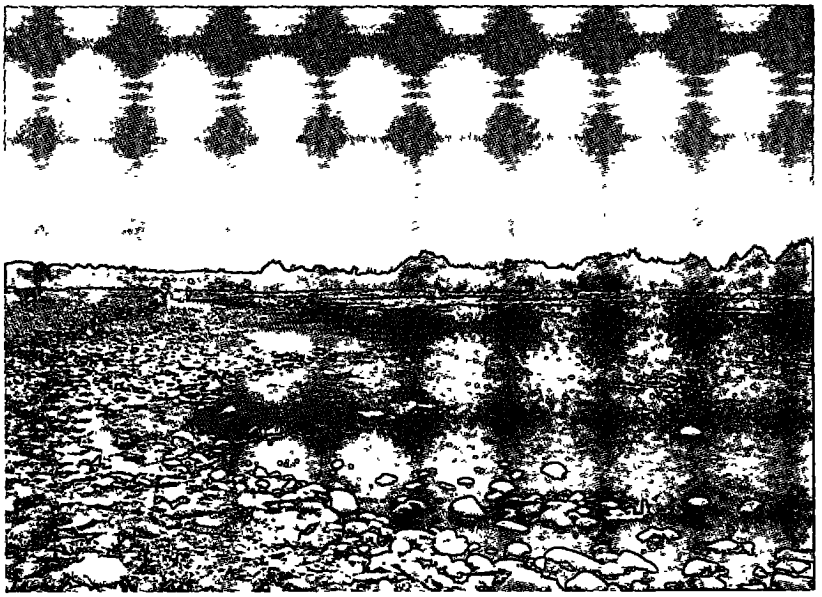

Photo 22. West end of Goethe Park.

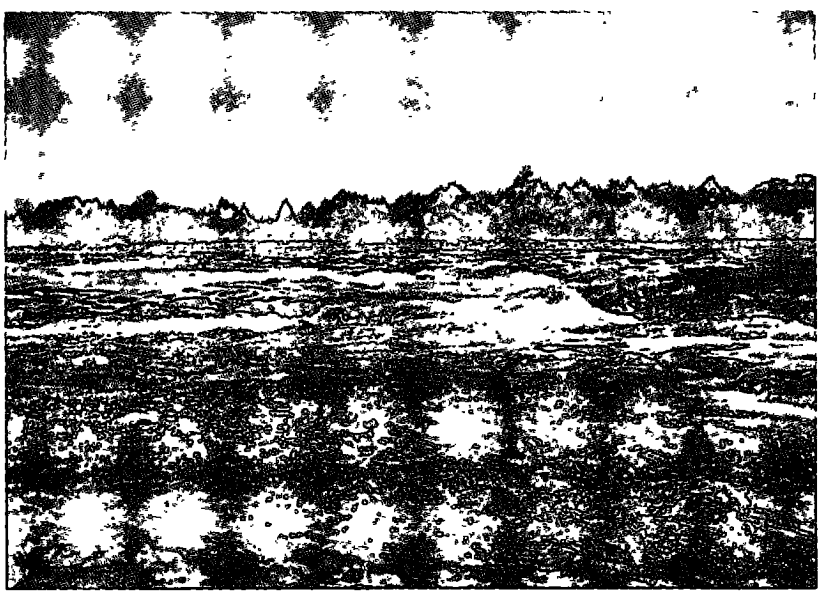

Photo 23. Class III Rapids at the west end of Goethe Park.

57. The very dense vegetation in this park made counting difficult and probably resulted in underestimating for some activities. The majority of use was recorded in an area immediately adjacent to Watt Avenue South. Because of the vehicular access and parking provided, the time required to reach this point by raft from Lower Sunrise (4 hours or more), and because the river current begins to slow considerably past this point, the west end of S.A.R.A. is the last major take-out point for rafters. (See also discussion on Watt Avenue South.)

58. Campus Commons. The levee system on the north side of the river begins about 2.5 miles east of Campus Commons. There is about 3 miles of riverfront between Ancil Hoffman Park and Campus Commons that is not part of the parkway. That area contains residential areas, a gravel mining operation, and a sewage disposal plant.

59. The Campus Commons section of the Parkway is a 6-mile-long strip of land between the levee and river. The levee is generally between 200-300 feet from the water's edge. (See photo 24.) In general, the land rises abruptly from the water's edge to the height of 10-15 feet and then forms a gently sloping berm back to the levee. The steep banks and adjacent exposed gravel beds are heavily vegetated with riparian trees and shrubs. (See photo 26.) Occasionally, groups of oak trees can be found growing on the high ground near the river. Most of the berm area is open grassland.

60. The bikeway and equestrian trail on the north side of the river originate in Campus Commons. Most of the bikeway runs through the open grassland on the levee berm. (See photo 27.) However, on the downstream section it does wind through some tree-shaded areas near the river (photo 28). Placed at various points along the bikeway overlooking the river are rest areas with one to three picnic tables. Two such rest spots have piped drinking water. The river is intermittently visible from the bikeway. There are no other county recreation facilities developed in this section of the Parkway. (There is, however, a 9-hole golf course between the bikeway and the river in the downstream section of the river.)

61. The river channel is relatively deep along the north bank through most of Campus Commons. The river depth becomes more uniform between the north and south banks in the lower reach. The current slows considerably toward the western end of the park.

62. The upper half of Campus Commons is borderd by a mature (average age of homes--10 years) residential area of single-family dwellings whose value significantly exceeds the state's average. The lower half is more characteristically bordered by multiple-family dwellings of average value.

63. There is no vehicle entry point to this section of the Parkway, although there are residential streets adjacent to the levee which provide access and parking space.

Photo 24. Right bank: Arden Bar and east end of Campus Commons.
Left bank: S.A.R.A.

Photo 25. Right bank: East end of Campus Commons.
Left bank: West end of S.A.R.A.

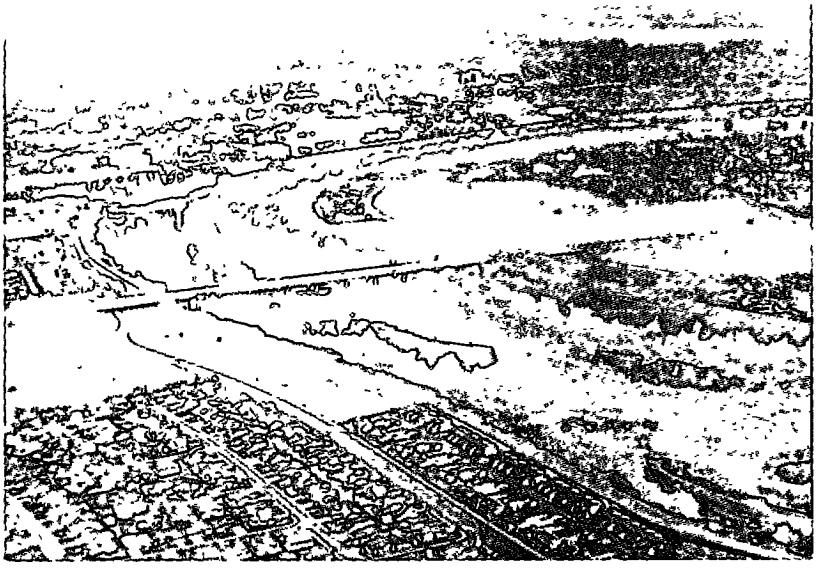

Photo 26. Right bank: Campus Commons.
Left bank: Watt Ave. South (See also Photo 29.)

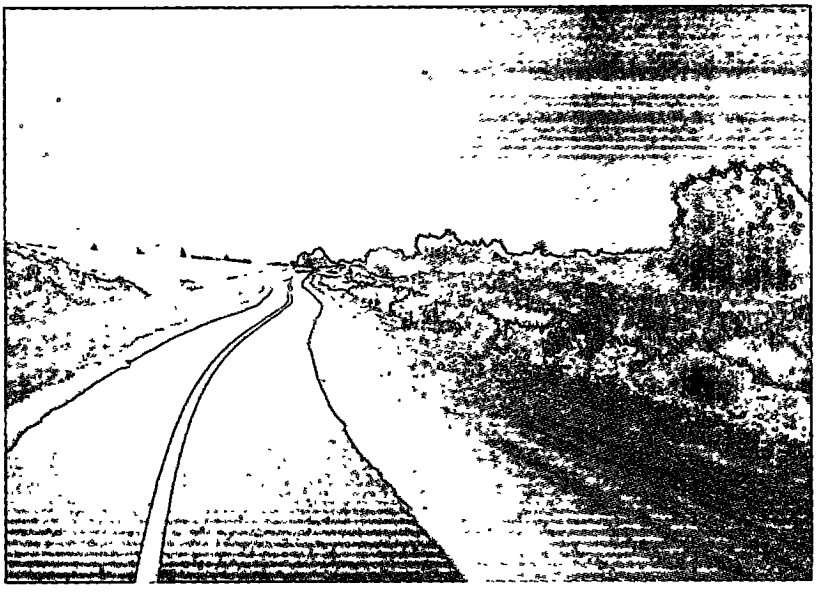

Photo 27. The Bikeway at east end of Campus Commons.

64. The bikeway receives a considerable amount of use as a transportation route from the surrounding residential areas to the high school and state university. Use of the bikeway was probably under-recorded because of the counting procedure. (See Woodlake discussion.)

65. Watt Avenue South. Watt Avenue South, composed of the land between the levee and river's edge, averages between 200-300 feet in width. A variety of land forms and vegetative habitat exist in this area. Watt Avenue South is essentially undeveloped except for two vehicle entry points and parking areas. (Subsequent to the survey, restrooms were constructed at one entry area.)

66. Along the eastern quarter of Watt Avenue South, the land rises gradually from the water's edge and extends about 200 feet back to the levee. A large, exposed gravel bar extends nearly two-thirds of the way across the river at the park's east entrance. (See photo 29.) A lush growth of riparian vegetation grows near the water (see photo 30) with grassland vegetation occurring on the higher ground near the levee. (See photo 31.) Along the middle half, the riverbanks rise quite steeply to a height of 5 to 10 feet. The majority of the riverbank supports extremely dense riparian vegetation. From the riverbank the land rises gradually back to the levee. Vegetative cover is a mixture of grassland and oak-grassland habitat. (See photo 32.) There is one notable exception to this general description. Near the midway point in this area a large, gently sloping sand-gravel bar extends from the water's edge almost to the levee. (See photo 33.) Through the lower quarter the river turns northward where it comes in direct contact with the levee. Only native grasses and a few shrubs grow on the levee.

67. Bordering the upper two-thirds of Watt Avenue South, is a mixture of relatively new (less than 10 years old) single and multiple-family dwellings of average value, with a larger proportion of multiple family dwellings occurring toward the west end. The lower third is adjacent to Sacramento State University and a city water filtration plant.

68. There are two vehicle entry points. A two-land, paved entry road is located at the east end of the park and is a common entry road for lower S.A.R.A. Park. The access road connects directly to a major expressway (Watt Avenue) through an interchange immediately adjacent to the park entrance. Paved parking is provided at the end of the entry road and is a common area shared with S.A.R.A. Park. (See photo 29.) A second vehicle entry point is available about midway in the park and provides access to the large sand and gravel bar previously mentioned. The road connects with a thoroughfare (Howe Avenue) via an interchange adjacent to the bar's entrance. The entry road is unimproved. There are no internal circulation roads.

Photo 28. Bikeway and equestrian trail in lower Campus Commons.

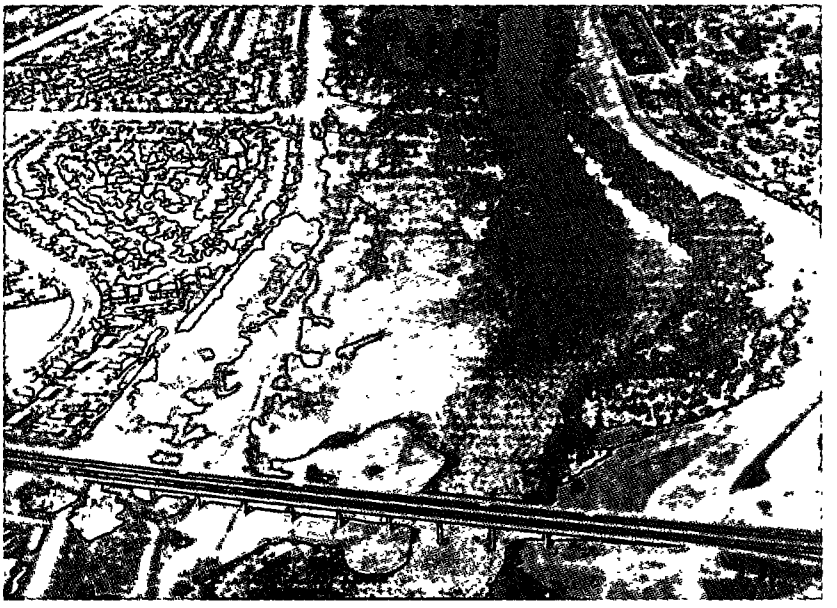

Photo 29. Right bank: upper Campus Commons.
Left bank: Downstream terminus of S.A.R.A. (below overcrossing) and start of Watt Ave. South (above overcrossing)

Photo 30. Riparian vegetation in upper Watt Ave. South.

69. The upstream half of the river is very similar to that found along S.A.R.A. Park. These are rather extensive sand and gravel bars in the river, many of them forming inlets and coves as they extend in a serpentive manner out into the main part of the river channel. Most of these bars support fairly dense stands of riparian vegetation. (See photo 29.) The downstream half of the river does not have any unsubmerged gravel bars. The channel generally becomes deeper and the current slows considerably. This reach of the river is traversed by three highway bridges, two of which have supports in the riverbed. There is an attractive suspension-type pedestrian bridge at Sacramento State University.

70. Similarly to S.A.R.A., the majority of use was recorded in and around the two areas with vehicle access. The slower current, the extensive gravel bars with their inlets and coves, and the gently sloping land along the waters edge are all favorable for swimming and fishing. The parking area at the east end of the park is a major "take-out" point for rafters. The large sand and gravel bar is the only place on the south bank where a small fishing boat (car top) can be launched. The physical size of the area and the heavy vegetation made counting difficult and probably resulted in undercounting participants in some activities.

71. Woodlake. - The land in the Woodlake area is very homogeneous, rising quite steeply from the river to a height of 5 to 10 feet and then forming a broad almost level plain that extends an average of 1,600 feet back to the levee. The riverbanks typically support dense riparian vegetation with some oak established on the higher ground adjacent to the bank. The majority of land is either undeveloped grassland or used for dryland farming. One localized area is used for sand and gravel mining. Although some of the Woodlake area is open to public use, the land is in private ownership and is not part of the parkway. An easement exists for the bikeway and equestrian trail.

72. At the east end of Woodlake, the bikeway generally parallels the river along the margin of the riparian and grassland habitats. (See photo 35.) The river is only intermittently visible from the bikeway. About a mile downstream the bikeway turns north until it meets the levee where it resumes its westernly direction paralleling the levee. From this point on, the river is not visible from the bikeway. Paralleling the bikeway on the south side, for a distance of about 2 miles, is a minor drainage ditch that supports a narrow but moderate stand of riparian vegetation. (See photo 36.) Near the west end of Woodlake is a larger drainage channel paralleling the bikeway along its north side. This channel supports a heavy stand of riparian vegetation. (See photo 37.) As with other sections of the bikeway, there are periodic rest stops supplied with one or two picnic tables. Chamical toilets are provided about midway along the trail. Aside from the bikeway and equestrian trail, and the few rest stops, there is no development in the Woodlake area.

Photo 31. Grassland vegetation near the levee in upper Watt Ave. South.

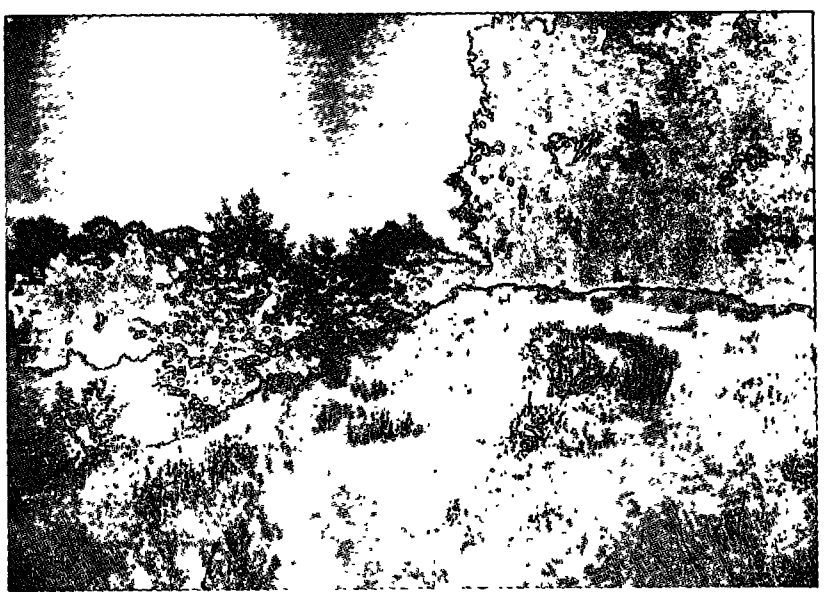

Photo 32. Riparian and oak - grassland along the middle one third of Watt Ave. South.

Photo 33. Large sand/gravel bar (with vehicle access) located midway in Watt Ave. South.

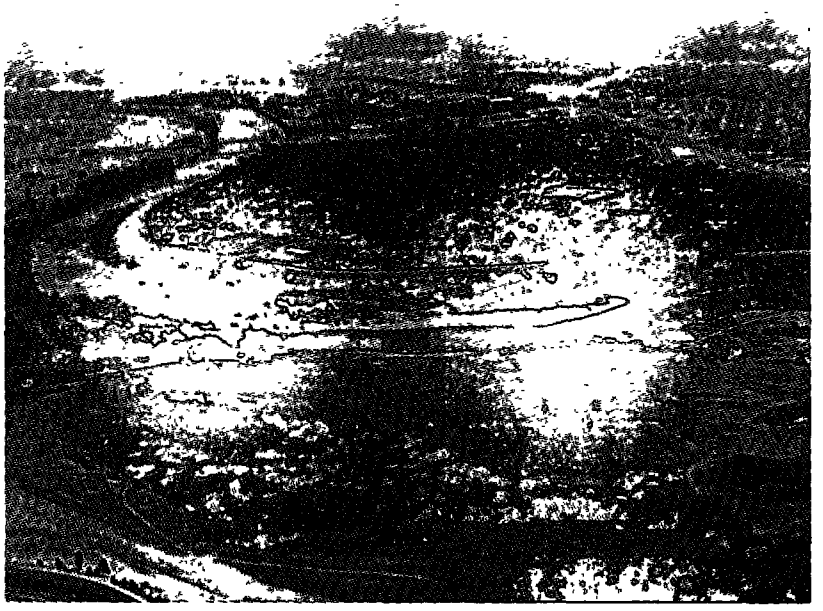

Photo 34. Paradise Beach (middle of picture). Upper end of Woodlake (lower half of picture).

Photo 35. Bikeway in upper Woodlake.

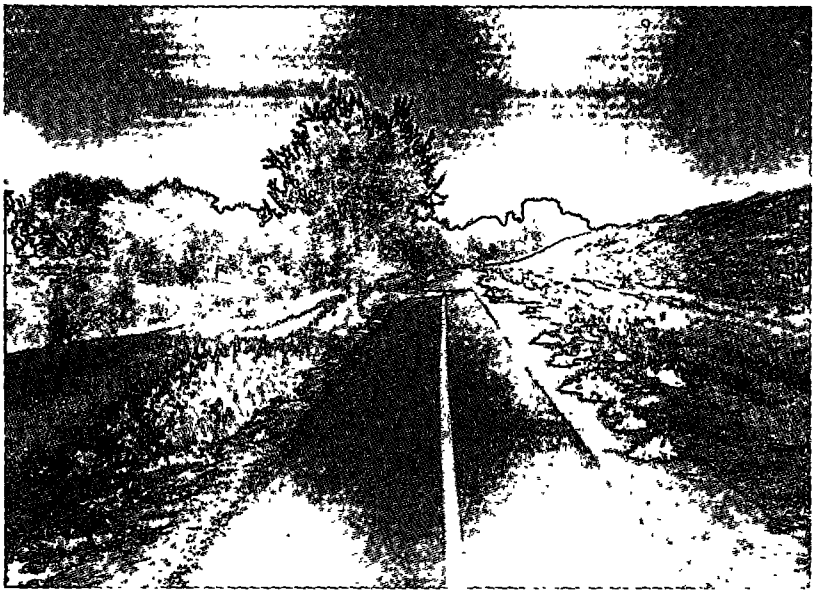

Photo 36. Bikeway between levee and small drainage ditch about midway in Woodlake area.

Photo 37. Bikeway at the lower end of Woodlake. (Large drainage channel on the right).

Photo 38. A section of the sand bar at the east end of Paradise. (See also Photo 34).

Photo 39. Right bank: West end of Woodlake.
Left bank: West end of Paradise.

73. Along the upper reach, a relatively deep channel flows along the north bank. Downstream, the depth becomes more uniform between the north and south banks. Occasional shallow areas occur where gravel bars exist. The current is very slow.

74. The California State Exposition borders Woodlake along the eastern third. Agricultural areas, light industry, and other commercial developments occupy the remaining two-thirds of the land adjoining Woodlake.

75. There are no vehicle entry points to the Woodlake area. A major entry for the bikeway is located at the east end of Woodlake adjacent to the California Exposition. The surface street, which connects with a major thoroughfare (Arden Way), terminates in a cul-de-sac at this entry point providing vehicle access and parking for the bikeway.

76. The large amount of trail bicycling recorded was influenced by the survey technique. The bicycle count was made at the main entry point near the California State Exposition which is very close to the dividing line between Campus Commons and Woodlake survey areas. All persons using this entry point were recorded in the Woodlake count; however, many bicyclists entering at this point would turn to the east and use the bikeway in the Campus Commons area. This was particularly true for persons using the bikeway as a transportation route to the State University. Therefore, the Woodlake trail bicycle count is biased upward, and the Campus Commons count is biased downward.

77. Paradise. Except for a large (approximately 75 acres), gently sloping, crescent-shaped sand/gravel bar near the eastern end of Paradise (see photos 34 and 38), there is very little land in this area. There are some stretches along the river where the levee is set back about 50 feet from the water's edge and where steep riverbanks covered with dense riparian vegetation occur. However, the river comes in direct contact with grass-covered levees throughout a significant portion of this area. (See photo 39.) The sand/gravel bar supports some shrubs and thin stands of riparian vegetation near the water's edge. A small area of oak-grassland exists on the higher ground along the bar's western edge. This bar provides the only sandy beach on the entire parkway.

78. Recreation facility development is limited to two portable chemical toilets on the sandbar near the levee, and trash containers along the beach area near the water.

79. As might be expected, the majority of use was recorded on the large sandbar. The slower current, warmer water, and shallow areas near the beach make it an ideal location for swimming. The proximity of the beach to a residential area and to a state university probably contributes to its total use. Also contributing to the area's popularity was the nude sunbathing. (A recent City Ordinance has banned nude sunbathing in this area.)

Photo 40. Light industrial area at the west end of Paradise. The undeveloped eastern section of Discovery Park.

Photo 41. Bikeway at the east end of Discovery Park.

80. Discovery Park. The topography of the 273 acres of land comprising Discovery Park is generally similar to the Woodlake area, rising rather abruptly from the river and forming a broad level expanse back to a large drainage channel. (See photo 40.) Vegetative cover is also similar. Unlike Woodlake, however, this land is part of the parkway. At the western tip of the park, where the American River joins the Sacramento River, there is a developed recreation area that includes 12 acres of irrigated turf, a portion of which is a picnic area shaded by mature oak trees (photo 44). There are drinking water, boat launching ramp, and paved parking (photo 42). Discovery Park is also the terminus of the bikeway and equestrian trail on the north side of the river. (See photo 45.) Through the undeveloped portion of the park, the bikeway runs parallel to the large drainage channel that forms the park's northern boundary. (See photo 41.) The river is not visible from the bikeway. There is also a small strip of land on the south side of the American River, at the confluence, that is part of the park. This land slopes gently upward from the water's edge to the levee, a distance of about 200 feet. A moderately dense stand of oak trees covers the area. (See photo 43.)

81. The river is at its greatest depth and the current is very slow through this reach. The clarity of the water has decreased significantly from the uppermost reaches, but it is of noticeably greater clarity than the Sacramento River which it joins.

82. The majority of the land adjacent to the park is in agricultural production, but there are also some light industry and railroad yards adjacent to the south bank.

83. There are two vehicle entry points to the park, one on each side of the river. From the south side of the river access is via a thoroughfare (Richards Boulevard) which connects to an interstate highway through an interchange practically at the park's entrance. A paved, two-lane entry road at the west end of the park spans the river on an old steel framed bridge. Entry to the south bank is via an unsurfaced road on top of the levee which intersects with the entry road at the entrance to the bridge. The second entry point, located about midway in the park, is directly off a two-lane thoroughfare (Garden Highway) located on top of the levee that borders the north side of the park. A paved, two-lane circulation road connects the two entry points.

84. Discovery Park is centrally located for a large number of potential users in the downtown, northeast, and West Sacramento areas. The park's excellent vehicular access via freeways and thoroughfares and the variety of facilities and recreation opportunities encourage use. On weekdays, significant numbers of persons who work in downtown Sacramento come to the park to picnic and occasionally to fish during their lunch break and after work. The gently sloping land on the south bank is conducive to swimming, sunbathing, and shore fishing.

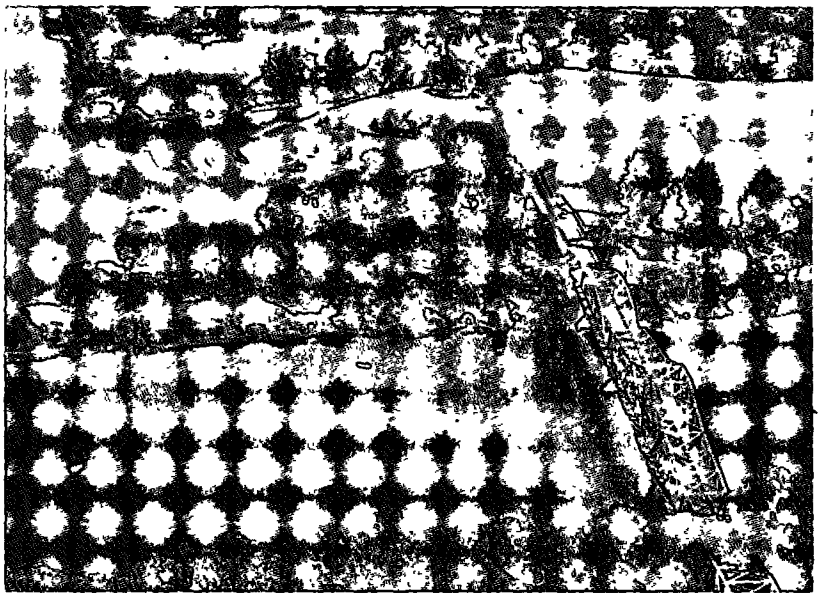

Photo 42. Discovery Park at the confluence of the American and Sacramento Rivers.

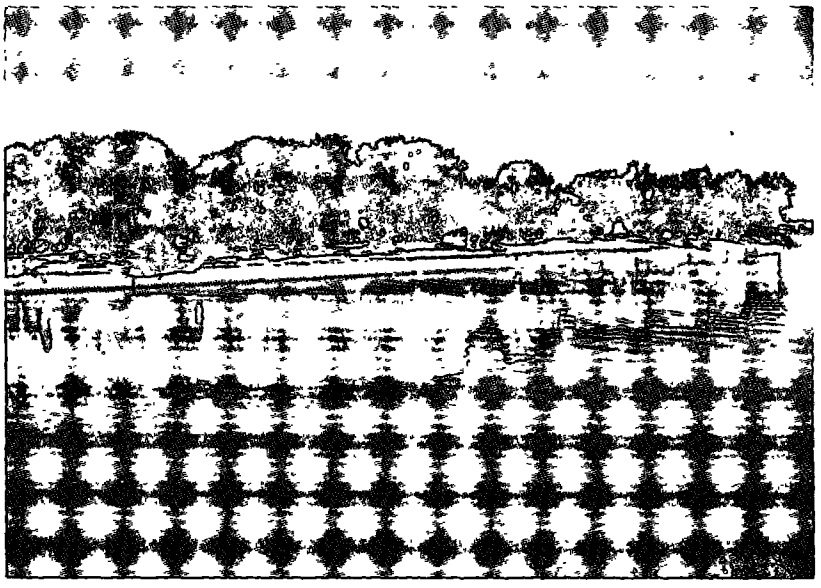

Photo 43. Discovery Park along the south bank.

Photo 44. Discovery Park picnic area.

Photo 45. End of the bikeway at Discovery Park.

# ANALYSIS OF SUPPLY AND DEMAND

# OF

# URBAN ORIENTED NONRESERVOIR RECREATION

## APPENDIX B

## REPLICATION OF THE ANALYSIS

NOVEMBER 1976

TABLE OF CONTENTS

## APPENDIX B: REPLICATION OF THE ANALYSIS

1. Introduction. The analysis and methodology developed from the American River Parkway data should be replicated in other locations to insure general applicability of the method elsewhere, prior to Corps-wide implementation. The generality of the American River Parkway analysis and the applicability of the models may be impaired by the lack of geographic variations. Origins with different ethnic composition, destinations with different climates, geographic areas with a different set of regional recreation opportunities are among the numerous sources of potential variation that may be expected at urban-oriented nonreservoir projects. In the earlier studies of reservoirs, it was apparent that even though the same variables significantly affected recreation attendance in different geographic regions, the magnitude of the effects varied between regions. The extent that this is true of the nonreservoir models can be determined by repeating the analysis elsewhere. The tasks required to replicate the analysis are: compile data on the observations, structure the model, estimate the parameters, and by comparing the results to this study either validate, improve, or possibly reject the models.

2. Procedure. The observations are defined by an origin and a destination. Zip code areas define origins which are extremely efficient with respect to data compilation. Destinations are park and recreation areas which may be well defined, e.g., Hoffman Park; or may be contiguous acreages which require some judicious partitioning, e.g., Upper and Lower Sunrise Parks. Values for three of the observation's variables can be extracted by any Corps office from the System of Information Retrieval and Analysis for Planners (SIRAP) at the Lawrence Berkeley Laboratory (LBL) at Berkeley, California. These are the population size of the zip code origins by age categories, their median age and their median income, which are available from the "Fifth Count 1970 Census of Population and Housing." The values for the median road-mile distance between origin and destination are road map measurements. The only park variable required is the acres of "turf" as defined in text paragraph 25. When used in the multiplicative model, the value is one if no such area exists for an observation. If no destination has such an area, then the variable is superfluous and should be omitted.

3. The dependent variable for the observations is an estimate of the quantity of recreation occurring at each destination originating in each zip code. Acquiring the values of this variable is likely to be the bulk of the effort necessary for replication of the analysis. (This is precisely why good data is so hard to find.) There is no single best way of gathering information to estimate recreation. However, it is assumed that complete counts or measurements of the recreational use are economically infeasible and that a recreation sample survey is sufficient. The procedures described below are comparable with the conduction of the American River Parkway survey.

4. The sampling frame is all the hours and areas where recreation activity can occur. The areas are defined as destinations or groups of small destinations. They should be sufficiently small so that they can be traversed and all recreation activity recorded within an hour. Activity definitions need not coincide with those used in Sacramento; they should, however, be as unambiguous as possible and employed consistently. The sampling frame is stratified by area and day type, which simply means there is a sample selected for each area for weekends and holidays and for each area on weekdays.

5. The selection of sample is expected to be constrained by the practicalities of conducting the counts. Constraints on the scheduling of sample counts are a function of personnel availability, transportation time between areas and the number of areas. The sampling schedules for the American River Parkway survey, given below, were constructed so that each area-time had an equal probability of selection. But they were constrained so that none of the five sampling areas on the lower river (areas I-V on Figure B1) would be counted at the same time, nor would any of the five areas on the upper river (areas VI-X) have any overlapping counts. In addition, the schedules were used sequentially within each day type, so that each area was counted at six different times over six different sample days.

6. For the American River Parkway survey, a total sample of 1046 counts was made at the 13 park areas during June-August 1975. Because of the size of some of the areas, the counts frequently took longer than an hour to complete. However, for estimating activity hours, it is assumed that the counts simulate an instantaneous picture of recreational activity and that this picture changes hourly. It is further assumed that the recreation day is 12 hours long. Therefore, the 1046 counts represent an overall sample fraction equal to 0.07 [1046/(92 days x 12 hours/day x 13 areas)]. This resulted in the following sampling error for total activity hours.

Coefficient of Variation X 100

| Park Area | June | July | August |
|---|---|---|---|
| Sailor Bar | 07 | 04 | 05 |
| Upper Sunrise | 08 | 08 | 06 |
| Sacramento Bar | 05 | 05 | 06 |
| Lower Sunrise | 07 | 04 | 06 |
| Rossmoor Bar | 08 | 11 | 08 |
| Hoffman Park | 08 | 07 | 08 |
| Goethe Park | 08 | 05 | 05 |
| S.A.R.A. Park | 11 | 08 | 08 |
| Campus Commons | 09 | 08 | 10 |
| Watt Avenue South | 10 | 11 | 09 |
| Woodlake | 13 | 07 | 08 |
| Paradise Beach | 18 | 16 | 16 |
| Discovery Park | 11 | 11 | 07 |
| American River Parkway | 03 | 03 | 03 |

## SAMPLING SCHEDULE

### Schedule A

| Time | Areas | |
|---|---|---|
| 08:00 - 10:00 | V | IX |
| 10:00 - 12:00 | II | |
| 12:00 - 2:00 | IV | X |
| 2:00 - 4:00 | III | VII |
| 4:00 - 6:00 | | VIII |
| 6:00 - 8:00 | I | VI |

### Schedule B

| Areas | |
|---|---|
| IV | |
| III | IX |
| II | VI |
| V | VIII |
| I | X |
| | VII |

### Schedule C

| Time | Areas | |
|---|---|---|
| 08:00 - 10:00 | II | VII |
| 10:00 - 12:00 | I | VI |
| 12:00 - 2:00 | III | |
| 2:00 - 4:00 | | X |
| 4:00 - 6:00 | V | IX |
| 6:00 - 8:00 | IV | VIII |

### Schedule D

| Areas | |
|---|---|
| | X |
| V | VIII |
| I | VII |
| IV | IX |
| II | VI |
| III | |

### Schedule E

| Time | Areas | |
|---|---|---|
| 08:00 - 10:00 | III | VIII |
| 10:00 - 12:00 | | VII |
| 12:00 - 2:00 | V | IX |
| 2:00 - 4:00 | I | VI |
| 4:00 - 6:00 | IV | |
| 6:00 - 8:00 | II | X |

### Schedule F

| Areas | |
|---|---|
| I | VI |
| IV | X |
| | VIII |
| II | |
| III | VII |
| V | IX |

7. An examination of the sampling variances by strata indicates that sampling ratios of 1/12 for weekend days and 1/20 for weekdays would yield a coefficient of variation of 0.05 for each stratum total. What this means is that if the sample sampling procedure were repeated, it would be practically certain that the resulting estimates would be plus or minus 15 percent of the first estimates. Significantly increasing the precision of the process, would require appreciably larger samples. To decrease would negate the usefulness of the estimates as dependent variables in the analysis. Using these sampling fractions means that each area is counted once on every weekend day and once on each of three randomly selected weekdays every week.

8. Given the measurements, the activity hours estimates are given by:

$$Y = \sum_{i} \frac{N_i}{n_i} \sum_{j} X_{ij}$$

Y is the estimate for an area

where: $X_{ij}$ is the activity hours counted in count j day type i

$n_i$ is the number of counts.

$N_i$ is the number of possible counts.

9. To allocate the activity estimates for each destination necessitates some concomitant subsampling of visitors to determine the distributions of zip code origins. The questionnaire used in Sacramento is reproduced at attachment B2. The information on the visitors was collected during some of the time periods when the activities were being counted.

10. The next step in the replication process is modeling. SIRAP at LBL also has a version of the Statistical Package for the Social Sciences (SPSS), which has two operating subroutines which can help with the modeling. One is REGRESSION, which has several options for multiple linear regression. The other is NONLINEAR, which is a nonlinear, least squares, approximation algorithm.

11. It should be noted that a test of the model's applicability can be accomplished short of a complete replication (but not much). The models can be used to estimate expected use at various destinations. (A test of the models includes a test of whether it can be used to produce estimates.) Alternative estimates at these destinations, using the best other procedure possible, should also be made. Both sets of estimates can then be compared with reasonably reliable survey estimates.

12. Suggested replication sites. A teletype message was sent from OCE (DAEN-CWP-V) on 26 June 1975 to all Division and District offices requesting information concerning recreation development at nonreservoir projects. An additional message was sent from OCE (DAEN-CWP-P) on 21 July 1975, clarifying the need for information about projects where recreation development was not directly related to the project (i.e., not included as a purpose for project justification, thereby subject to cost-sharing by local sponsors). As a result of the responses to these messages, OCE compiled a table of such projects planned, under construction, or existing throughout the Corps. A copy of the correspondence and the table of information were made available to the Recreation Research Unit in Sacramento District. After the information was studied, all incomplete projects were eliminated from consideration.

13. Three nonreservoir projects operated by the Corps could be considered in testing the estimator developed on the American River Parkway. These projects are either complete, or complete within the set of developed recreation opportunities recommended here for consideration. They are as follows: Cape Cod Canal, Massachusetts (New England Division); Okeechobee Waterway, Florida (Jacksonville District, South Atlantic Division); a portion of the system of recreation areas under development on the Missouri River, specifically those completed and proximate to Omaha, Nebraska-Council Bluffs, Iowa (Omaha District, Missouri River Division). Brief descriptions of these three sets of potential testing sites follow.

14. Cape Cod Canal is a deep-raft, sea-level canal which cuts across the Cape where it adjoins the Massachusetts mainland. It runs from Cape Cod Bay on the northeast to Buzzards Bay, about 7.7 miles in a southwesterly direction. The canal is 540 feet in width, ranging from 32 feet in depth at the northeast entrance to 25 feet at the southwest entrance. Activities along the canal include boating, fishing, swimming, picnicking, overnight camping, relaxing, and sightseeing. There are well-placed accesses all along the canal's length, with recreation activities other than boating, fishing, and sightseeing concentrated at two sites. One of these is the Bourne Scenic Park, located near the town of Bourne near the head of Buzzard's Bay. Among other activities, including camping, Bourne Scenic Park includes a salt-water swimming pool. Near the other entrance to the canal, off Cape Cod Bay, is Scusset State Beach. In addition to these, there are small boat basins at both ends; the East Boat Basin (northeast end of canal) harbors in excess of 50 boats and yachts (motor and sail); and a basin near Bourne (southwest end) is of undetermined capacity. The Cape and canal are proximate to several population centers, in addition to the fact that the Cape enjoys a unique regional popularity. Some of these centers are: the greater Boston area, with upward of 3.6 million people at an approximate range of 50 road miles; Providence, Rhode Island, at over 900 thousand and less than 50 miles; Fall River, Massachusetts, about 200 thousand and 25 miles. An aggregate estimate of 1.5 million recreation days of visitation is recorded in Corps' official recreation statistics. Federal recreation cost of current facilities was $691,000.

15. Okeechobee Waterway is a completed part of the authorized work in the Central and South Florida Project. Lake Okeechobee is the central focus of the canal project which links the Atlantic Ocean at St. Lucie Inlet with the Gulf of Mexico near Ft. Myers. There are two locks, the St. Lucie lock on the east near the Atlantic and the Franklin lock near Ft. Myers. Lake Okeechobee is a freshwater lake of approximately 31 miles in diameter. The canal arms average about 100 feet in width and 8 feet in depth, being designed for recreation and shallow draft (barge) traffic only. Park areas are located near the lock systems; the primary activities are boating, fishing, picnicking, outdoor sports and games, and general relaxation. In addition, bike trails are authorized. Major populations of note are the West Palm Beach County area, about 500,000 within a 50-mile radius on the east end; and Ft. Myers, at around 150,000 near the west end. Other canals extend both north and south from Lake Okeechobee, with the southern canals reaching the most distant and more populous Miami area. About 155 miles of waterways exist in the Okeechobee Waterway, with additional mileage in other canals peripheral to Lake Okeechobee. No recreation use estimates were reported. Federal recreation costs of the Central and South Florida Project are listed at $14.7 million, with the Okeechobee Waterway comprising approximately half the total.

16. Within the Missouri River Navigation & Bank Stabilization Project, Omaha District, several park areas adjacent to the Missouri River are being developed. Six such areas within the Omaha, Nebraska--Council Bluffs, Iowa recreation market area are completed. These are as follows: Wilson Island Recreation Area, Iowa; Friendship Park, Iowa; Long's Landing Recreation Area, Iowa; Dodge Park, Nebraska; Haworth Park, Nebraska; Riverview Park, Nebraska. All six parks have picnicking and camping facilities; all except Friendship Park, Iowa, have boating facilities. In addition, the two most urban parks have playground equipment. These are Dodge Park, in Omaha, and Haworth Park in Bellevue, home of Offutt Air Force Base (just south of the Omaha Metropolitan area). The major population is Omaha--Council Bluffs, about 600,000 with smaller towns also adjacent to or within the market area of the parks. For example, Riverview Park is in Nebraska City, a town of less than 50,000 roughly 20 miles below Bellevue. Wilson Island is some 20 river miles above Omaha with towns near but not adjacent. The federal recreation costs are, in order of descending magnitude, as follows: Dodge Park, $242,000; Haworth, $165,000; Wilson Island, $133,000; Long's Landing, $99,500; Friendship, $89,500; Riverview, $75,000. Attendance figures are, in general, unavilable.

17. These three systems of nonreservoir recreation opportunities would provide an adequate testing base for the nonreservoir models. Given statistically reliable survey procedures at each, the analysis should validate, improve, or reject the models. Each system is urban-oriented, although each is not necessarily located within an immediate urban area; each set of opportunities greatly resembles those of the American River Parkway; yet, each incorporates unique characteristics not found in the Parkway. For example, the Okeechobee Waterway includes planned bicycle trails like the Parkway; the others do not. Cape Cod canal offers saltwater fishing and swimming; the Parkway and the others do not.

U.S. Army Engineer District, Sacramento.
Analysis of supply and demand of urban oriented nonreservoir recreation / by U.S. Army Engineer District, Sacramento, California. -- Fort Belvoir, Va. : U.S. Institute for Water Resources, 1976.
v, 103 p. : ill. (Research report - U.S. Institute for Water Resources ; 76-R2)
Bibliography: p. 46.
1. Recreation - Planning. 2. Water resources development. 3. Flood control. I. Title. II. Series: U.S. Institute for Water Resources. IWR research report 76-R2.

HD1694 .A42 U584r no.76-R2 300

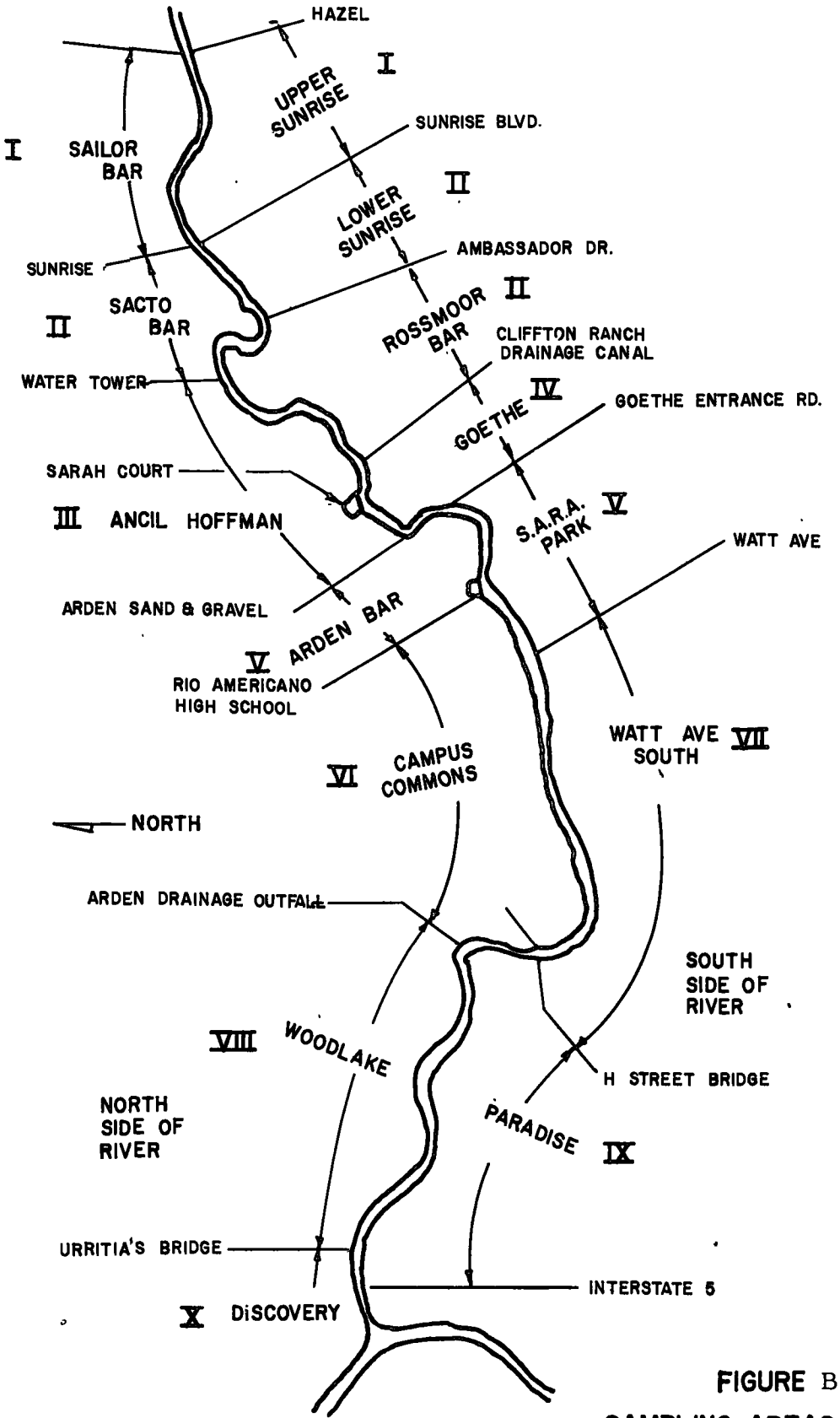


FIGURE B-1

SAMPLING AREAS

SACRAMENTO COUNTY PARK AND RECREATION DEPARTMENT

## AMERICAN RIVER PARKWAY RECREATION SURVEY

**Park:** _____ **Date:** _____

**DEAR VISITOR:**

**We need your help in finding out who visit the county parks, what they do there and how they feel about future development of park and recreation opportunities.**

**Your cooperation in completing this questionnaire will be greatly appreciated and all information will be treated confidentially.**

**THANK YOU**

1 WHICH OF THE FOLLOWING BEST DESCRIBES YOUR GROUP ? ( Check one please )

1 ☐ ONE PERSON ALONE 3 ☐ MORE THAN ONE FAMILY 5 ☐ AN ORGANIZED GROUP

2 ☐ A SINGLE FAMILY 4. ☐ A GROUP OF FRIENDS 6 ☐ OTHER

2 PLEASE WRITE IN THE NUMBER OF PEOPLE IN YOUR GROUP WHO ARE

_____ 12 YEARS OLD AND UNDER _____ 18 TO 30 YEARS OLD _____ 51 YEARS AND OVER

_____ 13 TO 17 YEARS OLD _____ 31 TO 50 YEARS OLD

3 WHAT IS YOUR ZIPCODE ? _____

4 INCLUDING THIS VISIT, APPROXIMATELY HOW MANY TIMES HAVE YOU VISITED THIS PARK

DURING THE PAST 30 DAYS ? _____ DURING THE PAST 12 MONTHS ? _____

5 HOW LONG WILL THIS VISIT BE ? _____ HOURS

6 WHICH OF THE ACTIVITIES LISTED BELOW WILL ANY MEMBER OF THE GROUP DO ON THIS VISIT ?
( Please check all boxes that apply )

| | | |
|---|---|---|
| 1 ☐ BICYCLING | 5 ☐ SWIMMING | 9 ☐ SPORTS OR GAMES |
| 2 ☐ FISHING | 6 ☐ RAFTING | 10 ☐ SIGHTSEEING |
| 3 ☐ PICNICKING | 7 ☐ WALKING | 11 ☐ HORSEBACK RIDING |
| 4 ☐ RELAXING | 8 ☐ JOGGING | 12 ☐ OTHER _____ |

7 HOW IMPORTANT DO YOU CONSIDER EACH OF THE FOLLOWING FACILITIES AND SERVICES IN THE FUTURE DEVELOPMENT OF PARK AND RECREATION OPPORTUNITIES ?

| | VERY IMPORTANT | SOMEWHAT IMPORTANT | NOT IMPORTANT | | VERY IMPORTANT | SOMEWHAT IMPORTANT | NOT IMPORTANT |
|---|---|---|---|---|---|---|---|
| 1 LAWN AND SHADE TREES | ☐ | ☐ | ☐ | 8 BICYCLE TRAILS | ☐ | ☐ | ☐ |
| 2 PARKING AREAS | ☐ | ☐ | ☐ | 9 EQUESTRIAN TRAILS | ☐ | ☐ | ☐ |
| 3 BOAT LAUNCHING AREAS | ☐ | ☐ | ☐ | 10 NATURE TRAILS | ☐ | ☐ | ☐ |
| 4 RESTROOMS | ☐ | ☐ | ☐ | 11 RANGER SERVICES | ☐ | ☐ | ☐ |
| 5 PICNIC TABLES AND GRILLS | ☐ | ☐ | ☐ | 12 TRASH SERVICES | ☐ | ☐ | ☐ |
| 6 DRINKING WATER | ☐ | ☐ | ☐ | 13. FOOD AND DRINK CONCESSIONS | ☐ | ☐ | ☐ |
| 7 SWIM BEACHES | ☐ | ☐ | ☐ | 14 OTHER _____ | ☐ | ☐ | ☐ |

8 OF THOSE FACILITIES AND SERVICES YOU INDICATED AS IMPORTANT IN THE LAST QUESTION, WOULD YOU PLEASE CIRLE THAT ONE WHICH IS THE MOST IMPORTANT TO YOU.

9 THIS SPACE IS FOR YOUR COMMENTS, PLEASE FEEL FREE TO OFFER ANY SUGGESTIONS TO HELP US SERVE YOU BETTER

Figure B-2



4 ·71,493—AG—Ft Belvoir