RECREATION RESEARCH PROGRAM

RRP

RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

Report 10

SOMERVILLE LAKE PROJECT AREA

by

Urban Research and Development Corporation
528 North New Street
Bethlehem, Pa. 18018

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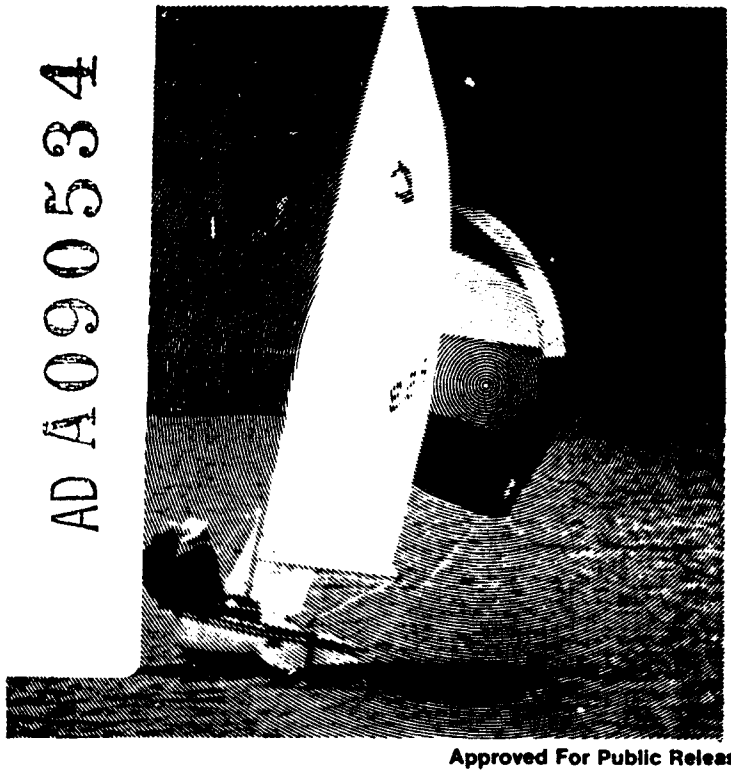

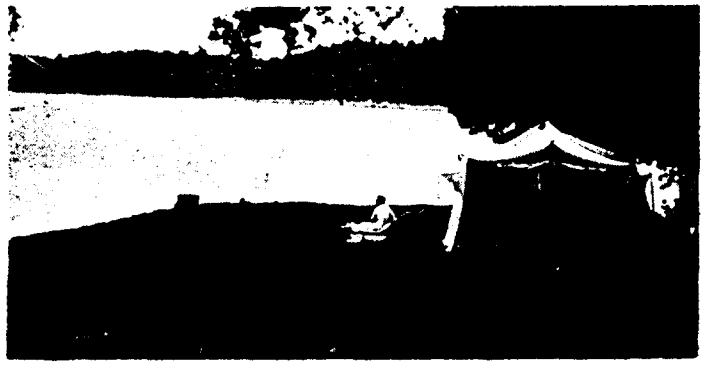

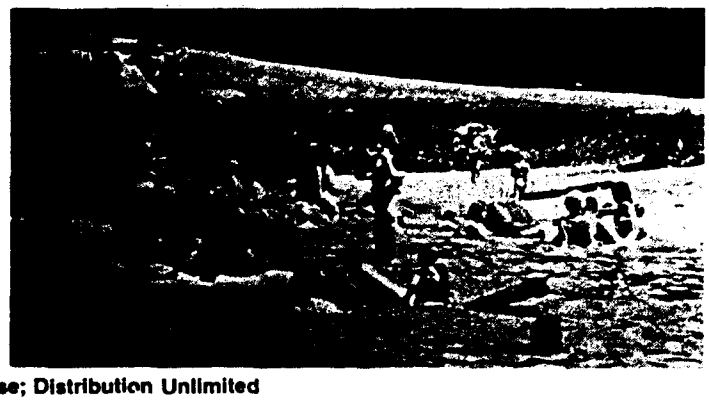

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RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

Title	Date
Report 1: Barkley Lock and Dam, Lake Barkley Project Area	Jul 1980
Report 2: Benbrook Lake Project Area	Jul 1980
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A project map of Somerville Lake is enclosed in an envelope attached inside the back cover of this report.

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Carrying capacity	Recreation resource planning	Utilization
Monitoring	Recreational areas	
Overcrowding	Recreational facilities	
Recreation	Sumerville Lake Project	

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

This report provides selected recreation carrying capacity-related information for the Somerville Lake Project. The information is based upon ~~19~~ user and management surveys conducted at Somerville Lake, and ~~28~~ Urban Research and Development Corporation's observations and perceptions of the situations at the project's activity areas. The report provides information regarding activity situations, user characteristics, carrying capacity findings, and other findings; it then focuses on selected problem situations and their possible solutions.

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PREFACE

This report presents the findings and recommendations of the Urban Research and Development Corporation (URDC) relative to recreational carrying capacity at the Sommerville Lake Project Area. Results of site analyses and user surveys are presented as they relate to existing carrying capacity conditions on the project. The study was conducted under Contract with the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi, (Contract No. DACW39-78-C-0096).

Mr. Donald R. Detwiler, President of URDC, was Principal-In-Charge of this study, assisted by Mr. Martin C. Gilchrist, Executive Vice-President and Mr. David H. Humphrey, Vice-President. Mr. B. Thomas Palmer, Project Director, had the major responsibility for technical project direction; Messrs. Phillip D. Hunsberger and Paul L. Sabrosky were involved in the site analysis, conducting surveys, and the success analysis; and Mr. Timothy A. Fluck was involved in conducting surveys, survey analysis, and development of methodologies.

Mr. R. Scott Jackson, WES was the Project Monitor. Dr. Adolph Anderson, WES, was Program Manager of the Environmental Laboratory (EL) Recreation Research Program. The study was supervised by Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL, under the general supervision of Dr. John Harrison, Chief, EL.

COL John L. Cannon, CE, and COL Nelson P. Conover, CE, were Commanders and Directors of WES during this study. Technical Director was Mr. F. R. Brown.

CONTENTS

CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	By	To Obtain
acres	4046.856	square metres
Fahrenheit degrees	5/9	Celsuis degrees or Kelvins
feet	0.3048	metres
horsepower (550 foot and pounds per second)	745.6999	watts
inches	2.54	centimetres
miles per hour (U. S. statute)	1.609344	kilometres per hour
miles (U. S. statute)	1.609344	kilometres
square feet	0.09290304	square metres
yards	0.9144	metres

* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: $C = (5/9)(F - 32)$. To obtain Kelvin (K) readings, use $K = (5/9)(F - 32) + 273.15$.

RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

SOMERVILLE LAKE PROJECT AREA

PART 1: INTRODUCTION

This Report

Purpose

This report, prepared as the tenth in a series of the U. S. Army Engineer Waterways Experiment Station's (WES) Recreational Carrying Capacity Design and Management Study reports, provides selected carrying capacity-related information for the Somerville Lake Project Area which is not contained in the Technical Report. The information is based upon: 1) the user and management surveys conducted at Somerville Lake and 2) Urban Research and Development Corporation's (URDC) observations and perceptions of the situations at the project's study activity areas. Some observations and suggestions dealing with project area planning, design, and/or management are included, even though they are not specifically carrying capacity related. The report also suggests specific solutions and treatments of specific recreation activity areas.

The report first provides information regarding activity situations, user characteristics, carrying capacity findings, and other findings; it then focuses on selected problem situations and their possible solutions. Although suggestions regarding possible solutions to problems are included, this report is not intended to be a substitute for master planning or to provide answers to all project area capacity problems. Instead, this report should be viewed as a constructive, informative document which points out directions and techniques for consideration by project managers and designers in the near or distant future.

Relationship to Technical Report and Handbook

In addition to this Project Area Report and similar reports on the other ten study project areas,* the overall capacity study effort produced a Technical Report and a Capacity Handbook:

a. The Technical Report describes the overall study process, reports detailed study findings, and suggests and demonstrates methods and techniques for capacity management.

b. The Capacity Handbook is a more graphic, "how-to-do-it" type of report, designed to serve as a useful field tool for determining carrying capacity and applying techniques for capacity design and management.

This project area report is different from the Technical Report and Handbook in several ways: it includes information not found in the Technical Report and Capacity Handbook; it reports and examines user survey information by activity area and project area, rather than from the total survey population; it addresses specific problems and examines possible solutions; and it does not include the methodologies for determining and monitoring social and resource capacity. For these reasons, this report is intended to compliment the Technical Report and the Handbook, and is not intended to substitute for them.

Qualifications

The information in this report is based on the Management/Site Survey conducted or November 12-14, 1978 and the User Survey conducted on May 11-14, 1979 by Urban Research and Development Corporation (URDC). (See Appendix B) The user survey information was collected over a one-weekend period, which may or may not have been representative of a typical or heavy use weekend at Somerville. Interviews were limited at some activity areas because of such factors as lack of users and weather conditions. For these reasons and because carrying capacity analysis is dynamic rather than static, this report is not intended to provide the final answers. Rather, it is a foundation for future analysis and carrying capacity progress.

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* See definition of "Study Project Area" in Appendix A for a listing of these project areas.

Summary Project Area Description*

Somerville Lake** was authorized for the purposes of flood control and water conservation. The dam is located approximately 26 miles§ southwest of Bryan, Texas; Houston is 88 miles to the southeast. The area surrounding the lake is predominantly rural. Somerville Lake has an average recreation pool of 9,700 acres and 72 shoreline miles. The recreational lake averages approximately 8.5 miles long and is about 1.5 miles wide. The total project area covers 32,725 acres. The topography of the project area is characterized by undulating lands with wide valleys and moderate slopes. The lake's shoreline is gradually sloping and has few steep or high banks. Somerville Lake lies in a moderately humid region where the climate is generally mild with hot summers and relatively cool winters. Vegetative densities vary throughout the project area, consisting of heavily wooded areas, sparsely wooded areas, and areas of old pasture growth. The dam area and the recreation areas located near the eastern end of the lake are easily accessible via adjacent state highways. Approximately 3.5 million people lived within a 100-mile radius of Sommerville Lake in 1970. Visitation at Somerville Lake in 1978 was approximately 2.5 million recreation days.

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* Appendix C contains a more detailed project area description for your future use.

** See map inside back cover.

§ A table of factors for converting U. S. customary units of measurement to metric (SI) units is found on page iv.

PART 2: SURVEY FINDINGS BY ACTIVITY

BOATING/WATERSKIING

Orientation

Boating and waterskiing at Somerville are very popular. Boating use on the lake is well balanced but at the threshold of being overcrowded. Like most of the other Corps lakes visited, lake zoning is not used.

The findings presented in the remainder of this section are based on the User Survey. This survey obtained 30 responses from boaters and waterskiers at Somerville.

User characteristics

Table 1 indicates the characteristics of the boaters and waterskiers surveyed at Somerville. The most significant difference in the characteristics of the boaters and the waterskiers at Somerville from those of other study project areas is the relatively large number of people travelling over an hour to reach the lake.

Table 1

Boater and Waterskier Characteristics

Age	Percent of Boaters/Waterskiers	Group Size	Percent of Boaters/Waterskiers
<18	0	1	0
18 - 25	29	2	18
26 - 40	64	3 - 4	71
41 - 55	7	5 - 8	4
56 - 65	0	9 - 12	0
>65	0	>12	7

Travel Time to Project Area	Percent of Boaters/Waterskiers	Visit Duration	Percent of Boaters/Waterskiers
<15 minutes	0	1 - 4 hours	0
15 - 30 minutes	0	5 - 8 hours	39
30 - 60 minutes	25	1 day	32
1 - 2 hours	54*	2 days	25
2 - 3 hours	18*	3 days	4
3 - 5 hours	0	4 days	0
>5 hours	4*	5 - 7 days	0
		>7 days	0

No. of Other Activities	Percent of Boaters/Waterskiers
0	11
1	25
2	11
3	21
4	18
5	15
6	0
>6	0

*Significantly higher than total survey sample.

User opinions

Spacing preferences - Tables 2 and 3 indicate the spacing that the boaters and waterskiers surveyed at Somerville and elsewhere prefer.

Table 2

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Boaters Surveyed	135	30- a	531	300	300
Somerville Lake	8	100-3960	510	550	300
All Waterskiers Surveyed	95	30- a	520	300	300
Somerville Lake	22	300-1320	715	500	-

*In feet; see Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 3

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1](100'-1500')	% in A[2] (100'-199')	% in B[2] (200'-450')	% in C[2] (451'-1500')
All Boaters Surveyed	79%	29%	37%	34%
Somerville Lake	94	13	25	63
Sample	**% in Planning Range[1](100'-1500')**	**% in A[2] (100'-199')**	**% in B[2] (200'-400')**	**% in C[2] (401'-1500')**
All Waterskiers Surveyed	91%	22%	50%	28%
Somerville Lake	100	0	50	50

*See Appendix A for definitions of terms; see Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.

[2]Percentage of all preferred distance responses in the Planning Range.

The boaters at Somerville favored spacing in the Group C range (451'-1500'). Somerville's waterskiers disfavored the spacing of Group A, and were evenly divided in their preference for Group B (200'-400') and Group C (451'-1500').

Reasons for pleasant/unpleasant experience - Table 4 indicates the impact that different factors had on making the boating or waterskiing experience pleasant or unpleasant for users at Somerville. The boaters and waterskiers at Somerville considered most aspects of their experience to be pleasant. The factor which most often made the experience unpleasant was waiting time to launch boats. One user indicated that he would not return (see Table 5).

Tables 6 and 7 indicate the changes in the physical condition and people's use of the area reported by boaters and waterskiers from their previous visit.

Table 5

Number and Percent of Users That Indicated They Would Not Return to the Activity Area and Their Reasons

Area	Number and percent of users surveyed who indicated they would not return		Reasons for not wanting to return
	#	%	
Somerville Lake	1	30%	"Crowded - characteristics and behavior of other people (littering)"

Table 4

Reasons Making Recreation Experience Pleasant or Unpleasant--Boating/Waterskiing
Somerville Lake

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	89	11	-
Distance from other people	95	-	4
Number of people in other visitor groups	54	4	32
Number and type of other activities occurring here	68	7	18
Scenic views	79	-	18
Noise	54	14	25
Accidents or near accidents	36	18	21
Enforcement of rules/regulations	75	11	11
Car parking facilities	79	4	14
Theft	40	-	22
Vandalism	40	-	22
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	79	14	7
Convenience to facilities (restrooms, water, etc.)	79	14	7
Maintenance of facilities	79	11	11
Condition of trees and landscape	82	-	14
Condition of grass or soil	82	-	14
Water-Based Reasons			
Water quality	96	4	-
Formal designation of places for your activity	7	-	30
Waiting time to launch boat	61	25	11
People in areas they shouldn't be	30	4	30

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 6

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Boaters and Waterskiers Somerville Lake

Area	Positive Changes	Negative Changes
Lake and Adjacent Areas	"Lake is nicer (cleaner)" (4) "Water higher" (10) "Area larger" (1) "Fewer boats" (1) "Trash can" (1) "Picnic tables" (1) "More sailboats" (1)	"Water and temperature cold" (1) "More trash" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 7

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Boaters and Waterskiers Somerville Lake

Area	Positive Changes	Negative Changes
Lake and Adjacent Areas	"People are courteous" (1) "Fewer people" (4)	"Waiting at launch ramp" (1) "Crowded" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 8 indicates the acceptability of different techniques to the boaters and waterskiers surveyed at Somerville Lake. The acceptability of many techniques is clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for seven of the 17 techniques. However, even for those techniques which were acceptable to most respondents, up to 39 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

In general, the more apparent and widespread that a problem of overcrowding or overuse is, the more likely users may accept a technique which addresses it. Thus, remedial techniques (which solve existing problems) are generally more acceptable than preventative techniques (which correct a problem before it becomes readily apparent).

The more users can understand the rationale and operation of a technique, the more likely they will accept the use of the technique. Education, therefore, would seem to be an important method of improving user acceptance of different techniques.

It also seems as though the more directly a technique impacts only the problem, and the less it operates to diminish recreational opportunities generally, the more likely users will accept the use of the technique. Thus, techniques which can be applied in the short-term or selectively to problem areas are favored (particularly if done in a crisis setting).

Techniques which call for reductions in existing opportunities to use recreational resources and facilities are strongly disfavored. User expectations of the opportunities available are critical in this determination. Consideration should be given initially to avoiding overdeveloping an area with the idea that selective cutbacks in services and facilities can be accomplished later. Users expectations will be based on the initial level, and subsequent reductions will be disfavored.

Table 8

User Acceptability of Techniques--Boating/Waterskiing
Somerville Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	23	42	23
Make vehicle access to areas less convenient	-	27	69
Make area's existence less obvious	8	19	73
Site Planning Techniques			
Design for greater distance between people	8	27	27
Reduce number of parking spaces	25	42	33
Management Techniques			
Procedures:			
Require prior reservations	4	12	77
Require permits	8	31	62
Charge/increase fees	12	27	62
Rules and Regulations:			
Impose more rules	4	35	58
Provide stricter enforcement of rules	65	27	8
Close areas when natural resource destruction reaches critical point	50	23	15
Close areas when they become "too full"	40	40	20
Reduce number of activities in same area	31	27	39
Keep unnecessary vehicles out	48	28	20
Services:			
Provide more and better information	44	44	4
Increase maintenance and restoration	46	12	4
Reduce facilities and services	4	20	72

*Percentages may not total 100% because of those responding "Does Not Apply."

BOAT FISHING

Orientation

Boat fishing is very popular at Somerville. Like most project areas visited, there are sometimes conflicts between powerboaters and boat fishermen.

The findings presented in the remainder of this section are based on the User Survey. This survey obtained 13 responses from boat fishermen at Somerville Lake.

User characteristics

Table 9 indicates the characteristics of the boat fishermen surveyed at Somerville. The most significant differences in the characteristics of the fisherman at Somerville from those of other study project areas are: the relatively small size of the groups of fishermen, and the relatively high number of fishermen coming from nearby areas.

Table 9

Boat Fishermen Characteristics

Age	Percent of Boat Fishermen	Group Size	Percent of Boat Fishermen
<18	8	1	0
18 - 25	0	2	85
26 - 40	69	3 - 4	8**
41 - 55	8	5 - 8	8**
56 - 65	15	9 - 12	0
>65	0	>12	0

Travel Time to Project Area	Percent of Boat Fishermen	Visit Duration	Percent of Boat Fishermen
<15 minutes	15*	1 - 4 hours	0
15 - 30 minutes	31*	5 - 8 hours	62
30 - 60 minutes	15	1 day	15
1 - 2 hours	39	2 days	8
2 - 3 hours	0	3 days	0
3 - 5 hours	0	4 days	0
>5 hours	0	5 - 7 days	15
		>7 days	0

No. of Other Activities	Percent of Boat Fishermen	Equipment	Percent of Boat Fishermen
0	85	Row Boat	0
1	15	Power Boat	
2	0	(<25 h.p.)	36
3	0	Power Boat	
4	0	(>25 h.p.)	64
5	0		
6	0		
>6	0		

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 10 and 11 indicate the spacing that the boat fishermen surveyed at Somerville Lake and elsewhere prefer.

Table 10

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Boat Fishermen Surveyed	111	30 - 5280	555	200	100
Somerville Lake	13	150 - 1320	611	525	450

*In feet; See Appendix A for definitions of terms.

Table 11

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (50'-1500')	% in A[2] (50'-199')	% in B[2] (200'-599')	% in C[2] (600'-1500')
All Boat Fishermen Surveyed	91%	49%	27%	24%
Somerville Lake	100	20	30	50

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in Planning Range.

Boat fishermen at Somerville Lake prefer greater spacing more frequently than did the total survey sample.

Reasons for pleasant/unpleasant experience - Table 12 indicates the impact that different factors had on making the boat fishing experience pleasant or unpleasant for users at Somerville Lake. The boat fishermen at Somerville found their experience to be very pleasant. The factor most often rated as unpleasant was catching fish. No boat fishermen indicated that he would not return.

Tables 13 and 14 indicate the changes in the physical condition and people's use of the area reported by boat fishermen from their previous visit.

Table 13

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Boat Fishermen

Area	Positive Changes	Negative Changes
Lake and Adjacent Areas	"Water better" (1) "Water level higher" (1)	"No brush or fish cover" (3) "No fish structures" (1) "Silt" (1) "Fishing not as good" (3) "No black bass" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 14

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Boat Fishermen

Area	Positive Changes	Negative Changes
Lake and Adjacent Areas	(None reported)	"Conflict between fishermen and skiers" (1) "Too many Northerner's" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 12

Reasons Making Recreation Experience Pleasant or Unpleasant—Boat Fishing
Somerville Lake

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	91	9	-
Number of people in other visitor groups	82	-	18
Number and type of other activities occurring here	82	-	-
Scenic views	92	-	-
Noise	83	17	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	92	-	-
Car parking facilities	83	17	-
Theft	92	-	-
Vandalism	92	-	-
Land-Based Reasons			
Visual privacy from other people	27	-	9
Amount of facilities (restrooms, water, etc.)	92	-	8
Convenience to facilities (restrooms, water, etc.)	83	8	8
Maintenance of facilities	92	-	-
Condition of trees and landscape	83	8	-
Condition of grass or soil	92	8	-
Water-Based Reasons			
Water quality	83	17	-
Catching fish	17	68	17
People in areas they shouldn't be	63	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Acceptability of techniques - Table 15 indicates the acceptability of different techniques for solving problems to the boat fishermen surveyed at Somerville Lake. The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for 10 of the 17 techniques. However, even for those techniques which were acceptable to most respondents, up to 42 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 15

User Acceptability of Techniques--Boat Fishing
Somerville Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	67	8	25
Make vehicle access to areas less convenient	17	-	83
Make area's existence less obvious	17	-	83
Site Planning Techniques			
Reduce number of parking spaces	50	33	17
Management Techniques			
Procedures:			
Require prior reservations	25	-	75
Require permits	58	-	42
Charge/increase fees	50	17	33
Rules and Regulations:			
Impose more rules	33	17	50
Provide stricter enforcement of rules	75	8	17
Close areas when natural resource destruction reaches critical point	83	17	-
Close areas when they become "too full"	8	42	42
Reduce number of activities in same area	75	8	8
Limit number of people in visitor groups	8	17	-
Keep unnecessary vehicles out	83	17	-
Services:			
Provide more and better information	42	25	33
Increase maintenance and restoration	75	17	-
Reduce facilities and services	-	-	100

*Percentages may not total 100% because of those responding "Does Not Apply."

BOAT LAUNCHING

Orientation

During the User Survey overcrowding was observed at the Yegua Creek Campground ramp and the Overlook Park ramp; limited parking is available. (Note: During the User Survey Welch Park was closed because of extensive improvements being made.)

The findings presented in the remainder of this section are based on the User Survey. This survey obtained 31 responses from boat launchers at Somerville (15 at Big Creek, 10 at Overlook, and 6 at Yegua).

User characteristics

Table 16 indicates the characteristics of the boat launchers surveyed at Somerville.

Table 16

Boat Launcher Characteristics

Age	Percent of Boat Launchers
<18	0
18 - 25	27
26 - 40	37
41 - 55	23
56 - 65	13
>65	0

Group Size	Percent of Boat Launchers
1	3
2	40
3 - 4	47
5 - 8	7
9 - 12	3
>12	0

Travel Time to Project Area	Percent of Boat Launchers
<15 minutes	15
15 - 30 minutes	31
30 - 60 minutes	15
1 - 2 hours	39
2 - 3 hours	0
3 - 5 hours	0
>5 hours	0

Visit Duration	Percent of Boat Launchers
1 - 4 hours	0
5 - 8 hours	62
1 day	15
2 days	8
3 days	0
4 days	0
5 - 7 days	15
>7 days	0

No. of Other Activities	Percent of Boat Launchers
0	85
1	15
2	0
3	0
4	0
5	0
6	0
>6	0

User opinions

Acceptable waiting times - Table 17 indicates the acceptable waiting times that boat launchers at Somerville and elsewhere prefer. The average time preferred for boat launching at Big Creek was significantly shorter than at the other launch areas.

Table 17

Acceptable Waiting Times*

Sample	Sample Size	Range	Mean	Median	Mode
All boat launchers surveyed	99	3-30 mins.	9	5	5
Somerville	31	4-25 "	8	-	-
Big Creek	15	4- 8 "	5	-	-
Overlook	10	4-25 "	11	-	-
Yegua	6	5-10 "	8	-	-

*In minutes; see Appendix A for definitions of terms.

Reasons for pleasant/unpleasant experience - Tables 18, 19, and 20 indicate the impact that different factors had on making the launching experience pleasant or unpleasant for users at the three areas surveyed. Launchers at Yegua found their experience to be generally the most pleasant, followed by those at Big Creek, then those at Overlook.

The occurrence of theft and vandalism, as well as the inconvenience of facilities were the factors which most often made the experience at Overlook unpleasant. At Big Creek, car parking facilities and enforcement of rules were the factors which most often made the experience unpleasant. No user indicated that he would not return.

Tables 21 and 22 indicate the changes in the physical condition and people's use of the area reported by launchers from their previous visit.

Table 18

Reasons Making Recreation Experience Pleasant or Unpleasant--Boat Launching
Big Creek

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	93	7	-
Distance from other people	93	7	-
Number of people in other visitor groups	69	-	31
Number and type of other activities occurring here	92	-	8
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	86	14	-
Enforcement of rules/regulations	77	23	-
Car parking facilities	50	50	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Steepness of slopes	79	14	7
Maintenance of facilities	100	-	-
Condition of trees and landscape	39	-	8
Condition of grass or soil	39	-	8
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity	100	-	-
Waiting time to launch boat	100	-	-
People in areas they shouldn't be	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 19

Reasons Making Recreation Experience Pleasant or Unpleasant--Boat Launching Overlook

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	78	22	-
Distance from other people	56	33	11
Number of people in other visitor groups	78	-	22
Number and type of other activities occurring here	89	-	11
Scenic views	56	-	33
Noise	33	-	67
Accidents or near accidents	-	11	67
Enforcement of rules/regulations	56	22	22
Car parking facilities	78	22	-
Theft	-	50	-
Vandalism	-	50	-
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	89	11	-
Convenience to facilities (restrooms, water, etc.)	56	44	-
Steepness of slopes	78	-	22
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity	67	11	11
Waiting time to launch boat	67	22	11
People in areas they shouldn't be	29	14	43

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 20

Reasons Making Recreation Experience Pleasant or Unpleasant--Boat Launching
Yegua

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	83	-	-
Number of people in other visitor groups	83	-	17
Number and type of other activities occurring here	83	-	17
Scenic views	50	-	50
Noise	50	-	50
Accidents or near accidents	80	-	20
Enforcement of rules/regulations	100	-	-
Car parking facilities	83	17	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Steepness of slopes	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	83	-	17
Condition of grass or soil	80	-	20
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity	80	-	-
Waiting time to launch boat	100	-	-
People in areas they shouldn't be	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 21

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Boat Launchers

Area	Positive Changes	Negative Changes
Big Creek	"Water is higher" (3) "Launching is easier" (1) "This launch is better than the others" (1)	"Harder to launch boat" (1) "Welch Park not open" (2) "More litter" (1) "Need more buoys when water is high" (1) "Launch is not as steep as at Welch" (1) "Launch not steep enough" (1)
Overlook	"Higher water level" (4) "Good lake" (2) "Good boat ramp - protected from wind in most directions" (1)	"Miss the launching ramp at Welch Park" (1) "Need more parking and storage area" (1) "Marina sewage" (1)
Yegua	"Poorly marked buoys" (1)	(None mentioned)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 22

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Boat Launchers

Area	Positive Changes	Negative Changes
Big Creek	"Not as crowded as in past years" (1)	"People tie-up the launch loading their things" (1) "People unload boats on the launch" (1) "A lot of garbage on the water" (1) "A lot more stealing" (1) "Waterskiers get in the way" (1) "Sailboats get in the way of waterskiers" (1) "Rangers do not patrol enough" (1) "Too many sailboats at times" (1) "Fifty percent of the people pull halfway up the ramp to open plugs and tie down boat" (1)
Overlook	(None mentioned)	(None mentioned)
Yegua	(None mentioned)	(None mentioned)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 23 indicates the acceptability of different techniques for solving problems to the boat launchers surveyed at Somerville. The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for 13 of the 19 techniques. However, even for those techniques which were acceptable to most respondents, up to 46 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 23

User Acceptability of Techniques--Boat Launching
Somerville Lake

Techniques	Levels of Acceptability		
	Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	27	27	22
Make vehicle access to areas less convenient	4	21	75
Make area's existence less obvious	-	11	89
Site Planning Techniques			
Redesign area to accommodate fewer users	7	4	82
Design for greater distance between people	18	32	32
Reduce number of parking spaces	18	4	79
Management Techniques			
Procedures:			
Require prior reservations	-	21	79
Require permits	-	32	68
Charge/increase fees	11	43	46
Rules and Regulations:			
Impose more rules	4	32	63
Provide stricter enforcement of rules	61	25	14
Close areas when natural resource destruction reaches critical point	71	29	-
Close areas when they become "too full"	68	21	7
Reduce number of activities in same area	32	25	39
Limit number of people in visitor groups	-	4	71
Keep unnecessary vehicles out	68	25	7
Services:			
Provide more and better information	71	21	7
Increase maintenance and restoration	57	32	7
Reduce facilities and services	4	4	93

*Percentages may not total 100% because of those responding "Does Not Apply."

CAMPING

Orientation

Somerville provides a variety of camping experiences. Some sites have electric and water hookups, shelters, and vegetative screening; some campgrounds have entrance gates and attendants. Some campers prefer sites close to the water, while others like shaded secluded areas.

The findings presented in the remainder of this section are based on the User Survey. This survey obtained 68 responses from campers at Somerville (29 at Yegua, 24 at Big Creek, and 15 at Overlook).

User characteristics

Table 24 indicates the characteristics of the campers surveyed at Somerville. The most significant difference in the characteristics of the campers at Somerville from those of other study project areas is the relatively few campers who travelled from places less than one hour from the project area.

Table 23

Camper Characteristics

Age	Percent of Campers	Group Size	Percent of Campers
<18	0	1	2
18 - 25	16	2	49
26 - 40	32	3 - 4	29
41 - 55	21	5 - 8	19
56 - 65	18*	9 - 12	2
>65	13*	>12	0

Travel Time to Project Area	Percent of Campers	Visit Duration	Percent of Campers
<15 minutes	2**	1 - 4 hours	0
15 - 30 minutes	2**	5 - 8 hours	3
30 - 60 minutes	6**	1 day	15
1 - 2 hours	53	2 days	43
2 - 3 hours	32	3 days	12
3 - 5 hours	3	4 days	6
>5 hours	3	5 - 7 days	9
		>7 days	13

No. of Other Activities	Percent of Campers	Equipment	Percent of Campers
0	22	Tent	30
1	21	Tent Camper	2
2	24	Truck-mounted camper	13
3	21	Travel trailer	40
4	6	Van	3
5	3	Motor Home	10
6	0	None	3
>6	4		

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 25 and 26 indicate the spacing (as measured on center of each site) that campers surveyed at Somerville and elsewhere prefer.

Table 25

Preferred Distance Responses* - Camping

Sample	Sample Size	Range	Mean	Median	Mode
All Campers Surveyed (11 projects)	511	10 - a	79	60	75
Somerville	68	18 - 120	49	40	40
Yegua	29	18 - 75	40	40	30
Big Creek	24	30 - 100	50	40	40
Overlook	15	50 - 120	70	60	50, 60

*in feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 26

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (20'-120')	% in A[2] (20'-39')	% in B[2] (40'-59')	% in C[2] (60'-79')	% in D[2] (80'-120')
All Campers Surveyed	90%	20%	28%	31%	21%
Somerville	97	28	41	21	10
Yegua	93	50	35	15	0
Big Creek	100	14	57	10	19
Overlook	100	0	27	55	18

*See Appendix A for definitions of terms; See Technical Report for full development of spacing preference information.
[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses within the Planning Range.

Campers at Yegua and Big Creek preferred closer spacing than the total survey sample, while campers at Overlook have a strong preference for Group C spacing (60'-79').

Reasons for pleasant/unpleasant experience - Tables 27, 28, and 29 indicate the impact that different factors had on making the camping experience pleasant or unpleasant for users at the three areas surveyed. Campers at Big Creek found their experience to be generally the most pleasant, followed by those at Yegua, then those at Overlook.

The amount and location of facilities were unpleasant in a significant number of cases at all 3 areas. In addition, noise and the behavior of other people were unpleasant in a significant number of cases at Overlook, and the enforcement of rules was unpleasant in a significant number of cases at Yegua. One user indicated that he would not return (see Table 30).

Tables 31 and 32 indicate the changes in the physical condition and people's use of the areas reported by campers from their previous visit.

Table 27

Reasons Making Recreation Experience Pleasant or Unpleasant--Camping
Big Creek

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	92	4	-
Distance from other people	83	8	8
Number of people in other visitor groups	63	8	25
Number and type of other activities occurring here	92	-	4
Fees charged	21	-	-
Scenic views	100	-	-
Noise	67	8	25
Accidents or near accidents	91	-	-
Enforcement of rules/regulations	83	8	8
Car parking facilities	77	-	23
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Visual privacy from other people	79	4	17
Amount of facilities (restrooms, water, etc.)	71	21	8
Convenience to facilities (restrooms, water, etc.)	63	29	8
Nearness to the water body	100	-	-
Steepness of slopes	83	4	13
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 28

Reasons Making Recreation Experience Pleasant or Unpleasant--Camping
Overlook

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	73	27	-
Distance from other people	86	7	7
Number of people in other visitor groups	73	13	13
Number and type of other activities occurring here	86	7	7
Fees charged	13	-	-
Scenic views	100	-	-
Noise	60	33	-
Accidents or near accidents	53	-	-
Enforcement of rules/regulations	86	7	7
Car parking facilities	93	-	7
Theft	53	7	-
Vandalism	53	7	-
Land-Based Reasons			
Visual privacy from other people	80	-	20
Amount of facilities (restrooms, water, etc.)	73	27	-
Convenience to facilities (restrooms, water, etc.)	67	33	-
Nearness to the water body	100	-	-
Steepness of slopes	73	-	13
Maintenance of facilities	93	7	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	93	7	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 29

Reasons Making Recreation Experience Pleasant or Unpleasant--Camping
Yegua

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	100	-	-
Number of people in other visitor groups	92	4	4
Number and type of other activities occurring here	85	4	11
Fees charged	92	4	-
Scenic views	96	4	-
Noise	93	7	-
Accidents or near accidents	89	7	4
Enforcement of rules/regulations	82	18	-
Car parking facilities	89	11	-
Theft	96	4	-
Vandalism	93	7	-
Land-Based Reasons			
Visual privacy from other people	89	4	7
Amount of facilities (restrooms, water, etc.)	61	39	-
Convenience to facilities (restrooms, water, etc.)	82	18	-
Nearness to the water body	89	-	11
Steepness of slopes	89	11	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	96	4	-
Water-Based Reasons			
Water quality	96	4	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 30

Number and Percent of Users That Indicated They Would Not Return to the Activity Area and Their Reasons
Somerville Lake

Area	Number and percent of users surveyed who indicated they would not return #	%	Reasons for not wanting to return
Big Creek	0	0	(None Mentioned)
Overlook	1	7	"Behavior of groups"
Yegua	0	0	(None mentioned)

Table 32

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Campers

Area	Positive Changes	Negative Changes
Big Creek	"People nice as ever" (1)	"People have no respect in regard to litter" (2)
	"Rangers should patrol more" (1)	
Overlook	(None mentioned)	"Large groups are noisy" (2)
		"People speeding in parks"(1)
		"Poor quality of people" (1)
Yegua	(None mentioned)	(None mentioned)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 31

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Campers

Area	Positive Changes	Negative Changes
Big Creek	"More littering than in years past" (2)	"Marina area used to have picnic tables, now only for tents" (1)
	"Very clean" (1)	"Toilet paper gone from the rest rooms" (1)
	"Garbage pick-up" (1)	
	"Rest rooms clean" (1)	
	"Privacy" (1)	
	"Beautiful" (1)	
	"A lot cleaner" (1)	
	"Water higher" (1)	
Overlook	"Water higher" (2)	"Courtesy dock in need of repair" (1)
	"Parks cleaner" (2)	"Closing of Welch Park" (1)
	"New garbage cans" (1)	
	"Grass mowed" (1)	
Yegua	"Added more electricity" (1)	"Bathrooms sometimes dirty" (1)
	"Better roads" (1)	"Cleared out brush" (1)
	"Grass cut" (4)	"Took away deer feeders" (1)
	"More sites" (2)	
	"Cleaner" (6)	
	"Better maintenance" (1)	
	"Cleaner rest rooms" (3)	
	"Drinking water better" (1)	
	"Canopy added" (1)	
	"New post and cable area" (1)	
	"Parking for extra vehicles nicer" (1)	

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 33 indicates the acceptability of different techniques for solving problems to the campers surveyed at Somerville. The acceptability of many techniques is very clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for 10 of the 22 techniques. However, even for those techniques which were acceptable to most respondents, up to 45 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 33

User Acceptability of Techniques--Camping
Somerville Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques Keep major recreation areas more separated	41	32	24
Make vehicle access to areas less convenient	9	24	66
Make area's existence less obvious	6	15	79
Site Planning Techniques Redesign area to accommodate fewer users	15	21	63
Design for greater distance between people	38	26	35
Reduce number of parking spaces	21	34	45
Change natural surface by hardening	33	33	33
Change natural surface by paving	38	29	32
Provide landscaped buffers	35	21	22
Management Techniques Procedures: Require prior reservations	18	28	54
Require permits	6	21	37
Charge/increase fees	15	43	41
Rules and Regulations: Impose more rules	9	18	72
Provide stricter enforcement of rules	28	34	34
Close areas when natural resource destruction reaches critical point	90	7	1
Close areas when they become "too full"	75	16	9
Reduce number of activities in same area	26	29	39
Limit number of people in visitor groups	22	18	60
Keep unnecessary vehicles out	48	34	18
Services: Provide more and better information	66	24	7
Increase maintenance and restoration	63	28	7
Reduce facilities and services	3	9	88

*Percentages may not total 100% because of those responding "Does Not Apply."

OFF-ROAD VEHICLE RIDING

Orientation

Somerville provides a designated area for off-road vehicle (ORV) riding at Yegua Creek. The area consists of 120 acres of "wasteland" and borrow pits well suited for ORV riding.

User information

The User Survey obtained only 2 responses from ORV riders at Yegua. These riders were both 26-40 years old, were in groups of 1 and 2 members, both travelled 1-2 hours to the project area, both were planning to stay 1-4 hours, were participating in 7 and 11 other activities, and both were riding motorcycles. Both riders preferred spacing of 150 feet between them and other riders.

Both riders found their experience generally pleasant. The amount and convenience of facilities were the only factors which both riders found unpleasant. Both indicated they would return and neither noticed any changes in the physical condition or people's use of the area from their previous visits.

Most techniques were very acceptable to both riders. Making vehicle access less convenient was mildly acceptable to both riders and making the area's existence less obvious was mildly acceptable to one rider and unacceptable to the other. Redesigning the area for fewer users, paving the natural surface, requiring prior reservations, and reducing facilities and services were unacceptable to both riders.

PICNICKING

Orientation

Picnicking is popular at Somerville, but there are few areas solely for picnicking. Picnicking and camping are both permitted in most areas (e.g. Big Creek Park, Overlook Park, Welch Park) on a first come first serve basis. There appears to be a need for group picnicking facilities. Overlook and Welch parks are very popular picnick areas.

The findings made in the remainder of this section are based on the User Survey. This survey obtained 8 responses from picnickers at Somerville (5 at Overlook and 3 at Yegua).

User characteristics

Table 34 indicates the characteristics of the picnickers surveyed at Somerville. The most significant differences in the characteristics of the picnickers at Somerville from those of other study project areas are: the relatively large number of picnickers under age 26, the large number of groups of two and the relatively small number coming from nearby areas.

Table 34

Picnicker Characteristics

Age	Percent of Picnickers	Group Size	Percent of Picnickers
<18	0	1	0
18 - 25	50*	2	25
26 - 40	38	3 - 4	50
41 - 55	0	5 - 8	25
56 - 65	13	9 - 12	0
>65	0	>12	0

Travel Time to Project Area	Percent of Picnickers	Visit Duration	Percent of Picnickers
<15 minutes	0	1 - 4 hours	0
15 - 30 minutes	0	5 - 8 hours	88
30 - 60 minutes	88*	1 day	22
1 - 2 hours	22	2 days	0
2 - 3 hours	0	3 days	0
3 - 5 hours	0	4 days	0
>5 hours	0	5 - 7 days	0
		>7 days	0

No. of Other Activities	Percent of Picnickers
0	38
1	0
2	13
3	0
4	50
5	50
6	0
>6	25

*Significantly higher than total survey sample.

User opinions

Spacing preferences - Tables 35 and 36 indicate the spacing that picnickers surveyed at Somerville and elsewhere prefer.

Table 35

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Picnickers Surveyed	190	1 - a	62	50	50
Somerville	8	50 -100	66	60	50
Overlook	5	50 - 60	52	50	50
Yegua	3	72 - 90	83	90	90

*In feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 36

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (20'-100')	% in A[2] (20'-39')	% in B[2] (40'-59')	% in C[2] (60'-79')	% in D[2] (80'-100')
All Picnickers surveyed	93%	23%	42%	20%	15%
Somerville	100	0	43	29	29
Overlook	100	0	75	25	0
Yegua	100	0	0	33	67

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in the Planning Range.

Picnickers at Somerville greatly disfavor group A spacing. Picnickers at Yegua prefer greater spacing than at Overlook.

Reasons for pleasant/unpleasant experience - Tables 37 and 38 indicate the impact that different factors had on making the picnic experience pleasant or unpleasant for users at the two areas surveyed. Picnickers at both areas found their experience to be generally pleasant. Convenience to facilities was unpleasant in a significant number of cases at Overlook, and trees/natural landscape was unpleasant in a significant number of cases at Yegua. No user indicates that he would not return.

Tables 39 and 40 indicate the changes in the physical condition and people's use of the areas reported by picnickers from their previous visit.

Table 37

Reasons Making Recreation Experience Pleasant or Unpleasant--Picnicking
Overlook Park

	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	100	-	-
Number of people in other visitor groups	100	-	-
Number and type of other activities occurring here	100	-	-
Scenic views	100	-	-
Noise	80	20	-
Accidents or near accidents	-	-	20
Enforcement of rules/regulations	20	20	40
Car parking facilities	100	-	-
Theft	-	-	-
Vandalism	-	-	-
Land-Based Reasons			
Visual privacy from other people	100	-	-
Amount of facilities (restrooms, water, etc.)	80	20	-
Convenience to facilities (restrooms, water, etc.)	20	80	-
Nearness to the water body	100	-	-
Steepness of slopes	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 38

Reasons Making Recreation Experience Pleasant or Unpleasant--Picnicking
Yegua Park

	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	100	-	-
Number of people in other visitor groups	100	-	-
Number and type of other activities occurring here	100	-	-
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	67	33	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Visual privacy from other people	100	-	-
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Nearness to the water body	100	-	-
Steepness of slopes	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 39

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Picnickers

Area	Positive Changes		Negative Changes	
Overlook	"Cleaner"	(1)	"Drinking fountain"	(1)
	"Better than in past"	(1)	"Closed Welch Park"	(1)
	"Lawn mowed"	(1)	"Rest rooms (writing)"	(1)
	"Trash cans"	(1)		
	"Better maintained"	(1)		
Yegua	(None mentioned)		(None mentioned)	

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 40

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Picnickers

Area	Positive Changes	Negative Changes	
Overlook	(None mentioned)	"People leave trash"	(1)
Yegua	(None mentioned)	(None mentioned)	

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 41 indicates the acceptability of different techniques for solving problems to the picnickers surveyed at Somerville. The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for 13 of the 21 techniques. However, even for those techniques which were acceptable to most respondents, up to 14 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 41

User Acceptability of Techniques--Picnicking
Somerville Lake

Techniques	Levels of Acceptability Percentage* of Users Responding: Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	14	14	67
Make vehicle access to areas less convenient	-	-	100
Make area's existence less obvious	-	29	71
Site Planning Techniques			
Redesign area to accommodate fewer users	-	14	86
Design for greater distance between people	43	57	-
Reduce number of parking spaces	14	29	57
Change natural surface by paving	57	43	-
Provide landscaped buffers	57	43	-
Management Techniques			
Procedures:			
Require prior reservations	-	29	71
Require permits	-	29	57
Charge/increase fees	-	-	100
Rules and Regulations:			
Impose more rules	14	14	71
Provide stricter enforcement of rules	43	29	-
Close areas when natural resource destruction reaches critical point	86	14	-
Close areas when they become "too full"	29	14	57
Reduce number of activities in seam area	20	20	60
Limit number of people in visitor groups	14	14	71
Keep unnecessary vehicles out	43	43	14
Services:			
Provide more and better information	71	29	-
Increase maintenance and restoration	100	-	-
Reduce facilities and services	-	-	100

*Percentages may not total 100% because of those responding "Does Not Apply."

SHORELINE FISHING

Orientation

Shoreline fishing is popular at Somerville. The more popular areas include marinas where fishermen can be further out in the water, launch ramps, areas within developed recreation areas, and the outlet during or after release.

The findings presented in the remainder of this section are based on the User Survey. This survey obtained 5 responses from shoreline fishermen at Somerville (1 at Big Creek and 4 at Overlook).

User characteristics

Table 42 indicates the characteristics of the shoreline fishermen surveyed at Somerville. The most significant differences in the characteristics of the fishermen at Somerville from those of other study project areas are: 1) the relatively high number in the 26-55 years age group, 2) the high number of fishing parties of over 3 people, the relatively small number of fishermen from nearby areas, and fewer fishermen participating in no other activity.

Table 42

Shoreline Fishermen Characteristics

Age	Percent of Shoreline Fishermen	Group Size	Percent of Shoreline Fishermen
<18	0	1	20
18 - 25	0	2	20
26 - 40	60*	3 - 4	40*
41 - 55	40*	5 - 8	20*
56 - 65	0	9 - 12	0
>65	0	>12	0

Travel Time to Project Area	Percent of Shoreline Fishermen	Visit Duration	Percent of Shoreline Fishermen
<15 minutes	0	1 - 4 hours	0
15 - 30 minutes	0	5 - 8 hours	0
30 - 60 minutes	20	1 day	20
1 - 2 hours	80*	2 days	60
2 - 3 hours	0	3 days	0
3 - 5 hours	0	4 days	20
>5 hours	0	5 - 7 days	0
		>7 days	0

No. of Other Activities	Percent of Shoreline Fishermen
0	0
1	0
2	40
3	20
4	0
5	0
6	40
>6	0

*Significantly higher than total survey sample.

User opinions

Spacing preferences - Tables 43 and 44 indicate the spacing that shoreline fishermen at Somerville and elsewhere prefer.

Table 43

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All shoreline fishermen surveyed	106	6 - a	76	35	50
Somerville	4	40 - 200	135	150	150
Big Creek	1	40	40	40	40
Yegua	3	150 - 200	167	150	150

*In feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 44

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (10'-100')	% in A[2] (10'-19')	% in B[2] (20'-39')	% in C[2] (40'-59')	% in D[2] (60'-100')
All shoreline fishermen surveyed	83%	20%	38%	24%	18%
Somerville	25	0	0	100	0
Big Creek	100	0	0	100	0
Overlook	0	-	-	-	-

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in the Planning Range.

Shoreline fishermen at Somerville generally preferred distances greater than in the planning range.

Reasons for pleasant/unpleasant experience - Tables 45 and 46 indicate the impact that different factors had on making the shoreline fishing experience pleasant or unpleasant for users at the two areas surveyed. Shoreline fishermen at Somerville found their experience to be generally pleasant.

Catching fish was the factor which most often made the experience at Overlook unpleasant. No fisherman indicated that he would not return.

Tables 47 and 48 indicate the changes in the physical condition and people's use of the area reported by shoreline fishermen from their previous visit.

Table 45

Reasons Making Recreation Experience Pleasant or Unpleasant--Shoreline Fishing
Big Creek

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	100	-	-
Number of people in other visitor groups	100	-	-
Number and type of other activities occurring here	100	-	-
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	100	-	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Visual privacy from other people	100	-	-
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Nearness to the water body	100	-	-
Steepness of slopes	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-
Catching fish	100	-	-
Formal designation of places for your activity	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 46

Reasons Making Recreation Experience Pleasant or Unpleasant--Shoreline Fishing Overlook

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	100	-	-
Number of people in other visitor groups	75	-	25
Number and type of other activities occurring here	75	25	-
Scenic views	100	-	-
Noise	75	-	25
Accidents or near accidents		-	50
Enforcement of rules/regulations	75	-	25
Car parking facilities	100	-	-
Theft		-	50
Vandalism		-	50
Land-Based Reasons			
Visual privacy from other people	25	-	75
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	75	25	-
Nearness to the water body	100	-	-
Steepness of slopes	75	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-
Catching fish	25	75	-
Formal designation of places for your activity	-	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 47

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Shoreline Fishermen

Area	Positive Changes	Negative Changes
Big Creek	"Always clean" (1)	(None mentioned)
Overlook	"Better maintenance" (1)	"Less fish" (3)
	"Higher lake" (1)	(None mentioned)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 48

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Shoreline Fishermen

Area	Positive Changes	Negative Changes
Big Creek	(None mentioned)	(None mentioned)
Overlook	"Generally considerate" (1)	(None mentioned)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 49 indicates the acceptability of different techniques for solving problems to the shoreline fishermen surveyed at Somerville. The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for 13 of the 22 techniques. However, even for those techniques which were acceptable to most respondents, up to 40 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 49

User Acceptability of Techniques--Shoreline Fishermen
Somerville Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	-	60	20
Make vehicle access to areas less convenient	-	20	80
Make area's existence less obvious	-	-	100
Site Planning Techniques			
Redesign area to accommodate fewer users	-	-	100
Design for greater distance between people		60	40
Reduce number of parking spaces	20	40	40
Change natural surface by paving	40	60	-
Provide landscaped buffers	20	60	-
Management Techniques			
Procedures:			
Require prior reservations	-	40	60
Require permits	-	40	60
Charge/increase fees	-	20	80
Rules and Regulations:			
Impose more rules	20	40	20
Provide stricter enforcement of rules	60	20	-
Close areas when natural resource destruction reaches critical point	40	60	-
Close areas when they become "too full"	20	60	20
Reduce number of activities in seam area	-	80	20
Limit number of people in visitor groups	-	20	80
Keep unnecessary vehicles out	20	80	-
Services:			
Provide more and better information	40	60	-
Increase maintenance and restoration	80	20	-
Reduce facilities and services		20	80

*Percentages may not total 100% because of those responding "Does Not Apply."

SUNBATHING/SWIMMING

Orientation

Sunbathing and swimming are popular activities at Somerville. Designated areas are not provided. At Welch and Overlook Parks the "volunteer roads" have caused traffic conflicts between sunbathers and vehicles along the natural sandy beaches. Conflicts between boaters and swimmers sometimes is a problem.

The findings presented in the remainder of this section are based on the User Survey. This survey obtained 10 responses from sunbathers and swimmers at the Overlook Area.

User characteristics

Table 50 indicates the characteristics of the sunbathers and swimmers surveyed at Somerville. The most significant differences in the characteristics of sunbathers and swimmers at Overlook from those of other study project areas are. the relatively small number over age 26, and the small number coming from nearby areas.

Table 50

Age	Percent of Sunbathers/Swimmers	Group Size	Percent of Sunbathers/Swimmers
<18	30	1	0
18 - 25	50	2	30
26 - 40	20**	3 - 4	50
41 - 55	0	5 - 8	20
56 - 65	0	9 - 12	0
>65	0	>12	0

Travel Time to Project Area	Percent of Sunbathers/Swimmers	Visit Duration	Percent of Sunbathers/Swimmers
<15 minutes	0	1 - 4 hours	30
15 - 30 minutes	0	5 - 8 hours	50
30 - 60 minutes	80*	1 day	0
1 - 2 hours	20	2 days	20
2 - 3 hours	0	3 days	0
3 - 5 hours	0	4 days	0
>5 hours	0	5 - 7 days	0
		>7 days	0

No. of Other Activities	Percent of Sunbathers/Swimmers
0	10
1	20
2	40
3	30
4	0
5	0
6	0
>6	0

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 51 and 52 indicate the spacing that sunbathers and swimmers surveyed at Somerville and elsewhere prefer.

Both sunbathers and swimmers at Overlook preferred greater distances than did participants in the total survey. Sunbathers at Overlook preferred distances in Group C (21'-30') or Group D (31'-50'). Swimmers at Overlook preferred distances greater than the planning range.

Table 51

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Sunbathers surveyed	161	3- a	30	20	15, 20
Overlook	7	30-100	38	35	30
All Swimme surveyed	120	2-200	25	20	20
Overlook	3	100-200	167	200	200

*In feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 52
Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1](5'-50')	% in A[2] (5'-14')	% in B[2] (15'-20')	% in C[2] (21'-30')	% in D[2] (31'-50')
All Sunbathers surveyed	88%	27%	39%	20%	14%
Overlook	57	0	0	50	50
Sample	% in Planning Range[1](5'-50')	% in A[2] (5'-14')	% in B[2] (15'-24')	% in C[2] (25'-34')	% in D[2] (35'-50')
All Swimmers surveyed	90%	25%	41%	19%	15%
Overlook	0	-	-	-	-

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.
[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in Planning Range.

Reasons for pleasant/unpleasant experience - Table 53 indicates the impact that different factors had on making the sunbathing or swimming experience pleasant or unpleasant for users at the Overlook area. Sunbathers and swimmers at Overlook found their experience to be pleasant. Theft, vandalism, and accidents or near accidents were the factors which most often made the experience at Overlook unpleasant. No user indicated that he would not return to the area.

Tables 54 and 55 indicate the changes in the physical condition and people's use of the area reported by sunbathers and swimmers from their previous visit.

Table 54

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Sunbathers/Swimmers

Area	Positive Changes		Negative Changes	
Overlook	"Grass mowed"	(1)	"Writing on restrooms"	(1)
	"Cleaner"	(2)	"Closed Welch Park"	(3)
	"New trash cans"	(1)		
	"Better trash pick-up"	(1)		

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 55

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Sunbathers/Swimmers

Area	Positive Changes		Negative Changes	
Overlook	"More people"	(1)	"Want to use Welch Park"	(2)
			"More crowded--students"	(1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 53

Reasons Making Recreation Experience Pleasant or Unpleasant--Sunbathing/Swimming Overlook

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	80	10	10
Number of people in other visitor groups	60	-	40
Number and type of other activities occurring here	80	-	20
Scenic views	90	-	10
Noise	40	20	40
Accidents or near accidents	-	30	50
Enforcement of rules/regulations	50	10	30
Car parking facilities	80	10	10
Theft	-	40	30
Vandalism	-	40	30
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	78	22	-
Maintenance of facilities	50	-	50
Condition of trees and landscape	80	10	10
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity			
People in areas they shouldn't be			

*Percentages may not total 100% because of those responding "Does Not Apply."

Acceptability of techniques - Table 56 indicates the acceptability of different techniques for solving problems to the sunbathers and swimmers surveyed at Somerville. The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the three levels of acceptability for 14 of the 18 techniques. However, even for those techniques which were acceptable to most respondents, up to 38 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 56

User Acceptability of Techniques--Sunbathing/Swimming
Somerville Lake

Techniques	Levels of Acceptability		
	Percentages of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	-	63	38
Make vehicle access to areas less convenient	-	12	75
Make area's existence less obvious	-	25	38
Site Planning Techniques			
Redesign area to accommodate fewer users	12	25	63
Design for greater distance between people	12	12	63
Reduce number of parking spaces	-	38	65
Management Techniques			
Procedures:			
Require permits	-	-	88
Charge/increase fees	-	12	60
Rules and Regulations:			
Impose more rules	10	10	60
Provide stricter enforcement of rules	20	20	20
Close areas when natural resource destruction reaches critical point	25	63	12
Close areas when they become "too full"	-	62	38
Reduce number of activities in same area	-	-	88
Limit number of people in visitor groups	-	-	100
Keep unnecessary vehicles out	-	75	12
Services:			
Provide more and better information	50	38	12
Increase maintenance and restoration	38	50	12
Reduce facilities and services	-	12	88

*Percentages may not total 100% because of those responding "Does Not Apply."

PART 3: ANALYSIS OF SELECTED PROBLEMS/SITUATIONS

PART 3: ANALYSIS OF SELECTED PROBLEMS/SITUATIONS

This final section identifies and examines selected problems and situations at Somerville Lake. This section is not intended to provide solutions to all project area problems. Nor is it a substitute for project area master planning. The solutions/techniques are intended to be only suggestions for further consideration by project area personnel, for they are most familiar with the intricacies associated with these problems.

In many cases, the project area staff is already aware of these problems or situations and is in the process of dealing with them. And in some cases, the solutions/techniques listed in Table 57 may not be practical or possible because of management, budget, or other constraints.

Table 57

Analysis of Selected Problems/Situations

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Boating	Boating use is well balanced but at the threshold of becoming overcrowded. Like at most lakes, there are sometimes conflicts between various types of boaters, and between boaters/waterskiers and boat fishermen.	o continue using 5 mph areas & consider designing more areas. o consider using lake zoning to control boating use. o provide more information to boaters, waterskiers, & boat fishermen (regarding their role in helping to achieve pleasant recreation experiences. o provide strict enforcement of regulations.
Camping	In some areas, there is a mixture of camping & day use activities; some sites can be used for picnicking or camping. Some campsites are not well designed for todays camper (e.g. tables on the wrong side of pads, utility connecters not well located, pads too short).	o consider providing only separate areas for camping and picnicking. o locate campsite facilities in a proper arrangement to allow maximum convenience & minimum overuse. (e.g. when looking from the vehicle entrance to the front of the campsite; the patio area, table, grill, fire ring, lantern post & trash receptacle should be on the left-hand side & the service hookups should be on the right hand side).

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Support Facilities	Need for extra vehicle/boat trailer parking lot within or near campgrounds (some campers at Big Creek were observed taking another campsite next to theirs for extra vehicle parking).	o consider providing extra vehicle parking areas at appropriate locations to reduce congestion at the campsites.
Boat Launching	Overcrowding & congestion observed at boat launching ramps--Yegua Creek and Overlook Park.	o provide for additional parking & better circulation & control. (Figure 1 demonstrates ways in which the carrying capacity at a boat ramp might be increased.) o designate the ramp inside Yegua Creek Campground for campers only; this should help reduce congestion at the ramp & long lines at the entrance gate. o on holiday weekends provide ranger to direct traffic & circulation.
Shoreline Erosion	Some shoreline areas are severely eroding and some campsites have been lost.	o identify problem & erosion-prone areas. o examine various ways of stabilizing shoreline (riprapping, bulkheading, etc.). o avoid developing new sites on erosion-prone areas.
Picniker/Camper Conflicts	Some conflicts between picnickers & campers--Overlook Park. (During the Survey one group of picnickers reported they are willing to pay the camping fee at Yegua to get away from conflicts at Overlook).	o discuss this problem with users. o consider providing separate group picnic areas (the problem may only result from conflicts between larger picnic groups & campers. o consider providing separate areas for camping & picnicking.
Sunbathing	Vehicle & sunbather conflicts on the beach areas at Welch & Overlook Park.	o eliminated random traffic movement & add a designated parking area (consider using post & cable or other materials as barriers).
Swimming	Sometimes there are conflicts between boaters & swimmers on the water surface.	o provide float line to try to keep swimming contained and/or provide buoy line to keep boaters out.

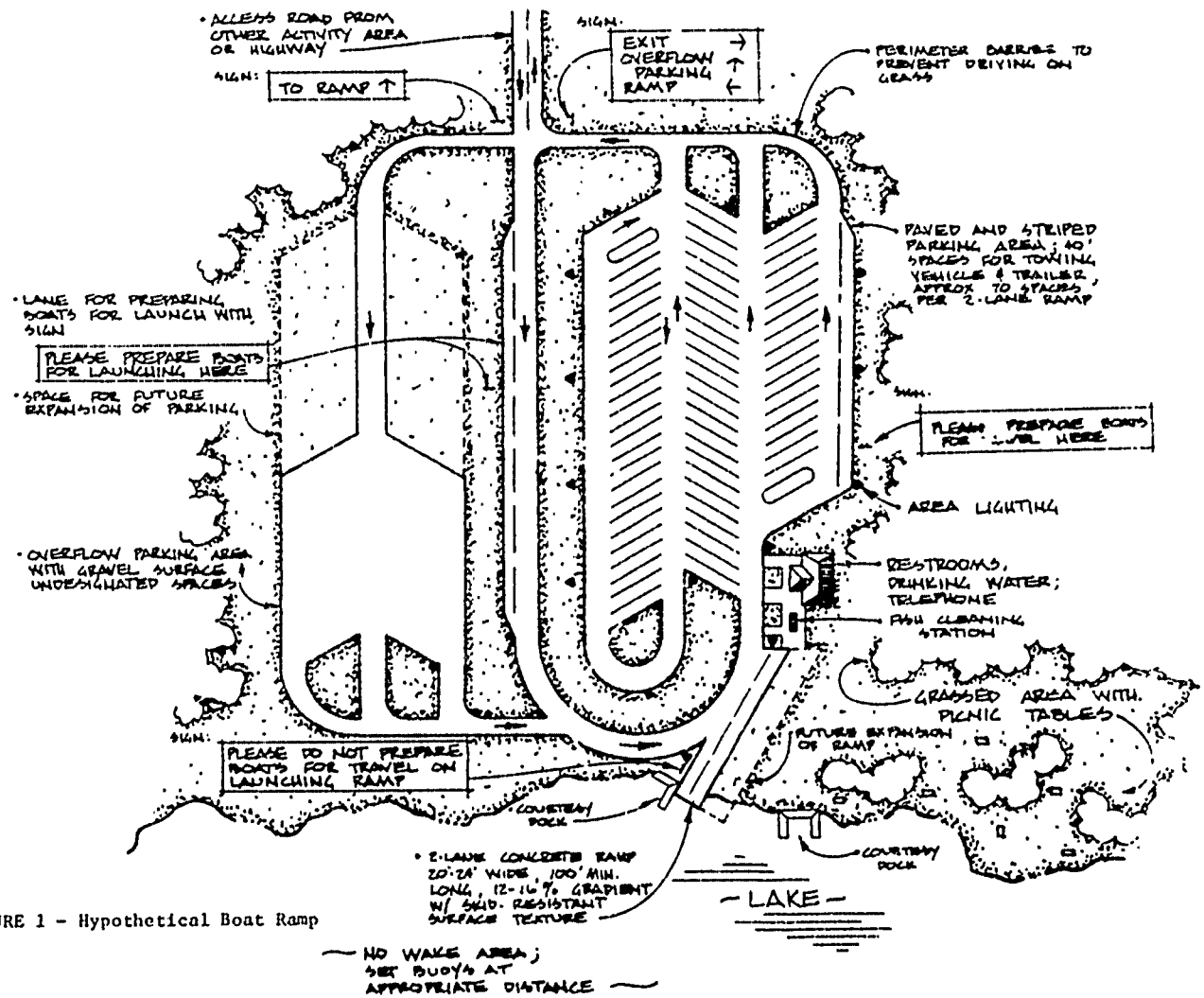


FIGURE 1 - Hypothetical Boat Ramp

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Shorefishing	Need for better & safer shoreline fishing access (for elderly, physically handicapped, children).	o continue to control & fence unsafe fishing. o consider the feasibility of providing fishing piers.
Overuse at Overlook and Welch	Some areas at Overlook are overused.	o eliminate random traffic movement & reseed and fertilize. o consider using impact type sites in the more sensitive areas.
Undeveloped Recreation Areas	The undeveloped recreation areas (Pecan and McCain) are very attractive and could become overused or overcrowded in the future.	o examine the social & resource capacity of these areas. o apply appropriate carrying capacity control techniques.

APPENDICES

APPENDIX A: KEY TERMS

1. Activity area - The specific area where an individual primary activity occurs (e.g., a campground, the lake, a hiking trail, a picnic area, etc.).

2. Capacity, recreational carrying - The capability of a recreational resource to provide opportunity for certain types of satisfactory recreation experiences over time without significant degradation of the resource. Inherent in this view of carrying capacity are resource (biophysical) and social (psycho-social) capacities.

3. Capacity, resource - The level of recreational use of a resource beyond which irreversible biological deterioration takes place or degradation of the physical environment makes the resource no longer suitable or attractive for that recreational use.

4. Capacity, social - The level of recreational use of a resource or area beyond which the user's expectation of the experience is not realized and he/she does not achieve a reasonable level of satisfaction.

5. Carrying capacity guidelines - The levels of use and the methods used to obtain and achieve them which are recommended in this report.

6. Factors - The characteristics and phenomena which influence carrying capacity.

7. Indicators - The phenomena which can be used to identify or measure the degree of overcrowding or overuse, and which can be used in conjunction with a monitoring system to help predict when problems of overuse and overcrowding will occur if preventive measures are not taken.

8. Management/site survey - The initial survey conducted at the study project areas where resource managers, rangers, and maintenance personnel were interviewed and a reconnaissance was made of "overused," "overcrowded," "underused," and "well-balanced" recreation areas. (See Appendix B)

9. Mean - The measure of central value defined as the sum of all observations divided by the number of observations.

10. Median - The measure of central value defined as the point on the scale of observations which is the middle observation (if there is an odd number of cases) or which is the mean of the two central observations (if there is an even number of cases).

11. Mode - The measure of central value defined as the observation with the largest frequency.

12. Monitoring - The periodic assessment of the impact that use levels have on the social capacity or resource capacity of an area.

13. Overcrowding - A condition where the user does not achieve a satisfactory recreational experience because of too many people, inadequate distances between sites, etc.

14. Overuse - A condition where (during the course of a season/year) degradation of the physical environment makes the resource no longer suitable or attractive for recreational use.

15. Planning range - The range of spacing distances for an activity which satisfies the spacing preferences of the majority of recreators participating in that activity, which at the same time accounts for other considerations (e.g., cost, safety, equity, etc.).

16. Preference distribution - The set of preference groupings for an activity which can be modified to develop the social carrying capacity of an area.

17. Preference groupings - The range of spacing distances for an activity which satisfies the similar spacing preferences of a group of recreators participating in that activity.

18. Primary activity - The major recreation activity which brought the visitor to the recreation area.

19. Project area - The land and water area of the total Corps of Engineers Project.

20. Project management - The project area staff, district personnel, and other people involved with project area management.

21. Recreation area - Corps-managed areas specifically identified for recreational use within the total Project Boundary; usually named.

22. Recreation day - A standard unit of use consisting of a visit by one individual to a recreation development or area for recreation purposes during any reasonable portion or all of a 24-hour period.

23. Recreation environment - An activity area together with its various recreation settings.

24. Recreation resource - The land and/or water areas, with associated facilities, which provide a base for outdoor recreation activities.

25. Recreation setting - The physical, development/control, activity/use relationship components of an activity area; taken as a whole, the various settings comprise a particular "recreation environment" for each activity area.

26. Recreation unit - A campsite, picnic table, boat, off-road vehicle, user group, or other unit which when spaced together with other units represents a use level or density.

27. Representative recreation setting - The most typical recreation setting for a particular activity.

28. Secondary activities - Incidental activities; activities which are supplemental to the primary activity.

29. Study activity area - An activity area at which the management/site survey and the user survey was conducted.

30. Study project area - One of the 11 project areas at which the management/site survey and the user survey were conducted. These project areas are: Barkley Lock and Dam, Benbrook Lake, Hartwell Lake, McNary Lock and Dam, Milford Lake, New Hogan Lake, Lake Ouachita, Lake Shelbyville, Shenango River Lake. Somerville Lake, and Surry Mountain Lake.

31. Title 36 - Part 327, Chapter III, of Title 36 of the Code of Federal Regulations which provides rules and regulations governing the public use of water resource development projects administered by the Army Corps of Engineers.

32. Underuse - A condition where use levels are significantly less than their potential service level.

33. User survey - The survey that provided user preference information used in developing social capacity guidelines; information was obtained from users at the study project areas by means of a questionnaire (see Appendix B).

34. Well-balanced use - A condition which exhibits just the right amount of use to satisfy users and protect the resource.

APPENDIX B: EXAMPLE SURVEY FORMS

This Appendix includes on the following pages examples of the survey forms that were used during the Management/Site Survey and the User Survey.

MANAGEMENT/SITE SURVEY

PICNICKING QUESTIONNAIRE

(Resource Manager, Head Ranger, Maintenance Foreman)

Project Area Name _____

Respondent Name _____ Title _____

Interviewer _____ Date _____

1. PICNICKING USE AREA INFORMATION (selected areas)

Recreation Area/Use Area Names	Support Facilities	Fee Charged	Acres: Total Use Area	Acres: Activity Area Only	Total Picnic Sites	List Primary Activities Adjacent to Area	When Started
OVERCROWDED							
OVERUSED							
UNDERUSED							
WELL-BALANCED							

2 VISITOR CHARACTERISTICS RELATED TO OVERCROWDING/OVERUSE

Recreation Area/Use Area Names (same as in #1)	# of picnicking groups on typical recreation season weekend day	Typical Length of Stay	Typical Ages	Typical Group Size	Origin of visitors[1] % U	% S	% R	Approximate # of miles most visitors travel to use area High	Average	Average Frequency of visits per year
OVERCROWDED										
OVERUSED										
UNDERUSED										
WELL-BALANCED										

NOTES: [1]U = Urban location (city), S = Suburban location, R = Rural

Pichicking

3. CAUSES & EFFECTS OF OVERCROWDING/OVERUSE

Use Area Names (same as in #1 & #2)	Actual Complaints (list in order of frequency)	Causes		Effects	
		Observed	Surmised	Observed	Surmised
OVERCROWDED					
OVERUSED					
UNDERUSED					
WELL-BALANCED					

Picnicking

4. OCCURRENCE OF OVERUSE/DEGRADATION

Use areas which experience overuse (from #1)	Off-season restoration potential: Recovers naturally	Off-season restoration potential: Requires treatment	Off-season restoration potential: Beyond off-season restoration	Approximate Dates of Recreation season (_____ to _____)	When signs of degradation first occur: Approx. date	When signs of degradation first occur: Approx. visitor groups to date	When highest degradation is reached: Approx. date	When highest degradation is reached: Approx. visitor groups to date

5. INDICATORS (SIGNS) OF OVERCROWDING

Indicators	Assign relative importance using a numerical rating on a scale of 1 (least) to 10 (most)	Comments
o Increase in the # of complaints		
o Arguments/conflicts between picnickers		
o Shorter stays		
o Fewer returnees		
o Increase in crime		
o Increase in noise		
o Picnicking, in non-picnic areas		
o Crowded support facilities		
o Increase in litter		
o Increase in resource and facility destruction		
o Occurrence of displacement/succession (changes in visitor characteristics)		
o Increase in number of accidents involving vehicles		
o Increase in use levels		

(Please list others below)

o

o

o

Picnicking

6. INDICATORS OF OVERUSE/DEGRADATION

Indicators	Assign relative importance using a numerical rating on a scale of 1(least) to 10 (most)	Comments
o Ground cover wearing away		
o Damaged trees and/or undergrowth		
o Absence/change in wildlife		
o Increased erosion/sedimentation		
o Little deadfall		
o Compacted soils		
o Increased litter/trash		
o Trees cut down		
o Increased runoff		
o Need for replacement of support facilities before normal life period		
o Rodent infestation		

(Please list others below)

o

o

o

o

7. FACTORS AFFECTING RESOURCE CARRYING CAPACITY

Picnicking

Factors	Assign relative importance using a numerical rating on a scale of 1 (least) to 10 (most)	Comments
o Resiliency of vegetation type		
o Resiliency of soils		
o Resiliency of wildlife		
o Degree of normal maintenance applied		
o Degree of off-season restoration applied		
o Site drainage		
o Slope/topography		
o Climate/micro-climate		
o Group size		
o Slope orientation		
o Tree cover		
o Level of development (e.g. paved roads/paths vs. unpaved roads/paths)		

(Please list others below)

o

o

o

8. FACTORS AFFECTING SOCIAL CARRYING CAPACITY

Factors	Assign relative importance using a numerical rating on a scale of 1 (least) to 10 (most)	Comments
o Similarity of visitor groups		
o Slope orientation		
o Distance from highway access		
o Proximity to the water		
o Scenic views or vistas		
o Quality, variety of natural amenities		
o Number, type, and degree of man-made intrusions or disturbances (power lines, buildings, etc.)		
o Visual screening between picnickers		
o Density/type of vegetation		
o Distance between picnic sites		
o Degree of designation		
o Level of support facilities		
o Proximity to support facilities		
o Size of picnicking area		
o Charging of fees		
o Compatibility of nearby primary activities		
o Single purpose or multi-purpose recreation area		
o Distance traveled		
o Frequency of visits		
o Origin of user (urban, suburban, rural)		
o Configuration of area		
o Degree of maintenance		

(Please list other factors)

o

o

9. PRESENT/PAST CAPACITY MANAGEMENT

Picnicking

Use areas where capacity management techniques were, or are now, applied (Name)	Past (√)	Present (√)	List capacity management techniques(s) used	Describe level of effectiveness (pros/cons regarding visitor satisfaction and resource protection)	Assessment of management feasibility (pros/cons why the technique could or could not be implemented)

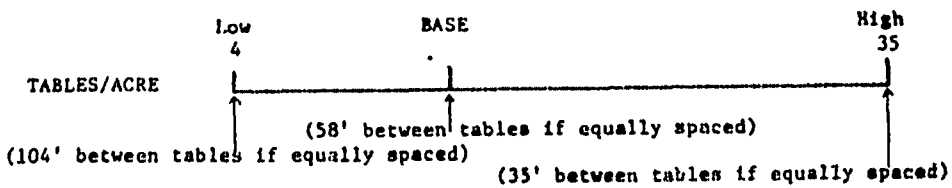
Picnicking

10. POSSIBLE CARRYING CAPACITIES

Use Area Names	Present capacity actual or estimated	Best guess as to what the capacity should be	Principal factors
THE MOST OVERCROWDED AREA:			
THE MOST OVERUSED AREA:			
THE MOST UNDERUSED AREA:			
THE MOST WELL-BALANCED AREA:			

EXAMPLES FROM BUREAU OF OUTDOOR RECREATION CAPACITY RESEARCH:

(Use as a general guide when estimating what the capacity should be)



MANAGEMENT/SITE SURVEY

CAMPING

USE AREA ANALYSIS SHEET

(for URDC staff use)

Project Area Name _____ Field Analyst(s) _____

Recreation Area and/or Use Area _____

_____ Weather _____

Code # _____ Date _____

			ANSWER COLUMN	COMMENT CODE	COMMENTS:
SITE AWARE-NESS	Signage (camping or name)	Between main highway and use area entrance			
		At use area entrance			
	Exposure of Site	Between main highway and use area entrance			
		At use area entrance			
SITE ACCESS	Relation-ship to Main Highway	Distance to area from main highway			
	Road Conditions	Road to site from main highway			
		Paved(P) or Unpaved(U)			
		Condition (E, G, P)			
		Estimated Width			
		Road within use area			
		Paved(P) or Unpaved(U)			
		Condition (E, G, P)			
		Estimated Width			
		Presence of informal roads			
SLOPES & VEGETATION	Slopes	% of area 0 - 5%			
		% of area 6 - 9%			
		% of area 10%+			
		Existence of unique land form			
	Vegetation	Density of trees			
		% dense			
		% moderate			
		% sparse			
		% little or none			
		Density of understory			
		% dense			
		% moderate			
		% sparse			
		% little or none			
	On the Use Area	Geologic, cultural, archeo-logic features			
		Abundance of wildlife			
		Water feature			

NATURAL AMENITIES	From the Use Area	Visibility to water features			
		(insert) O - outstanding	Severely obstructed		
			Moderately obstructed		
		C - good	Mildly obstructed		
		U - undesirable	Unobstructed		
		Visibility to other natural areas			
		(insert) O - outstanding	Severely obstructed		
			Moderately obstructed		
		C - good	Mildly obstructed		
		U - undesirable	Unobstructed		
		Distance to lake			
CONDITION OF NATURAL FEATURES	Vegetation & Soils	Dead or trampled vegetation			
		Evidence of taking			
		Compacted soils			
	Drainage	Wet soils/standing water			
		Erosion			
FACILITIES & SERVICES	Facility/ Service Distribution (S - Site D-Distributed C - Centralized)	Electric hook-ups			
		Water hook-up			
		Improved pad			
		Picnic tables			
		Cooking grill			
		Firewood			
		Drinking water (cold)			
		Hot water			
		Showers			
		Flush toilets			
		Vault toilets			
		Pit toilets			
		Dumping station			
		Shelter			
		First aid station			
		Telephone			
		Lighting (R - road, P - Parking W - Walkway, C - Comfort area			
		Recreation area or equipment			
		Convenience store			
	Condition	Excellent			
		Good			
		Need attention			
PLANNING DESIGN ASPECTS	Distance between campsites	Minimum			
		Maximum			
		Average			
	Distance between campsites and the facilities	Minimum			
		Maximum			
		Average			
	Space for camper unit maneuverability	Ample			
		Acceptable			
		Restrictive			
	Access Control	Controlled (gate, attendant)			
		Uncontrolled			

Car Parking	Parking space on each camp-site		
	Road parking		
Buffer between Campsites	Man-made		
	Natural vegetation		
	Planted landscape		
	None		

RELATIONSHIP OF CAMPING USE AREA TO OTHER USE AREAS

Use rea ame	Activity	Estimated direct distance from camping use area	Pedestrian accessibility to other use area			Visibility to other use area			Reasons for accessibility and/or visibility situation
			Easy	Mod-erate	Diffi-cult	Ob-structed	Semi-ob-structed	Unob-structed	

ANALYST'S PERCEPTION OF ACTIVITY AREA'S CARRYING CAPACITY

List the resource/physical factors you feel most affect carrying capacity on this site

_____

_____

_____

_____

_____

Should resource/physical carrying capacity of this site be: _____ higher _____ lower _____ same

List possible techniques which might be used to increase and/or to limit capacity on this site.

_____

_____

_____

CORPS OF ENGINEERS USER CAPACITY SURVEY

Notations ☐

Date _____ Day _____ OMB Clearance # 49-R0419

Time (hour) _____ Expires October 1983

Weather _____ Project Area Name _____

Interviewer _____ Recreation Area Name _____

Activity _____ Code _____ Activity Area _____ Code _____

We are conducting a survey for the Army Corps of Engineers at selected Corps recreation areas throughout the Country. Through these surveys, we will discover how visitors feel about overcrowding and overuse of these recreation areas. The Corps will use this information to help make decisions about the use and protection of its recreation areas. Would you be willing to take fifteen minutes of your time to answer some questions about your visit here?

BASIC VISITOR CHARACTERISTICS

1. In which category is your age?

17 & under	☐
18 - 25	☐
26 - 40	☐
41 - 55	☐
56 - 65	☐
66 & over	☐

2. How large is your group?

1	☐
2	☐
3- 4	☐
5- 8	☐
9-12	☐
13+	☐

3. Is this your main destination or a stopover on a trip?

Main destination ☐

Stopover on trip ☐

4. How long did it take you to travel here from your home ___(✓) or last destination ___(✓)?

Under 15 minutes	☐
15-30 minutes	☐
30 min. - 1 hour	☐
1 - 2 hours	☐
2 - 3 hours	☐
3 - 5 hours	☐
5+ hours	☐

VISITOR PARTICIPATION

5. How many times did you participate in this activity anywhere last year? (if "0", go to Question 7)

0	☐
1 - 5	☐
6 - 10	☐
11 - 20	☐
21 - 30	☐
31+	☐

6. How many times have you participated in this activity at this Lake?

a) Last year?		b) So far this year?	
0	☐	0	☐
1- 2	☐	1- 2	☐
3- 4	☐	3- 4	☐
5- 7	☐	5- 7	☐
8-10	☐	8-10	☐
11-19	☐	11-19	☐
20+	☐	20+	☐

7. How long are you staying on this visit?

1 - 4 hours	☐
5 - 8 hours	☐
1 day (overnight)	☐
2 days	☐
3 days	☐
4 days	☐
5 - 7 days	☐
8 or more days	☐

8. Have you participated in this activity at this specific location anytime before this visit?

No ☐ (go to #9) Yes ☐ Please list any changes you have noticed in the physical condition of this location or in people's use of the area.

Physical condition:	People's use of the area:
☐ Positive	☐ Positive
☐ Negative	☐ Negative

9. Would you say the number of people who are now participating in this activity are:

too many ☐ too few ☐ just the right number ☐

WES Form 2159
February, 1979

10. a) Would you say that the distance between you and other people is:

too far ☐ (to 10c) just right ☐ (to 10c) too close ☐

(Actual or estimated distance to be recorded by interviewer _____)

b) If other people are too close, how far away would you like them to be? ☐ Not Applicable

just a little farther ☐ twice as far ☐ three times farther ☐ more than 3 times ☐

c) What is the closest distance you would accept? _____.

d) What distance would you like them to be? _____

11. a) Which of the following reasons are making your present activity at this location pleasant or unpleasant?

	Pleasant	Un-pleasant	Not Important	Does Not Apply
GENERAL REASONS				
1. Characteristics and behavior of other people	☐	☐	☐	☐
2. Distance from other people	☐	☐	☐	☐
3. Number of people in other visitor groups	☐	☐	☐	☐
4. Number and type of other activities occurring here	☐	☐	☐	☐
5. Fees charged	☐	☐	☐	☐
6. Scenic views	☐	☐	☐	☐
7. Noise	☐	☐	☐	☐
8. Accidents or near accidents	☐	☐	☐	☐
9. Enforcement of rules/regulations	☐	☐	☐	☐
10. Car parking facilities	☐	☐	☐	☐
11. Theft	☐	☐	☐	☐
12. Vandalism	☐	☐	☐	☐
Others _____	☐	☐	☐	☐
_____				
LAND-BASED REASONS				
13. Trees/natural landscape	☐	☐	☐	☐
14. Visual privacy from other people	☐	☐	☐	☐
15. Amount of facilities (restrooms, water, etc.)	☐	☐	☐	☐
16. Convenience to facilities (restrooms, water, etc.)	☐	☐	☐	☐
17. Nearness to the water body	☐	☐	☐	☐
18. Steepness of slopes	☐	☐	☐	☐
19. Maintenance of facilities	☐	☐	☐	☐
20. Condition of trees and landscape	☐	☐	☐	☐
21. Condition of grass or soil	☐	☐	☐	☐
Others _____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
WATER-BASED REASONS				
22. Water quality	☐	☐	☐	☐
23. Catching fish	☐	☐	☐	☐
24. Formal designation of places for your activity	☐	☐	☐	☐
25. Waiting time to launch boat	☐	☐	☐	☐
26. Waiting time to retrieve boat	☐	☐	☐	☐
27. People in areas they shouldn't be	☐	☐	☐	☐
Others _____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

b) Will any of the above reasons prevent you from coming here again?

No ☐ Yes ☐

If yes, which reasons (selected from reasons checked "unpleasant" above)?

_____ _____ _____

_____ _____ _____

12. If recreation areas have too many people for each to enjoy the activity or if areas become damaged by too much use, there are some solutions for reducing that overcrowding or overuse. Please indicate which of the following possible solutions you would find very acceptable, mildly acceptable, or unacceptable for reducing crowding and/or natural resource destruction in this location. (If this location is not overcrowded or overused, assume that it is for this question.)

POSSIBLE SOLUTIONS FOR OVERCROWDING OR OVERUSE	Very Acceptable	Mildly Acceptable	Unacceptable	Does Not Apply
PUBLIC AWARENESS/EASE OF ACCESS SOLUTIONS				
1. Make vehicle access to areas less convenient.	☐	☐	☐	☐
2. Make the area's existence less obvious to the general public (fewer signs and directions)	☐	☐	☐	☐
3. Provide more and better information on how to use the area	☐	☐	☐	☐
ACTIVITY RELATIONSHIPS & USE DENSITY				
4. Keep major recreation activities more separated from one another.	☐	☐	☐	☐
5. Reduce the number of different activities occurring in the same area	☐	☐	☐	☐
6. Design for greater distance between people	☐	☐	☐	☐
7. Limit the number of people in each group	☐	☐	☐	☐
8. Change natural surfaces by hardening them to withstand more use.	☐	☐	☐	☐
9. Increase maintenance and restoration to allow more use	☐	☐	☐	☐
PLANNING & DESIGN SOLUTIONS				
10. Reduce the type and number of facilities and services provided	☐	☐	☐	☐
11. Keep unnecessary vehicles out of areas	☐	☐	☐	☐
12. Reduce number of parking spaces to limit number of users	☐	☐	☐	☐
13. Provide landscaped buffers between visitor groups to increase privacy	☐	☐	☐	☐
14. Redesign area to accommodate fewer users	☐	☐	☐	☐
RULES & REGULATIONS SOLUTIONS				
15. Have stricter enforcement of regulations	☐	☐	☐	☐
16. Impose more rules and regulations	☐	☐	☐	☐
17. Require prior reservations to use areas.	☐	☐	☐	☐
18. Require permits to use areas	☐	☐	☐	☐
19. Close down areas when natural resource destruction reaches critical point	☐	☐	☐	☐
20. Charge fees or increase fees now charged	☐	☐	☐	☐
21. Close gates when areas get "too full".	☐	☐	☐	☐
OTHERS				
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

13. Please answer the following questions about your other recreation activities on this visit.

	a) What are your other recreation activities on this visit?	b) Are they within walking distance or driving distance from this location? (use launching location for boat activities) (1) Walking distance	(2) Driving distance	c) What is your main recreation activity on this visit?
1.	Camping	☐	☐	☐
2.	Boating	☐	☐	☐
3.	Waterskiing	☐	☐	☐
4.	Swimming	☐	☐	☐
5.	Sunbathing	☐	☐	☐
6.	Picnicking	☐	☐	☐
7.	Shoreline fishing	☐	☐	☐
8.	Boat fishing	☐	☐	☐
9.	Hiking	☐	☐	☐
10.	Horseback riding	☐	☐	☐
11.	Off-road vehicle riding	☐	☐	☐
12.	_____	☐	☐	☐
13.	_____	☐	☐	☐
14.	_____	☐	☐	☐
15.	_____	☐	☐	☐
16.	None	☐	☐	☐

RECREATION EQUIPMENT RECORD

Camping

- ☐ Tent
- ☐ Tent camper
- ☐ Truck-mounted camper
- ☐ Travel trailer
- ☐ Van
- ☐ Motor home
- ☐ _____
- ☐ _____

Boat Activities

- ☐ Day sailer
- ☐ Sailer (cabin)
- ☐ Canoe
- ☐ Row boat
- ☐ Power boat (less than 25 hp)
- ☐ Power boat (25+ hp)
- ☐ Houseboat or cruiser
- ☐ _____
- ☐ _____

Off-Road Vehicle Riding

- ☐ Trail bike
- ☐ Motorcycle
- ☐ ATV
- ☐ Dune buggy
- ☐ 4-wheel drive
- ☐ _____
- ☐ _____

COMMENTS:

REPLACEMENT QUESTIONS TO ASK DURING BOAT LAUNCHING INTERVIEWS

(Write answers and comments directly on the User Survey Interview Sheet)

10. a) Would you say that the time it takes you to launch your boat at this ramp is:

too long ☐ long, but tolerable ☐ just right ☐

(Approximately how long does it take to launch your boat at this ramp? Actual or estimated time to be recorded by interviewer _____)

b) How long would yo prefer it to take:

just a little faster ☐ twice as fast ☐ three times faster ☐ more than three times faster ☐

c) What could be done to expedite boat launching at this ramp:

_____

_____

_____

APPENDIX C: PROJECT AREA DESCRIPTION

Somerville

Location

Somerville Lake (Fort Worth District) is located on the Yegua Creek 20 river miles upstream from its confluence with the Brazos River. Bryan, Texas is about 26 miles northeast of the dam; Houston is about 88 miles to the southeast; and Dallas is approximately 205 miles to the northeast.

Authorization and purpose

The Somerville Lake Project was authorized by the Flood Control Act of 3 September 1954, for the purposes of flood control and water conservation.

Project area size and features

The watershed area above the dam covers approximately 1320 square miles. The average recreational lake has a surface area of 9700 acres and there are 20,396 acres of project lands.

The recreational lake is approximately 8-1/2 miles long and 1-1/2 miles in width. The irregular 72-mile shoreline is the result of the swales and stream valleys which were inundated.

The shoreline has few steep or high banks. However, due to the thick vegetation which exists around the lake, access to the water is usually gained at the designated boat launching ramps.

Corps employees assigned to the project area include a Resource Manager, Head Ranger, Maintenance Foreman, several patrolling rangers, and clerical and maintenance personnel. Gate attendance and many maintenance services (such as vehicle maintenance) are carried out on a contract basis.

Topography

The topography of the reservoir area is characterized by undulating lands with wide valleys and moderate slopes.

Climate

Somerville Lake is in a moderately humid region. The climate is generally mild, with hot summers and cool winters. Normal temperatures range from the upper 90 degrees F. in summer to the lower 40 degrees F.

during the winter months, and the mean annual temperature is about 68 degrees F. Freezing temperatures are experienced occasionally though are usually of short duration. Precipitation over the watershed consists of 36 inches of rain annually, with one inch of snow. Prevailing winds are from the south at 11 mph in the summer and at 13 mph in the winter. While 65 percent of the days throughout the year are sunny, 72 percent of summer days are sunny.

Soils and vegetation

Vegetation in the project area consists of 33 percent heavily wooded areas, 35 percent sparsely wooded, and 32 percent old pasture growth. Tree cover consists mostly of oaks and hollies. During dry seasons much of the lakebed is above water, exhibiting lake-associated vegetation.

Fish and wildlife

The predominant species of game fish caught are bass, crappie, and catfish. An active fish management program is in operation at the lake.

Abundant wildlife is found on the project land with many deer, squirrels, wolves, beaver, and various other species of mammals, waterfowl, and birds located throughout the area.

Population areas
served and accessibility

Although the area surrounding the lake is predominantly rural, almost 5,000,000 persons live within a 100-mile radius of the lake.

State Highway 36 is the main road serving the Town of Somerville. This highway crosses Yegua Creek less than a mile downstream from the damsite. Access to the project lands is available over existing improved and unimproved county roads.

Recreation areas

The Corps manages seven recreational areas, two of which are undeveloped. The five developed areas encompass approximately 2000 acres and include: camping, picnicking, boating, marina slips, waterskiing, swimming, shore and boat fishing, and hunting of waterfowl. Opportunities also exist for observation and photography of the landscape and indigenous

flora and fauna. Some of the Corps support facilities include comfort stations, showers, boat launching ramps, sanitary dumping stations, and electrical and water hook-ups at the campgrounds. The State of Texas operates two parks at the lake, Birch Creek and Nails Creek, which generally provide for the same types of activities as the Corps areas.

Visitation

Project visitation for 1978 was 2,485,200 recreation days. The month of highest attendance was May with 369,700 recreation days.

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Urban Research & Development Corporation.
Recreation carrying capacity facts and considerations; Report 10: Somerville Lake Project Area / by Urban Research and Development Corporation, Bethlehem, Pa. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1980.
iv, 85, [25] p. : ill. ; 27 cm. (Miscellaneous paper - U. S. Army Engineer Waterways Experiment Station ; R-80-1, Report 10)
Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under Contract No. DACW39-78-C-0096.
Project map of Somerville Lake in pocket at end of report.

1. Carrying capacity. 2. Monitoring. 3. Overcrowding. 4. Recreation. 5. Recreation resource planning. 6. Recreational areas. 7. Recreational facilities. 8. Somerville Lake Project. 9. Utilization. I. United States. Army. Corps of Engineers. II. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Miscellaneous paper ; R-80-1, Report 10.
TA7.W34m no.R-80-1 Report 10