MISCELLANEOUS PAPER R-80-1

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
Report 3: Hartwell Lake Project Area	Jul 1980
Report 4: Lake Ouachita Project Area	Jul 1980
Report 5: Lake Shelbyville Project Area	Jul 1980
Report 6: McNary Lock and Dam, Lake Wallula Project Area	Jul 1980
Report 7: Milford Lake Project Area	Jul 1980
Report 8: New Hogan Lake Project Area	Jul 1980
Report 9: Shenango River Lake Project Area	Jul 1980
Report 10: Somerville Lake Project Area	Jul 1980
Report 11: Surry Mountain Lake Project Area	Jul 1980

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A project map of Surry Mountain Lake is enclosed in an envelope attached inside the back cover of this report.

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Carrying capacity	Recreation resource planning	Utilization
Monitoring	Recreational areas	
Overcrowding	Recreational facilities	
Recreation	Surry Mountain 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 Surry Mountain Lake Project. The information is based upon: 1) user and management surveys conducted at Surry Mountain Lake, and 2) 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 Surry Mountain 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 $K = (5/9)(F - 32) + 273.15$.

PART 1: INTRODUCTION

RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

SURRY MOUNTAIN LAKE PROJECT AREA

PART 1: INTRODUCTION

This Report

Purpose

This report, prepared as the eleventh in a series of 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 Surry Mountain Lake Project Area, which is not included in the Technical Report. The information is based upon: 1) the user and management surveys conducted at Surry Mountain, 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 on December 12-14, 1978 and the User Survey conducted on July 20-22, 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 Surry Mountain. 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*

Surry Mountain Reservoir** is located five miles north of the city of Keene, New Hampshire. The smallest project area visited, Surry Mountain provides a different basis for examination of carrying capacity. Authorized for the purpose of flood control, it serves as a recreation area for residents of southern New Hampshire. Surry is reportedly representative of most New England Corps project areas.

The pool is 260 acres§ at the lake's normal recreational elevation of 500 feet msl. The reservoir extends one mile up the Ashuelot River, averages one-half mile wide and six feet deep, and covers four shoreline miles. The topography of the area is characterized by hilly land with moderate relief. About one-third of the project's lands are woodlands. The climate of the area is variable with a mean annual temperature of 45°F and the mean annual precipitation is about 40 inches, uniformly distributed throughout the seasons. The average annual snowfall is about 60 inches.

The project area is readily accessible over a network of paved roads and interstate highways. In 1978, 229,711 recreation days of visitation were recorded at Surry Mountain Lake.

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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 iii.

PART 2: SURVEY FINDINGS BY ACTIVITY

SUNBATHING/SWIMMING

Orientation

Sunbathing and swimming is conducted primarily at the beach of the Surry Mountain Day Use Area. The beach is approximately 100 feet deep and 800 feet long and has a sand surface. Behind the beach is a large grass area which is popular for sunbathing.

Picnic tables are located near the beach, together with restrooms and a change house. The main parking area is within 200 yards of all sections of the beach.

The remaining findings of this section are based on the User Survey. The User Survey obtained 45 responses from sunbathers and swimmers at the Surry Mountain Day Use Area.

User characteristics

Table 1 indicates the characteristics of the sunbathers and swimmers surveyed at Surry. The characteristics of the sunbathers and swimmers surveyed at Surry were not significantly different from those surveyed at other study project areas.

Table 1

Sunbather/Swimmer Characteristics

Age	Percent of Sunbathers/Swimmers
<18	12
18 - 25	28
26 - 40	42
41 - 55	9
56 - 65	7
>65	2

Group Size	Percent of Sunbathers/Swimmers
1	13
2	33
3 - 4	24
5 - 8	24
9 - 12	0
>12	4

Travel Time to Project Area	Percent of Sunbathers/Swimmers
<15 minutes	58
15 - 30 minutes	13
30 - 60 minutes	4
1 - 2 hours	18
2 - 3 hours	0
3 - 5 hours	4
>5 hours	2

Visit Duration	Percent of Sunbathers/Swimmers
1 - 4 hours	49
5 - 8 hours	33
1 day	2
2 days	9
3 days	0
4 days	0
5 - 7 days	2
>7 days	4

No. of Other Activities	Percent of Sunbathers/Swimmers
0	0
1	47
2	29
3	20
4	4
5	0
6	0
>6	0

User opinions

Spacing preferences - Tables 2 and 3 indicate the spacing that sunbathers and swimmers surveyed at Surry and elsewhere prefer.

The spacing preferences of the sunbathers surveyed at Surry are very similar to those of the total survey sample. Swimmers surveyed at Surry prefer closer spacing more frequently than the total survey sample.

Table 2

Preferred Distance Responses*
Sunbathing/Swimming

Sample	Sample Size	Range	Mean	Median	Mode
All Sunbathers surveyed	161	3- a	30	20	15, 20
Surry	26	5-75	21	20	20
All Swimmers surveyed	120	2-200	25	20	20
Surry	16	10- 25	17	15	20

*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] (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%
Surry	96%	27%	42%	15%	15%
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%
Surry	100%	44%	31%	25%	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 4 indicates the impact that different factors had on making the sunbathing and swimming experiences pleasant or unpleasant for users at Surry. These users generally found their experience to be pleasant. Water quality was the factor which was unpleasant most frequently, and seems to be a concern of significant proportions. One user responded that she would not return to Surry because of the water quality.

Tables 5 and 6 indicate the positive and negative changes that sunbathers and swimmers reported on the physical condition and people's use of the area from their previous visit.

Table 5

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

Area	Positive Changes	Negative Changes
Surry Mt. Day Use Area	"Playground Equipment"(3) "More Sand" (3) "Better Maintenance" (3) "Better Developed" (2)	"Water Quality" (1) "Trees Exposed" (1)

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

Table 6

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

Area	Positive Changes	Negative Changes
Surry Mt. Day Use Area	"More Families" (1) "Variety of Users" (1) "Better Security" (1) "Less Littering" (1) "More People" (1)	"More Crowded" (5)

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

Table 4

Reasons Making Recreation Experience Pleasant or Unpleasant--Sunbathing/Swimming
Surry Mountain Lake

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons Characteristics and behavior of other people	93%	4%	2%
Distance from other people	93	2	4
Number of people in other visitor groups	82	-	8
Number and type of other activities occurring here	91	-	7
Scenic views	100	-	-
Noise	91	2	4
Accidents or near accidents	96	-	2
Enforcement of rules/regulations	91	4	4
Car parking facilities	96	-	-
Theft	96	4	-
Vandalism	98	-	-
Land-Based Reasons Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	98	2	-
Maintenance of facilities	89	11	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	89	11	-
Water-Based Reasons Water quality	42	58	-
Formal designation of places for your activity	96	-	-
People in areas they shouldn't be	78	4	9

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

Acceptability of techniques - Table 7 indicates the acceptability of different techniques to the sunbathers and swimmers surveyed at Surry. The acceptability of most techniques is very clear: over 60 percent of the respondents agreed on one of the three levels of acceptability for 11 of the 18 techniques. However, even for those techniques which were acceptable to most respondents, between 0 percent and 36 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 7

User Acceptability of Techniques--Sunbathing/Swimming
Surry Mountain Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	84%	7%	9%
Make vehicle access to areas less convenient	11	20	69
Make area's existence less obvious	22	7	71
Site Planning Techniques			
Redesign area to accommodate fewer users	36	16	23
Design for greater distance between people	23	4	5
Reduce number of parking spaces	24	18	59
Management Techniques			
Procedures:			
Require permits	11	18	71
Charge/increase fees	11	18	71
Rules and Regulations:			
Impose more rules	11	29	58
Provide stricter enforcement of rules	40	24	36
Close areas when natural resource destruction reaches critical point	98	2	-
Close areas when they become "too full"	71	13	16
Reduce number of activities in same area	38	9	53
Limit number of people in visitor groups	-	5	89
Keep unnecessary vehicles out	91	7	2
Services:			
Provide more and better information	73	18	9
Increase maintenance and restoration	48	2	4
Reduce facilities and services	7	4	87

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

PICNICKING

Orientation

Picnicking is conducted primarily at the Surry Mountain Day Use Area, although several tables are also provided at the east end of the dam. The three areas in the Day Use Area where surveys were obtained provide a variety of picnicking environments: the beach area provides for use in an open, mixed use area with immediate access to the water; the Point area provides for use in a wooded picnic area with access to the water; and the Upper area provides for use in a heavily wooded area, removed from the water and other activities.

All of the tables at Surry Mountain are movable, which allows for users to space themselves. Non-movable grills are also provided. Accessibility to restrooms has been a problem at the Upper and Point areas, but this should be remedied by the development of a new facility at the north end of the Day Use Area.

The remainder of the findings in this section are based on the User Survey. This survey obtained 32 responses from picnickers at three sections of the Day Use Area (the beach, the point, and the upper picnic areas).

User characteristics

Table 8 indicates the characteristics of the picnickers surveyed at Surry. The most significant differences in the characteristics of the picnickers surveyed at Surry from those surveyed at other study project areas are in their travel times.

Table 8

Picnicker Characteristics

Age	Percent of Picnickers
<18	0
18 - 25	12**
26 - 40	44
41 - 55	28
56 - 65	6*
>65	9*

Group Size	Percent of Picnickers
1	3
2	9
3 - 4	31
5 - 8	41
9 - 12	9
>12	6

Travel Time to Project Area	Percent of Picnickers
<15 minutes	38*
15 - 30 minutes	34
30 - 60 minutes	22
1 - 2 hours	3**
2 - 3 hours	3**
3 - 5 hours	0
>5 hours	0

Visit Duration	Percent of Picnickers
1 - 4 hours	50
5 - 8 hours	44
1 day	3
2 days	3
3 days	0
4 days	0
5 - 7 days	0
>7 days	0

No. of Other Activities	Percent of Picnickers
0	25
1	3
2	56
3	12
4	0
5	3
6	0
>6	0

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

User opinions

Spacing preferences - Tables 9 and 10 indicate the spacing that picnickers surveyed at Surry and elsewhere prefer.

Table 9

Preferred Distance Responses*
Picnicking

Sample	Sample Size	Range	Mean	Median	Mode
All Picnickers Surveyed	190	1 - a	62	50	50
Surry	30	15 -100	51	50	50
Beach	6	20 - 75	42	20	20
Point	15	15 -100	55	50	50
Upper	9	20 -100	48	50	20,60

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

Table 10

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%
Surry	97	27	40	27	7
Beach	100	50	17	33	0
Point	94	13	53	27	7
Upper	100	33	33	22	11

*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 picnickers surveyed at Surry tend to prefer closer spacing more frequently than the total survey sample. The variation in the spacing preferences of picnickers in the three different areas indicates how site characteristics can influence the spacing preferences of users within one day-use area.

Reasons for pleasant/unpleasant experience - Tables 11, 12, and 13 indicate the impact that different factors had on making the picnicking experience pleasant or unpleasant for users at the three areas surveyed. The responses of the picnickers surveyed vary from one area to another. Picnickers at the Beach Area found their experience to be generally the most pleasant, followed by those at the Upper Area, and those at the Point Area. No factor was unpleasant enough to cause a picnicker to indicate that he would not return. The number of other activities was the only factor which made the experience of picnickers at the Beach Area unpleasant. Car parking facilities and the amount/convenience of facilities were the only factors which made the experience at the Upper Area unpleasant. The water quality and the convenience of facilities were the only factors which made the experience at the Point Area unpleasant in a significant number of cases.

Tables 14 and 15 indicate the changes in the physical conditions and people's use of the areas reported by picnickers from their previous visit.

Table 11

Reasons Making Recreation Experience Pleasant or Unpleasant--Picnicking Beach Area

	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons Characteristics and behavior of other people	67%	-	33%
Distance from other people	83	-	17
Number of people in other visitor groups	67	-	33
Number and type of other activities occurring here	50	17%	33
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	83	-	-
Enforcement of rules/regulations	83	-	-
Car parking facilities	83	-	-
Theft	83	-	-
Vandalism	83	-	-
Land-Based Reasons Visual privacy from other people	83	-	17
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Nearness to the water body	100	-	-
Steepness of slopes	83	-	17
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 12

Reasons Making Recreation Experience Pleasant or Unpleasant--Picnicking Point Area

	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons Characteristics and behavior of other people	93%	-	7%
Distance from other people	100	-	-
Number of people in other visitor groups	93	-	7
Number and type of other activities occurring here	93	7%	-
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	93	7	-
Car parking facilities	100	-	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons Visual privacy from other people	93	-	7
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	80	20	-
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	93	7	-
Water-Based Reasons Water quality	33	66	-

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

Table 13

Reasons Making Recreation Experience Pleasant or Unpleasant--Picnicking
Upper Area

	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	80	20%	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons Visual privacy from other people	100	-	-
Amount of facilities (restrooms, water, etc.)	70	30	-
Convenience to facilities (restrooms, water, etc.)	90	10	-
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	50	-	-

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

Table 14

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

Area	Positive Changes	Negative Changes
Beach Area	"Better Maintenance" (1)	(None mentioned)
Point Area	"Better Maintenance" (2) "New Parking Area" (2) "New Beach" (2) "New Facilities" (2) "Better Signs" (1)	(None mentioned)
Upper Area	"Gate to Surry Closed" (1) "More Grills" (1) "More Tables" (1)	"Fewer Grills" (1) "Tables in Bad Condition" (1) "Insects" (1)

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

Table 15

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

Area	Positive Changes	Negative Changes
Beach Area	(None Mentioned)	"More Crowded" (1)
Point Area	"Local Users" (1) "More People" (1)	"More Outsiders" (1) "More Kids" (1)
Upper Area	(None Mentioned)	"More Crowded" (1) "Use of Area by Non-picnickers" (1)

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

Acceptability of techniques - Table 16 indicates the acceptability of different techniques to the picnickers surveyed at Surry. The acceptability of most techniques is very clear: over 60 percent of the respondents agreed on one of the three levels of acceptability for 15 of the 22 techniques. However, even for those techniques which were acceptable to most respondents, up to 48 percent responded that these techniques were unacceptable. Thus, project managers should expect some expression of opposition to any technique which they employ.

Table 16

User Acceptability of Techniques--Picnicking
Surry Mountain Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	78%	19%	3%
Make vehicle access to areas less convenient	6	22	69
Make area's existence less obvious	25	13	63
Site Planning Techniques			
Redesign area to accommodate fewer users	40	33	27
Design for greater distance between people	74	19	6
Reduce number of parking spaces	31	19	48
Change natural surface by paving	50	22	28
Provide landscaped buffers	28	31	41
Management Techniques			
Procedures:			
Require prior reservations	6	13	81
Require permits	9	16	75
Charge/increase fees	16	19	66
Rules and Regulations:			
Impose more rules	9	19	72
Provide stricter enforcement of rules	26	26	48
Close areas when natural resource destruction reaches critical point	88	13	-
Close areas when they become "too full"	81	9	9
Reduce number of activities in seam area	47	19	34
Limit number of people in visitor groups	9	16	75
Keep unnecessary vehicles out	84	13	3
Services:			
Provide more and better information	78	13	9
Increase maintenance and restoration	71	23	6
Reduce facilities and services	13	13	73

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

BOATING/WATERSKIING

Orientation

Because of the size of Surry Mountain Lake (265 acres at normal pool elevation), the opportunities for boating and waterskiing are limited. Project management has been successful in providing a well-balanced boating situation largely because they provide only one launching point. Parking spaces for 30 cars and boat trailers are provided at the launch ramp in the Day Use Area. A concessionaire has rented canoes and paddleboats, in the past but was not in operation during the Summer of 1979.

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

User characteristics

Table 17 indicates the characteristics of the boaters and waterskiers surveyed at Surry. The small sample size at Surry limits the usefulness of the boating/waterskiing data. The most significant differences in the characteristics of the boaters and waterskiers surveyed at Surry from those of other study project areas are: 1) the greater percentage of older and younger users, and 2) the shorter travel times.

Table 17

Boater/Waterskier Characteristics

Age	Percent of Boaters/Waterskiers	Group Size	Percent of Boaters/Waterskiers
<18	17*	1	0
18 - 25	33*	2	67*
26 - 40	0	3 - 4	17
41 - 55	17	5 - 8	17
56 - 65	33*	9 - 12	0
>65	0	>12	0

Travel Time to Project Area	Percent of Boaters/Waterskiers	Visit Duration	Percent of Boaters/Waterskiers
<15 minutes	50*	1 - 4 hours	83
15 - 30 minutes	50*	5 - 8 hours	17
30 - 60 minutes	0	1 day	0
1 - 2 hours	0	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 Boaters/Waterskiers
0	17
1	50*
2	17
3	17
4	0
5	0
6	0
>6	0

*Significantly higher than total survey sample.

User opinions

Spacing preferences - Tables 18 and 19 indicate the spacing that the boaters and waterskiers surveyed at Surry and elsewhere prefer.

Table 18

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Boaters Surveyed	135	30- a	531	300	300
Surry	3	100-300	233	300	300
All Waterskiers Surveyed	95	30- a	520	300	300
Surry	3	110-300	203	200	-

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

a - response of "alone" or "out of sight."

Table 19

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%
Surry	100%	33%	67%	0
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%
Surry	100%	33%	67%	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.

While the preferences of the boaters and waterskiers surveyed at Surry differ from elsewhere, these differences can largely be attributed to the small sample sizes at Surry. Spacing in the range of group C is greatly disfavored at Surry.

Reasons for pleasant/unpleasant experience - Table 20 indicates the impact that different factors had on making the boating/waterskiing experience pleasant or unpleasant for users at Surry. Boaters and waterskiers at Surry found their experience to be generally pleasant. People in areas they shouldn't be, enforcement of regulations, and water quality were the only factors which made the experience at Surry unpleasant. No factor was so unpleasant as to cause a boater or waterskier to indicate that he would not return. Tables 21 and 22 indicate the change in the physical conditions and people's use of the area reported by boaters and waterskiers from their previous visit.

Table 21

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

Area	Positive Changes	Negative Changes
Lake and Adjacent Areas	(None Mentioned)	"Dirtier Water" (1)

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 Boaters and Waterskiers

Area	Positive Changes	Negative Changes
Lake and Adjacent Areas	"More People" (1)	"Litter in Water" (3)

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

Table 20

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

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	50	-	17%
Number and type of other activities occurring here	100	-	-
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	67	33%	-
Car parking facilities	100	-	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	40	-	60
Convenience to facilities (restrooms, water, etc.)	40	-	60
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons			
Water quality	83	17	-
Formal designation of places for your activity	100	-	-
Waiting time to launch boat	100	-	-
People in areas they shouldn't be	50	50	-

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

Acceptability of techniques - Table 23 indicates the acceptability of different techniques to the boaters and waterskiers surveyed at Surry. 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 12 of the 19 techniques. However, even for those techniques which were acceptable to most respondents, up to 33 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--Boating/Waterskiing
Surry Mountain Lake

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	83%	-	17%
Make vehicle access to areas less convenient	17	50%	33
Make area's existence less obvious	-	17	83
Site Planning Techniques			
Design for greater distance between people	20	20	60
Reduce number of parking spaces	67	17	17
Management Techniques			
Procedures:			
Require prior reservations	-	50	33
Require permits	17	50	17
Charge/increase fees	-	50	33
Rules and Regulations:			
Impose more rules	50	-	33
Provide stricter enforcement of rules	50	-	33
Close areas when natural resource destruction reaches critical point	100	-	-
Close areas when they become "too full"	100	-	-
Reduce number of activities in same area	-	-	100
Keep unnecessary vehicles out	83	17	-
Services:			
Provide more and better information	33	67	-
Increase maintenance and restoration	33	17	50
Reduce facilities and services	17	-	83

*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 the Surry Mountain Day Use Area. The 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 24 may not be practical or possible because of management, budget, or other constraints.

Table 24

Analysis of Selected Problems/Situations

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Lake	The lake is well-balanced but at the threshold of being overcrowded.	o Monitor boater use levels to identify when overcrowding problems begin. o Continue to provide only one launching ramp at the lake & don't enlarge the existing parking lot at the ramp for boat trailers. o Continue to place limits on the number of boats the rental concession can let out on the lake at one time. o If overcrowding becomes a problem, consider zoning the lake for non-power & limited-power boats only. o Make users aware of their role in making the boating experience more enjoyable to users.

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Power boaters/ swimmers	Swimmer/boater conflicts in the vicinity of the swimming beach; people cut float line.	o Adopt & enforce more stringent regulations (e.g. power boats shall stay 100 yds. from shore) o Try the idea of using anchor buoys rather than float lines to keep boats out rather than swimmers in; this would be more visible to boaters and more difficult to vandalize.
Upper Picnic Area	In the past overuse resulted from vehicles driving within the area.	o Now that vehicle circulation is controlled, restoration efforts such as reseeding, impact sites, hardening with wood chips, etc., should begin. o Monitor the area to determine whether the overuse problem has been solved.
Beach and Point Picnic Areas	Overcrowding observed and reported during the User Survey.	o Determine social capacity of these areas. o Place only the appropriate number of picnic tables in these areas--initially at the beginning of recreation season. o It may be necessary to periodically move some tables out of these areas during the season.
Point Picnic Area	Overuse--soil erosion/exposed tree roots.	o Encourage use in other areas to limit use of this area. o Consider the potential for site hardening and provide agressive maintenance and restoration.

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Surry Mt. Day Use Area	When to close the gate to the Surry Mountain Day Use Area.	o Determine the social capacity of the day use area & increase or decrease parking lot size accordingly; close gate when there is no more parking space.[1] o Make adjustments, i.e. should be lower is resource capacity is lower than social capacity. o Determine the parking capacity based on the areas carrying capacity. o Increase or reduce the number of parking spaces at the day use area. o Close the gate when parking lots get filled. o Allow cars in as other cars leave. o Monitor use levels and impacts and refine carrying capacity.

[1]NOTE: See related demonstration in Technical Report for an example.

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							

Picnicking

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

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			Approximate Dates of Recreation season (_____ to _____)	When signs of degradation first occur		When highest degradation is reached	
	Recovers naturally	Requires treatment	Beyond off-season restoration		Approx. date	Approx. visitor groups to date	Approx. date	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

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		

Picnicking

9. PRESENT/PAST CAPACITY MANAGEMENT

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

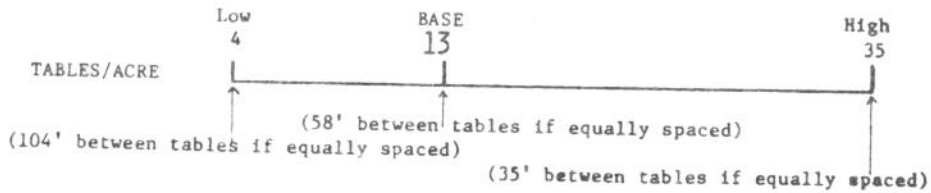
10. POSSIBLE CARRYING CAPACITIES

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:			

B11

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			
		Presenqe of informal roads			
SLOPES & GETATION	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 G - good U - undesirable	Severely obstructed		
			Moderately obstructed		
			Mildly obstructed		
			Unobstructed		
		Visibility to other natural areas			
		(insert) O - outstanding G - good U - undesirable	Severely obstructed		
			Moderately obstructed		
			Mildly obstructed		
			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			
CILITIES & ERVICES	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			
LANNING DESIGN SPECTS	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 area name	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 ☐

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 you 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

Surry Mountain

Location

The Surry Mountain Reservoir (New England Division) is located in the town of Surry, New Hampshire. The damsite is about five miles north of the City of Keene.

Authorization and purpose

The Surry Mountain Reservoir Project was authorized by the Flood Control Act of 28 June 1938 for the purpose of flood control.

Project area size and features

The dam controls a watershed area of 100 square miles and has storage capacity for 32,615 acre-feet of flood waters. At the lake's normal recreational elevation of 500 feet msl, 260 acres of water are contained by the dam. Surry Reservoir extends one mile up the Ashuelot River and averages one half mile wide and six feet deep. The lake has an average depth of six feet with a maximum depth of 15 feet at the damsite.

At normal lake level, the project area contains 1428 acres of land. Less than four percent of the land area is taken up by project structures and roads; the remaining territory is woodland, open land or pasture land.

Corps of Engineers personnel at the project area consists of a Project Manager, an Assistant Manager, park rangers, and maintenance people. Maintenance items such as trash pick-up and grass mowing are carried out by project area maintenance people.

Topography

The topography of the area is characterized by hilly land with moderate relief. The general vicinity of the reservoir is marked by a river valley about 2000 feet in width. The walls of the valley are comparatively steep, rising to as much as 1000 feet above the floor.

Climate

The climate of the area is variable with a mean annual temperature of 45 degrees F. The average monthly temperatures vary from about 70 degrees F. in July to about 20 degrees F. in January. The mean annual precipitation is about 40 inches and is uniformly distributed throughout the seasons. The average annual snowfall is about 60 inches.

Soils and vegetation

About one-third of the federally-owned lands are covered with woodland stands of varying ages and densities of hardwoods, softwoods, and mixed stands of hardwoods and softwoods. There are some pure stands of white pine and conifers. A sizeable area of open marsh exists at the northern end of the lake, with many grassy areas interspersed with coves and inlets. A number of fields used for pasture and growing of hay are also in the northern portion of the project.

Fish and wildlife

The Ashuelot River and Surry Mountain Lake provide good game fishing, with the major species being pickerel, bullhead, and bass.

Waterfowl are found in the reservoir, although not in significant numbers. Each year more waterfowl are seen. Deer, racoon, squirrel, fox, and wild turkey also range the site.

Population areas served and accessibility

Within the approximate 50-mile zone of influence from the lake are the cities of Keene, Claremont, Concord, Manchester, and Nashua in New Hampshire, Brattleboro in Vermont, and Fitchburg and Leominster in Massachusetts. The heavily populated states of Massachusetts, Rhode Island, and Connecticut are within day use distance. During the summer season, the year-round population is significantly increased by many seasonal and second home residents.

The project area is readily accessible over a network of paved roads and interstate highways. New Hampshire Route 12A runs along the western edge of the reservoir and provide ready access to the lake. A 30-foot paved road across the top of the dam provides access to the east abutment where there is a picnic and parking area. Access along

the eastern edge of the reservoir is limited to foot travel.

Recreation areas

The Corps maintains two recreation areas at the project. One is a picnic site at the eastern end of the dam with tables and fireplaces. Due to steep slopes on the outer edges of the reservoir, development is limited along almost the entire eastern shore. The other recreation area is located about 2000 feet upstream from the dam on the western shore. This recreation area is a day use area with a gently sloping sandy beach. Facilities here include picnic tables, fireplaces, a boat launching ramp, a change house for swimmers, and a toilet. This area is inundated from late winter to early spring each year. The scenic, rustic setting of the reservoir lends itself to day use recreation: swimming, picnicking, fishing, boating, hiking, snowmobiling, cross-country skiing, and group activities.

Facilities on land leased from the Corps include a pistol range operated by the City of Keene and a private archery course. A camping area which is privately developed and operated is located about 800 feet south of the day use area.

Visitation

In 1978, 229,711 recreation days were recorded at Surry Mountain Lake. July was the most popular month for recreaters, having 66,831 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 11: Surry Mountain 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.
iii, 43, [25] p. : ill. ; 27 cm. (Miscellaneous paper - U. S. Army Engineer Waterways Experiment Station ; R-80-1, Report 11)
Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under Contract No. DACW39-78-C-0096.
Project map of Surry Mountain 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. Surry Mountain 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 11.
TA7.W34m no.R-80-1 Report 11