

THE PERCEPTION OF WILDERNESS  
RECREATION CARRYING CAPACITY:  
A GEOGRAPHIC STUDY IN  
NATURAL RESOURCES MANAGEMENT

THESIS FOR THE DEGREE OF P.H.D.

MICHIGAN STATE UNIVERSITY

GEORGE HENRY STANKEY

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This is to certify that the

thesis entitled

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presented by

George Henry Stankey

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of the requirements for

Ph.D. degree in Geography

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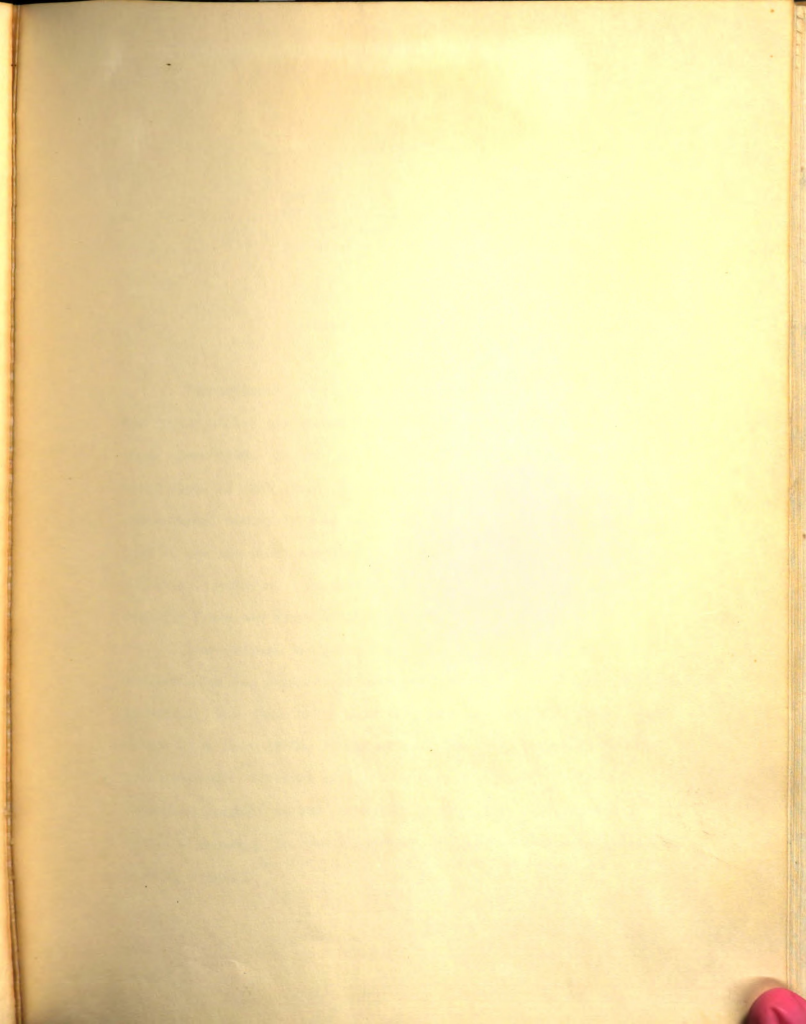
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ABSTRACT

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RECREATION CAPACITY  
A GEOGRAPHIC STUDY  
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By

George Henry Smith

Recreational use of Federally owned lands in the United States has probably been increasing exponentially ever since 1946. In this same period, wilderness designations of such areas has expanded the number of such recreational entity by only 3 per cent. As the popularity of use has risen sharply, threatening wilderness and its aesthetic objectives. The crucial question of wilderness carrying capacity forms the focus of this study.

Recreational use in four National Forest wildernesses was examined--the Bob Marshall Wilderness in Montana, the Bridger Wilderness in Wyoming, the High Uintas Primitive Area in Utah, and the Boundary Waters Canoe Area (BWCA) in Minnesota. The study sought to define what parameters visitors utilized to define capacity, what spatial variations existed in the perception of capacity, the geographic extent of crowding in each wilderness, and what measures to increase capacity existed.

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By

George Henry Stankey

Recreational use of Federally designated wilderness areas in the United States has probably been increasing nearly 10 per cent per annum since 1946. In this same period, administrative and legislative designation of such areas has expanded the acreage of this type of recreational entity by only 3 per cent. At many locations, the intensity of use has risen sharply, threatening wilderness preservation and esthetic objectives. The crucial question of wilderness carrying capacity forms the focus of this study.

Recreational use in four National Forest wildernesses was examined--the Bob Marshall Wilderness in Montana, the Bridger Wilderness in Wyoming, the High Uintas Primitive Area in Utah, and the Boundary Waters Canoe Area (BWCA) in Minnesota. The study sought to define what parameters visitors utilized to define capacity, what spatial variations existed in the perception of capacity, the geographic extent of crowding in each wilderness, and what measures to increase capacity existed.

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Nearly 500 visitors were sampled. Respondents were classified as to the extent they held "purist" attitudes about the wilderness, a procedure accomplished by use of an attitude scale. Those most demanding in their attitudes toward wilderness were labeled "strong purists."

Substantial areal variations were found among the study areas in the user's perception of carrying capacity. These variations were found to be related to differences in resource characteristics, situational aspects, level and type of present use, and cultural background of respondents.

Earlier published findings on the differential perception of wilderness were confirmed. Considerable discrepancy still exists between institutional goals and visitor objectives. Only 40 per cent of the sampled visitors were found to be seeking an experience coincident with institutional objectives.

Four aspects of carrying capacity were investigated: level of use encountered; type of use encountered; the location of the encounter; and depreciative behavior of users.

Type of use encountered was a more crucial aspect of capacity than level. Motor boats in the BWCA caused a sharp drop in satisfaction, especially for strong purists. Horseback use in the West adversely affected backpackers' and strong purists' satisfaction, but not to the extent motors affected canoeists in the BWCA. Large parties were an extraordinarily significant source of decreased quality for visitors in all areas.

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Greater tolerance was shown for encounters near the wilderness boundary than in the interior. Strong distinctions between encounters on the trail and at the campsite were made, with most favoring trail encounters.

No use control method was acceptable to a majority. A mail reservation system was the most acceptable and strong purists supported such a system more than others. Modifications in access or wilderness infrastructure were seen as more desirable means of controlling use. Zoning would be an important managerial step in the BWCA, separating canoeists and motor boats.

Use in all areas was poorly distributed and some zones in each wilderness were found to be used in excess of capacity. These generally correlated closely with ease of access and attractions, especially fishing, and in the BWCA, with motor use areas.

The definition of an area as crowded was linked to the average number of persons encountered both on the trail and at the campsite. Meeting two other groups on the trail or waterway generally appears to be the upper limit of use for a quality experience. Most favor no others near their campsite.

Twelve possible management techniques are suggested to increase capacity. The outline for a probabilistic model for estimating capacity is given, based upon the trade-off between allowing more visitors into an area and the impact of this on aggregate satisfaction. Through computer simulation, the use mixture that would maximize utility could be identified.

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As with all dissertations, a number of persons have provided invaluable assistance. The staff of administrators of the Ashley, Bridger, Flathead, Lewis and Clark, and Western National Forests provided considerable assistance in information and facilities for field personnel.

Field work was ably carried out by James Anderson, Dan Barnes, William Manning, and Sandra Thorne.

Mr. Dick Anderson of the School of Business at the University of Montana was especially helpful in the analysis stage. He developed the computer routine used in the study and helped work out numerous difficulties.

A THESIS

The secretarial staff of the Forestry Sciences Laboratory at Missoula, Montana, Submitted to  
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Dr. Dan Meier prepared the maps. Mrs. Susan Egan typed the final manuscript.

My wife, Jackie, Department of Geography job of translating my handwriting into the final rough draft. She also provided me with numerous comments and criticisms that helped considerably in revision.

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The secretarial staff of the Forestry Sciences Laboratory at Missoula, Montana, deserves mention for its assistance. Miss Elizabeth Toczek was particularly helpful, typing the review draft.

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Special thanks go to Ian Matley and Michael Chubb for their constructive advice throughout the dissertation. Constructive review comments were also received from Charles Cicchetti and John Krutilla of Resources for the Future.

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|                                                                                |    |
|--------------------------------------------------------------------------------|----|
| The Wilderness Act . . . . .                                                   | 14 |
| Recreational Use of Wilderness . . . . .                                       | 15 |
| The Wilderness Resource—Its Spatial Dimensions and Future . . . . .            | 21 |
| Study Objectives . . . . .                                                     | 30 |
| Chapter Outline . . . . .                                                      | 34 |
| II. THE CONCEPTS OF ENVIRONMENT AND CARRYING CAPACITY:                         |    |
| THE WILDERNESS CONTEXT . . . . .                                               | 37 |
| The Nature of Environment . . . . .                                            | 38 |
| The Concept of Carrying Capacity . . . . .                                     | 42 |
| Carrying Capacity Definitions in Man-Land Studies . . . . .                    | 43 |
| Sustained Yield and Carrying Capacity . . . . .                                | 47 |
| Wilderness Recreation Carrying Capacity . . . . .                              | 49 |
| The Concept of Wilderness Recreation Carrying Capacity . . . . .               | 57 |
| An Operational Definition of Wilderness Recreation Carrying Capacity . . . . . | 58 |

ix

THE DEVELOPMENT OF  
THE SPATIAL EXPRESSION

Introduction . . .

Wilderness: A Study

The Movement for

The Move to Land

Legislative Pro

The Wilderness

Recreational Use

The Wilderness: A

and Future . . .

Study Objective

Chapter Outline

THE CONCEPTS OF  
THE WILDERNESS

The Nature of

The Concept of

Carrying Cap

Sustained Vi

Wilderness Rec

The Concept

Carrying C

An Operational

Carrying Ca

# TABLE OF CONTENTS

| Chapter |                                                                                     | Page |
|---------|-------------------------------------------------------------------------------------|------|
| I.      | THE DEVELOPMENT OF THE WILDERNESS CONCEPT AND ITS SPATIAL EXPRESSION . . . . .      | 1    |
|         | Introduction . . . . .                                                              | 1    |
|         | Wilderness: A Study in the Definition of Resource . . .                             | 3    |
|         | The Movement for Preservation . . . . .                                             | 7    |
|         | The Move to Institutionalize Wilderness . . . . .                                   | 12   |
|         | Legislative Protection for Wilderness . . . . .                                     | 14   |
|         | The Wilderness Act . . . . .                                                        | 16   |
| IV.     | Recreational Use of Wilderness . . . . .                                            | 17   |
|         | The Wilderness Resource--Its Spatial Dimensions and Future . . . . .                | 21   |
|         | Study Objectives . . . . .                                                          | 30   |
|         | Chapter Outline . . . . .                                                           | 31   |
| II.     | THE CONCEPTS OF ENVIRONMENT AND CARRYING CAPACITY: THE WILDERNESS CONTEXT . . . . . | 33   |
|         | The Nature of Environment . . . . .                                                 | 35   |
|         | The Concept of Carrying Capacity . . . . .                                          | 42   |
|         | Carrying Capacity Definitions in Man-Land Studies . .                               | 42   |
|         | Sustained Yield and Carrying Capacity . . . . .                                     | 47   |
|         | Wilderness Recreation Carrying Capacity . . . . .                                   | 49   |
|         | The Concept of Wilderness Recreation Carrying Capacity . . . . .                    | 57   |
|         | An Operational Definition of Wilderness Recreation Carrying Capacity . . . . .      | 58   |

# THE AREA AND SITE

Study Area Select

The Characteris  
 Source Charac  
 Situational Cha

The Questionnaire

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 The "Parish" So  
 Administration

Sampling Procedure

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 Determination o  
 Sample Characte

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 QUALITY . . . . .

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The Dimension  
 The Impact of

Type of Use and

Previous Resea  
 Perceived App  
 Visitor Prefer  
 The Effects of  
 of Carrying

Use and Satisfac

Spatial Aspects

Relevant Rese  
 Peripheral Ve  
 The Campsite

Depreciative Be

Campsite Over  
 Littering .

Some Concluding

Wilderness G

| Chapter                                                                          | Page |
|----------------------------------------------------------------------------------|------|
| III. STUDY AREAS AND STRATEGIES . . . . .                                        | 63   |
| Study Area Selection . . . . .                                                   | 63   |
| Use Characteristics . . . . .                                                    | 64   |
| Resource Characteristics . . . . .                                               | 67   |
| Situational Characteristics . . . . .                                            | 79   |
| The Questionnaire . . . . .                                                      | 82   |
| The Likert Attitude Scale . . . . .                                              | 82   |
| The "Purism" Scale . . . . .                                                     | 84   |
| Administration of the Questionnaire . . . . .                                    | 88   |
| Sampling Procedures and Problems . . . . .                                       | 92   |
| Trail Stratification Procedure . . . . .                                         | 92   |
| Determination of the Sampling Schedule . . . . .                                 | 94   |
| Sample Characteristics . . . . .                                                 | 95   |
| IV. THE PERCEPTION OF WILDERNESS RECREATION CARRYING<br>CAPACITY . . . . .       | 99   |
| Use Level and Its Effect on Capacity . . . . .                                   | 99   |
| The Dimension of Solitude . . . . .                                              | 100  |
| The Impact of Encounters . . . . .                                               | 102  |
| Type of Use and Its Effect on Capacity . . . . .                                 | 117  |
| Previous Research . . . . .                                                      | 117  |
| Perceived Appropriateness of Modes of Travel . . . . .                           | 120  |
| Visitor Preferences for Other Modes of Travel . . . . .                          | 125  |
| The Effects of Large Parties on the Perception<br>of Carrying Capacity . . . . . | 129  |
| Use and Satisfaction . . . . .                                                   | 136  |
| Spatial Aspects of Capacity . . . . .                                            | 145  |
| Relevant Research . . . . .                                                      | 146  |
| Peripheral Versus Interior Encounters . . . . .                                  | 149  |
| The Campsite as "Territory" . . . . .                                            | 152  |
| Depreciative Behavior Aspects of Capacity . . . . .                              | 166  |
| Campsite Overuse . . . . .                                                       | 168  |
| Littering . . . . .                                                              | 171  |
| Some Concluding Remarks . . . . .                                                | 175  |
| Wilderness Quality . . . . .                                                     | 177  |

# REVIEW OF REQUIREMENTS, RECOMMENDATIONS AND MEASURES

For Investigation  
Dward Use Reg-

Editor Perception

Re Perception of

Specific Control  
"Indirect" Use

Modification  
Manipulation

Working . . . . .

Party Size Limit

Preferences for  
An Acceptable

Future Controls:

Visitor Attitude  
Their Relation

More High Qual

More Signs and

More Maps and

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Wilderness Reg

Etching Rack

Small Docks and

Simple Pit To

Simple Wooden

Managerial Input  
Additional Res

REVIEW OF RECORDS  
PERCEPTION OF C

Re Perception



|                                                                                                                   |     |
|-------------------------------------------------------------------------------------------------------------------|-----|
| V. THE MAINTENANCE OF QUALITY: PERCEPTION OF RESTRICTIVE, REDISTRIBUTIVE, AND MANAGEMENT INPUT MEASURES . . . . . | 180 |
| Past Investigations of Visitor Attitudes Toward Use Regulation . . . . .                                          | 181 |
| Visitor Perception of a "Carrying Capacity" . . . . .                                                             | 185 |
| The Perception of Use Regulation . . . . .                                                                        | 191 |
| Specific Control Measures . . . . .                                                                               | 192 |
| "Indirect" Use Controls . . . . .                                                                                 | 199 |
| Modification of Wilderness "Infrastructure" . . . . .                                                             | 200 |
| Manipulation of Access . . . . .                                                                                  | 203 |
| Zoning . . . . .                                                                                                  | 205 |
| Party Size Limitations . . . . .                                                                                  | 208 |
| Preferences for Party Size Limits . . . . .                                                                       | 210 |
| An Acceptable Number of Horses . . . . .                                                                          | 212 |
| Future Controls: Necessary or Not? . . . . .                                                                      | 214 |
| Visitor Attitudes Toward Managerial Inputs and Their Relation to Carrying Capacity . . . . .                      | 218 |
| More High Quality Trails . . . . .                                                                                | 220 |
| More Signs Indicating Places to Camp . . . . .                                                                    | 222 |
| More Maps and Information Pamphlets . . . . .                                                                     | 224 |
| More Campsites . . . . .                                                                                          | 225 |
| Wilderness Rangers . . . . .                                                                                      | 226 |
| Hitching Racks and Corrals . . . . .                                                                              | 227 |
| Small Docks at Portage Landing and Canoe Rests . . . . .                                                          | 228 |
| Simple Pit Toilets . . . . .                                                                                      | 228 |
| Simple Wooden Bridges . . . . .                                                                                   | 230 |
| Managerial Inputs and Carrying Capacity: Some Additional Remarks . . . . .                                        | 231 |
| VI. PATTERNS OF RECREATIONAL USE IN RELATION TO THE PERCEPTION OF CARRYING CAPACITY . . . . .                     | 234 |
| The Perception of Crowding . . . . .                                                                              | 234 |

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The Objectives

Carrying Cap-

The Consequences

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Access at the

Elimination of

Continuation of

Cooperation with

the Establishment

Encourage "No-

Zoning . . .

The Closure of

Strive to Con-

Wilderness

The Decision to

A Probabilistic

Carrying Cap-

Appendix . . .

|            |                                                                                                        |     |
|------------|--------------------------------------------------------------------------------------------------------|-----|
| APPENDICES | The Effects of Crowding on Visitor Satisfaction . . . .                                                | 238 |
|            | The Effects of Crowding on Route and Length<br>of Stay . . . . .                                       | 239 |
| 2.         | The Areal Extent of Overuse . . . . .                                                                  | 243 |
|            | Overuse and Crowding in the BWCA . . . . .                                                             | 245 |
| C. Camp    | Overuse and Crowding in the Bob Marshall . . . . .                                                     | 251 |
|            | Overuse and Crowding in the Bridger Wilderness . . . .                                                 | 255 |
| D. Area    | Overuse and Crowding in the High Uintas . . . . .                                                      | 261 |
| 3.         | Wilderness and Overuse: Some Concluding Comments . . . .                                               | 266 |
| VII.       | MANAGERIAL AND CONCEPTUAL SOLUTIONS TO THE CARRYING<br>CAPACITY PROBLEM . . . . .                      | 269 |
|            | The Role of Values in Resource Decision-Making . . . . .                                               | 269 |
| WILDERNESS | The Relevant User Value System . . . . .                                                               | 273 |
|            | The Objectives of a Wilderness Recreation<br>Carrying Capacity Policy . . . . .                        | 274 |
|            | The Consequences of Carrying Capacity . . . . .                                                        | 275 |
|            | Measures to Increase Capacity . . . . .                                                                | 278 |
|            | Control Party Size . . . . .                                                                           | 278 |
|            | Elimination and Control of Littering . . . . .                                                         | 280 |
|            | Provide Wilderness Users a Greater Basis for Choice . .                                                | 281 |
|            | Eliminate Motor Craft in the BWCA . . . . .                                                            | 282 |
|            | Critically Examine the Extent and Quality of<br>Access at the Wilderness Boundary . . . . .            | 283 |
|            | Elimination of Structures . . . . .                                                                    | 286 |
|            | Continuation of the Wilderness Ranger Program . . . . .                                                | 287 |
|            | Cooperation with State Fish and Game Agencies in<br>the Establishment of Harvest Regulations . . . . . | 287 |
|            | Encourage "Off-Season" Use of Wilderness . . . . .                                                     | 289 |
|            | Zoning . . . . .                                                                                       | 290 |
|            | The Closure of Damaged Campsites . . . . .                                                             | 292 |
|            | Strive to Communicate the Objectives of the<br>Wilderness System . . . . .                             | 292 |
|            | The Decision to Restrict Use . . . . .                                                                 | 293 |
|            | A Probabilistic Model for the Calculation of<br>Carrying Capacity . . . . .                            | 294 |
|            | Addendum . . . . .                                                                                     | 299 |

- 1. The Business Act
- 2. The Questionnaire
- 3. Marketing Calendar
- 4. Analysis of Mail Q
- 5. Buyer and Follow-up
- 6. Special Mail Quest
- 7. Analysis of Non-Res

| Chapter                                                                                                                                                                                    | Page |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| APPENDICES . . . . .                                                                                                                                                                       | 303  |
| A. The Wilderness Act . . . . .                                                                                                                                                            | 303  |
| B. The Questionnaire . . . . .                                                                                                                                                             | 310  |
| C. Sampling Calendar . . . . .                                                                                                                                                             | 323  |
| D. Analysis of Mail Questionnaire Response . . . . .                                                                                                                                       | 328  |
| E. Cover and Follow-up Letters . . . . .                                                                                                                                                   | 330  |
| F. Special Mail Questionnaire to Non-Respondents . . . . .                                                                                                                                 | 333  |
| G. Analysis of Non-Response . . . . .                                                                                                                                                      | 335  |
| BIBLIOGRAPHY . . . . .                                                                                                                                                                     | 336  |
| 4. Growth of Designated Wilderness, 1909-1969 . . . . .                                                                                                                                    | 34   |
| 5. Estimated Maximum Potential Limits to the National<br>Wilderness Preservation System (Within the 48<br>Continiguous States) . . . . .                                                   | 36   |
| 6. Use Characteristics of Study Areas . . . . .                                                                                                                                            | 36   |
| 7. Administratively Defined Carrying Capacity of<br>Study Areas . . . . .                                                                                                                  | 67   |
| 8. Distribution of Purist Groups Among Study Areas . . . . .                                                                                                                               | 89   |
| 9. The Desirability of Solitude as an Element of the<br>Wilderness Environment, By Study Area . . . . .                                                                                    | 101  |
| 10. The Desirability of Solitude as an Element of<br>the Wilderness Environment by Purist Score . . . . .                                                                                  | 103  |
| 11. The Effect of Mode of Travel in the RWCA on Response<br>to "It is Reasonable to Expect that One Should be<br>Able to Visit a Wilderness Area and See Few,<br>if Any, People" . . . . . | 104  |
| 12. Purist Attitudes Toward Meeting Other Parties<br>on the Trail . . . . .                                                                                                                | 107  |

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

21

- 1. Growth in Visits  
Area at Five
- 2. Wilderness Recre-  
Forest Service  
Year Intervals
- 3. Percentage of Sa-  
economic Chara-  
ness Recreation
- 4. Growth of Design
- 5. Estimated Maxima  
Wilderness Pre-  
Continuous
- 6. The Characterist
- 7. Administrative  
Study Areas
- 8. Distribution of
- 9. The Desirabilit  
Wilderness Dr.
- 10. The Desirabilit  
the Wilderness
- 11. The Effect of h  
to "It is Rea  
Able to Visit  
if Any, Peop
- 12. Purist Attitude  
on the Trail



# LIST OF TABLES

| Table                                                                                                                                                                             | Page |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1. Growth in Visits to Wilderness and Primitive Areas at Five Year Intervals, 1946-1966 . . . . .                                                                                 | 18   |
| 2. Wilderness Recreation Use as a Percentage of Forest Service Auto Campground Use at Five Year Intervals, 1946-1966 . . . . .                                                    | 19   |
| 3. Percentage of Sample Possessing Certain Socio-economic Characteristics in Selected Wilderness Recreation Use Studies . . . . .                                                 | 22   |
| 4. Growth of Designated Wilderness, 1930-1969 . . . . .                                                                                                                           | 24   |
| 5. Estimated Maximum Potential Limits to the National Wilderness Preservation System (Within the 48 Conterminous States) . . . . .                                                | 26   |
| 6. Use Characteristics of Study Areas . . . . .                                                                                                                                   | 66   |
| 7. Administratively Defined Carrying Capacity of Study Areas . . . . .                                                                                                            | 67   |
| 8. Distribution of Purist Groups Among Study Areas . . . . .                                                                                                                      | 89   |
| 9. The Desirability of Solitude as an Element of the Wilderness Environment, By Study Area . . . . .                                                                              | 101  |
| 10. The Desirability of Solitude as an Element of the Wilderness Environment by Purism Score . . . . .                                                                            | 103  |
| 11. The Effect of Mode of Travel in the BWCA on Response to "It is Reasonable to Expect that One Should be Able to Visit a Wilderness Area and See Few, if Any, People" . . . . . | 104  |
| 12. Purist Attitudes Toward Meeting Other Parties on the Trail . . . . .                                                                                                          | 107  |





|     |                                                                                                                                               |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 13. | Response to "It's Most Enjoyable When You Don't Meet Anyone in the Wilderness," By Study Area . . . . .                                       | 109 |
| 14. | The Effect of Meeting No Other Parties During the Day on Trip Satisfaction, By Study Area . . . . .                                           | 110 |
| 15. | Percentage of Persons on First Wilderness Trip . . . . .                                                                                      | 112 |
| 16. | Frequency of Wilderness Visitation in the BWCA and Western Study Areas . . . . .                                                              | 112 |
| 17. | The Effect of the Frequency of Wilderness Visitation on Visitor Reaction to Meeting No Other Parties . . . . .                                | 113 |
| 18. | Response to "You Should See at Least One Group A Day in the Wilderness to Get the Most Enjoyment Out of Your Trip," By Study Area . . . . .   | 116 |
| 19. | Perception of Appropriateness of Foot and Horse Travel by Backpackers, Horsemen, and Hikers with Stock . . . . .                              | 121 |
| 20. | Perception of Appropriateness of Manual and Motor Travel by Paddling Canoeists, Motor Canoeists, and Motor Boaters . . . . .                  | 122 |
| 21. | Expressed Preferences for Seeing Other Modes of Travel in the BWCA, by Respondent's Mode of Travel . . . . .                                  | 126 |
| 22. | Expressed Preferences for Seeing Other Modes of Travel in the Western Study Areas, By Study Area . . . . .                                    | 128 |
| 23. | User Preference for Large Parties or a Variable Number of Small Parties, By Study Area . . . . .                                              | 133 |
| 24. | Expressed Preference for Encounters on Wilderness Periphery or in Interior Locations, By Study Area . . . . .                                 | 150 |
| 25. | Reactions to Other Campers by Members of Wilderness Organizations and by Members of Other Conservation and Outdoor Recreation Clubs . . . . . | 154 |
| 26. | Visitor Reaction to Camping Near Several Other Parties, By Study Area . . . . .                                                               | 156 |



| Table                                                                                                                                                | Page |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 27. The Effect of Single Activity Orientation Upon User<br>Reaction to Camping Near Several Other Parties . . . .                                    | 158  |
| 28. Preference for Camp Location, By Study Region . . . . .                                                                                          | 161  |
| 29. Other Camps Desirable Within Sight or Hearing,<br>By Study Area . . . . .                                                                        | 164  |
| 30. Visitor Reaction to Camping at a Place Worn from<br>Overuse, By Study Area . . . . .                                                             | 169  |
| 31. Respondent Reaction to "There Should be Restrictions<br>on How Many People Can be in a Wilderness at<br>any Given Time," By Study Area . . . . . | 186  |
| 32. Expressed Level of Agreement with Accepting Crowding<br>Rather than Use Controls, By BWCA Mode of Travel . . .                                   | 190  |
| 33. Overall Visitor Reaction to Use Control Measures . . . .                                                                                         | 193  |
| 34. Visitor Reaction to Reducing Number of Signs and<br>Trails, By Study Area . . . . .                                                              | 201  |
| 35. Visitor Agreement with Zoning on Basis of Mode<br>of Travel, By Study Area . . . . .                                                             | 206  |
| 36. Western Respondent Attitudes Toward a Party Size Limit .                                                                                         | 209  |
| 37. Backpacker and Horseback Rider Responses to<br>Maximum Number of Persons Per Party . . . . .                                                     | 211  |
| 38. Maximum Number of Stock Animals Per Party, By<br>Western Study Area . . . . .                                                                    | 213  |
| 39. Visitor Reaction to Allowing Use to Continue . . . . .                                                                                           | 216  |
| 40. Favorable Visitor Response to Managerial Inputs,<br>By Study Area and Strong Purists . . . . .                                                   | 219  |
| 41. The Perception of Crowding, By BWCA Visitors . . . . .                                                                                           | 236  |
| 42. The Perception of Crowding, By Western Visitors . . . .                                                                                          | 237  |
| 43. The Reaction to Crowding By Purist Groups . . . . .                                                                                              | 242  |

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the Perception

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## Table

## Page

|                                                                                                                                              |     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 44. The Relationship of Actual Use Encountered to the Perception of Crowding in the Bridger . . . . .                                        | 258 |
| 45. The Relationship of Other Parties Camped Nearby and the Perception of Crowding in the Bridger . . . . .                                  | 259 |
| 46. Pattern of Response to Mail Questionnaire . . . . .                                                                                      | 329 |
| 1. Study Area Locations . . . . .                                                                                                            | 60  |
| 2. Bob Marshall Wilderness Area . . . . .                                                                                                    | 70  |
| 3. Broad Partially Open Valley Along the West Fork of the Flathead River in the Bob Marshall Wilderness. U.S. Forest Service Photo . . . . . | 71  |
| 4. The Chinese Wall in the Bob Marshall Wilderness: a Focal Point of Visitor Attention. U.S. Forest Service Photo . . . . .                  | 71  |
| 5. Bridger Wilderness Area . . . . .                                                                                                         | 73  |
| 6. Island Lake in the Bridger Wilderness, Surrounded by a Mugged Glaciated Landscape. U.S. Forest Service Photo . . . . .                    | 76  |
| 7. Mt. Agassiz in the High Uintas Primitive Area Stands Above one of the High Alpine meadows. U.S. Forest Service Photo . . . . .            | 76  |
| 8. High Uintas Primitive Area . . . . .                                                                                                      | 76  |
| 9. Boundary Waters Canoe Area . . . . .                                                                                                      | 77  |
| 10. Numerous Lakes, Interspersed with Tree Covered Islands Characterizes the Landscape of the BWCA. U.S. Forest Service Photo . . . . .      | 78  |
| 11. Rocky Outcrops Along the Shore of Lac la Croix Preside Canoeists a Unique Esthetic Landscape. U.S. Forest Service Photo . . . . .        | 78  |
| 12. BWCA Satisfaction Curves . . . . .                                                                                                       | 139 |
| 13. Bob Marshall Satisfaction Curves . . . . .                                                                                               | 140 |

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13

- 1. Study Area Location
- 2. So. Marshall W.
- 3. Road Partially  
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- 5. Bridger Wildern
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Islands Chara  
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- 11. Rocky Outcrops  
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- 12. BWA Satisfact
- 13. So. Marshall S



## LIST OF FIGURES

| Figure |                                                                                                                                                  | Page |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.     | Study Area Locations . . . . .                                                                                                                   | 64   |
| 2.     | Bob Marshall Wilderness Area . . . . .                                                                                                           | 70   |
| 3.     | Broad Partially Open Valley Along the South Fork of<br>the Flathead River in the Bob Marshall Wilderness.<br>U.S. Forest Service Photo . . . . . | 71   |
| 4.     | The Chinese Wall in the Bob Marshall Wilderness,<br>a Focal Point of Visitor Attention. U.S.<br>Forest Service Photo . . . . .                   | 71   |
| 5.     | Bridger Wilderness Area . . . . .                                                                                                                | 73   |
| 6.     | Island Lake in the Bridger Wilderness, Surrounded<br>by a Rugged Glaciated Landscape. U.S. Forest<br>Service Photo . . . . .                     | 74   |
| 7.     | Mt. Agassiz in the High Uintas Primitive Area<br>Stands Above one of the High Alpine Meadows.<br>U.S. Forest Service Photo . . . . .             | 74   |
| 8.     | High Uintas Primitive Area . . . . .                                                                                                             | 76   |
| 9.     | Boundary Waters Canoe Area . . . . .                                                                                                             | 77   |
| 10.    | Numerous Lakes, Interspersed with Tree Covered<br>Islands Characterizes the Landscape of the<br>BWCA. U.S. Forest Service Photo . . . . .        | 78   |
| 11.    | Rocky Outcrops Along the Shore of Lac La Croix Provide<br>Canoeists a Unique Esthetic Landscape. U.S. Forest<br>Service Photo . . . . .          | 78   |
| 12.    | BWCA Satisfaction Curves . . . . .                                                                                                               | 139  |
| 13.    | Bob Marshall Satisfaction Curves . . . . .                                                                                                       | 140  |

1. Higher Satisfaction

2. High Times Satisfaction

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<sup>1</sup> Isaiah Bowman,  
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## CHAPTER I

## THE DEVELOPMENT OF THE WILDERNESS CONCEPT

## AND ITS SPATIAL EXPRESSION

Introduction

The past ten years have seen an increasing number of studies, by geographers and other social scientists, of resource management and conservation, built around the broad methodologies of environmental perception, concerned with the behavior of man in relation to resource, and striving to contribute to the utility of prediction. Much of this work has been a result of the recognition of resources as cultural-economic constructs, capable of change in space and time, rather than as fixed physical elements of the environment. As Bowman noted over 30 years ago:

The geographical elements of the environment are fixed only in the narrow and special sense of the word. The moment we give them human associations they are as changeful as humanity itself.<sup>1</sup>

The classic statement regarding the variable nature of resources in light of cultural-economic considerations is by Zimmerman. Expanding

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<sup>1</sup>Isaiah Bowman. Geography in Relation to the Social Sciences, Report of the Commission on the Social Studies, Part V (New York: Charles Scribner's Sons, 1934), p. 37.

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<sup>1</sup> Erich Zimmerman  
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<sup>2</sup> Ibid., p. 7.

<sup>3</sup> For two sources  
Gunter Spoehr, "Non-  
renewables" in Man's Impact  
on the Environment (Chicago)  
Marshall E. Segall,  
Scarcity of Resources  
1973.



on his famous and oft-cited "Resources are not, they become,"<sup>1</sup> he comments:

The word 'resource' does not refer to a thing or a substance but to a function which a thing or a substance may perform or to an operation in which it may take part.<sup>2</sup>

Consequently, the recognition of some element of the environment as a resource hinges on its perceived functional utility: what uses can it meet or what desires can it satisfy. As noted above, this recognition is highly variable, fluctuating between cultures,<sup>3</sup> as well as over time. Normally, however, the evolution of some environmental element to a resource is accompanied by economic or technological changes which permit utilization of the element within the cultural system. A common example of this has been the taconite iron resource of northern Minnesota. Long forsaken because of its low-grade iron content, taconite has now become an important source of iron, due largely to technological advances which permit economical recovery.

In the case of the wilderness resource, the role of economic and technological advance is not as clear nor apparently relevant. The perceived utility of this resource is not measured in the normal sense

<sup>1</sup>Erich Zimmerman. World Resources and Industries (New York: Harper and Brothers, 1933), p. 15.

<sup>2</sup>Ibid., p. 7.

<sup>3</sup>For two sources on the role of culture in perception, see Alexander Spoehr, "Cultural Differences in the Interpretation of Natural Resources," in Man's Role in Changing the Face of the Earth, ed. by William Thomas (Chicago: University of Chicago Press, 1956), pp. 93-102 and Marshall H. Segall, Donald T. Campbell, and Melville J. Herskovits, The Influence of Culture on Visual Perception (New York: Bobbs Merrill Company, 1966).



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of some commodity output. Rather, the cultural recognition of social and personal benefits to be derived from it is the key element.

Wilderness does share some common characteristics, however, with the taconite resource or any other resource for that matter. Its definition as a resource is, relatively speaking, a recent event. For a substantial period of American history, it has been an element of the environment toward which man directed a substantial proportion of his energies to eliminate. The evolution of wilderness from this situation to its present status as a legislatively endorsed and protected resource merits further comment.

#### Wilderness: A Study in the Definition of Resource

At the onset of European exploration of the New World, a continent of wilderness existed. The unexplored lands to the west held unknown dangers as well as unimagined wealth. Basically, the view of wilderness of the Jamestown settlers and their 16th and 17th century counterparts was one of abhorrence, an attitude that found justification from the Judeo-Christian traditions on which their society and life style were conceived.<sup>1</sup>

There were strong religious connotations to the use of the term "wilderness." Nash notes that a concordance of the Bible lists 280 "wildernesses." Nash notes that a concordance of the Bible lists 280 "wildernesses." Nash notes that a concordance of the Bible lists 280 "wildernesses." Nash notes that a concordance of the Bible lists 280 "wildernesses."

<sup>1</sup> The most detailed historical analysis of wilderness is found in Roderick Nash, Wilderness and the American Mind (New Haven: Yale University Press, 1967). This scholarly treatment traces in some detail the etymological origins of the term "wilderness," utilizing in-depth analyses of historical literature.

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<sup>1</sup> Ibid., p. 13.

<sup>2</sup> Wildland Resea-  
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Conservation, Vol. 3 (Washington, D.C., 1969)

<sup>3</sup> Wilderness

<sup>4</sup> For an informal  
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entries for the term.<sup>1</sup> The Wildland Research Center in analyzing Biblical use of "wilderness," noted three essential qualities: (1) it was virtually uninhabited; (2) it was desolate, occasionally savage; and (3) it was vast.<sup>2</sup> Again quoting Nash:

In a more figurative sense, wilderness represented the Christian conception of the situation man faced on earth. It was a compound of his natural inclination to sin, the temptation of the material world, and the forces of evil themselves. In this worldly chaos he wandered lost and forlorn, grasping at Christianity in the hope of delivery to the promised land that now was located in heaven.<sup>3</sup>

Thus, the strong Puritan Ethic which pervaded much of pre-nineteenth century America carried it with a moral imperative to remove wilderness.<sup>4</sup> There was, of course, a significant difference in the wilderness that faced the pioneer and the wilderness which they read about in the Bible. Rather than being lands of desolation and emptiness,

<sup>1</sup> Ibid., p. 13.

<sup>2</sup> Wildland Research Center, Wilderness and Recreation--A Report on Resources, Values, and Problems, Outdoor Recreation Resources Review Commission, Vol. 3 (Washington: Government Printing Office, 1962), p. 17.

<sup>3</sup> Nash, Wilderness and the American Mind, pp. 17-18.

<sup>4</sup> For an informative commentary on the perception of wilderness by the Puritans and the consequent effects upon their society, see Peter N. Carroll, Puritanism and the Wilderness: The Intellectual Significance of the New England Frontier, 1629-1700 (New York: Columbia University Press, 1969), 243 pp. It should be pointed out, however, that the exploitive attitude of the Puritan toward nature was not unique. Similar attitudes existed within other religious and cultural ideologies as well. See René Jules Dubos, The Genius of the Place, The Horace M. Albright Conservation Lectureship, Vol. X (Berkeley: University of California School of Forestry and Conservation, 1970), p. 3.

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<sup>1</sup> Hans H.  
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the area to the west held some of the most productive lands in the world. The benefits to be gained could be had simply for the taking. The recognition of this fact greatly accelerated the rate of westward movement, a movement that culminated with the "closure" of the frontier with the 1890 census. economy and a stable government, but also to the area. While the 19th century represented the accelerated decline of the unsettled and unmodified lands of America it also represented the beginning of a period in which nature, in its broadest sense, took on new meaning. characteristic, however, of the American landscape to which there was. Ruth<sup>1</sup> has suggested this change in the perception of nature from simply as a source of man's livelihood to one in which its inspirational and aesthetic qualities came to be valued may be attributed to the growth in scientific interest about the new nation. And, whereas past commentators had written on the repulsiveness and inherent evilness of wilderness, there began to exist an appreciation of the association between the Deity and wilderness.

As scientists revealed a universe that was at once vast, complex, and harmonious, they strengthened the belief that this majestic and marvelous creation had a divine source.<sup>2</sup>

The full development of this change in attitude has been attributed to the latter part of the 1700's and the early 1800's, the wilderness "Paradise Now!" Images of Nature in America," Columbia University Press (Spring, 1964), pp. 34-40.

<sup>1</sup>Hans Ruth, Nature and the American (Berkeley: University of California Press, 1957), p. 14. This is a survey of the literature of this period. It contains excellent bibliographies.

<sup>2</sup>Nash, Wilderness and the American Mind, p. 45. The most detailed discussion of this theme is in William R. Inge, "Nature as Symbol and Expression in American Life: A Sociological Exploration," (Unpublished Ph.D. dissertation, University of Minnesota, 1964).

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Age of Romanticism. The literature of this period was primarily European, but the appreciative attitudes expressed toward nature and away from the works of man were quickly caught up in America. Nash comments that the fact of independence gave impetus not only to efforts to build a flourishing economy and a stable government, but also to the creation of a distinctive culture.<sup>1</sup> The shortness of the nation's history and its minor literary and artistic accomplishments were severe handicaps in light of this goal. There was one distinctive and unique characteristic, however, of the American landscape to which there was no counterpart in all of Europe: wilderness. There was still pride in removing it, but its utility as a valuable element of the environment, in and of itself, was on the increase.<sup>2</sup>

Some of the principal literary discussions of the value of wilderness may be traced to the 1800's.<sup>3</sup> In both fiction and fact wilderness and nature became the themes of New World culture, symbols of the freedom that characterized Americans.<sup>4</sup>

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<sup>1</sup>Ibid., p. 67.

<sup>2</sup>For a discussion of an opposite view, see David Lowenthal, "Not Every Prospect Pleases: What is Our Criterion for Scenic Beauty?" Landscape (Winter, 1962-63), p. 19-23. Also by the same author, see "Is Wilderness 'Paradise Now'? Images of Nature in America," Columbia University Forum, 7 (Spring, 1964), pp. 34-40.

<sup>3</sup>The works of Nash, Wilderness and the American Mind and Ruth, Nature and the American are replete with commentary of the literature of this period. Both contain excellent bibliographies.

<sup>4</sup>The most detailed discussion of this theme is in William R. Burch, "Nature as Symbol and Expression in American Life: A Sociological Exploration," (Unpublished Ph.D. dissertation, University of Minnesota, 1964).

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The articulate, poetic writings of Thoreau probably best exemplified the growing literary recognition of the benefits of unfettered nature to man. In a lecture before the Concord Lyceum in 1851, he proposed that in the wildness of the Western United States lay those values most necessary in the moulding of, not only the American, but of men throughout the world. Concluding his address, he propounded the underlying thesis of his philosophy in the now famous statement, ". . . in wildness is the preservation of the world."<sup>1</sup>

Thoreau's statement signaled the introduction of a movement to remove wilderness from the realm of pure sentiment and philosophic attachment to one where its benefits were more discernible. The steady progression of western settlement had slowly given rise to the idea that certain areas, vignettes of the primitive landscape, should be set aside, not only to protect the resources within, but to insure that future generations would also have the opportunity to experience this rich heritage.

### The Movement for Preservation

Credit for the first public recognition for the need of preserving part of the American wilderness is usually given to

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<sup>1</sup>Henry David Thoreau, "Walking," in The American Environment: Readings in the History of Conservation, ed. by Roderick Nash (Reading, Massachusetts: Addison-Wesley Publishing Company, 1968), p. 12.

George Catlin,<sup>1</sup> a

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<sup>1</sup> Nash, American Environment  
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<sup>2</sup> George  
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American Environment

George Catlin,<sup>1</sup> a 19th century lawyer, painter, and student of American Indians. Following a series of trips throughout the Northern Great Plains, Catlin concluded that the rapid slaughter of the buffalo, the deterioration of the Indian culture as they came in contact with the white man, and the general disappearance of the primitive landscape, represented a serious loss that American culture could ill afford. In order to prevent such a loss, he envisioned:

... a magnificent park, where the world could see for ages to come, the native Indian in his classic attire, galloping his wild horse. . . . What a beautiful and thrilling specimen for America to preserve and hold up to the view of her refined citizens and the world, in future ages! A nation's Park, containing man and beast, in all the wild and freshness of their nature's beauty!<sup>2</sup>

As profound and revolutionary as the suggestion was, it received little attention. Twenty-five years later, Thoreau renewed the call for the need to preserve portions of the land from settlement and development:

... why should we not . . . have our national preserves . . . in which the bear and panther, and some even of the hunter race, may still exist, and not be civilized off the face of

<sup>1</sup>Quoted in Nash, Wilderness and the American Mind, p. 102.

<sup>1</sup>Nash, Wilderness and the American Mind, p. 100, Nash, The American Environment, p. 5, and Huth, Nature and the American, pp. 134-135.

<sup>2</sup>George Catlin, North American Indians: Being Letters and Notes on their Manners, Customs, and Conditions, Written during Eight Years' Travel amongst the Wildest Tribes in North America, 1832-1839, Vol. I (Philadelphia: Hubbard Brothers, 1913), p. 295. A brief excerpt of these volumes, including the above quote is in Nash, The American Environment, pp. 5-9.

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642, Nash, Wild  
Research Center  
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(Bos., 1965), p.



the earth--our forests . . . not for idle sport or food, but for inspiration and our own true recreation?<sup>1</sup>

The 1850's may, in a real sense, be viewed as the period in time in which wilderness moved from basically a philosophic concept to the beginnings of a movement that would insure it a permanent place in the American landscape. There were several actions which brought this about, but probably the two most significant were the 1864 federal grant of Yosemite Valley to California "to hold . . . for public use, resort and recreation, inalienable for all time"<sup>2</sup> and the establishment of Yellowstone National Park in 1872. While it is almost certain that neither area was established for wilderness purposes, it did provide the precedent for the role of the Federal Government in setting aside lands for nonexploitive purposes. Yellowstone, in particular, set the stage for a series of governmental actions that would eventually create a park system copied the world around.<sup>3</sup>

The move to set aside lands specifically for their wilderness qualities, however, still lacked a figure to organize and initiate

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<sup>1</sup> Quoted in Nash, Wilderness and the American Mind, p. 102.

<sup>2</sup> John Ise, Our National Park Policy: A Critical History (Baltimore: The Johns Hopkins Press, 1961), p. 53.

<sup>3</sup> Numerous books and articles deal with the significance of the reservation of Yellowstone to the development of our National Park Policy. See, for example, Ise, Our National Park Policy, pp. 13-50, 642, Nash, Wilderness and the American Mind, pp. 108-116, Wildland Research Center, p. 18, Conrad Wirth, "National Parks" in First World Conference on National Parks, ed. by Alexander B. Adams (Washington: Government Printing Office, 1962), pp. 17-21, and Freeman Tilden, The National Parks: What They Mean to You and Me (New York: Alfred A. Knopf, 1965), pp. 15, 110-118.



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action. He was not long in coming, however. In 1881, John Muir helped draft a bill to create a national park in the Kings River region of the southern Sierra, urging that its "fresh unspoiled wilderness" be protected as a public park.<sup>1</sup> Although the bill died in committee, the action brought Muir into contact with Robert Underwood Johnson, an associate editor of the national magazine Century. From this association arose the proposal to establish Yosemite Valley as a national park. With Muir providing articles on the area for Century and Johnson acting as a lobbyist, Congress in 1890 passed legislation setting aside the area. The major significance of this action, however, is the fact that Yosemite was the first area set aside consciously to protect wilderness.<sup>2</sup> Additionally, it established Muir as the figure upon whom further actions to preserve parts of America would center.<sup>3</sup>

Concerned that even with legislative protection, areas like Yosemite were not safe from intrusion, Muir helped establish an organization which would take a watch-dog role in protecting the parks. This was, of course, the Sierra Club, founded in 1892. It was, however,

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<sup>1</sup>See, National Park Policy, p. 641.

<sup>1</sup>Cited in Nash, Wilderness and the American Mind, p. 130.

<sup>2</sup>Ibid., p. 132.

<sup>3</sup>The role of the individual in initiating a formal structure through which certain goals may be attained is discussed in Eugene F. Jennings, An Anatomy of Leadership: Princes, Heroes, and Supermen (New York: Harper and Bros., 1960), esp. pp. 92-121. He comments that such individuals often have "a deep and disturbing sense of mission for which tremendous social power is necessary," p. 105.

Michael Bouldrey, "The Wilderness Act of 1908: Its Background and Meaning," Oregon Law Review, 45 (July, 1966), p. 283.

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neither the first, nor only organization formed in this period that favored wilderness; Ise notes nearly 20 others created between 1862 and 1911.<sup>1</sup> This growth of organizations at the onset of the 20th century reflected the growing crystallization of public attitudes concerning the benefits of the natural environment. Governmental action had been instituted at both the state<sup>2</sup> and the Federal level to designate areas for preservation. The spawning of wilderness and outdoor recreation organizations concurrent with governmental recognition of obligations to set aside areas for present and future generations were two components of a process over 200 years old in the making. Tied to these two elements was the broadening interest in the arts and sciences for the natural environment. McCloskey has noted that:

Two conditions seem to be necessary for a consensus that wilderness is a public good that warrants preservation: (1) a society with highly-educated leaders and economic surpluses; and (2) an increasing scarcity of wilderness areas.<sup>3</sup>

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<sup>1</sup>Ise, Our National Park Policy, p. 641.

<sup>2</sup>While the Federal grant to California of a portion of the Yosemite Valley was probably the first instance of preservation at the state level, the decision by the New York state legislature in 1885 to maintain "forever wild" over 700,000 acres of state forest land is the most significant preservation action to date taken by a state government. See Roger C. Thompson, "Politics in the Wilderness: New York's Adirondack Forest Preserve," Forest History, 6 (Winter, 1963), pp. 14-23. Nash comments that while preservation was the aim, its end was to halt excessive timber exploitation, Wilderness and the American Mind, p. 119.

<sup>3</sup>Michael McCloskey, "The Wilderness Act of 1964: Its Background and Meaning," Oregon Law Review, 45 (July, 1966), p. 288.

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In the brief history of America, wilderness had evolved from an element of the environment that evoked attitudes of alarm and provoked its removal to one in which it was perceived as a positive good. In economic terms, it has moved from a state of disutility to one of utility. The conditions cited as necessary for such perceptions by McCloskey definitely characterized America as the 20th century dawned. Still lacking, however, were appropriate institutional techniques whereby a system of representative samples of primitive America within which, to the extent of the Department's authority, could be preserved. It was to this fact that increasing attention was devoted.

#### The Move to Institutionalize Wilderness

Despite the widespread interest in wilderness at the turn of the century, it was over 20 years before formal steps were taken to set aside areas specifically for wilderness purposes.<sup>1</sup> The initial proposal came in 1921 when Aldo Leopold of the U.S. Forest Service called for the setting aside of a 500,000 acre wilderness in the Gila National Forest of New Mexico.<sup>2</sup> In 1924, it was so designated

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<sup>1</sup>Legislative recognition of the National Parks had been granted in 1916. However, as Ise notes, although the early parks were certainly wilderness in many ways, the management purposes were not conceived with wilderness preservation as a salient intent. See, Our National Park Policy, p. 642.

<sup>2</sup>Aldo Leopold, "The Wilderness and Its Place in Forest Recreation Policy," Journal of Forestry, 19 (November, 1921), p. 720.

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<sup>1</sup>Quoted in  
p. 20.

<sup>2</sup>Ibid., p.



thus becoming the first area set aside as wilderness under an institutional format. Two years later, the Forest Service conducted an inventory of roadless areas of National Forest land, at least 230,000 acres in size. This inventory provided the framework within which the first Forest Service wide preservation program was conducted. In 1929, the agency established Regulation L-20 which provided authority to set aside:

... a series of areas to be known as primitive areas, and within which, to the extent of the Department's authority, will be maintained primitive conditions of environment, transportation, habitation, and subsistence.<sup>1</sup>

While there was an emphasis on the maintenance of primitive conditions, low standard roads, simple shelters, and limited timber harvesting were still permitted. These activities were justified, in part, by the conviction that the areas were not perpetually withdrawn from commercial exploitation; the primitive status was viewed as a control on unplanned development.<sup>2</sup>

Between 1931 and 1939, 73 areas comprising 14 million acres, were designated under Regulation L-20. In 1939, the Regulation was supplanted by a new set of regulations; U-1, U-2, and U-3(a). This change was largely a result of the influence of Robert Marshall, Chief of the Forest Service Division of Recreation and Lands and a cofounder of the Wilderness Society in 1935.

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<sup>1</sup>Quoted in Wildland Research Center, Wilderness and Recreation, p. 20.

<sup>2</sup>Ibid., p. 21.

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The new regulations effected some broad and dramatic changes.<sup>1</sup>

In brief, it (1) differentiated two types of areas, based on size: wilderness, composed of National Forest lands in single tracts of at least 100,000 acres; and wild areas, tracts of National Forest land of less than 100,000 acres, but not less than 5,000 acres; (2) designated clear organizational lines for the establishment, modification, or elimination of these areas; and (3) specifically restricted various uses formerly permitted under Regulation L-20 (for example, timber harvesting and road construction).

Additionally, the Forest Service was required to review all areas under the Primitive designation and to reclassify these areas so they met the more restrictive criteria specified in the U-Regulations. This process was interrupted at the start by the outbreak of World War II and, by 1946, only 14 areas comprising slightly less than two million acres had been reclassified.

### Legislative Protection for Wilderness

Both the L- and U-Regulations were administrative designations. Decisions to designate new areas as wilderness or to modify existing areas were still largely a function of agency or departmental discretion. There was concern, however, this arrangement would not provide for a

<sup>1</sup>The best outline of the specific points in both Regulation L-20 and the U-Regulations is in Wildland Research Center, Wilderness and Recreation, pp. 20-23.



system of wilderness areas that would meet public need. This feeling received impetus from a number of sources, but two in particular are worth noting. A 1949 report to a congressional subcommittee noted that before long:

Original wilderness . . . will have disappeared entirely . . . . If, then, there is reason for preserving substantial portions of the remaining wilderness, it must be decided upon before it is too late.<sup>1</sup>

The report prompted moves by the various wilderness organizations to obtain statutory recognition of wilderness and the early fifties saw increased activity toward gaining Congressional interest in drafting such a bill. These moves were bolstered by the results of Gilligan's dissertation<sup>2</sup> in 1953 which concluded, among other things, that present administrative arrangement for establishing and protecting a series of large, representative samples of primitive America were inadequate, given the principles of multiple use management and the wide degree of interpretation given the administrative regulations regarding wilderness.

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<sup>1</sup>U.S., Congress, House, Committee on Merchant Marine and Fisheries, The Preservation of Wilderness Areas, by C. Frank Keyser, Subcommittee on Conservation of Wildlife Resources, Report No. 19 (Washington, D.C.: Legislative Reference Service, Library of Congress, 1949), p. 9.

<sup>2</sup>James P. Gilligan, "The Development of Policy and Administration of Forest Service Primitive and Wilderness Areas in the United States" (unpublished Ph.D. dissertation, University of Michigan, 1953). Some of the major points and conclusions are summarized by the author in "The Contradiction of Wilderness Preservation in a Democracy," Proceedings of the Society of American Foresters (Milwaukee, Wis., 1954), pp. 119-122.

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### The Wilderness Act

In 1956 the first Wilderness Bill was introduced before the Congress. Eight years later, on September 3, 1964, President Johnson signed Public Law 88-577, establishing "for the permanent good of the whole people" a National Wilderness Preservation System.<sup>1</sup> Wilderness had come the full circle, from a period when Congressional action had encouraged its destruction to one where Congressional action now endorsed and protected it.

The Act first provides a statement of purpose and objective.

It notes that wilderness areas:

... shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness. . . .<sup>2</sup>

Secondly, it provides a definition of wilderness:

... an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain . . . wilderness is further defined to mean . . . an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation, which is

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<sup>1</sup>U.S. Congress, Senate, An Act to Establish a National Wilderness Preservation System for the Permanent Good of the Whole People, and for Other Purposes, S. 4, 88 Cong., 1st Sess., 1964, p. 1. The full text of the Act is in Appendix A. For two excellent analyses of the legislative history of the Wilderness Act, see Nash, Wilderness and the American Mind, pp. 220-225, and McCloskey, "The Wilderness Act of 1964," pp. 297-301.

<sup>2</sup>The Wilderness Act, p. 1.



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<sup>1</sup> Ibid., pp. 1.

<sup>2</sup> A "visit" is defined as a visit to a National Forest site or as an element in the growth of visits noted in Forest Service Chapter 124, "Terms."

protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.<sup>1</sup>

The Wilderness Act serves as a legislatively defined constraint as to the types of areas which may be classified as wilderness as well as to the type and level of recreational use such areas should attempt to provide or satisfy. Both of these elements are dynamic and changing; the present and future use of wilderness and the opportunity for expanding the supply of wilderness need to be examined.

#### Recreational Use of Wilderness

Since 1946, the recreational use of wilderness and primitive areas in the United States has steadily increased. Table 1 shows that the growth of visits<sup>2</sup> in the 20 year post-war period increased nearly 10 fold.

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<sup>1</sup> Ibid., pp. 1-2.

<sup>2</sup> A "visit" is defined as the entry of any person upon a National Forest site or area of land or water generally recognized as an element in the recreation population. Further details are noted in Forest Service Manual, Recreation Information Handbook, Chapter 124, "Terms."

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TABLE 1  
GROWTH IN VISITS TO WILDERNESS AND PRIMITIVE  
AREAS, AT FIVE YEAR INTERVALS, 1946-1966<sup>a</sup>

|      | Visits (1,000's) |       | Percentage Growth |
|------|------------------|-------|-------------------|
| 1946 | 144              | 144   | --                |
| 1951 | 312              | 312   | 117               |
| 1956 | 448              | 448   | 44                |
| 1961 | 757              | 757   | 69                |
| 1966 | 1,392            | 1,392 | 84                |

<sup>a</sup>Taken from official Forest Service recreation reports.

The popularity of wilderness recreation is reflected not only in its rate of absolute growth, but in its growth relative to other forms of forest recreation as well. Table 2 compares the growth in wilderness recreation use with Forest Service auto campground use. This is a particularly useful comparison, since the length of recreation visits to these areas is comparable.

Increased public interest in wilderness recreation may also be noted in the proliferation of mail order businesses specializing in the sale of backpacking equipment, the growing number of books and magazines dealing with wilderness areas and recreation and by the extensive public participation in Congressional hearings on the classification of wilderness areas.

For discussions on this point, see Marion Clawson and Jack L. Knetsch, *Economics of Outdoor Recreation* (Baltimore: Johns Hopkins Press, 1966), pp. 41-99, and Knetsch, "Assessing the Demand for Outdoor Recreation," *Journal of Leisure Research*, 1 (Winter, 1969), pp. 85-87.

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TABLE 2

WILDERNESS RECREATION USE AS A PERCENTAGE OF  
FOREST SERVICE AUTO CAMPGROUND USE AT  
FIVE YEAR INTERVALS, 1946-1966<sup>a</sup>

|                                      | Man-days (1,000's) <sup>b</sup> |            | Wilderness as<br>Percentage of<br>Campground |
|--------------------------------------|---------------------------------|------------|----------------------------------------------|
|                                      | Wilderness                      | Campground |                                              |
| 1946                                 | 144                             | 3,055      | 4.7                                          |
| 1951                                 | 312                             | 4,141      | 7.5                                          |
| 1956                                 | 448                             | 7,205      | 6.2                                          |
| 1961                                 | 757                             | 11,835     | 6.4                                          |
| (Visitor Days, 1,000's) <sup>c</sup> |                                 |            |                                              |
| 1966                                 | 4,791                           | 32,664     | 13.3                                         |

<sup>a</sup>Taken from official Forest Service recreation reports.

<sup>b</sup>A man-day, a term now discontinued in Forest Service recreation use reporting, was defined as a stay of from 7 to 24 hours by one person.

<sup>c</sup>In 1965, the Forest Service commenced reporting recreation use statistics in terms of visitor days. This unit is defined as an aggregate stay of 12 hours; e.g., one person for 12 hours, 2 persons for 6 hours, etc.

Projections of wilderness recreation use need to be assessed critically, due to the low base from which they are initiated and to inadequacies in past use measurement techniques.<sup>1</sup> At the same time,

<sup>1</sup>An additional concern here is the confusion between measures of use and measures of demand. The terms are not synonymous, though often treated as though they were. Use figures simply reflect rates of participation given a particular opportunity condition. Demand, on the other hand, is a measure of the amount of a goods or service that will be consumed in a given period of time and at a specified price. For discussions on this point, see Marion Clawson and Jack L. Knetsch, *Economics of Outdoor Recreation* (Baltimore: Johns Hopkins Press, 1966), pp. 41-99, and Knetsch, "Assessing the Demand for Outdoor Recreation," *Journal of Leisure Research*, 1 (Winter, 1969), pp. 85-87.

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it seems clear that wilderness recreation use will increase, and at a substantial rate. What is not clear is the exact magnitude of the increase.

In 1959 the Wildland Research Center, in their report to the Outdoor Recreation Resources Review Commission (ORRRC), projected a nearly 10 fold increase in visits to wilderness areas by the year 2000.<sup>1</sup> Forest Service use statistics recorded 562,000 wilderness visits in 1959; the Wildland Research Center projection would indicate that wilderness areas would experience nearly six million visits by the turn of the century. This rate of growth would occur at a compounded interest rate of 6 percent. By 1967, however, just over two million visits to wilderness were recorded, or a four-fold increase in only 8 years. This reflects a 10 percent growth rate, and if it were to be maintained until the turn of the century, would yield over 45 million visits. This is, of course, unlikely, but it does suggest the general rate in which wilderness use appears to be growing.

Two factors should be noted at this point that bear on the accuracy of any projection of wilderness use. First, since 1946, wilderness visits have grown at an average annual rate of 10 percent. This rate of consistent growth suggests that use projections are not being influenced to any great extent by the presence of one or two abnormally high values in the use records. Secondly, almost without

<sup>1</sup>Wildland Research Center, Wilderness and Recreation, p. 236.

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exception, studies of wilderness users have indicated that wilderness users are disproportionately overrepresented in terms of such socioeconomic characteristics as high income (\$10,000 and over), college level or graduate education, urban residence, and the professional-technical occupational categories. Table 3 shows the results of a number of wilderness studies in regard to these characteristics.

Projections by the Bureau of the Census indicate a general upswing in all of these socioeconomic characteristics for the U.S. population; we normally assume our children will be better educated, have higher incomes, etc., than our present generation. As the segment of the U.S. population from which most wilderness users are now found grows larger, it seems reasonable to expect a growth in the number of persons seeking the wilderness environment.<sup>1</sup>

#### The Wilderness Resource--Its Spatial Dimensions and Future

While recreational use of wilderness has steadily grown, the status of the resource base upon which this use occurs has not. The U.S. Forest Service administratively designated 14 million acres for wilderness purposes between 1929 and 1939 under Regulation L-20.

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<sup>1</sup>For an expansion of this idea, see Burch and Wenger, The Social Characteristics of Participants in Three Styles of Family Camping, pp. 19-24. The authors also point out that persons who, as children, participated in automobile camping, are more likely to become remote or backcountry campers as adults. They note "If such a pattern holds, then recreational planners may wish to insure that there are always primitive and near-primitive camping areas available for the former easy-access camper," p. 18.

TABLE 3  
PERCENTAGE OF SAMPLE FURNISHING CERTAIN SOCIOECONOMIC CHARACTERISTICS  
IN SELECTED WILLIAMS RECREATION USE STUDIES

| Study | Year<br>Conducted | Income Over<br>\$10,000 | College<br>Education | Urban<br>Residence | Professional-<br>Technical Occupation |
|-------|-------------------|-------------------------|----------------------|--------------------|---------------------------------------|
|       | 1960              | 20                      | 34                   | 50                 | 50                                    |

TABLE 3

PERCENTAGE OF SAMPLE POSSESSING CERTAIN SOCIOECONOMIC CHARACTERISTICS  
IN SELECTED WILDERNESS RECREATION USE STUDIES

| Study                                                                 | Year Conducted | Income Over \$10,000 | College Education | Urban Residence   | Professional-Technical Occupation |
|-----------------------------------------------------------------------|----------------|----------------------|-------------------|-------------------|-----------------------------------|
| Mount Marcy <sup>a</sup>                                              | 1960           | 29                   | 84                | 90                | 50                                |
| High Sierra <sup>a</sup>                                              | 1960           | 46                   | 82                | 96                | 48                                |
| Boundary Waters Canoe Area <sup>a</sup>                               | 1960           | 40                   | 75                | 95                | 36                                |
| Merriman <sup>b</sup>                                                 | 1960           | 57                   | 52                | 94                | 55                                |
| Lucas <sup>c</sup>                                                    | 1960-61        | 30                   | 79                | n.s. <sup>1</sup> | 71                                |
| Burch and Wenger <sup>d</sup>                                         | 1962           | 38                   | 63                | 85                | 28                                |
| Merriman and Ammons <sup>e</sup>                                      | 1964           | 65                   | 37                | n.s.              | 71                                |
| Hendee <sup>f</sup>                                                   | 1965           | 59                   | 65                | 61                | 47                                |
| Percentage of National Population in Respective Category <sup>g</sup> | 1960           | 14                   | 16                | 70                | 11                                |
| Percentage of National Population in Respective Category <sup>h</sup> | 1965           | 20                   | 18                | n.s.              | 12                                |

<sup>a</sup> Ibid., pp. 131-133. The figures for Mount Marcy, the High Sierra and the Boundary Waters Canoe Area are all from Wilderness and Recreation--A Report on Resources, Values and Problems. The data for each area is listed separately here, due to differences in the population from which samples were drawn.

Lawrence C. Merriam, Jr.: A Land Use Study of the Job Marshall Wilderness Area, Montana Forest and Conservation Experiment Station Bulletin No. 26 (Missoula: University of Montana, 1963), pp. 165, 167-169.

<sup>c</sup>Robert C. Lucas, Recreational Use of the Quetico-Superior Area, U.S. Forest Service Research Paper LS-8 (St. Paul: Lake States Forest Experiment Station, 1974), p. 45. Percentages are in reference to paddling canoeists only.

<sup>d</sup>William R. Burch, Jr. and Wiley D. Wenfer, Jr.: The Social Characteristics of Participants in  
Pacific Northwest  
Forest Service Research Paper PN-24 (Portland: Pacific Northwest  
Forest Service, 1967). Includes persons



<sup>b</sup>Lawrence C. Merriam, Jr., A Land Use Study of the Bob Marshall Wilderness Area, Montana Forest and Conservation Experiment Station Bulletin No. 26 (Missoula: University of Montana, 1963), pp. 165, 167-169.

<sup>c</sup>Robert C. Lucas, Recreational Use of the Quetico-Superior Area, U.S. Forest Service Research Paper LS-6 (St. Paul: Lake States Forest Experiment Station, 1964), p. 45. Percentages are in reference to paddling canoeists only.

<sup>d</sup>William R. Burch, Jr. and Wiley D. Wenger, Jr., The Social Characteristics of Participants in Three Styles of Family Camping, U.S. Forest Service Research Paper PMW-43 (Portland: Pacific Northwest Forest and Range Experiment Station, 1967), pp. 14, 20, 22-23. Figure for income category includes persons with incomes \$9,000 and over.

<sup>e</sup>Lawrence C. Merriam, Jr. and Robert B. Ammons, The Wilderness User in Three Montana Areas, (St. Paul: School of Forestry, University of Minnesota, 1967), pp. 23-25.

<sup>f</sup>John C. Hendee, et al., Wilderness Users in the Pacific Northwest--Their Characteristics, Values, and Management Preferences, U.S. Forest Service Research Paper PMW-61 (Portland: Pacific Northwest Forest and Range Experiment Station, 1968), p. 13.

<sup>g</sup>U.S. Department of Commerce, Bureau of the Census, Census of Population: 1960 (Washington: Government Printing Office), Vol. 1, United States Summary, pp. 27, 207, 217, 227.

<sup>h</sup>U.S. Department of Commerce, Statistical Abstract of the United States, 1965 (Washington, D.C.: Government Printing Office, 1965), pp. 227, 469. The figure for education was obtained from the 1968 edition of the Statistical Abstract, p. 155.

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|      | Number of |
|------|-----------|
| 1930 |           |
| 1935 | 6         |
| 1940 | 7         |
| 1945 | 7         |
| 1950 | 7         |
| 1955 | 7         |
| 1960 | 7         |
| 1965 | 5         |
| 1969 | 5         |

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Regulation L-20 was superceded in 1939 by the U-Regulations. While these regulations provided authority for establishing new areas, the principal activity between 1939 and the passage of the Wilderness Act in 1964 was the reclassification of Primitive areas into Wilderness or Wild areas. In this 25 year period, total acreage increased approximately 400,000 acres, or only about 3.5 percent.<sup>1</sup>

Table 4 shows the growth of areas under either administrative or legislative authority between 1930 and 1969. As can be seen, the rapid period of initial growth during the thirties has been followed by a prolonged period of relatively slow growth.

TABLE 4

GROWTH OF DESIGNATED WILDERNESS 1930-1969<sup>a</sup>

|                   | Number of Areas | Acreage    | Percentage Growth in Acreage |
|-------------------|-----------------|------------|------------------------------|
| 1930              | 3               | 360,444    |                              |
| 1935              | 66              | 10,228,314 | 2,738                        |
| 1940              | 73              | 14,217,173 | 39                           |
| 1945              | 75              | 13,821,627 | -3                           |
| 1950              | 77              | 13,915,262 | 0.7                          |
| 1955              | 79              | 13,795,075 | -0.8                         |
| 1960              | 83              | 14,675,358 | 6                            |
| 1964 <sup>b</sup> | 88              | 14,617,461 | -0.4                         |
| 1969              | 93              | 14,293,056 | -2                           |

<sup>a</sup> Acreage figures for 1930-1964 taken from U.S. Department of Agriculture, Outdoor Recreation in the National Forests, p. 99. The figure for 1969 is from U.S. Congress, House, The Sixth Annual Report on the Status of the National Wilderness Preservation System, No. 91-372, Part 1, 91st Cong., 2nd Sess., 1970, pp. 7-21. Includes all areas classified as wilderness, wild, primitive, or canoe.

<sup>b</sup> Extent of designated wilderness at the passage of the Wilderness Act.

<sup>1</sup> U.S. Department of Agriculture, Forest Service, Outdoor Recreation in the National Forests, Agricultural Information Bulletin 301 (Washington, D.C.: Government Printing Office, 1965), p. 99.

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areas, respectively,  
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<sup>2</sup> De facto  
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Projections as to the potential size of the National Wilderness Preservation System vary widely, from a low of about 30 million acres to a high estimate of over 50 million acres.<sup>1</sup> Definitions provided within the Wilderness Act serve as constraints that will necessarily restrict the maximum size of the system. This fact, coupled with the other land management objectives of the administering agencies need to be taken into account in attempting to estimate the future growth of wilderness. Table 5 is an attempt to estimate the maximum acreage potentially available in the 48 states for consideration as wilderness by the various involved Federal agencies.

The following calculations have been used to arrive at these maximum figures. The Forest Service total includes the 9.9 million acres presently classified and included in the Wilderness System, 4.4 million acres presently classified as primitive, and 7 million acres of de facto wilderness.<sup>2</sup> This last figure is hard to estimate. As part of their nationwide inventory of wilderness in 1960, the

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<sup>1</sup>In Robert C. Lucas, "The Contribution of Environmental Research to Wilderness Policy Decisions," Journal of Social Issues, XXII (October, 1966), p. 117, the author estimates a leveling off of official wilderness at about 30-35 million acres. McCloskey and Zahniser and Nadel have published estimates of 48 and 55 million acres, respectively. See McCloskey, "The Wilderness Act of 1964," p. 289 and Howard Zahniser and Michael Nadel, "Parks and Wilderness, in America's Natural Resources, ed. by Charles H. Callison (New York: The Ronald Press Company, 1967), p. 166.

<sup>2</sup>De facto wilderness is defined as roadless and otherwise unmodified land that presently lacks administrative or legislative recognition as wilderness.

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Wildland Research Center<sup>1</sup> reported the existence of approximately 7 million acres of unreserved National Forest Land. Some of this unreserved wilderness has been developed since that time, of course, and would no longer qualify as wilderness. Assuming there were some underreporting errors in the 1960 estimate, the 7 million acre figure is probably a reasonable estimate of present de facto acreage.

TABLE 5

ESTIMATED MAXIMUM POTENTIAL LIMITS TO THE  
NATIONAL WILDERNESS PRESERVATION SYSTEM  
(WITHIN THE 48 CONTERMINOUS STATES)

| Management Agency                          | Acreage Classified Or<br>Suitable for Wilderness<br>Classification (Million) | Percentage<br>of U.S.<br>(48 States) |
|--------------------------------------------|------------------------------------------------------------------------------|--------------------------------------|
| Forest Service                             | 21.3                                                                         | 1.1                                  |
| National Park Service                      | 19.8                                                                         | 1.0                                  |
| Bureau of Sports Fisheries<br>and Wildlife | 4.2                                                                          | .2                                   |
| Bureau of Land Management <sup>a</sup>     | 2.2                                                                          | .1                                   |
| Total                                      | 47.5                                                                         | 2.4                                  |

<sup>a</sup>While the Bureau of Land Management is not required by the Wilderness Act to evaluate and classify areas as wilderness, it may designate suitable areas for wilderness preservation under terms of the Classification and Multiple Use Act of 1964, Public Law 88-607.

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<sup>1</sup>Wildland Research Center, p. 5.

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The National Park Service has designated 54 units of the National Park System as qualifying for study under the Wilderness Act.<sup>1</sup> Aggregate acreage of these areas is 19.8 million acres. This does not take into account the fact that some of this acreage will not meet the standards of the Wilderness Act (because of prior developments, etc.) or that in some instances, wilderness classification would hamper the primary management objectives. To date, National Park Service proposals for wilderness classification have averaged only about 54 per cent of aggregate acreage studied.<sup>2</sup>

The Bureau of Sports Fisheries and Wildlife is reviewing 76 areas (exclusive of Alaska). Total acreage of these units is 4.2 million acres.<sup>3</sup> As was the case with the National Park System holdings, however, it is unlikely that all of this acreage would qualify for wilderness classification. The management objectives associated with much of the Bureau's holdings would be seriously hampered by a classification that prohibits roads and other forms of environmental manipulation.

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<sup>1</sup>National Park Service, "Areas of the National Park System Included in the Wilderness Study Program," Washington, D.C., 1970, pp. 1-2. (Mimeographed.)

<sup>2</sup>U.S. Congress, Sixth Annual Report on the Status of the National Wilderness Preservation System, p. 19.

<sup>3</sup>U.S., Department of Interior, Fish and Wildlife Service, "Second Annual Status Report on Wilderness Reviews Within the National Wilderness Preservation System," Washington, D.C., 1970, pp. 1-2. (Mimeographed.)

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<sup>1</sup> U.S. Congr  
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Finally, the Bureau of Land Management (BLM) has identified 2.2 million acres in the conterminous United States as having characteristics potentially suitable for designation as wilderness.<sup>1</sup> At present, 31,000 acres have been set aside in Arizona. Although BLM acreages are not included in the National Wilderness Preservation System as defined by the Wilderness Act, they are included here since it is the aim of this discussion to define the maximum parameters within which opportunities for wilderness recreation may be provided.

The rapid growth rate of wilderness recreation use has far exceeded the provision of official wilderness acreage. This situation is not particularly unique; virtually all forms of outdoor recreation are characterized today by growth rates considerably higher than the rate at which recreation areas are being provided. The increasing intensities of use on wilderness areas, however, become of particular concern when viewed in the context of management objectives set forth by the Wilderness Act.

While wilderness, as defined by the Wilderness Act, can be reduced in supply, it is, given the constraints of time, impossible to expand. At the same time, use<sup>2</sup> will continue to rise, particularly

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<sup>1</sup>U.S. Congress, Sixth Annual Report on the Status of the National Wilderness Preservation System, p. 22.

<sup>2</sup>For the purposes of this study, references to "use" deal with the recreational aspects of the term. While recognizing that other types of uses are recognized in the Wilderness Act, recreational use is the major type.

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given the maintenance of the present practice of treating wilderness as a free good. The consequence of such a situation will be eventual loss of those environments wilderness classification is designed to protect as well as the loss of unique recreational opportunities to a steadily increasing proportion of our population. An alternative course of action exists, however; this involves an effort to allocate the benefits of the wilderness resource in such a manner so as to optimize net benefits for users while at the same time insuring preservation of the irreproducible assets of the resource.<sup>1</sup> The resolution of this problem lies in an in-depth understanding of (1) the inherent physical capabilities of the resource to withstand use, in place as well as over time, and (2) the effects of recreational use, in all its parameters, on the quality of the wilderness experience for the user. The former topic involves principally an analysis of biological and pedological factors while the latter centers on the role of a user's attitudes and perceptions in defining his level of satisfaction in light of some parameter of use. The study outlined here, while fully cognizant of the role of the biological-pedological dimension in defining capacity, will focus upon these user attitudes and perceptions and their role in wilderness recreation carrying capacity.

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<sup>1</sup>The obvious economic nature of this problem is discussed in Garrett Hardin, "The Economics of Wilderness," Natural History, 78 (June-July, 1969), pp. 20-27.

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### Study Objectives

This study is one of a series to be undertaken by the Wilderness Management Research Project of the Intermountain Forest and Range Experiment Station. The primary focus of this research project is on the various social aspects of wilderness recreation. The orientation of research is aimed at providing land managers charged with the administration of National Forest lands with empirical data to enhance and substantiate their decisionmaking relative to wilderness management.

There were four principal objectives to this study. Initially it sought to identify the relevant parameters of wilderness recreation use and the relation of these parameters to user attitudes and perceptions of carrying capacity. Four parameters were examined: (1) the levels of recreational use encountered; (2) the types of recreational use encountered, e.g., backpackers or horseback riders, solitary individuals or large organizational parties, canoes or motor powered craft, etc.; (3) spatial variations in use, i.e., did encounters at or near the access point to the wilderness differ in their affect on user satisfaction as compared to a point well inside the area, what differences were there in encountering others while traveling along a trail as opposed to seeing them while in camp; and (4) depreciative behavior, e.g., did adverse human activity (e.g., littering) significantly affect the perception of wilderness quality.

Second, the study sought to identify how the perception of carrying capacity varied among the study areas as well as among other



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relevant units of analysis. These units of analysis included such measures as mode of travel, level of general outdoor experience as well as wilderness experience, and the degree to which users held "purist" attitudes about the wilderness resource.

A third objective involved mapping those zones within the study areas where use exceeded the perceived carrying capacity. This cartographic analysis then permitted the identification of "problem" areas within each study area where some type of use control may prove desirable as well as those areas where use now is below capacity and which, through various redistributive techniques, could sustain higher levels of use with no adverse impact on recreational quality.

Finally, the study sought to probe user attitudes toward various management inputs that could control or otherwise influence use. This included institutional arrangements, such as permits, as well as physical modifications designed to increase capacity, such as more trails.

### Chapter Outline

Chapter II involves a discussion of the use of the term "carrying capacity" in geography and in several studies in resource management. From this broad analysis of the term, attention is then turned to focus specifically on its use in wildland recreation. This section will conclude with a statement of how the term is defined for the purposes of this study.

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A discussion of the study areas, methodologies, and strategies is undertaken in Chapter III. Included is a discussion of the development of a purism scale. In Chapter IV, the perception of wilderness recreation carrying capacity will be discussed, including the relevant elements users rely upon to define it and the manner in which it varies between users and study areas. Chapter V explores user attitudes and perceptions relative to the various management alternatives of controlling or influencing use. From this prescriptive level discussion, Chapter VI will examine how users actually behaved in relation to use and the relationship between "what people say they will do" and "what people actually do" will be developed. Chapter VII will then conclude with an analysis of the findings in terms of both its management significance and its relation to present and developing theoretical concepts.

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## CHAPTER II

### THE CONCEPTS OF ENVIRONMENT AND CARRYING CAPACITY: THE WILDERNESS CONTEXT

The relationship of man to his environment has been a theme common to a variety of methodological and theoretical orientations within geography. In recent years, significant advances in understanding how man relates to, utilizes, and distributes himself in environment have occurred. Much of this growth must be attributed to the increased realization by geographers that "environment" as a topic of study involves not only physical realities, but social, psychological, cultural, economic, and institutional aspects as well. From this realization has arisen a burgeoning number of studies that seek to explain man's use and occupance of space in terms of how he sees it, rather than in terms of physical reality. The key concept here is "perception"; that is, the recognition "that the objective reality of natural or artificial environments may be less significant in geographic research than the perception of such environments by groups or individuals."<sup>1</sup>

Perception has become of major significance to many geographic studies in response to geography's growing concern with understanding

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<sup>1</sup>Marvin W. Mikesell, "The Borderlands of Geography as a Social Science," in Interdisciplinary Relationships in the Social Sciences, ed. by Muzafer Sherif and Carolyn W. Sherif (Chicago: Aldine Publishing Company, 1969), p. 237.

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the processes of human behavior in space.<sup>1</sup> Research along these lines has been highly interdisciplinary in its methodological and theoretical underpinnings and has enjoyed particular fruition in those studies involving man's adjustment to natural hazards<sup>2</sup> and his approach to resource conservation and utilization.<sup>3</sup>

A common thread to the geographic work involving perception is the recognition that the cognitive environment of the individual

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<sup>1</sup> Joseph Sonnenfeld, "Geography, Perception, and the Behavioral Environment" (paper presented at the American Association for the Advancement of Science, Dallas, Texas, Dec. 27, 1968), p. 2.

<sup>2</sup> A large number of studies exist that could be cited. Representative examples include Robert W. Kates, Hazard and Choice Perception in Flood Plain Management, Department of Geography Research Paper No. 78 (Chicago: Department of Geography, 1962); Thomas F. Saarinen, Perception of the Drought Hazard on the Great Plains, Department of Geography Research Paper, No. 106 (Chicago: Department of Geography, 1966); Ian Burton, et al. The Shores of Megalopolis: Coastal Occupance and Human Adjustment to Flood Hazard. Publications in Climatology, Vol. XVIII (Elmer, New Jersey: C. W. Thornthwaite Associates, 1965), pp. 435-603; and Ian Burton, Robert W. Kates, and Gilbert F. White, The Human Ecology of Extreme Geophysical Events, Natural Hazard Research Working Paper No. 1 (Toronto: Department of Geography, University of Toronto, 1968).

<sup>3</sup> Examples include J. Blaut, et al. "A Study of Cultural Determinants of Soil Erosion and Conservation in the Blue Mountains of Jamaica," Social and Economic Studies, VIII (1959), pp. 402-420; L. Schuyler Fonaroff, "Conservation and Stock Reduction on the Navajo Tribal Range," Geographical Review, LII (April, 1963), pp. 200-223; Julian Wolpert, "The Decision Process in Spatial Context," Annals of the Association of American Geographers, 54 (December, 1964), pp. 537-558; Dean N. Quinney, "Small Private Forest Landownership in the United States--Individual and Social Perception," Natural Resources Journal, 3 (October, 1964), pp. 379-393; and Robert C. Lucas, "Wilderness Perception and Use: The Example of the Boundary Waters Canoe Area," Natural Resources Journal, 3 (October, 1964), pp. 394-411.

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seldom, if ever, coincides with the "real" world. The environment within which an individual behaves may be considerably different from that which an outside observer sees him to be operating within. To explain and predict behavior in space, therefore, requires that the parameters of the environment within which the individual behaves be delineated.

### The Nature of Environment

Although the notion of environment is a key concept in geography, its dualistic meaning has probably resulted in some confusion in efforts by geographers to develop rigorous environmental studies with other disciplines. Most references to the term are made with the physical elements of nature in mind; the biotic, edaphic, and climatic components that surround us. Characteristically, nongeographers refer to this as the geographic environment,<sup>1</sup> although the "environmentalist" tradition of Semple and Huntington utilized the term in a similar fashion.

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<sup>1</sup>Other terms are the nonpsychological environment, pre-perceptual environment, and ecological environment. Barker has remarked that much of psychology's neglect of the effect of the physical environment on human behavior can be traced to the influence of Kurt Lewin. Lewin considered it impossible to make derivation to behavior from the nonpsychological environment and his philosophy has molded much of present day thinking in psychology. See Roger G. Barker, "On the Nature of the Environment," Journal of Social Issues, XIX (October, 1963), pp. 17-38.

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The need for a broader definition of environment, however, has long been recognized by geographers. In 1935 Pomfret<sup>1</sup> defined human geography as the interrelationship between the physical environment and the social environment of any group. But in Pomfret's discussion, environment (both physical and social) was a readily observable entity, of similar magnitude and relevance to all who observed it.

In a report on the current status of geography and its future opportunities,<sup>2</sup> the National Academy of Science-National Research Council committee specifically recognized that a comprehensive view of geography had to include not only visible physical and social parameters, but that, "many . . . geographers are coming to realize that ideas, attitudes, and other nonvisible entities of culture are of importance in understanding spatial distributions and space relations of phenomena."

As a result of the need to adequately delineate the environment within which man perceives and behaves, the phrase "behavioral environment" has been suggested. The phrase has its origin in Gestalt psychology<sup>3</sup> and describes the environment as it is perceived and

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<sup>1</sup> John E. Pomfret, The Geographic Pattern of Mankind (New York: Appleton-Century Company, 1935), p. 13.

<sup>2</sup> Ad Hoc Committee on Geography, Earth Sciences Division, The Science of Geography (Washington, D.C.: National Academy of Sciences-National Research Council, 1965), p. 28.

<sup>3</sup> Kurt Koffka, Principles of Gestalt Psychology (New York: Harcourt and Brace, 1935), p. 374.

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reacted to by an individual, as opposed to the geographical environment, which referred to the objective physical and social environment in which the individual is immersed.<sup>1</sup> The phrase was introduced into geographical literature by Kirk<sup>2</sup> who suggested its use as a framework in which the man-environment relationship would be more adequately understood.

Since Kirk's application of the behavioral environment to geography, its use as a construct has gained in sophistication. It is a key concept to the man-milieu hypothesis of cognitive behaviorism, which contends that man reacts and behaves in regard to his environment according to how he perceives and interprets it.<sup>3</sup> The specific dimensions of the behavioral environment, as well as its philosophical ramifications, have been discussed by a number of authors, including David Lowenthal, Yi-Fu Tuan, Thomas Saarinen, and Robert Kates.

Lowenthal notes that we inhabit a world in which the amount of information available far exceeds our capability to absorb it; as a

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<sup>1</sup>Note that Koffka's use of "geographical environment" is distinctly different from that used by other nongeographers, who generally use it simply as a synonym for the physical environment.

<sup>2</sup>William Kirk, "Historical Geography and the Concept of the Behavioral Environment," in Indian Geographical Journal, Silver Jubilee Edition, ed. by George Kuriyan (Madras: Indian Geographical Society, 1952), pp. 152-160. A later expansion of Kirk's views is in "Problems of Geography," Geography, XLVII (1963), pp. 357-371.

<sup>3</sup>Saarinen, Perception of the Drought Hazard, p. 26.

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<sup>2</sup> Yi-Fu Tuan  
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result, we synthesize, reduce, and selectively acquire only that information necessary to function. This process is a reflection of our society and the end result is that we each inhabit a "private world," one which has points of commonality with others about us, but which is unique:

. . . because each person inhabits a different milieu . . .  
also . . . because everyone chooses from and reacts to the  
milieu in a different way.<sup>1</sup>

Man's relation to this environment is often influenced by the emotional or conative significance which he attaches to it. Tuan has detailed how the recognition and differentiation of landscapes is closely tied to the symbolic significance those landscapes hold for a society or culture.

Ancient writers tended to neglect the dry lands for reasons of theology as well as cosmogony. How could these great expanses of near sterility be made to fit the view of nature inspired by the Hebraic-Christian notion of a provident and omnipotent God?<sup>2</sup>

The man-land relationship also may be affected under conditions of stress, where the hardship that accompanies the pursuit of a livelihood is such that the perception of the environment is altered in some

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<sup>1</sup>David Lowenthal, "Geography, Experience, and Imagination: Towards a Geographic Epistemology," Annals of the Association of American Geographers, LI (September, 1963), p. 254.

<sup>2</sup>Yi-Fu Tuan, "Attitudes Toward Environment: Themes and Approaches" in Environmental Perception and Behavior, ed. by David Lowenthal (Chicago: Department of Geography, 1967), p. 10. For another discussion of the role of symbolism in affecting the man-land relationship, see Walter Firey, "Sentiment and Symbolism as Ecological Variables," American Sociological Review, 10 (February, 1945), pp. 140-148.

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<sup>1</sup> Saarinen.

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fashion. Saarinen has scrutinized this problem in a study of drought on the Great Plains. He concluded that increasing levels of experience with drought conditions tended to constrain the perception of alternative land practices and reduced the propensity of farmers to adopt new farming techniques. Additionally, he found marked inaccuracies in farmer perception of drought frequency, with almost all farmers underestimating occurrence.<sup>1</sup>

Kates has reviewed the role of environment in various social science disciplines and found that it commonly serves only as a backdrop against which man's activity is studied. He calls for more of an interdisciplinary approach to the study of environment, noting that:

Geography has long dealt with the stimulus properties of the environment--weather, topography, city form--and the symbolic qualities--space, regions, maps . . . psychology . . . has studied intensively the perception and symbolization of discrete stimuli.<sup>2</sup>

The work of these scholars, and many others, points to the need to develop a conceptual framework which incorporates man, on the one hand, and environment on the other, and delineates their relationship from various levels of analysis. In the paper before the American Association for the Advancement of Science, Sonnenfeld proposed a

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<sup>1</sup>Saarinen, Perception of the Drought Hazard, p. 139.

<sup>2</sup>Robert W. Kates, "Stimulus and Symbol: The View from the Bridge," Journal of Social Issues, XXII (October, 1966), p. 26. For a partial explanation of why the two disciplines have not been more closely associated see footnote 1, p. 35.

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scheme to accomplish this need. He noted that man functions within a nested set of environments:

At the broadest level is the geographical environment, constituting both proximal and distal elements of man's universe. This is reduced in stages to the operating (operational) environment, which is that environment impinging on man with which in some way or another he is likely to be directly involved; to the perceptual environment, which is that environment of which man is aware; and finally to the behavioral environment, the environment which elicits a behavioral response from the individual.<sup>1</sup>

The critical difference between the perceptual environment and the behavioral environment is that the latter does not include those elements to which no overt or conscious action or behavior is directed. Sonnenfeld notes "there is no necessary relationship between that which one perceives to exist . . . and the way in which he behaves . . . ." <sup>2</sup>

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<sup>1</sup>Sonnenfeld, "Geography, Perception, and the Behavioral Environment." Emphasis added. This conceptualization is similar, although much more detailed, to one proposed by Marston Bates in The Human Environment, The Horace M. Albright Conservation Lecture-ship, Vol. II (Berkeley: University of California School of Forestry and Conservation, 1962), pp. 7-10.

<sup>2</sup>Ibid. Sonnenfeld's "behavioral environment" is very similar to Chein's "geo-behavioral" or "objective-behavioral" environment, defined as the geographical environment (the physical and social environment in which an individual is immersed) looked at from a point of view that is concerned with understanding behavior. See Isidor Chein, "The Environment as a Determinant of Behavior," Journal of Social Psychology, 39 (February, 1954), p. 116. It is also logically related to Barker's "eco-behavioral" concept which describes the environment in which behavior occurs. This would unite the ends of the E-E arc (environment-environment) where a stimulus in the physical end (an area of no concern in Lewinian psychology) elicits a response in the psychological environment of the individual. See Barker, "On the Nature of the Environment," p. 25.

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Since geographers are concerned with the spatial manifestations of man's activities (behavior) on the earth's surface, it necessarily follows that the nature and dimension of the behavioral environment are of importance. We are concerned to a large extent with the interaction which occurs in that environment between man and the physical elements and, to a lesser degree, between man and the social system. This degree of concern then serves as a rough boundary between areas principally of concern to geographers and those of primary relevance to sociology or psychology. To again refer to Sonnenfeld, the difference is whether the concern is for the reacting environment (reacting is defined in terms of social interaction) or the nonreacting environment. Geographers have been principally involved in the latter area; however, concern for the geographical implications of social interaction is salient and growing.

Sonnenfeld's framework is a useful model in conceptualizing the different environments in which man is immersed and, to varying degrees involved, and lends itself to efforts by human geographers to understand differential spatial organization. The variability which characterizes human occupancy and use of space is necessarily a reflection of man's perceived relationship to the environment. This is especially true in the case of wilderness. Despite the array of administrative and legislative edicts, wilderness remains largely a function of human perception. Examining the question of

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wilderness recreation carrying capacity requires that research focus on the wilderness environment as it is perceived by the user, not in terms of its administrative or legislative definition. Such an approach will focus attention on those elements of the resource and its use that influence carrying capacity determination.

### The Concept of Carrying Capacity

As a focus of study, carrying capacity is a traditional theme in geography. Students in introductory geography courses are often presented with various man-land ratios; population to total acreage, population to arable acreage, and so forth. These ratios are, in essence, simplistic notions of carrying capacity. They help express a relationship between man and resource. They are also, however, only descriptive. They describe conditions as they are; they lack expression of the man-land relationship as it should be (a measure of prescription). The prescriptive dimension of the carrying capacity concept is extremely important since it implies the incorporation of a perceived need or objective into the calculation, a value judgment as to what "should be."

### Carrying Capacity Definitions in Man-Land Studies

The preponderance of work by geographers on questions of carrying capacity has involved the study of subsistence

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economies.<sup>1</sup> In this context, carrying capacity has been defined as:

. . . the maximum number of people that a given land area will maintain in perpetuity under a given system of usage without land degradation setting in.<sup>2</sup>

Zimmerman has noted that an understanding of man-land relationships must be evaluated in terms of the capacity of the land "to support life, to satisfy human wants."<sup>3</sup> He suggests that while carrying capacity can be relatively easily ascertained in closed primitive societies, the increasing complexities brought about by the technological and institutional advances of civilization require a shift in the definition of the term. Whereas primitive societies rely on the internal capacity of land for sustenance<sup>4</sup> (that is, the capability of the lands in situ to provide a livelihood), it is

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<sup>1</sup>Street notes "the calculation of carrying capacity of the environment of some particular primitive society and the improvisation of formulae for the determination of carrying capacities have been fairly common objectives of . . . cultural geographers," John M. Street, "An Evaluation of the Concept of Carrying Capacity," The Professional Geographer, XXI (March, 1969), p. 104. Other pertinent discussion may be found in the section "Through the Corridors of Time" in Man's Role in Changing the Face of the Earth, ed. by William L. Thomas, Jr. (Chicago: University of Chicago Press, 1956), pp. 115-448, and William M. Denevan, "Aboriginal Drained-Field Cultivation in the Americas," Science, 169 (August 11, 1970), pp. 647-654.

<sup>2</sup>William Allan, "Studies in African Land Usage in Northern Rhodesia," Rhodes Livingstone Papers, No. 15 (1949), quoted in Street, "An Evaluation of the Concept of Carrying Capacity," p. 104.

<sup>3</sup>Zimmerman, World Resources and Industries, p. 92.

<sup>4</sup>An expansion of this point is found in Philip Wagner, The Human Use of the Earth (Glencoe, Illinois: The Free Press, 1960), pp. 77-78.

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necessary to consider the external capacity, as well as the internal capacity, when studying more advanced societies. External capacity takes into account such things as trade agreements with other countries, and political and financial arrangements that enable a country to support a population above and beyond the capabilities of the home territory.

The complicating effect of increased civilization was also noted by Vogt. He examined the problem of determining carrying capacity through the formula,  $C = B:E$ .

Here C stands for the carrying capacity of any area of land. In its simplest form this means its ability to provide food, drink, and shelter to the creatures that live on it. In the case of human beings, the equation finds complicated expression in terms of civilized existence.

B means biotic potential or the ability of the land to produce plants for shelter, for clothing, and especially for food.

E stands for environmental resistance, or the limitations that any environment, including the part of it contrived and complicated by man, places on the biotic potential or productive ability. The carrying capacity is the resultant of the ratio between the other two factors.<sup>1</sup>

The prescriptive nature of carrying capacity estimates has led to considerable involvement on the part of economists. Efforts to allocate scarce resources between competing uses have led to the development of conceptual frameworks designed to optimize resource utilization in time. Wantrup, for example, speaks of the safe minimum

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<sup>1</sup>William Vogt, Road to Survival (New York: William Sloane Associates, Inc., 1948), p. 16.

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standard of conservation, a concept of defining the economic optimum by the restriction of avoiding immoderate possible losses.<sup>1</sup> Maintenance of this "safe minimum standard" is accomplished by avoiding the critical zone--"that is, those physical conditions, brought about by human action, which would make it uneconomical to halt and reverse depletion."<sup>2</sup>

Gannon has argued that in a world of technologic change, the Malthusian and Ricardian hypotheses of natural resource scarcity hold little validity. However, the recent growth in the demand for the services of unique natural phenomena coupled with the relative inability of present day technology to produce suitable substitute services has produced a legitimate need for renewed evaluation of a restricted-use philosophy.<sup>3</sup> Developing some of the notions originally posited by Krutilla,<sup>4</sup> he attempts to formulate an economic framework

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<sup>1</sup>S. V. Ciriacy-Wantrup, Resource Conservation: Economics and Policies (Berkeley: University of California, 1963), p. 88.

<sup>2</sup>Ibid., p. 253.

<sup>3</sup>Colin A. Gannon, Towards a Strategy for Conservation in a World of Technological Change, RSRI Discussion Paper Series No. 24 (Philadelphia: Regional Science Research Institute, 1968), pp. 1-3.

<sup>4</sup>Three papers by Krutilla are the foundation to Gannon's effort. See John V. Krutilla, "Conservation Reconsidered," American Economic Review (September, 1967), pp. 777-786; "Some Environmental Effects of Economic Development," Daedalus, 96 (Fall, 1967), pp. 1058-1070; and "Balancing Extractive Industry with Wildlife Habitat," Transactions of the Thirty-Third North American Wildlife and Natural Resources Conference (Washington, D.C., 1968), pp. 119-130.

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In recent testimony before the Federal Power Commission concerning proposed construction of the High Mountain Sheep Dam on the Snake River, Krutilla has developed an economic model to assess the costs and benefits associated with preserving the canyon in its natural state. He incorporates into the model a carrying capacity constraint, designed to insure preservation of the desirable characteristics of the area in the face of increasing demand.<sup>1</sup> This capacity constraint has the effect of creating higher prices with increases in demand, thus representing increases in accrued annual benefits.<sup>2</sup> Computation of the carrying capacity constraint is not well developed, however. One surrogate suggested by Krutilla is a level of recreational use that does not adversely affect the effort-success ratio for hunters and fishermen of the area.

Barnett and Morse have examined the concept of "scarcity," its origins in Malthusian and Ricardian economics, and its relevance in a society of changing technology.<sup>3</sup> The decision to establish a

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<sup>1</sup>John V. Krutilla, Draft of testimony presented to the Federal Power Commission concerning construction of the High Mountain Sheep Dam, Hells Canyon, 1970.

<sup>2</sup>For a criticism of some of the underlying assumptions of Krutilla's thinking, see Warren C. Robinson, "A Critical Note on the New Conservationism," Land Economics, XLV (November, 1969), pp. 453-456.

<sup>3</sup>Harold J. Barnett and Chandler Morse, Scarcity and Growth: The Economics of Natural Resource Availability (Baltimore: The Johns Hopkins Press, 1963).

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carrying capacity standard implies the notion that unrestricted use will yield a deteriorating state of the resource; a condition of scarcity. The authors of Scarcity and Growth argue, correctly, that advances in technology and various types and levels of investment may largely mitigate the effects of continued and increasing levels of resource consumption.

In situations where the concerned resource is characterized by uniqueness and irreproducibility, however, consumption rates will have to be tempered. In the absence of certain capacity constraints, irreversible destruction will occur; that is, damage which could only be amended by "lavish outlays of time, trouble, and economic inputs" by future generations.<sup>1</sup> If preservation of a spectrum of environmental conditions is deemed socially valuable, then means to insure perpetuation of these areas must be taken.

#### Sustained Yield and Carrying Capacity

Carrying capacity has been linked to the concept of sustained yield. Dana has commented:

There are two underlying philosophies that apply to all natural resources management . . . they are multiple use and sustained yield . . . . Sustained yield is equivalent to what we have here been calling carrying capacity . . . . Research is needed to determine what facilities and what concentration of users will result

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<sup>1</sup>Ibid., p. 257.

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in optimum permanent satisfaction from the particular recreational activity involved.<sup>1</sup>

Both concepts seek a pattern of resource allocation that optimizes utilization in time. Various "rules of conservation"<sup>2</sup> have been developed that attempt to govern our management and organization of resources in such a manner so as to promote this end.

The relationship of sustained yield and carrying capacity is further strengthened within the Multiple Use-Sustained Yield Act of 1960. The Act defines sustained yield as:

The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.<sup>3</sup>

Wilderness is recognized within the Act as being consistent with the purposes and provisions of the legislation. Thus, management of these areas must provide for a sustained output of its various products, including such elements as solitude and a primitive and unconfined type of recreation. The establishment of carrying capacity standards is mandatory in light of this Congressional charge.

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<sup>1</sup>Samuel T. Dana, "Conference Summation," Proceedings of the National Conference on Outdoor Recreation Research (Ann Arbor: Ann Arbor Publishers, 1963), p. 142.

<sup>2</sup>Ronald Beazley, "Conservation Decisionmaking: A Rationalization," Natural Resources Journal, 7 (July, 1967), p. 345.

<sup>3</sup>U.S. Congress, House, An Act to Authorize and Direct that the National Forests be Managed Under Principles of Multiple Use and to Produce a Sustained Yield of Products and Services, and for Other Purposes, H. R. 10572, 86th Cong., 1st Sess., 1960, p. 1.

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Normally, the calculation of carrying capacity involves a consideration of the relationship between population and material benefit. This holds true, in part, when estimating the carrying capacity of recreation resources. The output of these resources, however, is often measured principally by their ability to satisfy the nonmaterial related desires and wants of people. This dimension of the overall capacity of recreation resources is a difficult one to measure; it may very well be, however, the principal constraint in establishing appropriate parameters of use for the maintenance of these resources over time. This is particularly true in the case of wilderness recreation, where a principal management objective is to provide for a primitive and unconfined type of recreational experience in an environment largely unmodified by man.<sup>1</sup>

#### Wilderness Recreation Carrying Capacity<sup>2</sup>

Specific calls for research on the question of wilderness recreation carrying capacity have come from a variety of sources.

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<sup>1</sup>The Wilderness Act, p. 1.

<sup>2</sup>The discussion presented in this study concerns the recreational carrying capacity of wilderness. While it is recognized that similar investigations of recreational carrying capacity have been made on areas other than wilderness, the investigation here is restricted to the application of the term in the wilderness context only. For simplicity's sake, carrying capacity and capacity will be used as synonyms for the lengthier "wilderness recreation carrying capacity." For a good discussion of the use of carrying capacity in recreational environments other than wilderness, see Michael Chubb, "Outdoor Recreation Land Capacity: Concepts, Usage, and Definitions" (Unpublished M.S. thesis, Michigan State University, 1964), esp. pp. 117-141.

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Both physical and social scientists have recommended that research efforts be directed at ascertaining critical use levels in wilderness in relation to the quality of the experience. In the pioneering study by Dana on forest recreation research needs, he noted:

A basic problem in recreation management, comparable to that of sustained yield in timber management, is determination of the 'carrying capacity' of different sites for different recreational uses. How much use can a given area stand without physical deterioration of the site and without impairment of esthetic and spiritual values.<sup>1</sup>

Fisher, in a paper before the Outdoor Recreation Resources Review Commission, commented, "Granting that wilderness is an economic resource and has value because of use, the interesting question arises: how much of what kinds of uses can it have and still be wilderness?"<sup>2</sup> Hawkes further emphasized the necessity to probe the quantity-quality relationship, noting:

The research of the future will need to learn more about the capacity of different areas to supply recreation without modifying the qualities of the area, to know more about the traits and desires of the different segments of the total public who will visit the recreation areas.<sup>3</sup>

Finally, in a speech at the National Conference on Outdoor Recreation Research, Clawson and Knetsch cited carrying capacity as

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<sup>1</sup>Samuel T. Dana, Problem Analysis Research in Forest Recreation (Washington, D.C.: U.S. Department of Agriculture), p. 22. Underlining is added.

<sup>2</sup>Joseph L. Fisher, Notes on the Value of Research on the Wilderness Part of Wildland, Resources for the Future Reprint No. 23 (Washington, D.C.: Resources for the Future, Inc., 1960), p. 3.

<sup>3</sup>H. Bowman Hawkes, "The Paradoxes of the Conservation Movement," paper presented at the Twenty-Fourth Annual Frederick William Reynolds Lecture, Salt Lake City, Utah, February 11, 1960, p. 26.

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a primary research need relating it to the concept of optimum intensity of use.<sup>1</sup>

### The Concept of Wilderness Recreation Carrying Capacity

Despite a broad base of support for such research, empirical efforts directed specifically at formulating the carrying capacity of wilderness have been limited. Several authors, however, have examined the concept and suggested specific ways in which carrying capacities could be defined or investigated. Other studies have touched upon issues which are certainly important to understanding carrying capacity in a wilderness concept, such as the level of use encountered, but which, by themselves, are not sufficient for complete understanding.

In a 1959 nationwide survey of recreation resources,<sup>2</sup> the U.S. Forest Service attempted to develop guidelines by which the capacity of recreational areas could be estimated. Efforts were directed at creating "converting factors" which represented the acreage of a recreation resource needed to satisfactorily accommodate one man-day of use for that resource. For wilderness areas, a

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<sup>1</sup>Marion Clawson and Jack L. Knetsch. "Recreation Research: Some Basic Analytical Concepts and Suggested Framework for Research Programs." In Proceedings of the National Conference on Outdoor Recreation Research (Ann Arbor: Ann Arbor Publishers, 1963), p. 20.

<sup>2</sup>U.S., Department of Agriculture, Forest Service, The National Forest Outdoor Recreation Resources Review Work Plan (Washington, D.C., 1959).

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<sup>1</sup>Ibid., p.

general converting factor of 3.0 acres per man-day was accepted as a guide for estimating capacity.<sup>1</sup>

The study recognized that capacity could be defined only if the wilderness experience were considered, noting "in determining the capacity for wilderness-type areas we must consider that a wilderness experience should provide isolation from the masses of civilization."<sup>2</sup>

The theoretical capacity of a wilderness was defined as the "number of persons who could be dispersed in the area at one time . . . without destroying the wilderness . . . multiplied by the length of the season of use."<sup>3</sup> The acceptable "number of persons" was based upon the judgment of personnel familiar with the wilderness area.

While the quality of the wilderness experience was a consideration in the definition of the theoretical capacity, there still existed no empirical method of fully estimating its significance as a guideline in wilderness recreation management. The establishment of appropriate levels of use that would provide for adequate visitor isolation were based on arbitrary decisions. It is unclear whether the qualifying clause concerning the numbers of people possible--"without destroying the wilderness"--referred to the ecological community, to the aesthetics of the visit, or to both.

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<sup>1</sup>Ibid., p. 53.

<sup>2</sup>Ibid., p. 51.

<sup>3</sup>Ibid., p. 52.

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The study revealed the inherent difficulty in establishing capacity standards for wilderness areas in the absence of empirical data concerning users. It did, however, focus attention on the importance of the wilderness experience as a factor in a consideration of capacity. In addition, it pointed out the necessity of considering inputs other than acreage in developing an appropriate measure of capacity--factors such as trail systems, campsites, and recreational opportunities were noted.

Wagar has defined recreational carrying capacity as "the level of use at which quality remains constant."<sup>1</sup> Obviously, each shift in the level of use will result in a redefinition of the level of quality. In attempting to define capacity, then, decisions must be made regarding the level of quality for which the area is to be managed. Additionally, Wagar points out that high-quality recreation is possible by a variety of costs paid by the recreationist, such as limitations on the number of visits, paying higher prices for forest products that are less abundant because recreation causes a reduction of timber supply, and accepting a different kind of recreational experience. This discussion again emphasizes that land cannot be considered the only input in management plans for high quality recreation.

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<sup>1</sup> J. Alan Wagar, The Carrying Capacity of Wildlands for Recreation, Forest Science Monograph 7 (Washington, D.C.: Society of American Foresters, 1964), p. 5. The monograph is an abbreviated form of Wagar's Ph.D. dissertation "The Carrying Capacity of Wildlands for Recreation" (unpublished Ph.D. dissertation, University of Michigan, 1961).

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<sup>2</sup> Ibid



One of the few studies providing empirical data relative to recreational capacity was conducted by Lucas in the Quetico-Superior Area. The author defined capacity as the ability of a recreational area to provide satisfaction, a service limited by both physical factors and the attitudes of people.<sup>1</sup> Findings of the study revealed that user definitions of capacity were related to both amounts and kinds of recreational use. Canoeists, for example, "wanted much lower levels of use and distinguished more sharply between sorts of groups met than did motorboaters."<sup>2</sup>

The operational assumption for defining the capacity of the Quetico-Superior Area was that paddling canoeists were the critical group for establishing appropriate levels of use. Nearly all canoeists identified lakes where use was less than about 300 canoe parties per season as wilderness. Where there were between 300 to 600 canoe parties per season, or up to 200 canoeing and boating groups combined, only about half of the canoeists continued to identify the area as wilderness. These latter results point to the highly significant relationship between capacity and both forms and levels of use.

By relating specific levels and forms of use to capacity as perceived by user groups Lucas was able to project the amount of time

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<sup>1</sup>Robert C. Lucas, The Recreational Capacity of the Quetico-Superior Area, U.S. Forest Service Research Paper LS-15 (St. Paul: Lake States Forest Experiment Station, 1964), p. 5.

<sup>2</sup>Ibid., p. 9.

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before various areas would exceed capacity. The availability of such information presents resource managers with a much clearer picture of decision needs and provides empirical support for management decisions affecting the wilderness resource.

A recent study for the National Park Service attempted to develop new methodologies for determining the capacity of Natural Areas in the National Park System to absorb use for a sustained period of time "without destroying definable and measurable park and recreation values."<sup>1</sup> The authors point out that recreation or visitor carrying capacity cannot be considered as a single, absolute value. Rather, it is a flexible measure, changing with the particular level of investment, design, and user experience as well as in space. If any level of use represented the absolute capacity, it would be characterized by virtually a complete loss of user satisfaction and irreversible damage to the physical resource. They conclude:

The major consideration in determining the level of use of an area is the trade-off between the benefits which result from admitting additional users to the area or permitting more intensive use of the area and the losses, if any, associated with the increase of intensification of use.<sup>2</sup>

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<sup>1</sup>Arthur T. Wilcox and R. Burnell Held, "A Study to Develop Practical Techniques for Determining the Carrying Capacity of Natural Areas in the National Park System" (unpublished study proposal, Center for Research and Education, Estes Park, Colorado, 1967), p. 2.

<sup>2</sup>R. Burnell Held, Stanley Brickler, and Arthur T. Wilcox, A Study to Develop Practical Techniques for Determining the Carrying Capacity of Natural Areas in the National Park System, Report to the National Park Service, Washington, D.C., Nov. 15, 1969 (Estes Park, Colorado: Center for Research and Education, 1969), p. 8.

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Additional studies, not directly concerned with the question of carrying capacity, have nevertheless provided substantive evidence that crowding and its symptoms seriously affect user satisfaction, and hence are closely related to the establishment of capacity standards.

The Wildland Research Center questioned visitors to several wildland recreation areas around the country as to their reaction to various negative features encountered on wilderness trips. In the High Sierra Primitive Area of California, for example, 50 per cent of the respondents noticed littered or rundown campsites, 38 per cent noted the effects of too many horses on trails or near campsites, 33 per cent responded negatively to very large parties, and 27 per cent reported difficulty in finding isolation from other camping parties.<sup>1</sup> Additionally, 43 per cent of all wilderness users interviewed indicated the principal reason they wanted to visit a wilderness was to get away from crowds of people.<sup>2</sup> Merriam and Ammons<sup>3</sup> found that between 70 and 90 per cent of the persons interviewed in three different wildernesslike areas felt that "few people" were an important characteristic of wilderness. In a study comparing three

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<sup>1</sup>Wildland Research Center, Wilderness and Recreation, p. 144.

<sup>2</sup>Ibid., p. 147.

<sup>3</sup>Merriam and Ammons, The Wilderness User in Three Montana Areas, p. 29.

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different styles of outdoor recreation camping, Burch and Wenger noted that "the more primitive one's style of camping, the less he desires sharing the camping area with strangers."<sup>1</sup>

Education and interpretive programs are seen by Brandborg as important means of increasing the carrying capacity of wilderness. By improving visitor behavior, and thus reducing the impact of the visitor upon the wilderness resource, greater numbers could be accommodated with a reduction in the deleterious effects. Similarly, providing better maps and other guide materials could relieve congestion and result in a more even distribution of use over the area.<sup>2</sup>

Given an increasing population and a limited amount of wilderness, Hardin views three possibilities as existing for future management action: (1) opening the wilderness to all (end result: absolute destruction); (2) closing the wilderness to all (end result: preservation, but does no good for anyone now); and (3) limiting access to wilderness.<sup>3</sup> Choosing the latter option as the only course of action that can be "rationally defended," he suggests that the selection of those who may utilize the wilderness be based on merit; only those with the physical abilities and skills could use such areas.

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<sup>1</sup>Burch and Wenger, The Social Characteristics of Participants in Three Styles of Family Camping, p. 26.

<sup>2</sup>Stewart M. Brandborg, "On the Carrying Capacity of Wilderness," Living Wilderness, 82 (Summer-Fall, 1963), pp. 29-31.

<sup>3</sup>Hardin, "The Economics of Wilderness," pp. 21-22.

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The notion of restricting use in wilderness areas, while unpalatable in many ways, has received further attention from Hendee:

The potential for increasing carrying capacity by better distribution of use is not infinite, and attempts to control distribution have largely been unsuccessful . . . ultimately, the use of wilderness will need to be rationed by charging fees or by other means . . . . Research must also bend to the task of determining physical and esthetic carrying capacities consistent with preservation objectives, to serve as standards upon which to base rationing decisions.<sup>1</sup>

#### An Operational Definition of Wilderness Recreation Carrying Capacity

Defining the recreational carrying capacity of a wilderness is a complex and frustrating task. Part of the difficulty arises from the fact that any calculation of carrying capacity must take into account two distinct parameters. First, capacity may be determined in a purely ecologic or biotic sense,<sup>2</sup> and indeed, it is this dimension that most land managers consider when speaking of carrying capacity. In attempting to utilize ecological capacity as a surrogate for recreational capacity, however, two shortcomings may be noted: (1) it does not recognize the wide range of quality perceived as acceptable by users. For some, the ecological carrying capacity may be synonymous with their perception of recreational carrying capacity. For others,

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<sup>1</sup>Hendee et al., Wilderness Users in the Pacific Northwest, p. 61.

<sup>2</sup>Carrying capacity in this ecological sense may be defined as the population level above which no major increases can occur; a level determined by environmental resistance. See Eugene P. Odum, Fundamentals of Ecology (Philadelphia: W. B. Saunders Co., 1959), p. 183.

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it may have little or no relationship; and (2) any use that occurs in an ecological complex results in some changes. Frissell<sup>1</sup> found in a study of campsite deterioration in the Quetico-Superior Canoe Country that over 80 per cent of the ground cover was lost with only light use. Similarly, Wagar concluded "in wilderness situations, even a little direct contact by recreationists might cause marked changes in plant composition and appearance."<sup>2</sup> The decision on the amount of change in the ecology to be accepted is arbitrary, unless there is an understanding of the manner in which people perceive and respond to the environment.

This then leads to the second "type" of carrying capacity. The use a wilderness area will be allowed to sustain can be defined in terms of the effects of such use upon the recreational experience of the user. Obvious and serious problems immediately arise, however. Such a measure requires a consideration of values. Whose values are to be considered; the managing agency's or the public's? And if the public values are to be relied upon, which public? Represented within the population that uses wilderness are value systems ranging from those which favor maximizing use to those supporting virtual

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<sup>1</sup>Sidney S. Frissell, Jr., and Donald P. Duncan, "Campsite Preference and Deterioration in the Quetico-Superior Canoe Country," Journal of Forestry, 63 (April, 1965), p. 258.

<sup>2</sup>Wagar, The Carrying Capacity of Wildlands for Recreation, p. 18.

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The construction of a definition of wilderness recreation carrying capacity for the purposes of this study is based on certain propositions. First, the capacity of wilderness must be judged against the objectives detailed within the Wilderness Act. The legislative charge to manage certain areas "as wilderness" and to provide within them "outstanding opportunities for solitude and a primitive and unconfined type of recreation" necessarily will require restrictions on the number and type of users at some future date. Secondly, recreational carrying capacity is principally a function of the users' perceptions and attitudes. It may be expected to vary in response to increased levels of use and different kinds and characteristics of use, as well as in response to personality and socioeconomic variations among the users. Third, recreational carrying capacity cannot be defined in an absolute sense; no single figure exists which represents the capacity of an area. It will vary from place to place within any wilderness, between different users, according to the management objectives, and over time. Finally (related to proposition three), the capacity of a wilderness may be increased not only by inputs of land, but also by decisions of the managing agency to consider various levels of investment, various

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Based upon these propositions, and focusing upon the actions of the wilderness user, wilderness recreation carrying capacity is defined as:

The level, type, and/or character of recreation use consistent with (1) sustaining the optimum level of user satisfaction with the area as wilderness, and (2) guaranteeing the maintenance of the wilderness resource over time as defined in the Wilderness Act.

This definition explicitly recognizes the dual nature of wilderness recreation carrying capacity and provides a framework where the two elements are balanced against one another. In cases where the optimum level of user satisfaction is adversely affected by some parameter of recreational use (for example, too many people), then capacity has been exceeded, irrespective of the fact that the physical resource may be capable of withstanding considerable more use. On the other hand, if some level or type of recreational use has a deleterious impact on the wilderness resource, then the physical capability of the resource becomes the constraint despite the fact the level of experience for the user may not have been affected in any way.

This definition leaves two important methodological questions to be investigated. First, how is the "optimum level wilderness

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<sup>1</sup>Held, Brickler, and Wilcox, A Study to Develop Practical Techniques for Determining the Carrying Capacity of Natural Areas in the National Park System, p. 7.

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experience" to be defined? Secondly, how can the physical impact of recreational use upon the wilderness resource be measured?

In regard to the latter point, substantial literature is available documenting the effects of recreation use on the physical environment.<sup>1</sup> While some of the research has been conducted on non-wilderness environments, it seems feasible to interpret and apply results to the wilderness environment. Research upon the former question, however, is very limited. Defining the parameters for determining the "optimum level wilderness experience" is crucial to a rigorous definition of carrying capacity, and in Chapter III, the methodological dimensions of how this was done in the study are detailed.

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<sup>1</sup>Examples include A. D. Dotzenko, N. T. Papamichos, and D. S. Romine, "Effect of Recreational Use on Soil and Moisture Conditions in Rocky Mountain National Park," Journal of Soil and Water Conservation, 22 (1967), pp. 196-197; Robert P. Gibbons and Harold F. Heady, The Influence of Modern Man on the Vegetation of Yosemite Valley, Manual 36 (Berkeley: University of California, Division of Agricultural Science, 1964); H. J. Lutz, "Soil Conditions of Picnic Grounds in Public Forest Parks," Journal of Forestry, 43 (February, 1945), pp. 121-127; Frissell and Duncan, "Campsite Preference and Deterioration," pp. 256-260; Stephen F. McCool, Lawrence C. Merriam, Jr., and Charles T. Cushwa, The Condition of Wilderness Campsites in the Boundary Waters Canoe Area, Minnesota Forestry Research Notes No. 22, April 15, 1969 (St. Paul: University of Minnesota School of Forestry); Wilbur F. LaPage, Some Observations on Campground Trampling and Ground Cover Response, U.S. Forest Service Research Paper NE-68 (Upper Darby, Pa.: Northeast Forest Experiment Station, 1967); E. P. Meinecke, A Report Upon the Effect of Excessive Tourist Travel on the California Redwood Parks, Report to the California Department of Natural Resources, Sacramento, California, 1928 (Sacramento: California State Printing Office, 1928); and Bettie Willard Scott-Williams, "Effects of Visitor Use on the Ecosystems of Rocky Mountain National Park, Colorado, U.S.A.," Proceedings and Papers of the IUCN 10th Technical Meeting (Lucerne, Switzerland, 1966), pp. 1160-1170.

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## CHAPTER III

### STUDY AREAS AND STRATEGIES

#### Study Area Selection

Four areas were selected for study: The Bob Marshall Wilderness Area in Montana, the Bridger Wilderness Area in Wyoming, the High Uintas Primitive Area in Utah, and the Boundary Waters Canoe Area in Minnesota (see Figure 1). Except for the High Uintas, all are presently part of the National Wilderness Preservation System. The Utah area is presently awaiting reclassification as wilderness, although under the terms of the Wilderness Act, it is managed as though it is presently in the system.<sup>1</sup>

The selection of study areas was based on several criteria; ratio of use to area size, per cent of summer use, ratio of foot to horse travel (except in the BWCA), the basic resource characteristics of the area, and the situational characteristics of each area. It was considered desirable that the study areas represent a broad range of use and resource characteristics so that the perception of carrying capacity could be measured against a backdrop of varying conditions. Some wilderness areas are predominantly summer use areas; others

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<sup>1</sup>The Wilderness Act, p. 2.

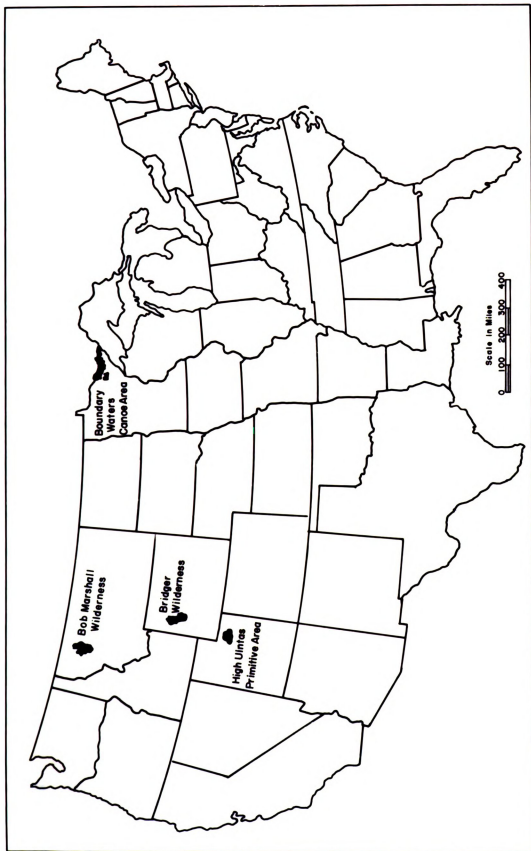


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receive the major volume of use during the fall hunting season. Some serve principally a hiking and backpacking clientele while others are characterized primarily by horse travel.

### Use Characteristics

Table 6 shows the use characteristics of each study area. As can be seen, a broad range of characteristics is represented among the areas.

One additional use characteristic remained to be examined. In 1959, the Forest Service made subjective estimates that wilderness and primitive areas in Region 1<sup>1</sup> had a carrying capacity of 3.5 acres per man day. Areas in Region 4 were estimated to have a capacity of 3.0 acres per man day while the capacity in Region 9 was placed at 1.75 acres per man day.<sup>2</sup> Utilizing these subjective capacity figures, the relationship of current use to suggested capacity was examined (Table 7). As can be seen, all the areas appear to have substantial acreage remaining for wilderness recreation use.

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<sup>1</sup>Region 1 is a Forest Service Administrative unit, made up of Montana, North Dakota, northern Idaho, and small portions of eastern Washington, northwestern Wyoming, and northwest South Dakota.

<sup>2</sup>Region 4 includes southern Idaho, western Wyoming, Utah, and Nevada. Region 9 encompasses Minnesota, Iowa, Missouri, Illinois, Indiana, Ohio, West Virginia, Maryland, and all states to the northeast. The carrying capacity figures are from a memorandum from John Sieker, Director of the Division of Recreation, Washington, D.C. to the Regional Foresters, January 22, 1960.

TABLE 6  
USE CHARACTERISTICS OF STUDY AREAS

TABLE 6

## USE CHARACTERISTICS OF STUDY AREAS

| Area                                                                     | 1969 Attendance<br>(visitor-days) <sup>a</sup> | Net<br>Acreage <sup>b</sup>              | Acres/<br>Visitor-Day     | Percentage<br>Summer Use <sup>c</sup> | Percentage<br>Foot Travel       |
|--------------------------------------------------------------------------|------------------------------------------------|------------------------------------------|---------------------------|---------------------------------------|---------------------------------|
| Bob Marshall<br>Bridger<br>High Uintas<br>Boundary Waters<br>Canceo Area | 66,300<br>111,600<br>111,600<br>780,700        | 950,000<br>383,300<br>240,717<br>886,673 | 14.3<br>3.4<br>2.1<br>1.1 | 38<br>80<br>98<br>90                  | 5<br>65<br>40<br>not applicable |

<sup>a</sup>Figure obtained from official Forest Service recreation statistics.

<sup>b</sup>Taken from Outdoor Recreation in the National Forests, pp. 99-106.

<sup>c</sup>Estimates by National Forest personnel and staff.





TABLE 7  
ADMINISTRATIVELY DEFINED CARRYING CAPACITY OF STUDY AREAS

| Area                                                                    | Man Days <sup>a</sup>                 | Acres Needed<br>(Man Days x Acres<br>Needed per Man Day) | Net Acreage<br>(1967)                    | Surplus (+)<br>or Deficit (-)<br>Acreage               |
|-------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------|------------------------------------------|--------------------------------------------------------|
| Bob Marshall<br>Bridger<br>High Uintas<br>Boundary Waters<br>Canoe Area | 41,437<br>69,750<br>69,750<br>487,937 | 145,029<br>209,250<br>209,250<br>853,889                 | 950,000<br>383,300<br>240,717<br>886,673 | 804,971 (+)<br>174,050 (+)<br>31,467 (+)<br>32,784 (+) |

<sup>a</sup>The reported visitor day use for each study area was converted to a man day figure by an arbitrary judgment conversion factor of .625 man days per visitor day.

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Three important factors need to be considered, however. First, the conversion factors established by the Forest Service were based upon personal judgments of individuals familiar with the areas. The relationship of variations in topography, vegetation, cover, trail systems, and attractions to a definition of capacity are unclear. Furthermore, the estimations were made in the absence of any substantive knowledge concerning user perceptions of capacity.

Secondly, comparing the acres needed to the net acreage of the area is not altogether a valid procedure. Depending upon the particular area studied, substantial acreages may be unavailable or inaccessible to the wilderness user. As the Outdoor Recreation Resources Review Commission reported, "The (recreation) problem is not one of total acres but of effective acres."<sup>1</sup>

Finally, the recreational use of wilderness areas is generally distributed very irregularly. Factors such as topography and the trail system strongly influence use patterns. Capacity standards based upon an entire Forest Service region are likely to be misleading.

#### Resource Characteristics

The study areas differed considerably in terms of their physical resource characteristics. These differences, in turn, provided a broad range of aesthetic and recreational opportunities for visitors.

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<sup>1</sup>Outdoor Recreation Resources Review Commission, Outdoor Recreation for America (Washington, D.C.: Government Printing Office, 1962), p. 4.

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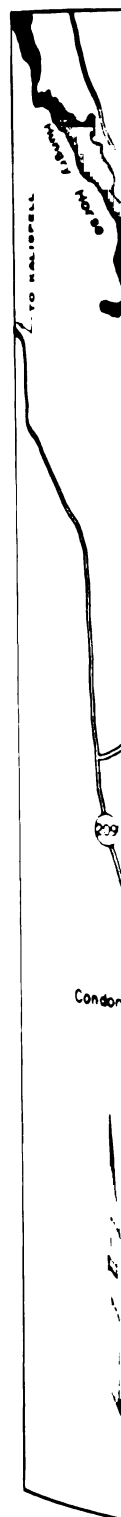
The largest of the areas is the Bob Marshall Wilderness, comprising 950,000 acres on the Flathead and Lewis and Clark National Forests in western Montana. Elevations range from 4,000 feet to over 9,000 feet along the Continental Divide, which runs north-south through the middle of the area. While there are not an especially large number of lakes in the area, several river systems cross the area (see Figure 2 for area map). The Flathead system, composed of the South Fork, Middle Fork, Spotted Bear, and White Rivers, drains the western portion of the area through generally broad and open parklike flats. On the eastern side, the North and South Forks of the Sun River are the principal rivers, and again, much of the area adjacent to these rivers is open. In these open valleys, horsefeed is relatively abundant.

Glaciation has been a major force in shaping the landscape. Ice action along the Cambrian limestone cliffs on the east side of the Continental Divide has formed the Chinese Wall, a major scenic attraction.<sup>1</sup>

Generally it is the first part of July before snow has melted off access trails. By early September, snow has usually returned. However, due to the hunting attractions of the area (elk, deer, and mountain goats, as well as grizzly bear), use continues into November.

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<sup>1</sup>The best account of the geologic history of the Bob Marshall is in W. C. Alden, Physiography and Glacial Geology of Western Montana and Adjacent Areas, Geological Survey Professional Paper 231 (Washington, D.C.: Government Printing Office, 1953).



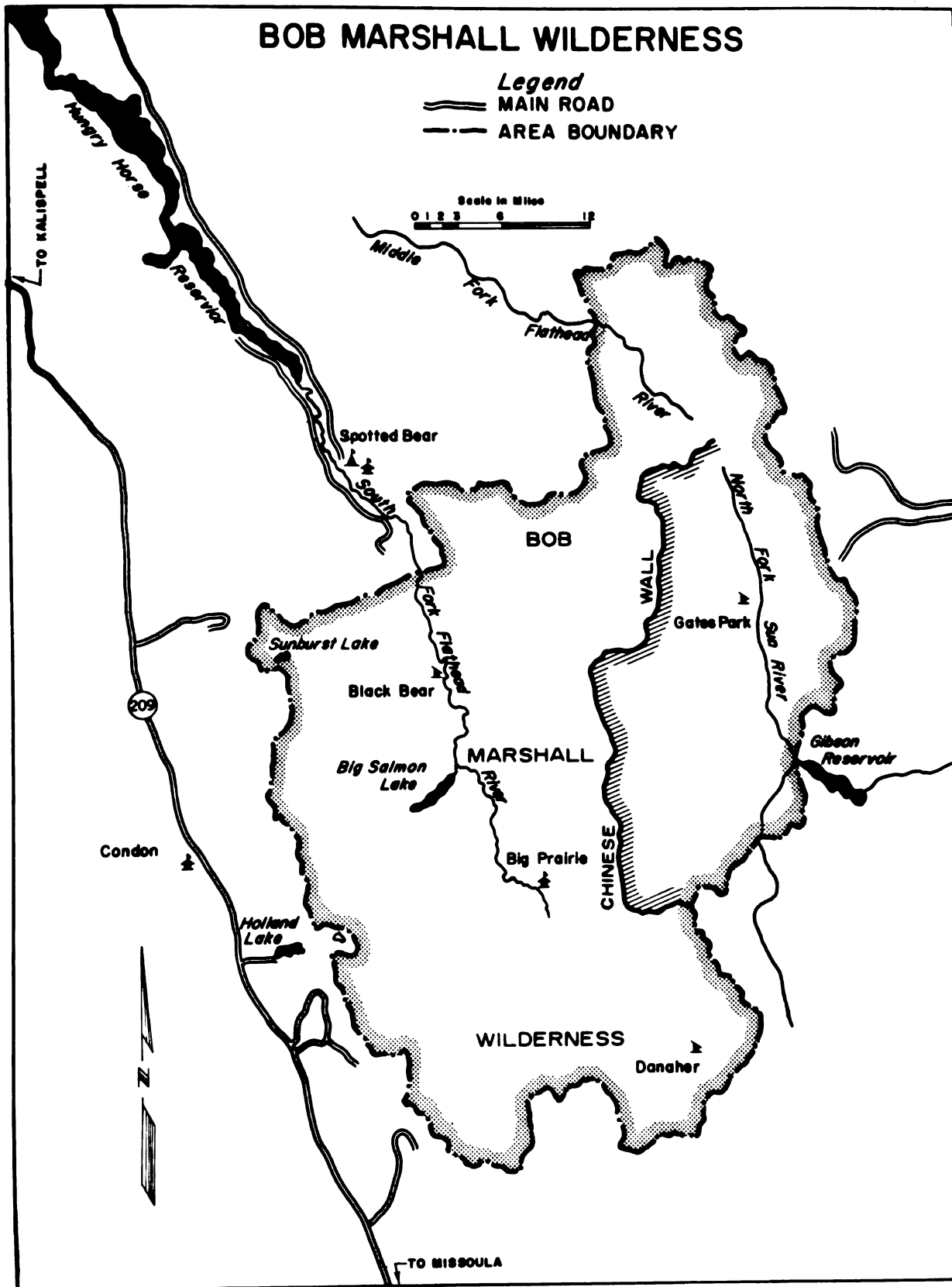


Figure 2. Bob Marshall Wilderness Area.





Figure 3. Broad, partially open valley along the South Fork of the Flathead River in the Bob Marshall Wilderness. U.S. Forest Service photo.



Figure 4. The Chinese Wall in the Bob Marshall Wilderness, a focal point of visitor attention. U.S. Forest Service photo.

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While broad parklike valleys, developed around the major river systems, characterize the Bob Marshall Wilderness, the Bridger Wilderness of northwestern Wyoming presents a strikingly different area. Much of the area is high, glaciated terrain. The Continental Divide along the crest of the Wind River Range forms the north and east boundary of the 383,300 acre area.

The extensive glacial action has left over 1,300 lakes in the area and the fishing opportunities are substantial. The only major river is the Green River, draining the northwest end of the area.

Along the crest of the Wind River range are several permanent glaciers. The presence of the glaciers, coupled with the rugged Wind River range itself affords some of the best technical rock and ice climbing to be found in the conterminous United States.<sup>1</sup> Peaks along the crest range between 11,000 and 13,000 feet high.

The major access points range from 6,000 to approximately 9,000 feet above sea level. Snow makes most of the high elevation trails inaccessible before mid-July. Snow returns by early September, but as in the Bob Marshall, hunting continues into the latter part of fall. Hunting use is, however, relatively light in comparison to the Bob Marshall.

The intense glacial scouring of the area has left much of the area devoid of soil. Vegetation is sparse in many areas, and soils are unstable under even limited use in some of the higher basins, especially in the spring.

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<sup>1</sup>An excellent description of the geological features of the Wind Rivers is in Orrin H. Bonney and Lorraine Bonney, Field Book--The Wind River Range (Houston, Texas: By the author, 1968).

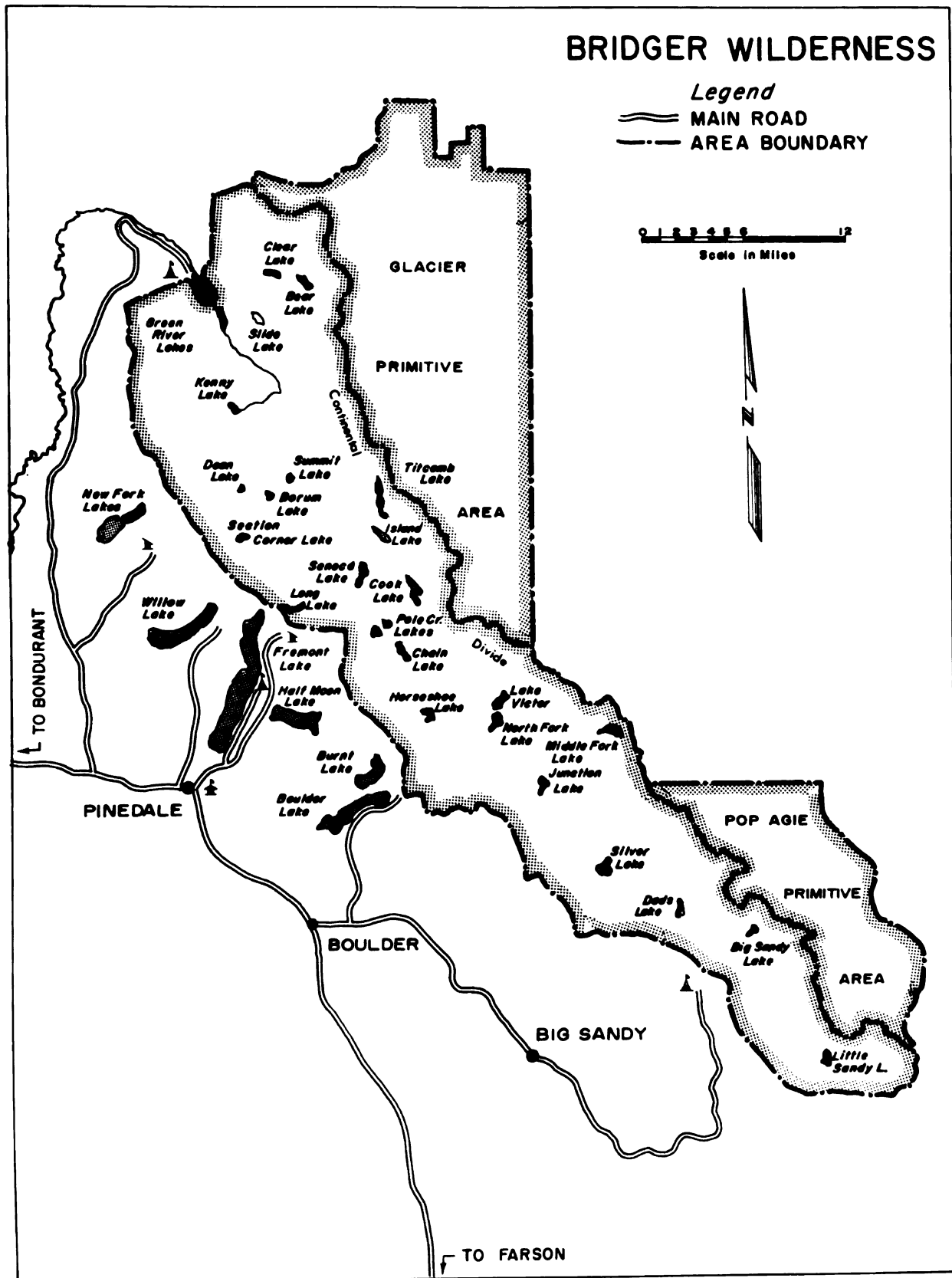


Figure 5. Bridger Wilderness Area.





Figure 6. Island Lake in the Bridger Wilderness, surrounded by a rugged glaciated landscape. U.S. Forest Service photo.



Figure 7. Mt. Agassiz in the High Uintas Primitive Area stands above one of the high alpine meadows. U.S. Forest Service photo.

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The third western study area, the High Uintas Primitive Area, lies on the Uinta Mountain range in northeastern Utah. Geologically it is unique since the Uinta Mountains are the only range in the United States that lie on an east-west axis. Several peaks within the Primitive Area are over 13,000 feet high. Extensive glaciation has resulted in numerous cirques and tarns. The resulting high alpine basins provide the focal points for much of the summer recreational activity.

Summer thunder storms are quite common. Winter snow remains on many of the trails until mid-July, or even later. Snow comes early to the area, and results in the movement of game animals down to lower elevations; consequently, fall hunting is limited.

The Boundary Waters Canoe Area presents a wilderness environment strikingly dissimilar from the three western study areas. Lakes are the most essential feature of the landscape, covering 16 per cent of the total area. Local relief within the area is low, with 500 feet about the maximum figure. Despite low relief, however, the numerous rock outcrops provide for scenic variation.<sup>1</sup> Additionally, the low relief results in a reduced visual field for the visitor, and the effects of man's past activity, such as logging, is much less visible than in mountain areas of the west.

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<sup>1</sup>A good resume of the physical environment of the Boundary Waters Canoe Area is in Robert C. Lucas, "The Quetico-Superior Area: Recreational Use in Relation to Capacity" (unpublished Ph.D. dissertation, University of Minnesota, 1962), pp. 20-40.



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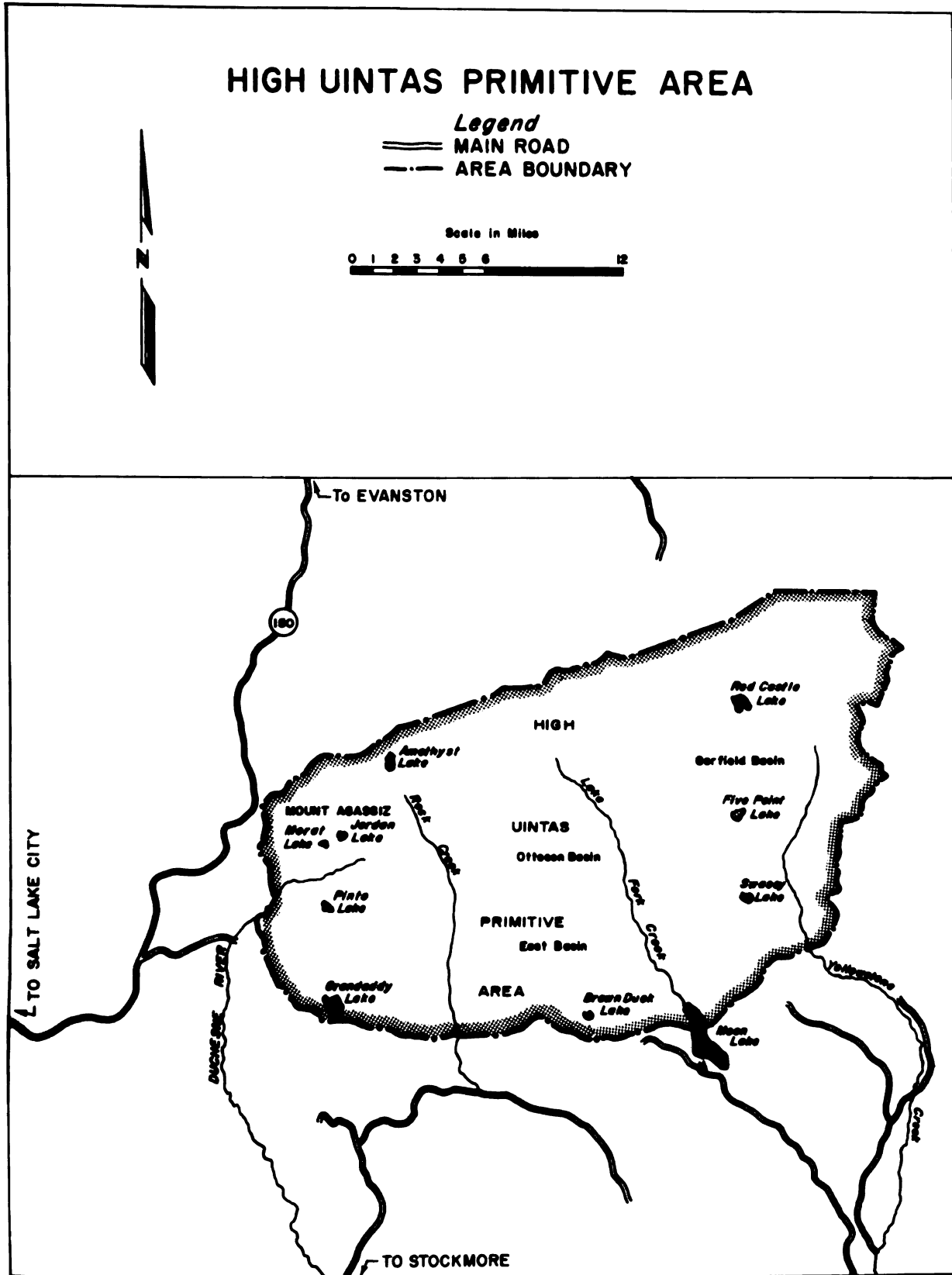


Figure 8. High Uintas Primitive Area.

BOUNDARY WATERS CANOE AREA

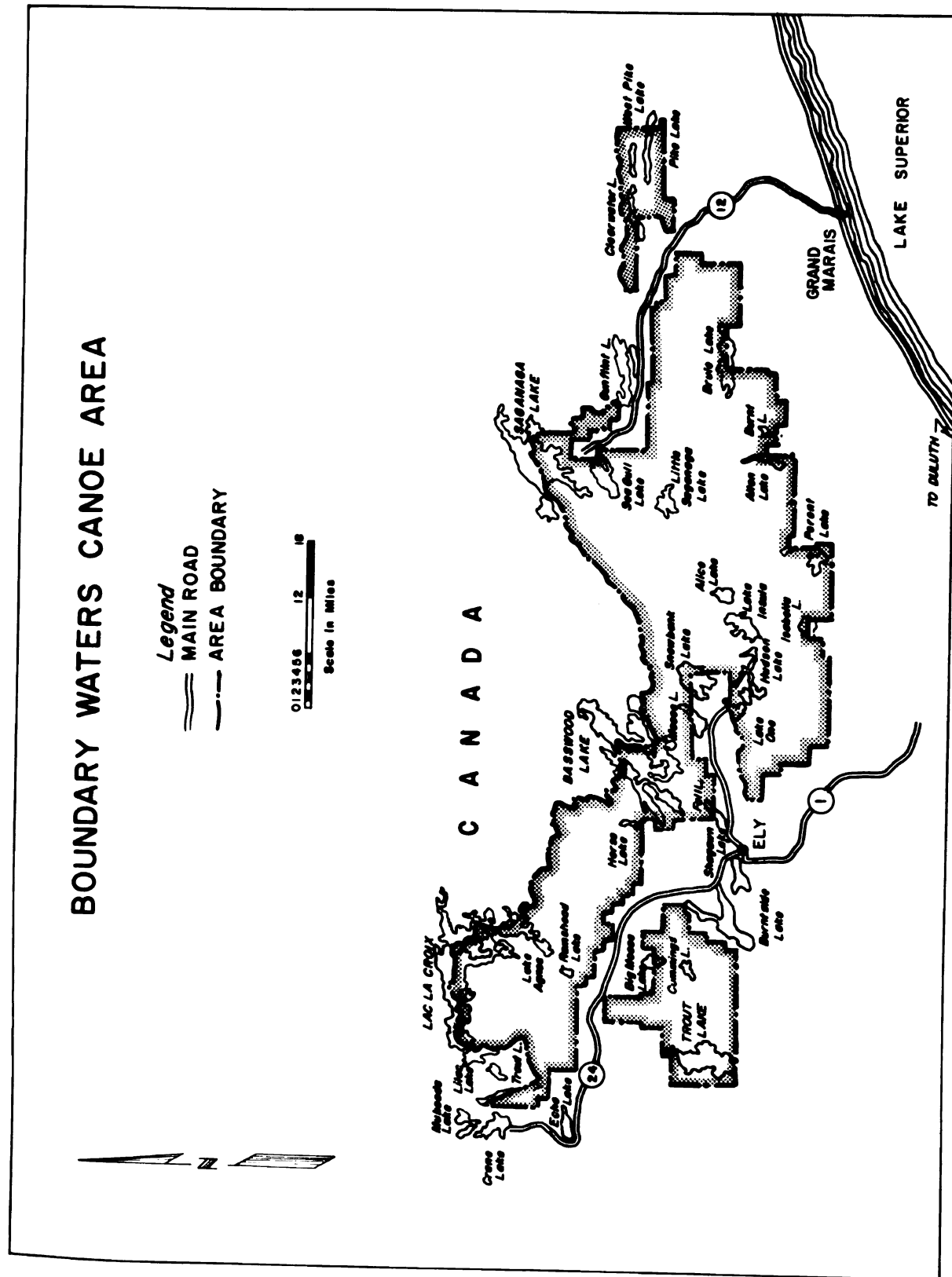


Figure 9. Boundary Waters Canoe Area.





Figure 10. Numerous lakes, interspersed with tree covered islands characterize the landscape of the BWCA. U.S. Forest Service photo.



Figure 11. Rocky outcrops along the shore of Lac La Croix provide canoeists a unique esthetic landscape. U.S. Forest Service photo.

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Lucas notes "because of the combination of climate and bed-rock conditions, the lakes are relatively infertile."<sup>1</sup> Due to relatively low fishing pressure, however, fishing success is fairly good. The area experiences a summer maximum in precipitation and winters are severe.

In summary, then, the four study areas represent a broad range of physical resource characteristics. The Bob Marshall is characterized by broad, open valleys, at relatively low elevations, interspersed by the ranges of the Continental Divide. The Bridger is a high, alpine area, with sparse vegetation, dotted with numerous lakes, and characterized by considerable exposed rock. Although similar in many ways, the High Uintas offers a less harsh environment, with several high basins and meadows. Finally, the Boundary Waters Canoe Area is a relatively flat region, endowed with numerous lakes which are separated by rock outcrops and deciduous forests.

#### Situational Characteristics

The situational characteristics of each study area differ markedly. The relationship of study area location to population centers, major routes of travel, and access is an important influence on both the levels and types of use they receive.

The Bob Marshall is relatively remote from any major population center. It is, however, within an hour's driving distance of western

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<sup>1</sup>Ibid., p. 33.



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Montana's main urban areas: Missoula (29,000), Great Falls (60,000), Helena (22,000), and Kalispell (11,000). Montana State Highway 209 parallels the western boundary of the area, while state routes 200 and 89 run along the south and east sides.

Direct access into the area varies. Along the west and east side, the visitor can drive within two or three miles of the wilderness boundary at some locations. Road access to the boundary on the north and south, however, is restricted and substantial distances must be traveled on foot or horseback through de facto wilderness to reach the boundary. There are approximately 20 access points into the wilderness itself; use on these trails, however, is very unevenly distributed.

The Bridger Wilderness is even more isolated from any major center of population than the Bob Marshall. The towns of Jackson (1,000) and Lander (4,000) are the only concentrations of population close to the area. Tourist travel in this area is very high, however, particularly in the summer due to the presence of Yellowstone and Grant Teton National Parks, two hours driving time to the northwest of the wilderness. Wyoming State Highway 187 parallels the southwest boundary of the area.

All but one of the access points to the wilderness lie along the southwest border. The Green River entrance lies on the northwest end of the area. The Glacier and the Popo Agie Primitive Areas and the Wind River Indian Reservation all abut directly on the Bridger's

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northeastern boundary. Approximately 15 trails provide direct access into the wilderness along the southwest boundary.

Whereas the Bob Marshall and Bridger Wilderness lie in relative isolation to population centers, the High Uintas Primitive Area lies only 50 miles east of Salt Lake City, Utah, with a population of over 500,000. In addition, the western boundary of the area lies only a few hundred feet from state highway 189, a major route of travel to and from Salt Lake City. The southern and northern boundaries are paralleled by major state highways and road access to the immediate boundary is well developed in **several places**. Approximately 15 trails provide access into the Primitive Area.

The Boundary Waters Canoe Area lies within relatively easy driving distance of St. Paul-Minneapolis and Chicago. Together these two areas represent over 5 million people. Highway access to the Canoe Country is well developed, and visitors can drive close to the boundary along most of the area.

Additionally, the BWCA represents a unique type of environment to the area, with only limited alternatives available to the population of the upper midwest. In the Rocky Mountain west, numerous alternative locations are available to the person wishing to visit a wilderness.

Access directly into the BWCA is extensive. There are nearly 70 locations where users may enter; however, eight of them account for nearly 80 per cent of the total use.<sup>1</sup>

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<sup>1</sup>Superior National Forest, Official Registration Data, 1968.  
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### The Questionnaire

The principal source of data for this study was obtained from a detailed questionnaire. The questionnaire items focused on five dimensions: (1) a description of the party; (2) the past experience of the respondent in terms of general outdoor recreation and wilderness; (3) respondent attitudes and perceptions of the various parameters of use; (4) respondent attitudes about potential management alternatives in regard to wilderness; and (5) a standard socioeconomic description of the respondent. (The questionnaire is in Appendix B.)

### The Likert Attitude Scale

Attitude scales are simply a series of statements with which the respondent is asked to rank himself in terms of the order of his agreement or disagreement.<sup>1</sup> A number of different scales have been developed; two of the most common are the Thurstone Attitude Scale and the Likert Attitude Scale. The latter scale was selected for use in this study for three reasons: (1) the Likert Scale is concerned with unidimensionality--that is, each statement in the scale is designed to investigate a single, specific attitude, rather than a composite group of attitudes toward some dimension; (2) it is a much easier device to use in a field interview situation than is the Thurstone

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<sup>1</sup>A. N. Oppenheim, Questionnaire Design and Attitude Measurement (New York: Basic Books, Inc., 1966), p. 120.

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Scale; and (3) it requires much less advance testing and developing.<sup>1</sup> Furthermore, evidence indicates that the correlation between scores obtained from the two scales ranges from .77 to 1.00, indicating a high degree of comparability.<sup>2</sup>

The attitude scale was applied in two different but related fashions. First, 18 items were constructed that focused on three basic attitude dimensions: (1) attitudes toward encountering various levels of use in the wilderness; (2) attitudes toward various forms of use in the wilderness; and (3) attitudes toward various wilderness management policies. Responses to these statements form a portion of the analysis to be covered in chapters IV and V.

A second use of the technique centered on the need for a unit of analysis in this study that recognized the wide range of individual involvement, concern, and knowledge about wilderness among the respondents sampled. Recent work along this line by researchers at the University of Washington and the Pacific Northwest Experiment Station provided a point to work from and an effort to improve the analytic technique was made.

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<sup>1</sup>For a discussion of the underlying assumptions and construction procedures of the Likert Scale, see Rensis Likert, "A Technique for the Measurement of Attitudes," Archives of Psychology, No. 140 (1932), pp. 7-35. Further discussion on the method of construction is in Gordon Murphy and Rensis Likert, Public Opinion and the Individual (New York: Harper and Brothers, 1938), pp. 281-291.

<sup>2</sup>Likert, "A Technique for the Measurement of Attitudes," p. 25; Allen L. Edwards and Kathryn C. Kenney, "A Comparison of the Thurstone and Likert Techniques of Attitude Scale Construction." Journal of Applied Psychology (1946), p. 82.



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### The "Purism" Scale

Previous studies have recognized that wilderness users hold varying, and at times, contradictory notions of what wilderness is and what management practices are necessary and appropriate. Attempts to identify the different wilderness user groups and the intensity with which they hold certain value systems have been made. Lucas approached the problem by differentiating users in the BWCA by their mode of travel, noting that paddling canoeists held more rigid and demanding conceptions of wilderness than persons traveling in motor propelled craft.<sup>1</sup> The Wildland Research Center, on the other hand, utilized prior wilderness experience "as a rough and admittedly partial measure of commitment."<sup>2</sup>

Both of these efforts were aimed at differentiating wilderness users in a manner that would enhance the land manager's ability to translate user values and preferences into actual management decisions, consistent with legislative and agency constraints.

The analysis herein recognized this need of land managers for a framework within which data supplied by wilderness users could be most meaningfully evaluated. Two basic guidelines by which such judgments could be made were recognized.

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<sup>1</sup>Lucas, "Wilderness Perception and Use," p. 408.

<sup>2</sup>Wildland Research Center, Wilderness and Recreation, p. 135.

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First, the Wilderness Act specifically permits certain types of activities and prohibits others. If there exists public demand for some practice now prohibited by law, then the law can be changed. Until such time, however, it forms an institutional constraint on certain actions. A primary concern of the Act is to protect the resource. Mills has pointed out, "needs and desires must be tempered by the ecological capability of the land."<sup>1</sup> Making management decisions on a "majority vote" basis may not prove feasible to begin with.

Secondly, the range of opinion among wilderness users in terms of basic notions about what the area is and the purpose for which it has been designated is great.<sup>2</sup> Many persons may be using the area in a manner incompatible with management objectives; the kind of experience they desire lies elsewhere. Land managers need to know what users think about wilderness and their attitudes toward various management alternatives; they also need to know how these feelings vary among the total user population.

In a study of wilderness users in the Pacific Northwest, Hendee developed a scale to differentiate wilderness users on the basis of the underlying values that governed their attitudes and

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<sup>1</sup> Archie Mills, "Back Country and the Hand of Man" (Paper presented at the national meeting of the American Society of Range Management, Seattle, Wash., Feb., 1967), p. 2.

<sup>2</sup> See Lucas, "Wilderness Perception and Use," pp. 408-411 and Hendee et al., Wilderness Users in the Pacific Northwest, pp. 65-68.

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motivations to visit wilderness.<sup>1</sup> The scale consisted of 30 short statements relating to wildland recreation values that persons with a strong wilderness-purist set of values might hold more intensely than persons with less extreme concepts.<sup>2</sup>

The scale developed for the purposes of this study presented the respondent with 10 statements concerning three basic elements of wilderness defined within the Wilderness Act; ecology, level of development, and simplicity of the recreational activity (see question 10 of the questionnaire for the specific items, Appendix B). In addition, four other items relating to the wilderness environment were presented: solitude, little evidence of other visitors, remoteness from urban areas, and the size of the area.

Respondents replied to the items on the basis of how desirable or undesirable they felt such an item was in the context of wilderness.<sup>3</sup> A five-point scale, ranging from "very undesirable" to "very desirable," was provided for answering. These responses were accorded values from

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<sup>1</sup>Hendee, et al., Wilderness Users in the Pacific Northwest, p. 23.

<sup>2</sup>For details of the mechanical construction of the scale, see Hendee et al., Wilderness Users in the Pacific Northwest, pp. 24-26, and John C. Hendee, Thomas Steinburn, and William R. Catton, Jr., "Wildernism--The Development, Dimensions, and Use of an Attitude Scale" (paper presented at the annual meeting of the Rural Sociological Society, San Francisco, Calif., August 26, 1967).

<sup>3</sup>It was recognized that the term "wilderness" holds many connotations. A definition of the term was therefore supplied on the first page of the questionnaire, indicating exactly what type of area was meant by "wilderness."

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one to five and a total score for each individual was computed. Scoring was arranged so that a person who held strong "purist" ideas about wilderness would score high while the person with less intense notions would score low. The possible range of scores was between 70 and 14. The end result was the ability to rank users along a continuum ranging from a strong purist concept of wilderness to a less purist philosophy. This ability made it possible to examine and evaluate user attitudes regarding levels and types of uses as well as management alternatives in light of the user's knowledge and understanding of the intent and purpose underlying wilderness resource preservation and his agreement with this end. It also provided a convenient framework for examining the degree to which the various purist group attitudes corresponded with or departed from institutional constraints embodied within the Wilderness Act. This provides land managers with a framework of information within which decisions can be made that reflect the preferences and desires of a selected segment of the user population, one whose perception and use of wilderness is most nearly in accord with institutional and physical constraints, rather than on the simple, but inefficient, basis of "majority rule."<sup>1</sup>

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<sup>1</sup>For an interesting discussion of the role of a minority group in influencing policies toward some end that will benefit even the disinterested majority, see Aaron Wildavsky, "Aesthetic Power or the Triumph of The Sensitive Minority Over the Vulgar Mass: A Political Analysis of the New Economics," Daedalus, 96 (Fall, 1967), pp. 1115-1128.



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The respondents were classified into groups on the basis of their over-all "purism" score. Four groups were established: strong purists, persons who scored between 60 and 70 on the scale; moderate purists, persons with scores from 50 to 59; neutralists, scoring from 40 to 49; and non-purists, persons scoring less than 40 points.

Table 8 shows the distribution of these groups among the study areas.

As can be seen, the relative proportion of users of the four study areas who were classified as "strong purists" varied greatly. Two questions come to mind: (1) why did such a range occur; and (2) did persons who were classified as "strong purists" in one study area hold similar attitudes and perceptions concerning use levels, management alternatives, and other related variables as those persons similarly classified in another study area? Chapters IV and V focus, in part, on these questions.

#### Administration of the Questionnaire

The questionnaire was administered primarily in the field. A field worker contacted exiting parties at the trail heads and asked for cooperation in completing the questionnaire. A departure from past studies was made in that each person in the party over 15 years of age was asked to participate. Also, rather than having the field employee ask the questions and record them on the answer form, questionnaires were passed out and the respondents completed the answers themselves. These steps eliminated the bias that has resulted



TABLE 8  
DISTRIBUTION OF PURIST GROUPS AMONG STUDY AREAS

| Study Area   | Strong Purists<br>(70-60) |          | Moderate Purists<br>(59-50) |          | Neutralists<br>(49-40) |          | Non-Purists<br>(39-14) |          | Total |
|--------------|---------------------------|----------|-----------------------------|----------|------------------------|----------|------------------------|----------|-------|
|              | Number                    | Per cent | Number                      | Per cent | Number                 | Per cent | Number                 | Per cent |       |
| EWCA         | 41                        | 20       | 100                         | 49       | 52                     | 25       | 13                     | 6        | 206   |
| Bob Marshall | 63                        | 53       | 47                          | 39       | 8                      | 7        | 2                      | 1        | 120   |
| Bridger      | 96                        | 67       | 33                          | 23       | 14                     | 10       | 1                      | *        | 144   |
| High Uintas  | 48                        | 31       | 76                          | 49       | 28                     | 18       | 2                      | 2        | 154   |
| Total        | 248                       | 40       | 256                         | 41       | 102                    | 16       | 18                     | 3        | 624   |

\*Less than one-half of one per cent.

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in the past studies relying entirely upon the party leader's responses. In a study of attitudes, it cannot be assumed that one person's attitudes toward wilderness are held by the other party members.

Despite the length of the questionnaire (13 pages, taking about 30 minutes) cooperation by visitors was very good. The only refusals to cooperate fully came in the BWCA where three persons refused to finish the questionnaire, after completing half of it.

The decision to rely upon questionnaires administered in the field rather than by mail was based on two considerations. First, there was not a good source of visitor names from which a mailing list could be compiled. A self-administered registration system is only in the early stages of development in most areas.<sup>1</sup> Additionally, not everyone registers when they enter a wilderness<sup>2</sup> and certain types of visitors are more likely to register than others. Preliminary results of a study by the Intermountain Forest and Range Experiment Station indicates, for example, that backpackers register at a rate of about 2 to 1 compared to horseback riders.

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<sup>1</sup>The exception is the BWCA, where a mandatory permit system has been in effect since 1965. Due to the poorly developed systems in the other study areas, however, it was not used.

<sup>2</sup>Wenger and Gregerson note, "Some types of persons distort the data on relevant variables by their tendency to avoid registration." See Wiley D. Wenger, Jr., and Hans M. Gregerson, The Effect of Non-response on Representativeness of Wilderness-Trail Register Information, U.S. Forest Service Research Paper PNW-17, (Portland: U.S. Pacific Northwest Forest and Range Experiment Station, 1964), p. 11.



A second problem of the mail questionnaire is nonresponse on the part of persons receiving questionnaires. This is, however, a problem that can be mitigated to a large extent by stressing the importance of the study in the initial contact with the potential respondent and by using followup contacts.

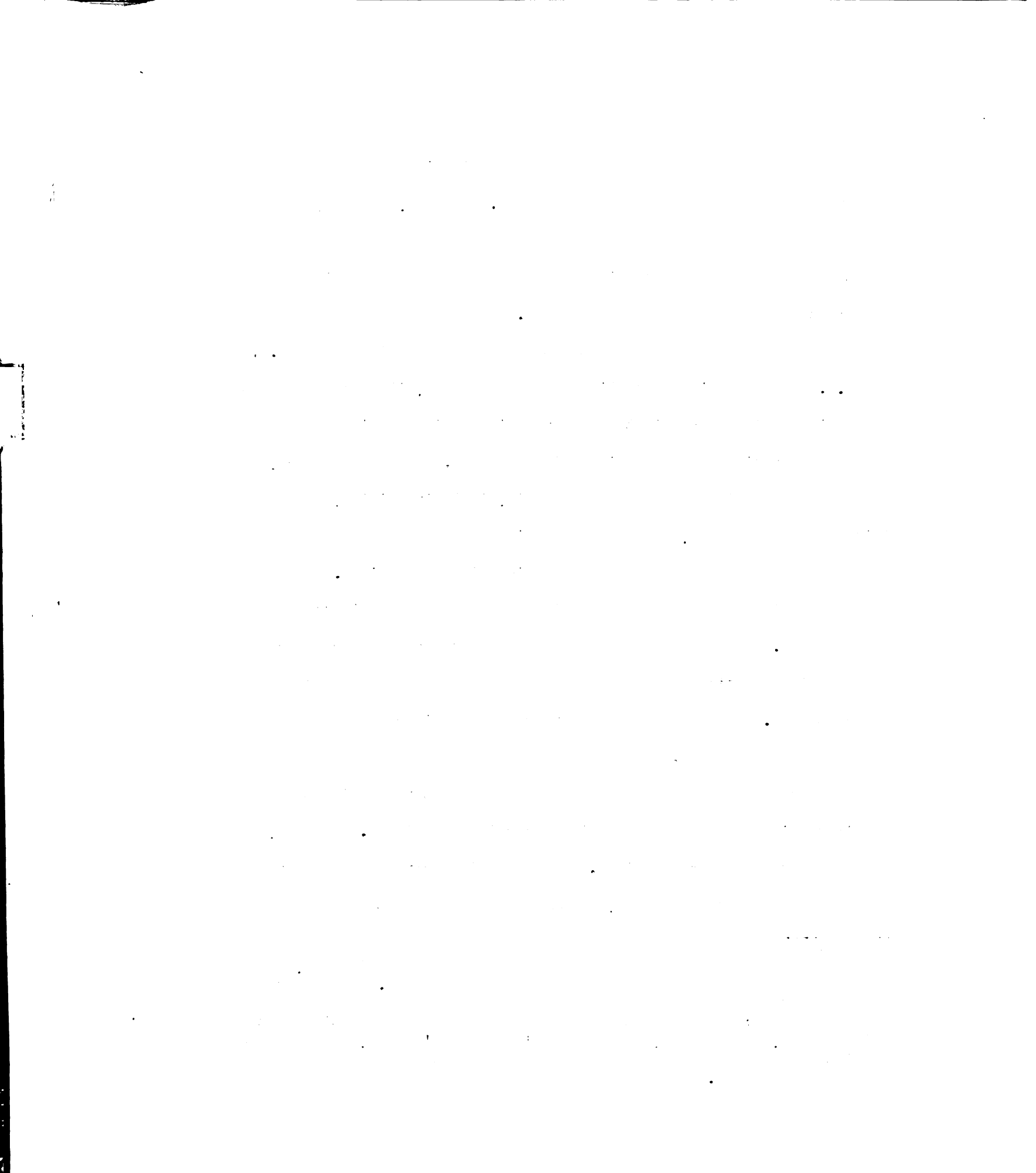
Field personnel worked on the trails from approximately 10 a.m. to 6 p.m. Shortly after initiating the field season, it became apparent that parties exiting late in the day or during periods of inclement weather were reticent to participate in the study. As a consequence, the field personnel were instructed that if, in their opinion, the visitor was "in a hurry," the name and mailing address of each person who normally would have completed a questionnaire be obtained. These persons were informed they would receive the questionnaire in the mail in a few days. This technique proved to be a satisfactory technique for obtaining questionnaires from persons who would otherwise not have been contacted. No statistical difference existed in responses obtained from the different forms.<sup>1</sup>

Up to two followups were sent to persons not responding to the first mailing (the followup letters are in Appendix G). Overall, a 78 per cent return was obtained. The remaining nonrespondents were mailed a one page questionnaire, containing selected portions of the

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<sup>1</sup>The field and mail questionnaires were identical in form, except for minor changes in verb tense on some questions. There was no evidence that persons in the same family "collaborated" in answering the mail version; answers to the attitude and open ended questions often varied widely, for example, on a husband's and wife's form, further substantiating the need to avoid obtaining all answers from just a single party representative.





original questionnaire. Analysis revealed no significant differences in their answers from those of respondents (see Appendix F).

Field contacts yielded 303 questionnaires while an additional 191 were obtained by mail.

### Sampling Procedures and Problems

The use of wilderness trails varies greatly. In order to eliminate the problem of allocating field time to trails where the probability of encountering an exiting party was very low, the trail heads<sup>1</sup> were stratified on the basis of the probability of encountering a certain number of exiting parties each day. Two levels of use were defined: Class I trails, where an average of at least two parties per day could be expected and Class II trails, where from three-fourths to two parties per day could be expected on the average.

### Trail Stratification Procedure

National Forest staff were asked to stratify the trails in each of the study areas on the basis of the above definitions. Their tabulation provided the following results in the three western areas:

|              | Strata I | Strata II |
|--------------|----------|-----------|
| Bob Marshall | 3        | 10        |
| Bridger      | 4        | 7         |
| High Uintas  | 6        | 6         |

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<sup>1</sup>Trail head simply describes the location where the wilderness visitor leaves his vehicle to enter the wilderness. It may or may not be directly on the formal wilderness boundary.

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The case of the BWCA is somewhat different. Applying the use standards used for the western study areas to the BWCA produced a total of 39 access points in the two strata. These accounted for nearly 100 per cent of the total use. The range of use intensity, however, was very great. The difference between the most intensively used entry point in the BWCA and the entry point ranking 28th is 100 fold. The level of use at this 28th point was sufficiently heavy enough however, to be categorized as a Class I trail under the system designed for the western areas.

An additional problem was that the published use estimates, in some instances, were for entire lakes, rather than a single entry point. For example, 31 per cent of the total BWCA use was estimated to enter on Moose Lake. There were several points where persons launched their craft onto the lake, however.

In light of these problems, the decision was made to identify the two major access points (Moose Lake and Fall Lake, together accounting for approximately half of the entries into the BWCA) as strata I locations, and the remaining entry points as strata II. The rationale behind this decision lay in one of the assumptions underlying the purpose of stratifying. It was hypothesized that the users of less intensively used access points might differ in certain basic attitudes toward the various parameters of use in a wilderness. Although the level use on the strata II access points in the BWCA was many times that of similarly classed trails in the west, relatively speaking their

use was very much less intense than the two major access points. Consequently, people using these locations to enter the BWCA may have selected them for their less crowded characteristics.

Two locations each on Moose Lake and Fall Lake were selected for contacting visitors, for a total of four Class I access points; 18 entry points were classified in strata II.

#### Determination of the Sampling Schedule

The study season for the three western study areas was 11 weeks long (June 25-September 7, 1969). Each of the field staff worked five days per week, resulting in an effective 55 day study period. In the BWCA, due to administrative difficulties, it was not possible to have a field employee on a continuous basis. Arrangements were made, in cooperation with the North Central Forest Experiment Station, for a field assistant for 40 days. This block of time was divided into four 10 day study periods, spaced evenly over the late spring and summer use season (May 22-September 7, 1969).

The sampling schedule for each field worker was constructed so that each day of the week was approximately equally represented (see Appendix C for sampling calendar).

Strata I trails were sampled at rates approximately twice that of the strata II trails. Because of problems involving driving distances from one trail head to another, small variations in this rate occurred. The basic procedure was as follows:

1. The trail heads were numbered consecutively around each study area.
2. Using random numbers, a starting point was selected (the first day of field work).
3. The direction the field worker moved on the second day of work was based on the flip of a coin; for example, if heads, move to the next trail north (or west), tails, move to the next trail south (or east).
4. To maintain the 2:1 sampling ratio on strata I trails, the field worker sampled on every other strata II trail the first time around the study area, then sampled the skipped class II trails on the second pass. Strata I trails were sampled each time they were encountered.

In order to utilize sampling time most efficiently, some adjustments in the sampling plan had to be made in the field. It was possible, however, to maintain the proposed sampling ratio to a close degree. The ratios for each area were as follows:

|              |       |
|--------------|-------|
| Bob Marshall | 2.1:1 |
| Bridger      | 1.8:1 |
| High Uintas  | 1.8:1 |
| EWCA         | 1.7:1 |

### Sample Characteristics

The sampling technique utilized in this study yielded a stratified sample of unequal clusters. The clusters were defined as location-date units; that is, one trail head location on one day of the use season represented one location-date unit. The elements of the clusters were individual visitors.

The clustered sampling unit was picked primarily because it was the most efficient sampling technique, in terms of both time and



cost per element. Additionally, it provided a convenient framework to obtain information on the attitudes and perceptions of all persons contacted within the sampling framework, rather than just the arbitrarily selected party leader. As noted before, most past studies of wilderness users have relied upon the information obtained from a single individual from each party; as a consequence, their analysis reflects only this one individual's attitudes. It was hypothesized that while the parties were probably homogeneous in many ways, important differences existed within them relative to individual attitudes concerning crowding and the effects of use on the enjoyment of a wilderness trip.

Kish notes that if sampling rates ( $f_h$ ) are uniform within strata, they may differ between strata, provided that  $y_{hx}$  and  $x_{hx}$  (the simple sums of the stratum totals) are properly weighted to compensate for unequal sampling fractions.<sup>1</sup> In this study, the sampling ratio between strata was 2:1. Therefore, those observations obtained from strata II trails was duplicated, resulting in an adjusted sample size of 624.<sup>2</sup>

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<sup>1</sup>Leslie Kish, Survey Sampling (New York: John Wiley & Sons, Inc., 1967), p. 191.

<sup>2</sup>The 624 figure is broken down as follows: 362 observations were obtained from strata I trails, 131 observations from strata II, yielding a basic raw sample size of 493. Expansion of the strata II observations by a multiple of 2 raised the sample size of strata II observations to 262 and the over-all adjusted sample size to 624.



Two problems can be noted here concerning the structure of the sample. This study, like almost all recreation studies, utilizes a cluster sample rather than a simple random sample. One of the important effects of clustering is its tendency to increase the level of the error term over what a simple random sample would yield. Error terms have not been calculated in this study; however, given the objectives of this study, it seems that the over-all conclusions and interpretations are not affected greatly by this problem.

Secondly, expanding the strata II trails resulted in a 26 per cent increase in overall sample size. This increase, in turn, appears to elevate the level of significance of such statistics as chi square. The exact dimensions of this influence are not clear, but with the relatively large size of the raw sample, it does not appear to be appreciable.

Recreation surveys in general, and wilderness studies in particular, have suffered from numerous statistical shortcomings in the past. Part of this may be traced to the relative newness of the field. Sampling wilderness visitors involves contacting persons who are widely dispersed in space and time. Estimates as to the relative intensities of use at trail heads are more often than not very inaccurate or totally lacking.

What has been done in this study is to define where sources of bias exist and to control for these sources to the maximum degree possible. Contacting all party members eliminated bias emanating

from studies relying only on party leader responses. By personally contacting the respondents, the problems associated with non-registration at trail registration boxes was avoided. Followups resulted in a good response rate to the mail questionnaire. The field questionnaire was completed by the respondent himself; eliminating two sources of bias and confusion: (1) the biases which the field worker himself might introduce into the study<sup>1</sup> and (2) where any misunderstanding of a question occurred, it could be clarified by the field worker.

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<sup>1</sup>The effects of the administrator of a questionnaire (interviewer) on the quality of data obtained is discussed in Wilbur F. LaPage, "The Camper Views the Interview," Journal of Leisure Research, I (Spring, 1969), pp. 181-186.

## CHAPTER IV

### THE PERCEPTION OF WILDERNESS RECREATION CARRYING CAPACITY

We now move to an examination of those parameters of use that bear on the question of carrying capacity. As noted earlier, four dimensions of use are investigated: (1) the level of use encountered; (2) the type of use encountered; (3) the spatial variations in use encounters; and (4) the depreciative aspects of use. These elements, of course, are not unique and distinct, but overlap one another in various ways.

#### Use Level and Its Effect on Capacity

Probably one of the most commonly ascribed attributes of wilderness is solitude--an area characterized by a low intensity of use. This dimension is specified in the Wilderness Act and it seems, intuitively, to be a prerequisite to defining an area as wilderness. It is a quality that may underlie much of the motivation to use wilderness. The opportunity to get away from people has been demonstrated in several studies to be an important factor.<sup>1</sup>

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<sup>1</sup>The Wildland Research Center concluded that the "exit-civilization motif (defined as a general desire to escape from crowded cities and crowded resort areas, and to have the experience of doing something different) has the more pervasive and . . . broader impact." Wilderness and Recreation, pp. 145-147. Utilizing factor analysis, Hendee et al. found that "escapism," identified as those items implying aversion to involvement with human aggregations, had the lowest eigenvalue of seven factors defined over-all. The authors note, however, that the escape from civilization theme is implicit to the other factors investigated "but, by itself, is overshadowed," Wilderness Users in the Pacific Northwest, p. 31. Also see William R. Catton, Jr., "Motivations of Wilderness Users," Pulp and Paper Magazine of Canada (December, 1969), pp. 121-126.

Solitude, low intensities of use, and freedom from crowding are all relative measures, however. Conditions perceived as "uncrowded" by one person may represent an intolerable situation to another. Management to provide "outstanding opportunities for solitude" must recognize this variation to define acceptable ranges of use.

#### The Dimension of Solitude

Within the items listed in the purism scale, visitors were asked to indicate the degree to which "solitude--not seeing many other people except those in your own party" was desirable. A favorable response to this item was judged to be a measure of the visitor's recognition of solitude as a salient feature in his personal definition of wilderness as well as a characteristic specified within the institutional framework of the Wilderness Act. Table 9 shows that the preponderance of visitors to all the study areas felt solitude was a desirable and important facet of the wilderness experience. Visitors to the three western wildernesses tended to find solitude a more desirable feature than those in the BWCA (86 per cent over-all for the three western areas compared to 72 per cent in the BWCA). Recreational use of the BWCA, however, is the highest of any wilderness in the country and the intensity of use (see Table 6) is similarly high. It seems likely that visitors to the area may commonly expect to encounter other parties on their trip and the importance of solitude is diminished in the face of this expectation.



TABLE 9

THE DESIRABILITY OF SOLITUDE AS AN ELEMENT OF  
THE WILDERNESS ENVIRONMENT, BY STUDY AREA

| Study Area   | N   | Very Unde-<br>sirable | Unde-<br>sirable | Neutral | Desirable | Very de-<br>sirable |
|--------------|-----|-----------------------|------------------|---------|-----------|---------------------|
|              |     | %                     | %                | %       | %         | %                   |
| BWCA         | 205 | 4.4                   | 7.3              | 16.1    | 32.2      | 40.0                |
| Bob Marshall | 120 | 0.0                   | 5.0              | 12.5    | 26.7      | 55.8                |
| Bridger      | 144 | 2.8                   | 1.4              | 6.9     | 25.7      | 63.2                |
| High Uintas  | 154 | 2.6                   | 0.6              | 9.1     | 28.6      | 59.1                |
| Total        | 623 | 2.7                   | 3.9              | 11.6    | 28.7      | 53.1                |

Chi-square 37.82, 12 degrees of freedom, .001 > p.<sup>1</sup>

Lucas noted that canoeists in the BWCA wanted much lower levels of use than those visitors utilizing motor propelled craft.<sup>2</sup> Differentiating wilderness recreationists by their mode of travel had little effect on the pattern of response for the three western areas but substantial differences did occur in the BWCA. Eighty per cent of the

<sup>1</sup>Chi-square is the standard test of statistical significance used throughout this report. The test provides a measure of the probability that the distribution of cell values is not random as well as a method of overlooking the effect of sample size upon the distribution of values. The null hypothesis in each case is that k samples of frequencies or proportions come from the same or identical populations. A good discussion of chi-square is in Sidney Siegel, Non-parametric Statistics (New York: McGraw-Hill, 1956), pp. 175-179.

<sup>2</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 9.



paddling canoeists responded that solitude was desirable, while only 65 per cent of the motor canoeists and 62 per cent of the motor boaters responded in this fashion.

While solitude seemed to be generally considered desirable, differences in terms of its desirability were noted when analyzed by the purism score. Table 10 shows that none of those persons classified as strong purists felt solitude to be an undesirable feature and only 10 (4 per cent) out of 248 responded in a neutral manner. Conversely it may be noted that nearly all non-purists (89 per cent) considered solitude an undesirable or neutral environmental element as did 40 per cent of the neutralists. Considered together, nearly half (48 per cent) of these two groups held a conception of wilderness that did not contain solitude as an integral element.

Solitude is, however, an amorphous term that is subject to varying interpretation. For some, solitude is only possible with no other people around; for others, it may be experienced in the presence of several. Attempting to define levels of use that add to or delete from the satisfaction of the wilderness trip required questioning respondents about specific circumstances of encounters.

#### The Impact of Encounters

In light of the general desirability of solitude as a characteristic of wilderness, did visitors expect to find a situation where they would encounter little or no use? Respondents were asked the degree to





which they agreed or disagreed with the proposition "It is reasonable to expect that one should be able to visit a wilderness area and see few, if any, people." In the three western areas, 77 per cent of the respondents were in agreement with this statement, while only 67 per cent of the BWCA respondents agreed. It again seems to be a reasonable pattern of response, given the high intensity of use in the BWCA. The chances of seeing other parties is greater; hence, it is unreasonable not to expect some other parties.

TABLE 10

THE DESIRABILITY OF SOLITUDE AS AN ELEMENT OF THE  
WILDERNESS ENVIRONMENT BY PURISM GROUP

| Purist Group    | N   | Very Unde-<br>sirable | Unde-<br>sirable | Neutral | De-<br>sirable | Very de-<br>sirable |
|-----------------|-----|-----------------------|------------------|---------|----------------|---------------------|
|                 |     | %                     | %                | %       | %              | %                   |
| Strong Purists  | 248 | 0.4                   | 0.0              | 4.0     | 17.8           | 77.8                |
| Moderate Purist | 254 | 0.8                   | 4.3              | 12.2    | 36.2           | 46.5                |
| Neutralists     | 102 | 8.8                   | 8.8              | 22.5    | 40.2           | 19.6                |
| Non-purists     | 19  | 26.3                  | 21.1             | 42.1    | 10.5           | 0.0                 |
| Total           | 623 | 2.7                   | 3.9              | 11.6    | 28.7           | 53.1                |

Chi-square 214.63, 12 degrees of freedom, .001 > p.

Gamma .59<sup>1</sup>

<sup>1</sup>Throughout this report, the standard measure of statistical association is gamma. Gamma provides the proportional reduction in error (PRE) in predicting the dependent variable possible through knowledge of the independent variable. For discussion on the calculation and use of gamma, see Leo A. Goodman and William H. Kruskal, "Measures of Association for Cross Classifications," Journal of the American Statistical Association, 49 (December, 1954), pp. 732-764,



Examining responses from the BWCA, however, revealed they varied sharply between modes of travel. Paddling canoeists tended to be more in agreement with the statement than those traveling in motor propelled craft, as Table 11 shows. Two reasons support this result.

TABLE 11

THE EFFECT OF MODE OF TRAVEL IN THE BWCA ON RESPONSE TO "IT IS REASONABLE TO EXPECT THAT ONE SHOULD BE ABLE TO VISIT A WILDERNESS AREA AND SEE FEW, IF ANY, PEOPLE"

| Mode of Travel     | N   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--------------------|-----|-------------------|----------|---------|-------|----------------|
|                    |     | %                 | %        | %       | %     | %              |
| Paddling Canoeists | 119 | 2.5               | 4.2      | 21.0    | 54.6  | 17.6           |
| Motor Canoeists    | 22  | 9.1               | 22.7     | 4.5     | 45.5  | 18.2           |
| Motor Boaters      | 60  | 15.0              | 13.3     | 13.3    | 48.3  | 10.0           |
| Total              | 201 | 7.0               | 8.9      | 16.9    | 51.7  | 15.4           |

Chi square 23.77, 8 degrees of freedom,  $.01 > p > .001$ .

First, the range and penetration of canoeists into the area is greater than that of motor propelled craft.<sup>1</sup> With increased penetration

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and, by the same authors, "Measures of Association for Cross Classifications: III. Approximate Sampling Theory," Journal of the American Statistical Association, 58 (June, 1963), pp. 310-364. Herbert L. Costner, "Criteria for Measures of Association," American Sociological Review, 30 (June, 1965), pp. 341-353 is also useful.

<sup>1</sup>Lucas, Recreational Use of the Quetico-Superior Area, p. 36.

into the area, use falls off, and with it, the probability of encountering others.

Secondly, paddling canoeists were decidedly more purist than other groups in the BWCA. Twenty-eight per cent of the group was classified as strong purists, compared to 14 and 6 per cent respectively for motor canoeists and motor boaters. As noted in Chapter III, the purism scale was constructed using the Wilderness Act as a normative framework in which wilderness could be defined. Considered in this context, then, it was entirely reasonable that one should expect to see few, if any, people in a wilderness; it represented the normative situation defined by the Wilderness Act. This reasoning is substantiated in examining response to the statement by purist score: 87 per cent of the strong purists were in agreement, compared to only 71 per cent of the moderate purists and 59 per cent of the neutralists.

While respondents indicated it was reasonable to expect to see few people on their trip, the question did not yield any information as to whether encounters with other parties added to or deleted from their enjoyment of that trip. Some authors have argued that an important part of wilderness recreation centers on the social interaction the visitor may engage in with others he meets.<sup>1</sup> Visitors thus were asked a series of questions aimed at eliciting attitudes toward situations where opportunities for increased social interaction would be enhanced.

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<sup>1</sup>See, for example, Gregory P. Stone and Marvin J. Taves, "Camping in the Wilderness," in Mass Leisure, ed. by Eric Larrabee and Rolf Meyersohn (Glencoe, Illinois: The Free Press, 1958), pp. 298-300.



Encounters with other parties may occur at two basic locations: while enroute from one destination to another or at the campsite. It was hypothesized that attitudes toward meeting other people would vary according to whether the respondent was in transit or in camp.<sup>1</sup> Initially, persons were asked to indicate their reaction to encountering other parties on the trail. Over-all, only about one out of five persons (19.1 per cent) indicated they enjoyed it, while one-third (32.2 per cent) replied that it "did not matter." In the BWCA, however, nearly one-third (29 per cent) responded they enjoyed the encounters, while only 14 per cent of the western respondents felt similarly inclined.

Analyzing the responses to the statement by the purist categories revealed considerable variation in the degree to which encounters affected satisfaction. As Table 12 indicates, only about one out of ten of the strong purists enjoyed meeting people on the trail. The gamma statistic of  $-.21$  indicates a moderately strong inverse relationship between purist score and the degree to which one enjoys encounters.

There was some variation between study areas, however, in the responses of the strong purists. In the Bridger and the Bob Marshall, these persons were less inclined to accept encounters on the trail as a part of their wilderness trip than the strong purists in the BWCA

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<sup>1</sup>This component of capacity will be more fully investigated and expanded upon in the section on "Spatial Aspects of Capacity."

and the High Uintas. Whereas about one out of five strong purists in these latter areas (21 and 17 per cent, respectively) enjoyed trail encounters, only about one out of twenty in the former areas were so inclined (5 per cent in each).

TABLE 12

## PURIST ATTITUDES TOWARD MEETING OTHER PARTIES ON THE TRAIL

| Purist Group     | N   | Bother a lot | Bother a little | Enjoy it | Does not matter |
|------------------|-----|--------------|-----------------|----------|-----------------|
|                  |     | %            | %               | %        | %               |
| Strong Purists   | 248 | 20.5         | 39.5            | 10.1     | 29.8            |
| Moderate Purists | 254 | 12.6         | 32.7            | 23.2     | 31.5            |
| Neutralists      | 102 | 4.9          | 30.4            | 30.4     | 34.3            |
| Nonpurists       | 20  | 0.0          | 20.0            | 20.0     | 60.0            |
| Total            | 624 | 14.1         | 34.6            | 19.1     | 32.2            |

Chi square 45.53, 9 degrees of freedom, .001 > p.

Gamma -.21.

As noted earlier, it was hypothesized that attitudes toward encountering other people would be expected to vary according to whether the encounters took place along the trail or at the camp site. The trail is, of course, a focal point of movement. While one is on the trail the normal activity is travel and the expectation that one will meet others in transit probably tempers adverse reactions. While in camp, however, attitudes towards other parties may shift



markedly. Visitors were asked the extent to which they agreed with the statement "Meeting other people around the campfire at night should be part of any wilderness trip."

Surprisingly, the pattern of responses to this statement and the previously discussed one were quite similar. Again, only about one out of five persons (21 per cent) agreed that meeting people around the campfire was part of the trip and about one-third (34 per cent) were neutral on the matter. As was also true with the statement on encounters while traveling, respondents from the BWCA tended to be more in agreement (28 per cent) than their western counterparts. Finally, the response of strong purists was essentially identical to this statement as it was to the statement concerning encounters while traveling (only 10 per cent agreed that meeting people around the campfire was part of the trip). The association between purist score, and the level of agreement showed a somewhat stronger inverse relationship, however, with a gamma value of  $-.39$ , evidence that strong purists tend to consider encounters in camp more disturbing than on the trail.

To further test specific attitudes regarding encounters with others, visitors were asked to respond to two similar questions, one describing a normative condition and the second a hypothetical situation, but one which they almost certainly had encountered. First, they were asked the degree to which they accepted or rejected "It's most enjoyable when you don't meet anyone in the wilderness." Table 13 shows marked differences between the study areas in response to the statement.

TABLE 13

RESPONSE TO "IT'S MOST ENJOYABLE WHEN YOU DON'T MEET  
ANYONE IN THE WILDERNESS," BY STUDY AREAS

| Study Area   | N   | Strongly<br>Disagree | Disagree | Neutral | Agree | Strongly<br>Agree |
|--------------|-----|----------------------|----------|---------|-------|-------------------|
|              |     | %                    | %        | %       | %     | %                 |
| BWCA         | 203 | 10.3                 | 23.2     | 20.2    | 23.6  | 22.7              |
| Bob Marshall | 120 | 1.7                  | 11.7     | 21.7    | 32.5  | 32.5              |
| Bridger      | 144 | 2.1                  | 12.5     | 19.4    | 25.7  | 40.3              |
| High Uintas  | 154 | 4.5                  | 15.6     | 27.9    | 25.3  | 26.6              |
| Total        | 621 | 5.3                  | 16.6     | 22.2    | 26.2  | 29.6              |

Chi square 39.40, 12 degrees of freedom, .001 > p.

Visitors to the Bob Marshall and Bridger Wildernesses responded almost identically (65 and 66 per cent, respectively) in terms of considering the statement a desirable norm. It is interesting to note the close percentage response to the desirability of the statement that occurred between the BWCA and the High Uintas (46 and 52 per cent, respectively). To again refer to Table 6, it can be seen that the relative intensities of use of these two areas are very similar. They are also similar in their situational characteristics, with well-developed access and nearby concentrations of population. Finally, they both had a substantially lower percentage of strong purists within the sample than did the Bob Marshall or Bridger (see Table 8). It would thus follow that the pattern of response to the normative

statement posed here would reflect the less discerning perception of wilderness by users.

As a related question, visitors were asked to respond to a situation where they encountered no other parties during the day on a wilderness trip. As a situation which they had either actually experienced or could reasonably expect to experience, what effect did it have on the enjoyment of their trip?

It was expected that responses to this question would closely mirror those found in Table 13, as this question presented the respondent a specific framework within which to answer as opposed to the normative situation posed above. This prediction held reasonably well for the study areas as can be seen in Table 14. Only in the BWCA did a noticeable difference occur; on the statement presented in Table 13, nearly half (46.3 per cent) felt no encounters was a desirable situation whereas in Table 14, the figure declined to 37 per cent.

TABLE 14

THE EFFECT OF MEETING NO OTHER PARTIES DURING THE  
DAY ON TRIP SATISFACTION, BY STUDY AREAS

| Study Area   | N   | Bother a lot | Bother a little | Enjoy it | Doesn't matter |
|--------------|-----|--------------|-----------------|----------|----------------|
|              |     | %            | %               | %        | %              |
| BWCA         | 205 | 5.9          | 20.0            | 37.1     | 37.1           |
| Bob Marshall | 120 | 0.0          | 3.3             | 62.5     | 34.2           |
| Bridger      | 144 | 2.1          | 4.9             | 63.2     | 29.9           |
| High Uintas  | 154 | 3.2          | 9.1             | 52.6     | 35.1           |
| Total        | 623 | 3.2          | 10.6            | 51.8     | 34.3           |

Chi square 52.93, 9 degrees of freedom, .001 > p.

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    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185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 | 1495 | 1 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-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The responses to these two statements were examined using mode of travel as the independent variable. There was a similar decline in the positive reactions toward encountering no other parties among travelers in the BWCA, but not among the western visitors.

The hiatus that exists between the prescriptive frame of reference and actual conditions for visitors to the BWCA was examined in more detail. One hypothesis was that the level of wilderness experience might affect visitor attitudes toward solitude, with those persons having little or no prior experience less receptive to conditions involving few or no encounters. Such persons might hold notions of wilderness where few encounters was conceptually important, but which actually proved dissatisfying in reality. In testing this possibility, two dimensions of experience were examined. First, respondents were asked whether they had ever been on a wilderness trip before. As can be seen from Table 15, the western study areas as a whole had significantly fewer first time visitors compared with the BWCA. Secondly, an examination of the relative frequency of wilderness trips was made. Again, visitors in the western study areas tended to have a higher level of experience than those in the BWCA, as Table 16 indicates.

Surprisingly, the higher frequency of wilderness visitation appeared to have only a minor effect upon attitudes about other parties. As Table 17 indicates, those persons with lower levels of wilderness experience tended to react more favorably towards not meeting any

other parties than did those with more experience. There was a slight inverse relationship, however, between experience and the effect upon satisfaction.

TABLE 15

## PERCENTAGE OF PERSONS ON FIRST WILDERNESS TRIP

| Study Region  | N   | Was this your first wilderness trip? |         |
|---------------|-----|--------------------------------------|---------|
|               |     | No (%)                               | Yes (%) |
| BWCA          | 206 | 71.8                                 | 28.2    |
| Western Areas | 418 | 84.2                                 | 15.8    |
| Total         | 624 | 80.1                                 | 19.9    |

Chi square 12.67, 1 degree of freedom, .001 > p.

TABLE 16

FREQUENCY OF WILDERNESS VISITATION IN THE  
BWCA AND WESTERN STUDY AREAS

| Study Region  | N   | More than<br>once a<br>year | About<br>once a<br>year | About<br>once every<br>two years | Less than<br>once every<br>two years |
|---------------|-----|-----------------------------|-------------------------|----------------------------------|--------------------------------------|
|               |     | %                           | %                       | %                                | %                                    |
| BWCA          | 148 | 41.2                        | 25.0                    | 11.5                             | 22.3                                 |
| Western Areas | 352 | 42.0                        | 32.4                    | 12.2                             | 13.4                                 |
| Total         | 500 | 41.8                        | 30.2                    | 12.0                             | 16.0                                 |

Chi square 7.15, 3 degrees of freedom, .10 > p > .05.



TABLE 17

THE EFFECT OF THE FREQUENCY OF WILDERNESS VISITATION ON  
VISITOR REACTION TO MEETING NO OTHER PARTIES

| Frequency of<br>Wilderness<br>Visitation | N   | Bother<br>a lot | Bother a<br>little | Enjoy it | Doesn't<br>matter |
|------------------------------------------|-----|-----------------|--------------------|----------|-------------------|
|                                          |     | %               | %                  | %        | %                 |
| More than once<br>a year                 | 207 | 2.4             | 9.7                | 51.2     | 36.7              |
| About once a<br>year                     | 148 | 4.7             | 9.5                | 50.0     | 35.8              |
| About once every<br>two years            | 58  | 0.0             | 6.9                | 67.2     | 25.9              |
| Less than once<br>every two years        | 75  | 0.0             | 14.7               | 57.3     | 28.0              |
| Total                                    | 488 | 2.5             | 10.0               | 53.7     | 33.8              |

Chi square 13.93, 9 degrees of freedom,  $.20 > p > .10$ .

Gamma  $-.08$ .

The persons with the lower level of wilderness experience may represent a population which, because of various kinds of constraints (distance from the wilderness, cost, etc.), are able to visit the wilderness infrequently. When they have the opportunity for a wilderness visit, however, they desire an experience that affords them few or no other encounters. To these people, the wilderness trip may represent the "once in a life time" event and as such, it needs to provide the kind of experience no other opportunity can provide.





An additional factor may lie in the patterns of membership in conservation and outdoor recreation organizations between the study areas. In the western study areas, 34 per cent of the visitors indicated membership in some type of outdoor interest group, as opposed to only 14 per cent in the BWCA. Additionally, within the population belonging to such groups, 30 per cent of the western visitors as opposed to only 3 per cent of the BWCA users indicated membership in a wilderness-interest type of organization.<sup>1</sup> Membership in organizations with general interests about the out-of-doors as well as specifically in wilderness tend to provide a framework within which certain attitudes are stressed and reinforced. Interaction within such organizations probably tends to strengthen the concept of wilderness as an area where few or no encounters is the norm. As a result, members come to the wilderness anticipating an experience to fit their norms and their expressed attitudes toward prescriptive and actual situations tend to be more nearly aligned.<sup>2</sup>

To this point, discussion has centered specifically and directly on the absence of people. What effect on satisfaction,

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<sup>1</sup>Wilderness-interest organizations were defined as the Sierra Club, Wilderness Society, National Parks Association, or a state or regional level organization specifically orienting its activity and interest toward wilderness.

<sup>2</sup>For a discussion of the significance of conservation organizations on molding opinion, see Keith A. Argow and Selz C. Mayo, "The Sociology of Informal Groups and Their Significance to Conservation Opinion," Journal of Forestry, 65 (March, 1967), pp. 176-179, and Joseph Harry, Richard Gale, and John Hendee, "Conservation: An Upper-Middle Class Social Movement," Journal of Leisure Research, 3 (Summer, 1969), pp. 246-254.

however, does the presence of others have or should it have? Respondents were asked to evaluate the statement, "You should see at least one group a day in the wilderness to get the most enjoyment out of your trip." Over-all, only about 25 per cent of the visitors to the four study areas expressed agreement with this statement. Substantial differences occurred, however, between the various units of analysis. As before, the responses of BWCA visitors differed markedly from those of the western areas, whereas the responses in the High Uintas varied from those of the Bob Marshall and Bridger visitors.

As Table 18 indicates, respondents in the Bob Marshall and Bridger showed a much stronger negative reaction toward the statement than those in the BWCA or the High Uintas. Within the BWCA, motor boaters had the highest level of agreement, 45 per cent. This greater desire for seeing others substantiates Lucas' earlier conclusions that motor boaters were less discerning in their perception of the wilderness resource and, in fact, may consider encounters with others as an important contribution to the enjoyment of their trip.<sup>1</sup>

The pattern of responses between study areas is further clarified in examining the percentage of each area's sample classified as strong purists (see Table 8). This group provided the most stringent evaluation of the statement under discussion; only 13 per cent agreed with it, while 26 per cent of the moderate purists agreed.

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<sup>1</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 18.

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TABLE 18

RESPONSE TO "YOU SHOULD SEE AT LEAST ONE GROUP A DAY  
IN THE WILDERNESS TO GET THE MOST ENJOYMENT  
OUT OF YOUR TRIP," BY STUDY AREA

| Study Area   | N   | Strongly<br>Disagree | Disagree | Neutral | Agree | Strongly<br>Agree |
|--------------|-----|----------------------|----------|---------|-------|-------------------|
|              |     | %                    | %        | %       | %     | %                 |
| EWCA         | 203 | 5.9                  | 24.1     | 33.5    | 26.6  | 9.9               |
| Bob Marshall | 120 | 13.3                 | 45.0     | 27.5    | 11.7  | 2.5               |
| Bridger      | 144 | 18.8                 | 39.6     | 25.7    | 13.9  | 2.1               |
| High Uintas  | 154 | 13.6                 | 31.2     | 29.2    | 23.4  | 2.6               |
| Total        | 621 | 12.2                 | 33.5     | 29.5    | 20.0  | 4.8               |

Chi square 53.81, 12 degrees of freedom, .001 > p.

To this point in the discussion, it seems clear that regardless of how the question is examined, wilderness visitors conceptualize low intensities of use, involving few or no other encounters, as an important dimension of the wilderness environment. Important differences in perception do exist, however, and are reflected in such user characteristics as mode of travel and purist score. In examining the role of the level of use on perception of carrying capacity, it soon became apparent that it is difficult, and perhaps impossible, to disassociate the number of encounters from the type or kind of encounters. Hence, the specific examination of levels of use was combined with types; the two dimensions of use are closely interwoven in the

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wilderness setting and their effects on user satisfaction and consequent impact on perception merit such combined consideration.

### Type of Use and Its Effect On Capacity

Although the term "wilderness recreation carrying capacity" implies a measure of some level, it appears that the character of that level is quite critical. That is to say, the type of use bears directly upon user evaluations and attitudes about the accompanying level. As used here, type refers to either the mode of travel (backpackers, paddling canoeists, etc.) or to the character of the party (large organization-sponsored party, family group, etc.).

### Previous Research

Part of the importance in centering attention specifically on the type of group, particularly the mode of travel, relates to the conflicts that exist between groups and which thus tend to operate to reduce the capability of an area to provide an optimum level of satisfaction. Lucas has examined the conflicts that exist between paddling canoeists and those traveling by motor propelled craft in the BWCA. He notes that paddling canoeists, in response to the question, "How many canoeing and motor boating groups could you meet in a day before you would feel there was too much use?" replied they wanted to see no motorboats, while they could tolerate up to five canoes without a loss in satisfaction.<sup>1</sup> Motorboaters, in response

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<sup>1</sup>Ibid., p. 16.

to the same question indicated no limit on the number of canoeists and anywhere from 25 to 100 boats. Lucas further notes:

Some motorboaters seemed puzzled by the question. They apparently were not thinking in terms of seeking solitude.<sup>1</sup>

Other studies of BWCA users have supported Lucas' findings. The Wildland Research Center reported that one-third of the canoeists sampled indicated annoyance at encountering motor boats.<sup>2</sup> A 1967 survey of users in Quetico Provincial Park of Canada reported that 15 per cent of the canoeists disliked encounters with motor propelled craft. Additionally, when asked to define what "crowding" meant, 22 per cent of the canoeists replied "motor boats."<sup>3</sup>

While not as well documented, a similar conflict may exist in most western wildernesses between backpackers and horseback travelers. Merriam and Ammons reported nearly 40 per cent of the hikers sampled in Glacier Park backcountry preferred to neither ride horses nor encounter them.<sup>4</sup> Thorsell has reported that residents near Waterton

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<sup>1</sup>Ibid.

<sup>2</sup>Wildland Research Center, Wilderness and Recreation, p. 144.

<sup>3</sup>Gordon Lusty Survey Research Ltd., A Study of Visitor Attitudes Towards Quetico Provincial Park (Don Mills, Ontario: Gordon Lusty Survey Research Ltd., 1968), Table 41.

<sup>4</sup>Merriam and Ammons, The Wilderness User in Three Montana Areas, p. 32.





Lakes National Park in Alberta attribute the deterioration of wild-flowers in the park backcountry to large horse parties.<sup>1</sup> Hendee found mixed feelings on the part of users toward developments to facilitate horse use. He concluded that conflicts between horse users and others are likely to increase as wilderness use increases and that efforts should be made to keep horses away from hikers wherever possible.<sup>2</sup> A third of the visitors sampled in the High Sierra area of California were reported by the Wildland Research Center to have found the effects of stock on trails and campsites annoying.<sup>3</sup>

Burch and Wenger attempted to estimate how many hikers and horsemen backcountry visitors could meet and still have an enjoyable experience. They found that 88 per cent of the respondents were favorably inclined toward backpackers while 77 per cent expressed a favorable response to horsemen. However, the structure of the question was such that the exact meaning of the answers is difficult to interpret. If the respondent indicated he would prefer not meeting any of a particular category of recreationists, the response was interpreted as expressive of an unfavorable attitude toward that group. If, however, he could meet at least one without a loss in enjoyment, his

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<sup>1</sup>J. W. Thorsell, Wilderness Recreational Use, Waterton Lakes National Park Visitor Use Survey, Part II (Ottawa, Canada: Parks Planning Division, 1967), p. 5.

<sup>2</sup>Hendee et al., Wilderness Users in the Pacific Northwest, pp. 56-57.

<sup>3</sup>Wildland Research Center, Wilderness and Recreation, p. 144.



response was interpreted as an over-all favorable attitude toward that type of recreationist. Additionally, it was unfortunate that the respondent's mode of travel was not recorded as an independent variable for analysis.

The impact of large parties on the quality of the wilderness recreation experience seems similarly important. These groups appear to represent more than a simple discrete number of individuals; they are perceived as a particular unit with certain ecological and esthetic impacts on the wilderness environment not associated with a similar number of individuals traveling by themselves or in small groups. In both the Mt. Marcy area and the High Sierra of California, for example, 16 per cent of the respondents to the Wildland Research Center survey reported encounters with large parties annoying.<sup>1</sup>

#### Perceived Appropriateness of Modes of Travel

An effort was made to ascertain the degree to which the various modes of travel were perceived as appropriate in a wilderness setting. Visitors were asked to respond to the statement, "Both backpacking and horseback travel are entirely appropriate ways to travel in wilderness areas."<sup>2</sup>

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<sup>1</sup>Ibid.

<sup>2</sup>On the BWCA form, "paddling" was substituted for backpacking, and "using an outboard motor" for horseback travel.

An interesting pattern of responses developed. In the west, the bulk of the respondents agreed with the statement. However, response was less strongly in agreement in the Bridger (74 per cent) than in the High Uintas (80 per cent) or the Bob Marshall (92 per cent). The Bridger is an area of foot travel rather than horseback use, whereas horseback use predominates in the latter two areas. It would thus appear that backpackers are less tolerant of horseback riders than the reverse situation. Horses often leave trails badly muddied, backpackers often need to move off the trails to prevent startling horses, and horse manure on the trails often makes hiking difficult and unpleasant! Aside from problems of horses being startled by passing hikers, horseback travelers are not particularly bothered by persons on foot. Analysis of this statement with mode of travel as the independent variable tends to confirm this (see Table 19).

TABLE 19

PERCEPTION OF APPROPRIATENESS OF FOOT AND HORSE TRAVEL  
BY BACKPACKERS, HORSEMEN, AND HIKERS WITH STOCK

| Mode of Travel | N   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|----------------|-----|-------------------|----------|---------|-------|----------------|
|                |     | %                 | %        | %       | %     | %              |
| Backpacker     | 237 | 5.9               | 7.6      | 11.4    | 60.3  | 14.8           |
| Horseback      | 168 | 1.8               | 0        | 7.7     | 59.5  | 31.0           |
| Hiker-Stock    | 14  | 0                 | 0        | 28.6    | 42.9  | 28.6           |
| Total          | 419 | 4.1               | 4.3      | 10.5    | 59.4  | 21.7           |

Chi square 37.13, 8 degrees of freedom, .001 > p.



Notwithstanding certain objections to horse travel, visitors perceive the three modes of travel in western areas as appropriate within their normative conception of wilderness. This attitude, of course, coincides with institutional constraints; hiking and horse travel are implicitly recognized as appropriate by the Wilderness Act.

In examining response in the BWCA, however, the conflict between paddling canoeists and motor propelled craft demonstrated by Lucas and others is further substantiated (see Table 20).

TABLE 20

PERCEPTION OF APPROPRIATENESS OF MANUAL AND MOTOR TRAVEL BY  
PADDLING CANOEISTS, MOTOR CANOEISTS, AND MOTOR BOATERS

| Mode of Travel | N   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|----------------|-----|-------------------|----------|---------|-------|----------------|
|                |     | %                 | %        | %       | %     | %              |
| Paddling Canoe | 119 | 19.3              | 32.8     | 21.8    | 21.8  | 4.2            |
| Motor Canoe    | 20  | 15.0              | 10.0     | 5.0     | 35.0  | 35.0           |
| Motor Boat     | 60  | 0                 | 6.7      | 18.3    | 46.7  | 28.3           |
| Total          | 199 | 13.1              | 23.6     | 19.1    | 30.7  | 14.6           |

Chi square 57.59, 8 degrees of freedom, .001 > p.

Only about one out of four paddling canoeists agreed that both paddling and using an outboard motor were appropriate means of travel in a wilderness. As will be documented later in this chapter, the strong negative reaction to the statement can be attributed almost

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    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|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-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185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 | 1495 | 1 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-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entirely to the reference to outboard motors. The perceived norm regarding appropriate means of wilderness travel held by the paddling canoeists is in close coincidence with institutional norms, while motor canoeists and motor boaters look upon their own mode of travel as largely appropriate and in keeping with the wilderness environment.<sup>1</sup>

Continuing the investigation at the normative-conceptual level, attention was focused on the degree to which respondents perceived differences in other visitors as reflected in their mode of travel. Over-all, 50 per cent of the respondents sampled felt there was a great difference between the kind of people who chose to backpack (or paddle a canoe) and those who went by horseback (or by outboard motor). Distinct regional patterns arose which appear tied to the respondent's mode of travel.

In the BWCA, 55 per cent of the respondents agreed that a great deal of difference is to be found between people who travel by paddling a canoe and those who utilize a motor for propulsion. Examining this statement in light of the respondents mode of travel, however, revealed that 73 per cent of the paddling canoeists were in agreement, compared to only 36 and 30 per cent of the motor canoeists and motor boaters, respectively. Nearly half of both of these latter groups disagreed with the statement. Again, it appears that paddling

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<sup>1</sup>Under the terms of the Wilderness Act, "Prohibition of Certain Uses," Section 5, the use of motor propelled craft is permitted as a protection of pre-existing rights. Currently, over half of the water acreage of the area is open to motorized craft.

canoeists perceive those traveling by motors to be inappropriate intrusions in their normative concept of wilderness. On the other hand, visitors using motor propelled craft consider their use consonant with wilderness. Moreover, they tend to perceive other wilderness groups as homogeneous to themselves and this may explain the source of at least part of the conflict between these user groups. If motor users extrapolate their attitudes and norms about the wilderness environment to those traveling in non-mechanized craft, then their behavior in regard to these other travelers may be governed by their perception of a shared value system, although in fact no such shared system exists.

Although the intensities involved were not so great, a similar pattern of response appeared among western visitors. Backpackers tended to perceive greater differences between themselves and those traveling by horse than did the horsemen (57 per cent as opposed to 28 per cent, respectively). Backpacking is often considered the "elite" way to travel by its advocates. However, four out of ten backpackers either disagreed with the contention or held a neutral view, reflecting the greater level of perceived appropriateness of horse travel revealed in Table 19.

Overall, strong purists in the western study areas did not show an appreciably greater level agreement with the statement than other purists groups, and gamma was only .12. Nor did strong purists in the BWCA demonstrate any greater level of agreement than the other



purist groups there. Gamma between purism score and tendency to agree with the contention that a difference exists between persons using different modes of travel was .09.

#### Visitor Preferences for Other Modes of Travel

An effort was made to develop an index of preference for the various modes of travel. Visitors were asked to indicate their personal preference for seeing the different modes of travel they might encounter. The question was worded so that respondents assumed they would meet some other parties.

The pattern of response showed marked regional variations as well as distinctions based upon the respondent's own mode of travel. In the BWCA, 69 per cent of the response indicated a preference for seeing paddling canoeists while only 15 per cent indicated a preference for motor canoeists and 6 per cent for motor boats, despite the fact these latter two groups comprised nearly 42 per cent of the sample. Table 21 examines BWCA responses by the respondent's mode of travel.

The over-all favorable attitude toward paddling canoeists is clearly recognizable. Motor canoeists tend to be more ambivalent in their attitudes toward paddling and motor canoeists; this may be a reflection of the small sample size of motor canoeists (N = 22). Their distinct negative reaction towards motor boats concurs with Lucas' earlier findings, however,<sup>1</sup> Whereas there is strong antipathy

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<sup>1</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 18.

TABLE 21  
EXPRESSED PREFERENCES FOR SEEKING OTHER MODES OF TRAVEL  
IN THE BWCA, BY RESPONDENT'S MODE OF TRAVEL

| Mode<br>of<br>Travel | Expressed Preferences, By Percentage |                                |               |                      |                                |               |                      |                                |               |
|----------------------|--------------------------------------|--------------------------------|---------------|----------------------|--------------------------------|---------------|----------------------|--------------------------------|---------------|
|                      | Paddling Canoeists                   |                                |               | Motor Canoeists      |                                |               | Motor Boaters        |                                |               |
|                      | Prefer<br>to<br>Meet                 | Prefer<br>to<br>not to<br>Meet | Don't<br>Care | Prefer<br>to<br>Meet | Prefer<br>to<br>not to<br>Meet | Don't<br>Care | Prefer<br>to<br>Meet | Prefer<br>to<br>not to<br>Meet | Don't<br>Care |
| Paddling Canoeist    | 85                                   | 3                              | 12            | 5                    | 35                             | 60            | 1                    | 81                             | 13            |
| Motor Canoeist       | 41                                   | 5                              | 55            | 50                   | 0                              | 50            | 9                    | 55                             | 36            |
| Motor Boater         | 51                                   | 2                              | 47            | 21                   | 2                              | 78            | 14                   | 16                             | 70            |



by paddling canoeists toward motor boaters, the reverse is not true. Over three times as many motor boaters expressed a preference to see canoeists as those indicating preference for their own kind. Encounters with canoeists probably add an aura of the "voyageur" spirit to the visitor's experience.

Also of interest here is the general "don't care" attitude of a large proportion of the motor boaters. This reflects in many ways their undiscerning attitude about appropriate uses of the wilderness and is indicative of their greater interest in a specific aspect of the area than other visitors. When asked if there was one single activity for which they used the BWCA, 40 per cent of the motor boaters answered yes, compared to only 25 and 14 per cent of the paddling canoeists and motor canoeists, respectively.<sup>1</sup>

In the western study areas, spatial patterns of preferences for different modes of travel appeared linked to the type of travel characteristic of the individual study areas. Table 22 shows this relationship.

In the Bridger Wilderness, where backpacking is the predominant form of travel, nearly eight out of ten persons sampled favored seeing backpackers and six out of ten preferred not to encounter horseback parties. This attitude contrasts with that found in the

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<sup>1</sup>Thirty-seven per cent of the motor boaters answering yes to this question indicated fishing as the principal attraction compared to 24 per cent for the paddling canoeists.

TABLE 22  
EXPRESSED PREFERENCES FOR SEEING OTHER MODES OF TRAVEL  
IN THE WESTERN STUDY AREAS, BY STUDY AREA

| Study Area   | Expressed Preferences, By Percentage |                    |            |                  |                    |            |                   |                    |            |
|--------------|--------------------------------------|--------------------|------------|------------------|--------------------|------------|-------------------|--------------------|------------|
|              | Backpackers                          |                    |            | Horseback Riders |                    |            | Hikers with Stock |                    |            |
|              | Prefer to Meet                       | Prefer not to Meet | Don't Care | Prefer to Meet   | Prefer not to Meet | Don't Care | Prefer to Meet    | Prefer not to Meet | Don't Care |
| Bob Marshall | 44                                   | 14                 | 42         | 37               | 21                 | 42         | 16                | 14                 | 70         |
| Bridger      | 78                                   | 4                  | 18         | 15               | 59                 | 26         | 10                | 28                 | 62         |
| High Uintas  | 51                                   | 8                  | 41         | 35               | 25                 | 40         | 15                | 29                 | 56         |



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Bob Marshall and the High Uintas, where horse travel is predominant (65 and 51 per cent, respectively). In both of these areas, visitors were more favorably inclined to encounters with horseback parties and showed a reduced propensity for seeing backpackers. The large "don't care" response in the three areas in reference to hikers with stock reflects the unfamiliarity of travelers with this mode of travel; over-all, it represented only 3 per cent of the sample.

Taken as a unit of analysis, horseback riders showed a strong preference for seeing other horseback parties (47 per cent), but were largely passive in their attitudes toward backpackers, with 62 per cent indicating they "didn't care" about seeing hikers. As was true in the BWCA, there seems to be a situation of one-way resentment, with backpackers strongly disliking encounters with horsemen, whereas nearly nine out of ten horseback riders show either a preference for or a neutral reaction to seeing hikers.

Analysis of this question by purism score revealed that the responses of strong purists in each area closely resembled those presented in Table 22. The one notable exception occurred in the Bridger, where strong purists expressed a greater rejection of horseback travel; only 8 per cent preferred to meet horseback riders and 66 per cent preferred not to.

#### The Effects of Large Parties on the Perception of Carrying Capacity

Other characteristics of the recreational use of wilderness remain to be examined. As noted earlier, other research studies



have suggested that "large" parties may have especially severe impacts on user satisfaction. Such an effect could result in any or all of three ways: (1) the perception by other users that such groups are inappropriate in the wilderness; (2) the recognition of the severe ecological damage that such parties inflict upon the resource; and (3) the manner in which such groups contribute to feelings of crowding.

To establish a notion of the user's perceptions of large parties, visitors were asked to respond to the statement, "Seeing a large party (a dozen or more people from a club, etc.) reduces the feeling that you're out in the wilderness."

Two-thirds of the respondents concurred with the statement, but important areal variations were noted. Bridger visitors expressed considerably more agreement (80 per cent) than their counterparts in the Bob Marshall (68 per cent) and the High Uintas (69 per cent).<sup>1</sup> Both these latter areas are characterized by more organization-sponsored trips (for example, Boy Scouts) and by more trips handled by commercial outfitters. Both of these types of parties are usually large (20 or more people) and there seems to be some relationship here between the degree of exposure to such groups and tolerance for them. In the Bridger, where most travel is in small parties, a norm supporting the small group as appropriate seems widely held; in the

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<sup>1</sup> A difference significant at the .001 level.



other western study areas where large parties are more common, norms have apparently shifted to a more tolerant position.

A similar line of reasoning holds for the BWCA, where only 54 per cent of the respondents were in agreement with the statement. Mode of travel, interestingly enough had no effect on response.

Strong purists, however, were much more in accord between the study areas in their acceptance of the statement. About 80 per cent of this group over-all considered encounters with large parties as detrimental to their enjoyment of the trip. Again strong purists in the Bridger were more in agreement than others with 87 per cent. Seventy-five per cent of the strong purists in the BWCA concurred with the statement.

Sonnenfeld has suggested that in the face of various conditions of stress, man may adapt to the conditions through the process of either heightening or reducing his sensitivity.<sup>1</sup> The results found in response to the questionnaire item discussed above tends to support this hypothesis. This would suggest that any effort at formulating a measure of carrying capacity for wilderness would be valid only for the particular area studied and at the particular point in time.

Mitigating this conclusion, however, is the fact that the phenomenon of adaptation appears to be sharply reduced when the norms

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<sup>1</sup> Joseph Sonnenfeld, "Variable Values in Space and Landscape: An Inquiry into the Nature of Environmental Necessity," Journal of Social Issues, XVII (October, 1966), p. 75.



of those persons holding a more discerning and purist concept of wilderness are examined. It seems that certain values are shared over space; the extent to which they are maintained over time awaits the availability of data from which trends may be examined.

One final examination of user preferences for the size of parties encountered while traveling was made. Visitors were presented with three situations in which they were asked to indicate their preference for: (1) seeing one large party during the day and no one else or one small party a day and no one else; (2) one large party a day and no one else or five small parties a day and no one else; and (3) one large party a day and no one else or ten small parties a day and no one else. A large party was indicated to have about 30 people in it, a small party about three. Table 23 presents the results, by study areas.

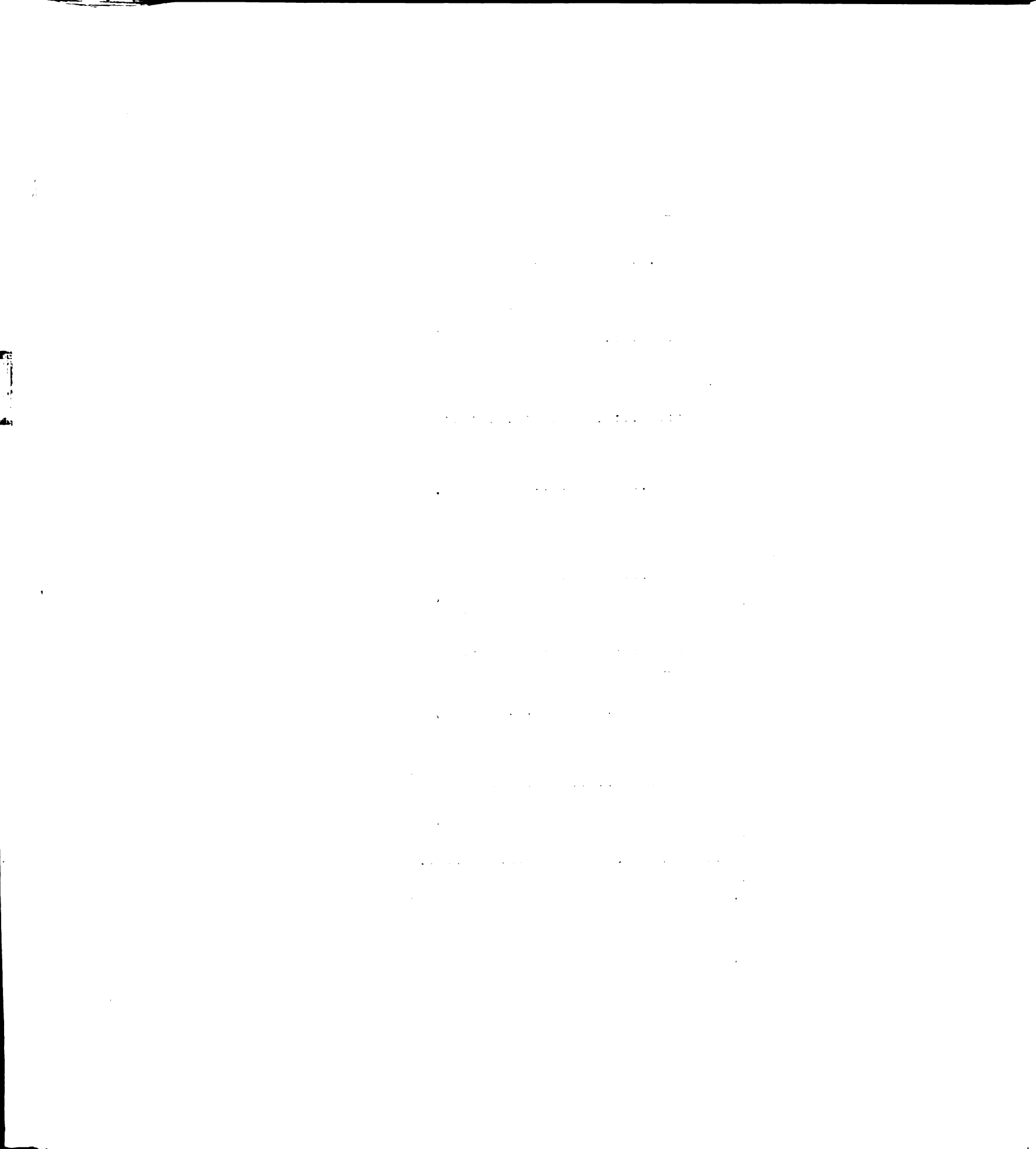
As was expected, the preponderant share of visitors expressed preference for a single small party rather than one large party, and this percentage declined for five and ten small parties. However, note that only in the Bob Marshall did more respondents ever favor meeting the single large party over the small parties. This occurred despite the fact that ten small parties would mean the respondent was seeing the same total number of people during the day (30), but could probably expect to see at least one party every hour, assuming a ten-hour long day on the trail! This seems a situation hardly conducive to solitude. It indicates that the large party has an extraordinarily



TABLE 23

USER PREFERENCE FOR LARGE PARTIES OR A VARIABLE  
NUMBER OF SMALL PARTIES, BY STUDY AREA

| Study Area   | Percentage of Responses Favoring Seeing: |                 |            |                 |                    |            |                 |                   |            |  |
|--------------|------------------------------------------|-----------------|------------|-----------------|--------------------|------------|-----------------|-------------------|------------|--|
|              | One Large Party                          | One Small Party | Don't Care | One Large Party | Five Small Parties | Don't Care | One Large Party | Ten Small Parties | Don't Care |  |
| BWCA         | 7                                        | 70              | 23         | 15              | 60                 | 26         | 19              | 48                | 33         |  |
| Bob Marshall | 4                                        | 79              | 17         | 24              | 47                 | 28         | 36              | 33                | 31         |  |
| Bridger      | 4                                        | 88              | 8          | 16              | 68                 | 16         | 23              | 56                | 21         |  |
| High Uintas  | 3                                        | 73              | 24         | 14              | 57                 | 29         | 25              | 43                | 32         |  |
| Average      | 5                                        | 77              | 18         | 17              | 58                 | 25         | 24              | 46                | 30         |  |
| Probability  | .01 > p > .001                           |                 |            | .02 > p > .01   |                    |            | .001 > p        |                   |            |  |



detrimental effect upon user satisfaction as well as suggesting a recognition on the part of respondents of the generally harmful impact of such groups on the physical resources such as soils and forage.

Other factors almost certainly bear upon the pattern of response obtained. Such large parties (30 people, or maybe more) generally travel by horse in the western areas and respondents probably were weighing the situation at least partially on the basis of this fact. Also, 30 people in a party, if traveling by horse, would normally have at least an additional 30 animals accompanying them, loaded with gear. Thus, in effect the party size becomes 60 and its esthetic and ecological impact is substantial.

The respondent's mode of travel did not result in appreciable variation in response. All modes favored the small parties over the large one, with paddling canoeists in the BWCA and backpackers in the west slightly more disposed toward the small parties (which is the way they normally travel) than others. Strong purists showed a more definite response to meeting a single small party rather than a single large party (88 per cent) than did other units of analysis, but their responses to the other two situations were quite similar (57 per cent and 48 per cent, respectively, favoring small parties).

It was hypothesized, however, that user preferences for small parties would tend to be offset in the face of a situation where they were posed the alternative: meeting one large party and no one else on a week-long trip or encountering three or four small parties every

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day on a week-long trip, but no large parties. A choice of the first option would mean an encounter that might be rather dissatisfying at the time for the visitor, but would result in the remainder of the trip devoid of other encounters. Given the strong indications that few or no encounters is a desirable condition, it seemed reasonable to expect persons would accept a trade-off between a brief period of dissatisfaction with an extended period of complete solitude.

The over-all results, however, indicated that 51 per cent of the respondents favored seeing the small parties each day rather than a single large party and 22 per cent were neutral. Only about one out of four persons chose seeing the large party. The most favorable response for small parties came in the BWCA, with 61 per cent preferring them. Only in the Bob Marshall did a majority favor the large party (38 per cent) over the small parties (36 per cent).

Analysis by mode of travel revealed similar results with all favoring the small parties over the large. Seventy-one per cent of the motor boaters responded in this fashion; it seems likely, however, that in light of their generally more social orientation (or non-solitude value system), they could be expected to favor that situation most conducive to enhancing opportunities for social interaction. This conclusion may, in fact, have some relevancy in interpreting the entire question.

The pattern of response obtained from the strong purists in each of the study areas reflected the ambivalent nature of the

situation and probably presented this group with a dissonance-laden alternative.<sup>1</sup> The large party certainly has the most severe impact upon the physical resource and also appears to be generally perceived as normatively inappropriate in wilderness. On the other hand, solitude is a particularly important element of the total wilderness experience for strong purists and by choosing the large party they afforded themselves with a greater opportunity to enjoy this aspect.

Resolving these alternatives, which are in many ways mutually exclusive, was difficult for the strong purists. In the BWCA, Bridger, and High Uintas, about five out of ten preferred the small parties, but nearly four out of ten in each of these areas opted for the large party. Only in the Bob Marshall did a clear pattern of preference emerge; 52 per cent preferred the large party and 29 per cent, the small. Thus, the responses of the strong purists matched the general sample in direction, but not in degree.

#### Use and Satisfaction

It is clear that in the wilderness situation, increasing use results in declining satisfaction or quality for the user. Although the rate at which this decline occurs varies according to the type of visitor examined, it is a matter of magnitude rather than direction.

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<sup>1</sup>Festinger defines dissonance thus: "Two elements are in a dissonant relation if, considering these two elements alone, the obverse of one element would follow from the other." Leon Festinger, A Theory of Cognitive Dissonance (New York: Row, Peterson, and Company, 1957), p. 13.

The preceding discussion has pointed out that the character of the use also affects satisfaction, perhaps to a greater degree than the level. Neither of these two use dimensions operate alone, however; an individual's recollection and evaluation of the day's events might involve a certain number of encounters with perhaps two or three different types of groups. Additionally, these encounters have a spatial-temporal aspect to them and the behavior of the persons encountered also affects the user's evaluation.

To arrive at a measure of how two of these dimensions, level and type, operate together, with the temporal dimension fixed at one day, visitors were asked to indicate how they felt about encountering an increasingly larger number of other parties (Question 16, Appendix B). Specifically, they were asked to evaluate the question in terms of meeting the different modes of travel they could normally expect to encounter. In this manner it would be possible to estimate the effect of, for example, an increasing number of encounters with backpackers on user satisfaction.

These "satisfaction curves" were computed for each of the study areas regarding the various modes of travel a visitor might encounter.<sup>1</sup> The curve was computed by determining the percentage of respondents in each study area who indicated a "very pleasant" or "pleasant" response

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<sup>1</sup>No curve was computed for hikers with stock. The small percentage this group makes up of the sampled use in the study areas and the consequent infrequency of encounters with such parties negated the usefulness of such information.

to the various use encounter situations. The slope of the curve thus represents the declining percentage of persons responding in a favorable fashion to the increased level of use.

The general hypothesis that satisfaction declines as use increases was clearly substantiated. However, certain variations in the slope of the curve are worth noting. In the BWCA the particular mode of travel encountered yields broadly disparate curves (Figure 12). Immediately of notice is the upswing in the number of respondents citing satisfaction that occurs with seeing up to two parties of paddling canoeists.<sup>1</sup> It declines quickly, however, with encounters with persons traveling in motor propelled craft, especially motor boats.

The initial upswing in satisfaction found for paddling canoeists lends support to the notion that, over-all, encounters are both expected, and perhaps to a degree, enjoyed. This is tied closely, however, to the perception of the other group's appropriateness in the wilderness environment. It was found, for example, that the number of responses indicating satisfaction increased for paddling canoeists with up to about two encounters with other canoeists, but declined sharply in reaction to encounters with motor craft. Motor boaters, in line with hypotheses concerning their less purist and discerning

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<sup>1</sup>Clawson hypothesized that user satisfaction might increase to a limited degree in a wilderness situation with increasing use, but would then drop rather abruptly. See Clawson and Knetsch, Economics of Outdoor Recreation, p. 168.





attitudes, reacted favorably to seeing up to about three other parties, regardless of their mode of travel.

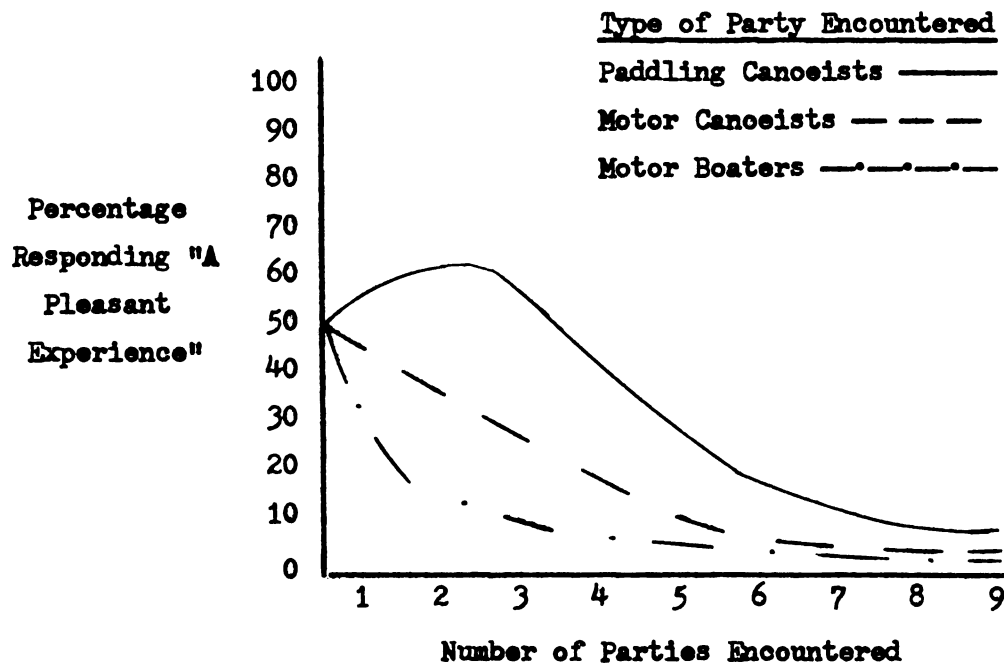


Figure 12. BWCA Satisfaction Curves

Figures 13, 14, and 15 show a basic similarity between results in the western study areas with those obtained in the BWCA, suggesting some shared conceptual norms regarding use encounters. Certain variations exist between the three western areas, however. An extremely close association exists between the satisfaction curves portraying reactions to backpackers and horseback riders in the Bob Marshall and the High Uintas. Little differentiation occurs in these areas between the two modes of travel in terms of effect upon user satisfaction. In

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the Bridger, however, visitors sharply distinguish between the two travel methods; and an encounter with only one horse party as opposed to one backpackers group results in over a 30 per cent decline in the over-all level of satisfaction.

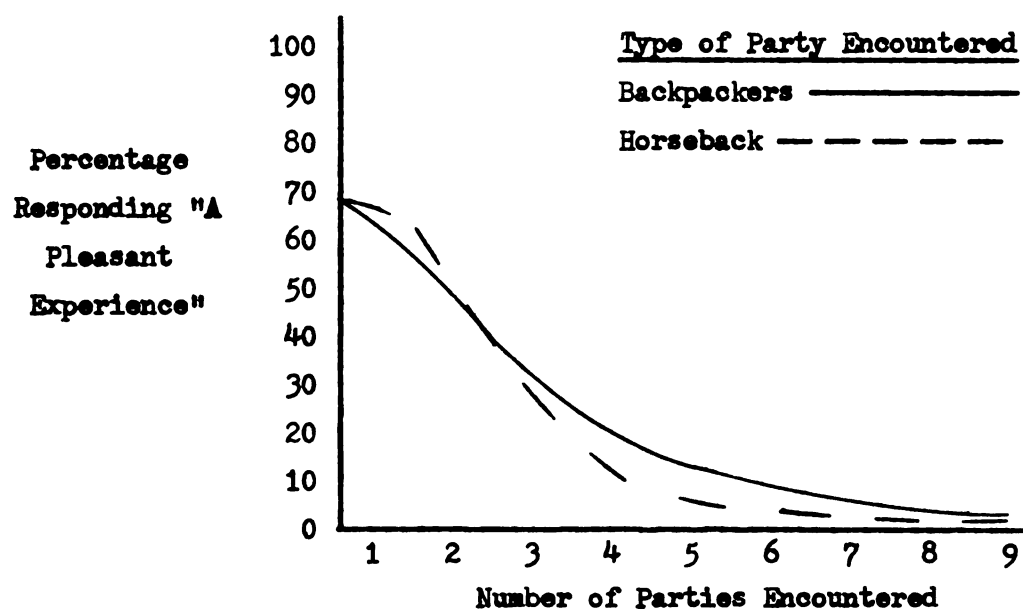


Figure 13. Bob Marshall Satisfaction Curves

Generally it appears that up to two encounters per day still results in a satisfactory experience for at least half of the visitors. The notable exception is encounters with motor propelled craft in the BWCA, where only one encounter results in over a 50 per cent decline in over-all visitor satisfaction. As discussed in Chapter III, however, interpretation of data based on averages may result in management



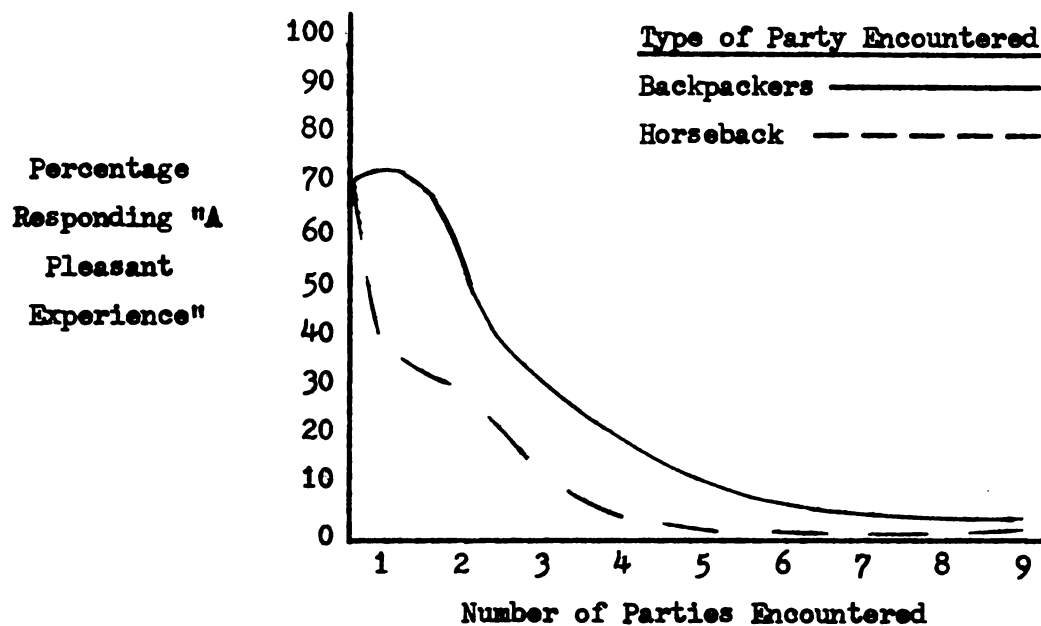


Figure 14. Bridger Satisfaction Curves

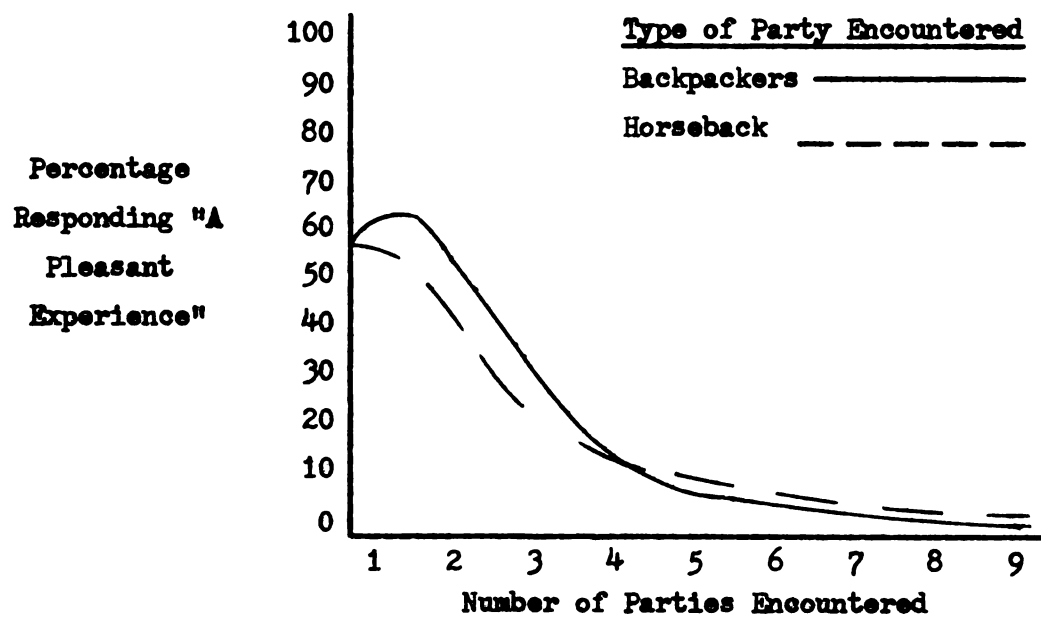


Figure 15. High Uintas Satisfaction Curves



decisions that are perceived as inappropriate and nonnormative by those users classified here as strong purists. To ascertain the degree to which these visitors reflected average values and the extent to which their perceptions departed significantly from those reported for each study area as a whole, satisfaction curves were computed for the strong purists. Figure 16 presents the curves obtained for strong purists in the western study areas; Figure 17, those for purists in the BWCA. A comparison between the two figures and with the previous charts reveals a number of significant differences.

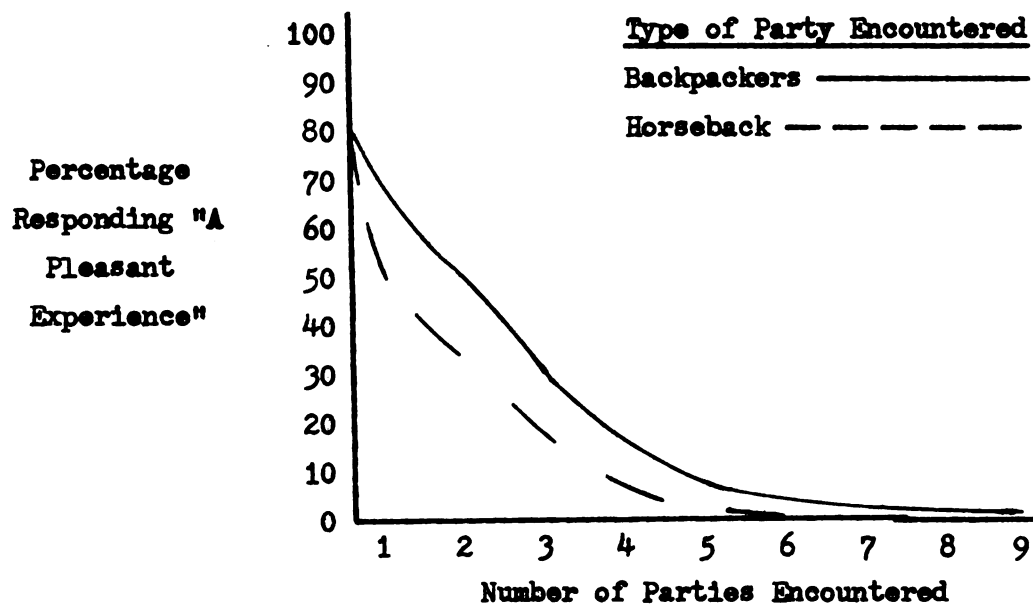


Figure 16. Western study area strong purists satisfaction curve.



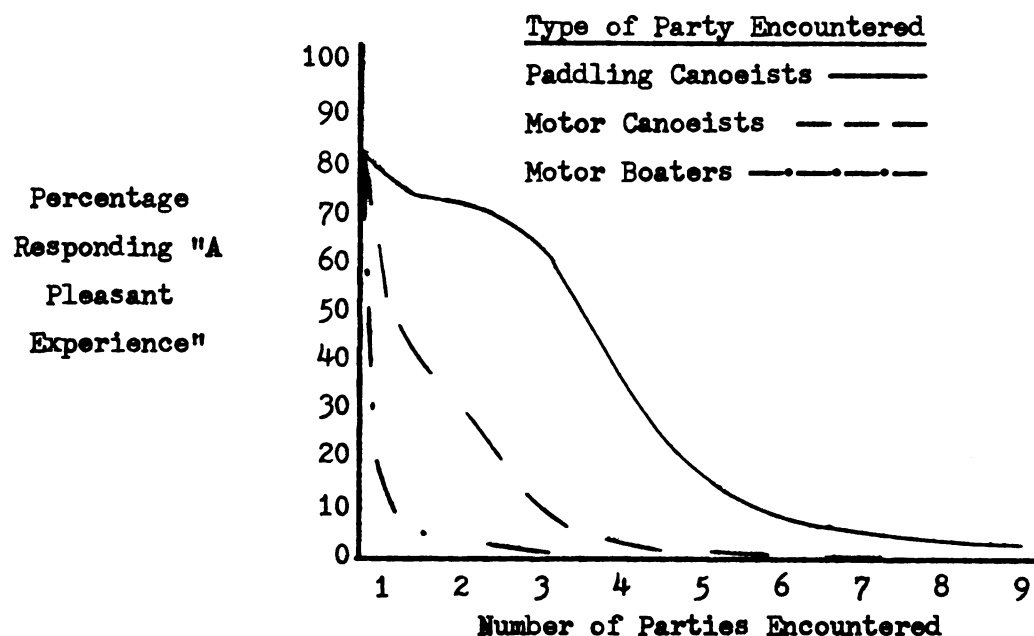


Figure 17. BWCA strong purist satisfaction curve

Initially, it reveals the degree to which solitude (not seeing any other parties) is an important and differentiating criterion for the strong purists. Just over 80 per cent of this group in both the western areas and the BWCA preferred a situation of no encounters. This follows the hypotheses developed from Table 10, where the strong association between purist score and the desirability of solitude was clearly documented ( $\text{Gamma} = .59$ ). Thus, it seems clear that for those persons whose perception of wilderness is most rigid and demanding, solitude is a major requisite.

A second observation is that satisfaction for the strong purist declines more rapidly in the face of any type of encounter than for any



other unit of analysis. Note there is no upswing in satisfaction with the first or second encounter as occurs in the other figures, a fact further solidifying conclusions concerning the importance of solitude. However, as was the case with the other groups, most strong purists appear to tolerate up to two encounters per day.

The single most notable exception to this occurs in the presence of motor boats in the BWCA. The percentage of strong purists indicating a pleasant reaction drops from 82 per cent (with no encounters) to 7 per cent with one encounter with a motor boat, clearly delineating the degree to which such craft are perceived as inappropriate and destructive to the wilderness setting.

Over-all, strong purists differentiate much more sharply than other groups about the types of use they meet and their satisfaction declines more sharply and rapidly with increases in the level of use. Perhaps most importantly, however, is the high degree of association between the perception of what constitutes inappropriate use by the strong purists among the study areas. The presence of a commonly accepted set of values among users of spatially separate and diverse wilderness environments suggests that the perceptual and behavioral environments of these people are conceptually quite similar. Shared value systems have been demonstrated to exist within individual subcultures of the broader social structure, which, although spatially segregated, are linked through one or more similar concerns (that is, socio-economic status, institutional structures, and other forms of

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social reinforcement).<sup>1</sup> In the case of strong purists, it seems evident that the social interaction and attitude reinforcement provided through affiliation with outdoor recreation and conservation organizations fosters a common set of values toward wilderness.<sup>2</sup>

As cited earlier, level and type of use have been normally considered the principal components in a determination of wilderness recreation carrying capacity. Encounters also have, however, a spatial aspect to them which can substantially influence the user's perception. In the following discussion, attention turns to the manner in which the locational component of encounters affects attitudes toward carrying capacity perception.

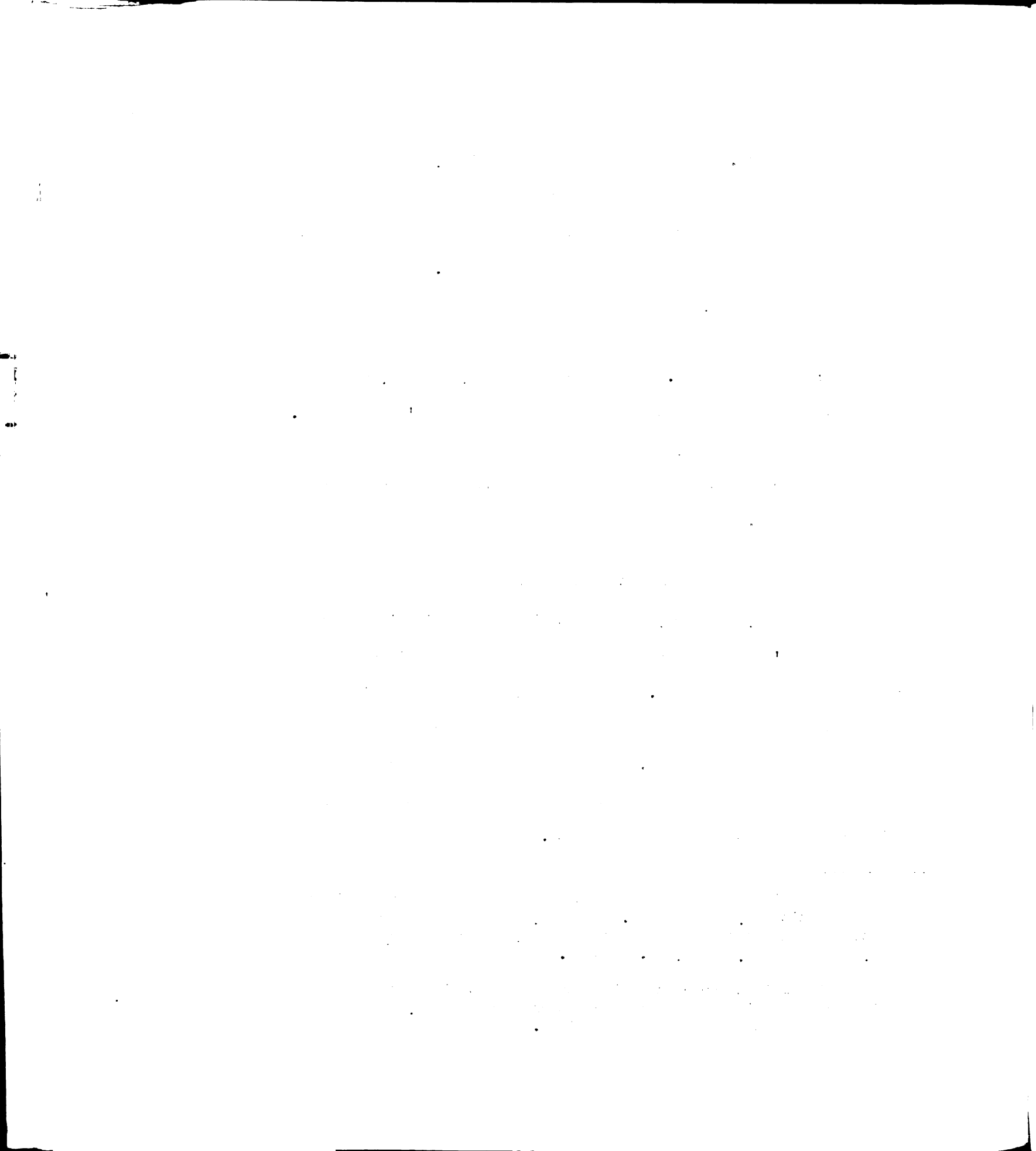
#### Spatial Aspects of Capacity

Geographers, planners, and architects are becoming increasingly cognizant of man's differential perception of space into hierarchies of increasing involvement of self. Of particular relevance to this recognition is the fact that human behavior and attitudes may differ sharply between these perceived spheres. Two conceptual developments seem pertinent in assessing how this variable perception relates to an analysis of wilderness recreation carrying capacity.

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<sup>1</sup>For a discussion of the importance of these reinforcing institutions on attitudes, see James M. Fendrich, "Perceived Reference Group Support: Racial Attitudes and Overt Behavior," American Sociological Review, 32 (December, 1967), pp. 960-970.

<sup>2</sup>Thirty-eight per cent of the strong purists indicated membership in a conservation or outdoor recreation organization, as opposed to only 23 per cent of the moderate purists.



### Relevant Research

First, work by Hall and Sommer<sup>1</sup> suggests that individuals delineate two important behavioral characteristics of space; personal space, or that area immediately surrounding the individual, and the territorial cluster, or that space enclosing others frequently visited and the paths taken to reach them. Physical distance is a principal consideration in defining these spheres, but the area in which an extension of self occurs is the delineating characteristic of personal space. Stea has reviewed material suggesting that alterations in the shape, size, boundedness, and differentiation of these zones yield marked alterations in the behavior of individual members.<sup>2</sup>

A second closely linked concept is that of territoriality. A definition of the concept includes more than physical ownership of real estate; emotional attachment is a particularly strong element. Sommer cites Fried and Gleicher concerning that space around the individual:

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<sup>1</sup>Edward T. Hall, The Hidden Dimension (Garden City, New York: Doubleday, 1966), 201 pp. and "Proxemics," in Man's Image in Medicine and Anthropology, ed. by New York Academy of Medicine (New York: International Universities Press, 1963). Also see Robert Sommer, "Man's Proximate Environment," Journal of Social Issues, XXII (October, 1966), pp. 59-70, and by the same author, Personal Space: The Behavioral Basis of Design (Englewood Cliffs, New Jersey: Prentice-Hall, 1969), 177 pp.

<sup>2</sup>David Stea, "Space, Territory, and Human Movements," Landscape, 15 (Autumn, 1965), pp. 13-16.

(This space) is territorial in a more profound sense: that individuals feel different spatial regions belong to or do not belong to them and, correspondingly, feel that they belong to . . . specific spatial regions or do not belong.<sup>1</sup>

This sense of possession of a spatial territory has been described by some authors as an important psychological need of man; Jung has noted "Each person should, possess his own piece of land, then the old instincts would flourish again."<sup>2</sup> The classic statement on territoriality is by Ardrey. Positing that man's behavior is motivated by three basic needs, identity, stimulation, and security, he argues that territoriality is one of the few human or animal institutions which satisfies all these needs.<sup>3</sup> Matore' has written of a need for vital space; space that not only has a physical dimension, but one which provides for a projection of one's personality and a realization of various psychological desires.<sup>4</sup>

To what degree do wilderness visitors perceive and establish territories and if so, what effects do "intrusions" on this territory

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<sup>1</sup>Sommer, "Man's Proximate Environment," p. 61, quoting M. Fried and P. Gleicher, "Some Sources of Residential Satisfaction in an Urban Slum." Journal of American Institute of Planners, 27 (November, 1961), p. 313.

<sup>2</sup>Hans Carol, "C. J. Jung and the Need for Roots," Landscape, 14 (Spring, 1965), p. 2.

<sup>3</sup>Robert Ardrey, The Territorial Imperative (New York: Atheneum, 1966), pp. 333-339. Much of Ardrey's work has been criticized, however, for its biological reductionist approach to understanding human behavior.

<sup>4</sup>Georges Matore, "Existential Space," Landscape, 15 (Spring, 1966), p. 6.



have on a user's experience? As was suggested by the data in Table 12, users appear to sharply differentiate between encounters with other parties on the trail and those at or near their campsite. Such encounters appear distinct and separate in the nature of their effect on user satisfaction beyond the specific level or type of use involved. Any capacity estimation for wilderness, then, must take into account the differential impacts upon quality brought about by the spatial variations of those encounters.

Wilderness has often been measured in a spatial framework. The Wildland Research Center defined wilderness recreation as use over one-half mile from a road.<sup>1</sup> Merriam and Ammons found that visitors to National Forest Wilderness and Primitive areas were somewhat divided over "where wilderness began," with about half answering "at the end of the road" and the remainder indicating "three miles or more from end of road." National Park backcountry visitors were much more likely to define wilderness in terms of the latter definition.<sup>2</sup> The difference seems predictable, since the administrative boundaries of most National Forest wilderness areas are clearly delineated on the land with a sign, and many visitors were probably basing their response on this fact. National Park backcountry, however, is not

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<sup>1</sup>Wildland Research Center, Wilderness and Recreation, p. 119.

<sup>2</sup>Merriam and Ammons, The Wilderness User in Three Montana Areas, pp. 30-31.



administratively designated; hence user definition of the boundary tends to be more a function of the individual's perception. Additionally, areas along National Park roads sustain considerable day use, and the visitor seeking solitude may in some cases have to travel some distance to escape the casual day visitor.

Other empirical efforts have suggested, however, that the spatial parameter is not highly important. Lucas found that neither graphs nor rank order correlation coefficients relating wilderness perception to use suggested that remoteness influenced ratings.<sup>1</sup>

To adequately describe how the esthetic effect of the location of the encounter varied, visitors were asked to evaluate situations involving meeting others along the route of travel compared to in camp and near the periphery of the area versus some distance inside. Additionally, the degree to which camp areas represent personal territory was investigated in some depth.

#### Peripheral Versus Interior Encounters

The trail head represents a point where entering and exiting parties are focused. Generally, as one first enters an area he can expect that the probability of encountering others is high. It was hypothesized that this expectation would desensitize to some extent the adverse reactions visitors would normally experience if these

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<sup>1</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 19.



encounters occurred "deep" inside the area, particularly in the area of the visitor's campsite. To test this, visitors were asked which condition they would prefer: "Seeing a lot of people within the first few miles or so from the road and no one else the rest of the trip or several other parties in the area where I expect to camp and no one else." As expected, over-all response indicated a preference for encounters at the periphery of the area rather than in an interior location near camp; about two-thirds (68 per cent) responded in this fashion. As Table 24 shows, respondents in the Bridger tended to be slightly more in favor of peripheral encounters, and were considerably less ambivalent in their response than other users; only about 17 per cent indicated they "didn't care."

TABLE 24

EXPRESSED PREFERENCE FOR ENCOUNTERS ON WILDERNESS PERIPHERY  
OR IN INTERIOR LOCATIONS, BY STUDY AREAS

| Study Area   | N   | Encounters<br>on Periphery | Encounters<br>in Interior | Don't Care |
|--------------|-----|----------------------------|---------------------------|------------|
|              |     | %                          | %                         | %          |
| BWCA         | 203 | 59.1                       | 14.3                      | 26.6       |
| Bob Marshall | 118 | 65.3                       | 7.6                       | 27.1       |
| Bridger      | 143 | 76.2                       | 7.0                       | 16.8       |
| High Uintas  | 152 | 73.7                       | 3.3                       | 23.0       |
| Total        | 616 | 67.9                       | 8.6                       | 23.5       |

Chi square 22.04, 6 degrees of freedom, .10 > p > .001.

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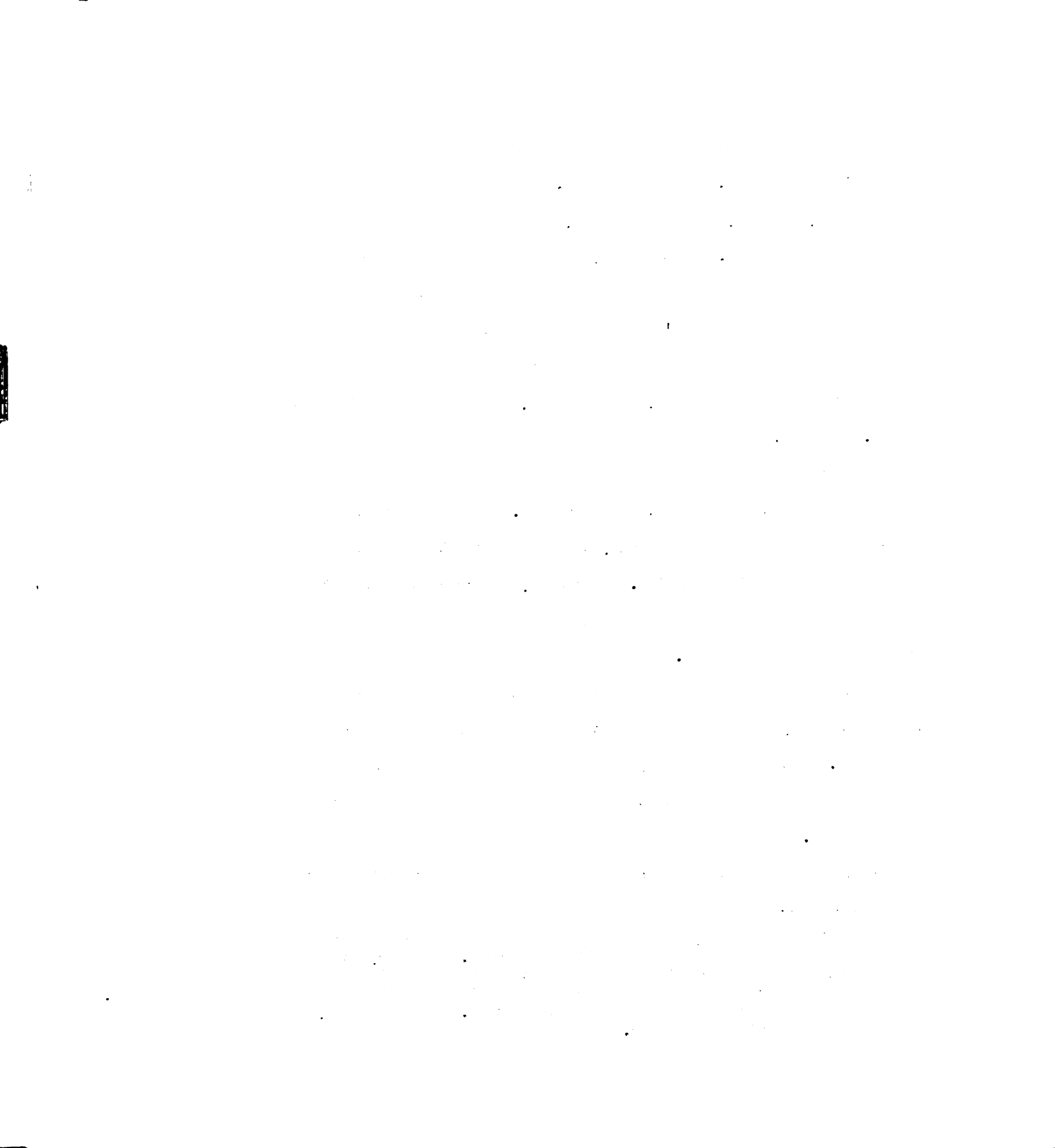
BWCA visitors tended to reflect a greater over-all tolerance for interior encounters. This figure (14.3 per cent) was influenced substantially, however, by motor boaters, nearly a quarter of whom favored such encounters. In the west, backpackers showed both a greater preference for peripheral encounters (74 per cent) and a lesser tendency to reply "don't care" (19 per cent) than horseback riders (corresponding percentages for horseback riders on these two options were 68 and 28 per cent, respectively, a difference significant at the .10 level).

A strong association showed between purist score and preference for encounters on the periphery. A gamma of  $-.42$  indicated that the higher the score on the purist scale, the greater the tendency to reject encounters in the interior.<sup>1</sup> Over-all, 81 per cent of the strong purists favored encounters on the trail and there was little variation between the four study areas.

It would thus appear that users conceptually zone wilderness at a macro-scale, identifying at least one peripheral region and a core region. Within these zones, expectation of other encounters and the consequent behavior and attitudes toward such meetings appear to differ sharply. This does not suggest that visitors necessarily enjoy or welcome meetings on the trail; the data presented in Table 12 points

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<sup>1</sup>Strictly speaking, responses to this statement were nominal level measurements and thus not susceptible to gamma. However, it was assumed that an order or ranking did exist between responses in the sense they represented a series of decreasingly rigid evaluations of where encounters had the most impact on satisfaction. So considered, gamma was an appropriate statistic.





to the contrary. It does indicate, however, that most wilderness users, given the option, prefer seeing others while in transit from one point to another, rather than while in camp. The campsite thus seems to represent the user's territory and his behavior and attitudes toward others is influenced by this. The extent to which the possession of "territory," in the form of a camp, was an important component of the user's evaluation of the quality of his trip was further investigated.

#### The Campsite as "Territory"

Initially, respondents were asked the extent to which they agreed with the statement, "When staying out overnight in the wilderness it is most enjoyable not to be near anyone else." There was surprisingly broad and uniform agreement with the statement; 75 per cent over-all indicated their acceptance of the concept, and only motor boaters differed appreciably, but still with 65 per cent agreeing.

Analysis by purist scores revealed that strong purists agreed more intensely than other groups. About nine out of ten strong purists in each of the study areas agreed that solitude at the campsite was an important and desirable feature; the association between the variables was .43.

In light of this information, notions that the campsite area of the wilderness visitor is an arena for social interaction with other parties and the development of friendships with strangers appear false. There is always the possibility that the item as presented represented

a "motherhood" type of statement. To cross-check results and to obtain a measure of how the user's behavior might actually be affected by intrusions in their "territory," respondents were posed a situation where, after setting up their camp in an isolated location, two or three other parties arrived on the scene (see question 11, Appendix B).

Visitor reactions to this situation varied sharply. Over-all, about three out of ten persons indicated they would keep their camp where it was and that they either did not care about other parties camping in the same area or they would enjoy the companionship provided by these persons. However, 65 per cent responded that such a situation would result in a loss of quality to them. Reactions to this situation by these people varied from staying at the same camp, but with reduced enjoyment, to leaving the area and setting up camp elsewhere. None indicated they would be so disgusted as to go home.

Wilderness organization membership again resulted in a significantly different pattern of response as compared with that obtained from the over-all sample. Persons affiliated with such organizations also revealed a much stronger tendency to react negatively to other campers than did members of organizations with general outdoor recreation or conservation interests; Table 25 indicates that six out of ten wilderness club members would be sufficiently distressed by other persons camping nearby to spatially segregate themselves from these other parties.<sup>1</sup>

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<sup>1</sup>It is unclear at present what, if any, active defense mechanisms wilderness users employ to defend "territory." Acting to spatially segregate oneself from others, however, suggests that accepted social norms that frown upon physical violence probably make defense of the territory difficult. What may be more important to investigate is the manner in which users render their camping area distinctive.

TABLE 25  
 REACTIONS TO OTHER CAMPERS BY MEMBERS OF WILDERNESS  
 ORGANIZATIONS AND BY MEMBERS OF OTHER CONSERVATION  
 AND OUTDOOR RECREATION CLUBS

| Type of<br>Organization | N   | Stay,<br>would en-<br>joy others | Stay,<br>don't<br>care | Stay, but<br>reduced<br>enjoyment | Stay, cut<br>short<br>visit | Pack up,<br>camp<br>elsewhere | Other |
|-------------------------|-----|----------------------------------|------------------------|-----------------------------------|-----------------------------|-------------------------------|-------|
|                         |     | %                                | %                      | %                                 | %                           | %                             | %     |
| Wilderness              | 44  | 9.1                              | 0.0                    | 13.6                              | 13.6                        | 61.4                          | 2.3   |
| Other                   | 127 | 20.5                             | 10.2                   | 25.2                              | 7.4                         | 22.8                          | 11.8  |
| Total                   | 171 | 17.5                             | 7.6                    | 22.2                              | 10.5                        | 32.7                          | 9.4   |

Chi square 27.41, 5 degrees of freedom, .001 > p.



Over-all, 88 per cent of the wilderness organizations members reacted in some negative way to other campers, compared to only 57 per cent of the other club members. It appears clear that members of such organizations perceive solitude as a critically important component of their total wilderness experience, an aspect sufficient to motivate a change in their spatial behavior if threatened or lost. It was interesting to find that the responses obtained from members of wilderness organizations showed a more negative reaction to other campers than those recorded for the strong purists in the BWCA and the High Uintas; only 68 per cent of these respondents indicated either a loss of enjoyment, a shortened visit, or a search for a new camp as their reaction. Nearly 80 per cent of the strong purists in the Bridger and Bob Marshall, however, responded in this manner. Gamma for purist score and respondent reaction was  $.34$ , reflecting a moderately strong association.

User attitudes about others in the same camping area were examined further. The previous statement had revealed that the presence of two or three other parties elicited a fairly general negative response, but at the same time, a full 30 per cent had replied they would enjoy the company of others or would not care about others camped nearby. Visitors were then presented a situation that required them to evaluate how "camping at a place where several other parties are camped" would affect their enjoyment.

The frame of reference thus shifted from a specific stimulus (two or three parties) to a general one (several parties). A marked increase in the degree to which such a situation was detrimental to user satisfaction accompanied the shift, as Table 26 shows.

TABLE 26

VISITOR REACTION TO CAMPING NEAR SEVERAL  
OTHER PARTIES, BY STUDY AREA

| Study<br>Area | N   | Bother<br>a lot | Bother a<br>little | Enjoy<br>it | Doesn't<br>matter |
|---------------|-----|-----------------|--------------------|-------------|-------------------|
|               |     | %               | %                  | %           | %                 |
| BWCA          | 206 | 38.8            | 39.8               | 6.3         | 15.0              |
| Bob Marshall  | 120 | 40.8            | 43.3               | 1.7         | 14.2              |
| Bridger       | 142 | 41.5            | 43.7               | 2.1         | 12.7              |
| High Uintas   | 153 | 43.8            | 43.1               | 2.0         | 11.1              |
| Total         | 621 | 41.1            | 42.2               | 3.4         | 13.4              |

Chi square 9.94, 9 degrees of freedom, .50 > p > .30.

Several features of Table 26 are worth noting. First, there is a strong indication that camping near several others is a bothersome and detrimental feature to the visitor's satisfaction. Over-all, only three per cent enjoy it.

Secondly, the negative reaction is quite uniform over the study areas; little spatial variation in the attitudes toward other campers occurs, suggesting the existence of a commonly understood and accepted



norm of wilderness behavior. This uniformity extended to the strong purists; about 90 per cent of them in each study area indicated they would be bothered to some degree by other parties camping near them. Gamma was  $-.34$ , indicating a moderately strong negative association between increasing purist score and the tendency to accept persons camping nearby.

The slightly higher response of "Enjoy it" recorded in the BWCA is primarily a reflection of the response of persons traveling by motor craft, particularly by motor boat. Fourteen per cent of this group indicated a favorable reaction to other parties camped nearby. This concurs with the earlier findings, both published and in this study, describing these visitors as less wilderness environment oriented and more concerned with activities and social interaction.

A somewhat contradictory finding, however, involved those users who described their visit as one with a single activity focus, rather than as a more general "wilderness enjoyment" trip. As Table 27 shows, those respondents with a single activity as the major attraction of their wilderness trip tended to be somewhat more adamant in their negative reaction to other campers.

It had been hypothesized that persons with an activity orientation would tend to be less sensitive to numbers of other people. On virtually all the variables this was tested against, however, little or no association or significance could be detected, and in some cases, these persons showed more "purist" tendencies than those seeking





a more general experience. Upon retrospect, however, two facts seem helpful in explaining this general pattern of response and particularly, the data in Table 27.

TABLE 27

THE EFFECT OF SINGLE ACTIVITY ORIENTATION UPON USER  
REACTION TO CAMPING NEAR SEVERAL OTHER PARTIES

| Was a single<br>activity<br>the major<br>attraction | N   | Bother a<br>lot | Bother a<br>little | Enjoy<br>it | Doesn't<br>matter |
|-----------------------------------------------------|-----|-----------------|--------------------|-------------|-------------------|
|                                                     |     | %               | %                  | %           | %                 |
| No                                                  | 378 | 41.3            | 39.4               | 4.8         | 14.6              |
| Yes                                                 | 243 | 40.7            | 46.5               | 1.2         | 11.5              |
| Total                                               | 621 | 41.1            | 42.2               | 3.4         | 13.4              |

Chi square 8.22, 3 degrees of freedom, .05 > p > .02.

Those persons indicating that a single activity was the major attraction for their wilderness visit generally cited either fishing or mountain climbing as that activity. For fishermen, their basic intolerance of other people in the wilderness in general, and for those camped in the same area in particular, probably reflects their concern over the possible fishing competition concomitant with growing numbers of people. The very reason they utilize the wilderness fishery may lie, in part, in the fact of low fishing pressure; hence, their adoption of a more purist-like attitude toward other users.

In the case of mountain climbers, these persons often view themselves as the "elite of the elite." Mountain climbing (technical rock and ice climbing) is one of the most arduous and demanding activities that occur in wilderness and its advocates probably espouse a very pure philogophy in regard to wilderness, in line with their self-perception as persons who are actually pitting their lives against the environment.<sup>1</sup> As a consequence, many of these individuals obtained quite high scores on the purism scale.

Based upon the preceding data, it seems clear that wilderness users consider the campsite location "personal territory." The boundaries of such sites are difficult to delineate. Wilderness camps are usually simply locations where it is possible for a small party to pitch a tent, preferably close to water and reasonably level. Some locations, of course, become recognized camp locations simply through use and these may be marked on maps of the area. Generally, however, no fences, signs, or curbs provide visual evidence of campsite extent; its bounds are set only by the perception of the occupants and those passing by. It appears their perceptions closely coincide, a fact accomplished in part by the apparent general acceptance of certain norms regarding wilderness behavior among users.<sup>2</sup>

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<sup>1</sup>For a discussion of the underlying motives and attraction of mountain climbing, see Richard M. Emerson, "Games: Rules, Outcomes and Motivation" (paper presented to the American Academy for the Advancement of Science Symposium: Psychology and Sociology of Sport, Dallas, Texas, December, 1968).

<sup>2</sup>Sommer cites a variety of studies suggesting many commonly accepted norms govern spatial relationships in interpersonal behavior. See his excellent discussion "In Defense of Privacy" in Personal Space, pp. 39-57.



Intrusions by others on this territory have a particularly strong impact upon the satisfaction of most visitors. It seems likely that persons passing by the camp, however, do not create the level of disturbance that a party which establishes their camp nearby does. The generally widely expressed displeasure about others near one's campsite was expected to be reflected in user's expressed preferences for a campsite location, in terms of its spatial relationship to other camps. To determine what factor this spatial relationship played in a user's decision-making process regarding campsite selection, respondents were asked to indicate their preference for three basic kinds of location: (1) a site out of sight and hearing of others;<sup>1</sup> (2) a place some distance away from others, but where seeing or hearing others would not result in a loss of satisfaction; and (3) a place near others, to enhance opportunities for social interaction. Additionally, a "doesn't make any difference" option was provided.

Clear differences appeared between the BWCA and the western study areas. Visitors to the Canoe Country expressed a more ambivalent response to the options as Table 28 indicates, splitting almost evenly on the first two types of camp locations. As was expected, persons traveling by motor propelled craft tended to show a greater propensity for camp locations near others. In the west, about two-thirds

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<sup>1</sup>The phrase "out of sight and hearing" was used as a surrogate for a specific expression of distance in yards or miles. Variations in topography, vegetation cover, etc. made such measures meaningless. The phrase provided the respondent with the idea of a location substantially removed from others, one where he could gain a sense of solitude.

of the respondents favored locations that were out of sight and hearing of others, with backpackers slightly more so inclined; however, no significant differences were detected between the modes of travel.

TABLE 28

## PREFERENCE FOR CAMP LOCATION, BY STUDY REGION

| Study Region | N   | Out of Sight and Hearing | Some Distance from Others | A Place Near Others | Don't Care |
|--------------|-----|--------------------------|---------------------------|---------------------|------------|
|              |     | %                        | %                         | %                   | %          |
| BWCA         | 201 | 42.3                     | 37.3                      | 6.5                 | 13.9       |
| West         | 420 | 65.2                     | 26.9                      | 1.0                 | 6.9        |
| Total        | 621 | 57.8                     | 30.3                      | 2.7                 | 9.2        |

Chi square 39.66, 3 degrees of freedom, .001 > p.

The pattern of responses from the BWCA follows preceding discussions. The tendency to prefer campsites that do not guarantee solitude from others concurs with earlier findings that BWCA visitors are less inclined than their western counterparts to perceive solitude as a desirable element of the wilderness environment (see Table 9). Additionally, a chi square analysis between the BWCA and the three western areas treated as a whole concerning visitor reaction to camping near other parties (see Table 26 for an area by area response) revealed that BWCA respondents were significantly less bothered by others camping in the same area.<sup>1</sup>

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<sup>1</sup>A difference significant at the .05 level.

Prior wilderness experience influenced preferences for campsites. Those persons who had been on previous wilderness visits were somewhat more inclined (60 per cent) to prefer campsites out of sight and hearing than those on their initial visit (51 per cent) while the reverse situation existed in expressed preference for sites that afforded opportunities for social interaction.

Preferences for sites providing complete solitude were most intensely expressed by strong purists in the Bridger and Bob Marshall. While over-all only about 55 per cent of the respondents favored this type of site, 84 per cent of these strong purists responded to this option. Although a smaller percentage of the strong purists in the BWCA and the High Uintas preferred this type of camping location (69 and 75 per cent, respectively), they still were decidedly more inclined to prefer such a site than the general sample. The association between purist score and preference for a location out of sight and hearing was quite strong ( $\gamma = .52$ ). None of the strong purists indicated a preference for a site near others, and considering the four areas together, less than two out of ten desired a location where others would be some distance away, but still within sight or hearing.

It seems apparent, then, that the opportunity to segregate one's self from others is an important characteristic of the camping site and it may, in fact, represent a spatial manifestation of the strong purist's conceptualization of the relationship of man to man and man to nature in the wilderness. Within this zone around the camp the

primary interaction involves man and the physical environment; socialization with persons other than one's own party members is unwanted and probably discouraged.<sup>1</sup>

To further clarify, and also to quantify, the density level of camps that would be acceptable to wilderness users within the range of their visual and audio senses, visitors were questioned as to how many other camps they would like set up near their own.

Although there was considerable association over-all between responses to this question and the answers provided to the statement just examined certain interesting variations occurred.

Table 29 indicates that over half of the respondents to each of the western study areas wanted a campsite with no other parties around; the BWCA visitors were less demanding about this. Visitors to the Bob Marshall, however, were particularly emphatic in their preference for such a location. A possible explanation for this lies in the fact that the Bob Marshall is an extremely large area (950,000 acres) and visitors may consider that in an area this size, use can be distributed in such a manner so as to preclude the necessity of any group ever having to camp near another. Size of area was found to be an important component of wilderness in the computation of the purist score ( $\gamma = .72$ ) and the strong relationship found between preference

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<sup>1</sup>Catton has concluded that it appears "that the sophisticated wilderness user genuinely prefers contact with the natural environment rather than with other campers," "Motivations of Wilderness Users," p. 125.



for no other camps and the Bob Marshall may empirically demonstrate what role area size plays in providing a wilderness experience to the user. Note also that none of the Bob Marshall respondents wanted more than three camps near them.

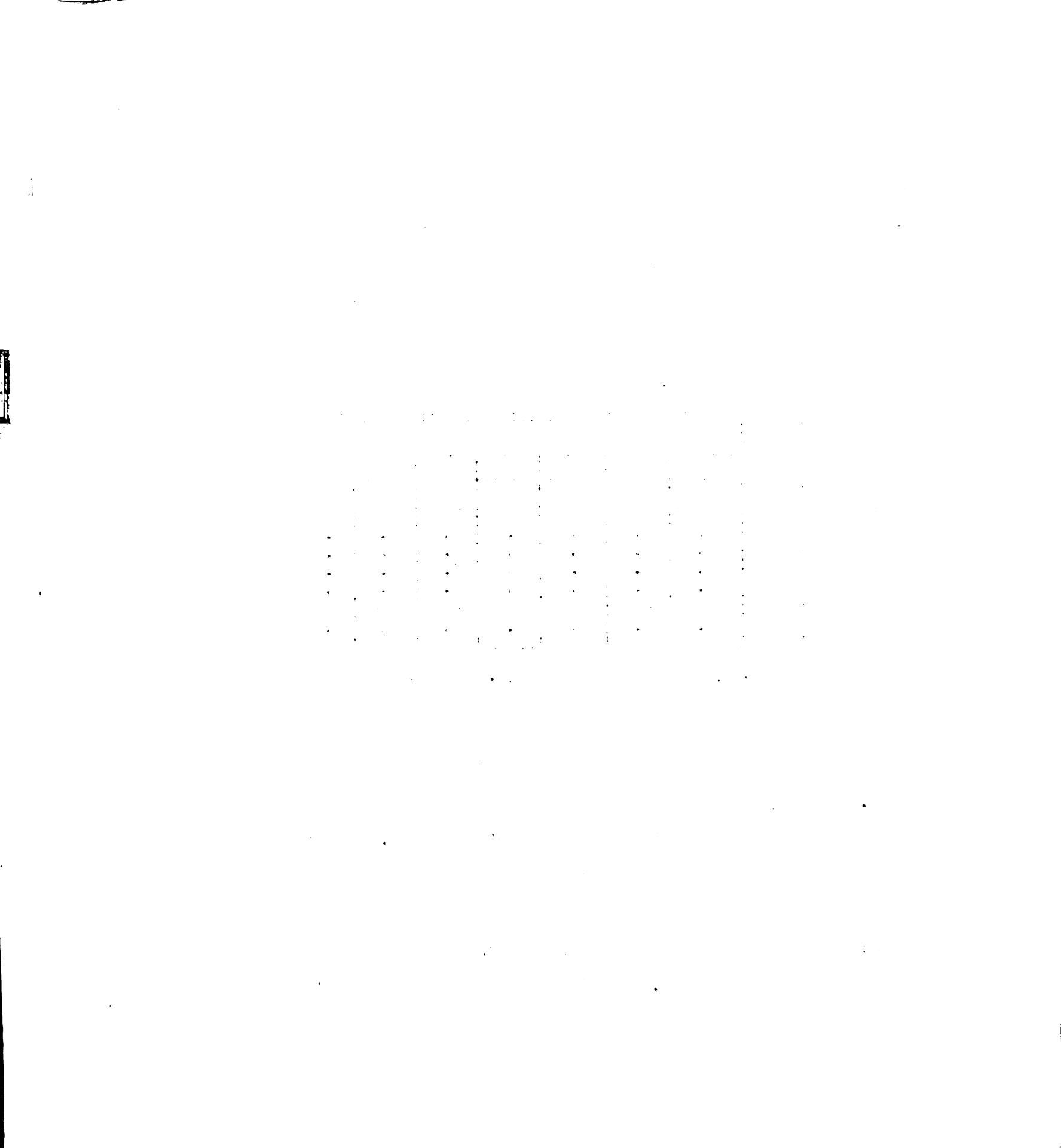
TABLE 29

OTHER CAMPS DESIRABLE WITHIN SIGHT OR  
HEARING, BY STUDY AREA

| Study<br>Area | N   | Number of Other Camps Desired |      |      |      |     |     |     |
|---------------|-----|-------------------------------|------|------|------|-----|-----|-----|
|               |     | 0                             | 1    | 2    | 3    | 4   | 5   | 6   |
|               |     | %                             | %    | %    | %    | %   | %   | %   |
| BWCA          | 206 | 43.2                          | 20.4 | 15.0 | 11.7 | 4.4 | 1.5 | 3.9 |
| Bob Marshall  | 120 | 75.0                          | 12.5 | 9.2  | 3.3  | 0.0 | 0.0 | 0.0 |
| Bridger       | 144 | 57.6                          | 14.6 | 16.0 | 6.2  | 1.4 | 1.4 | 2.8 |
| High Uintas   | 154 | 57.1                          | 13.6 | 18.2 | 6.5  | 1.9 | 1.9 | 0.6 |
| Total         | 624 | 56.1                          | 15.9 | 14.9 | 7.5  | 2.2 | 1.3 | 2.0 |

Chi square 48.19, 18 degrees of freedom, .001 > p.

It has been suggested that many persons do not want and may even discourage opportunities for social interaction with others at their campsite. However, this exchange with strangers may be replaced by the camaraderie that develops with the members of one's own party. Persons traveling with family or friends evidenced no appreciable difference from the over-all sample response in terms of desiring an isolated campsite; persons traveling by themselves, however, were decidedly more in favor of such locations. Seventy per cent preferred no other



camps nearby and the remaining 30 per cent wanted no more than two. Sample size for this group was small ( $N = 12$ ), but the results seem in accord with the type of philosophy one might associate with an individual who "takes on the wilderness," so to speak, by himself.

The association between membership in wilderness type organizations and a more discerning, pure attitude toward the wilderness environment and wilderness spatial behavior was again demonstrated. Eighty-five per cent of persons belonging to a wilderness organization preferred an isolated campsite, as compared to only 50 per cent of those belonging to more general oriented outdoor recreation or conservation clubs.<sup>1</sup> The wilderness norm prescribing and reinforcing nature of the former organization tends to support a value system among members that is highly purist in nature. Future research by behavioral scientists should investigate other ways in which such groups influence and modify the behavior of wilderness users.

Responses to this question by strong purists closely followed the earlier finding that only about 20 per cent would accept other camps within sight or hearing. Only in the BWCA did they depart appreciably from this pattern; only 55 per cent preferred no other camps.

The perception of the occupance of that space within the purview of the visual and audio faculties of the wilderness visitor

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<sup>1</sup>A difference significant at the .01 level.

thus seems tied to the individual's commitment to and acceptance of certain behavioral norms. Those persons possessing what has been described herein as a purist attitude toward wilderness perceive this zone as one optimally devoid of occupancy other than their own. The "personal space" of these individuals is decidedly larger than that normally ascribed to the person in his daily life. Recognition of this seems to be fairly common among most users, and this fact may operate to create a somewhat natural state of dispersal, at least in regard to campsite selection. The effects on satisfaction of encounters with others in the trail appears to be mitigated by a reduction in the individual's perception of the extent of his personal space, a process encouraged by the traveler's increased expectation of encountering others while on an artery of travel.

To this point, the discussion of capacity has focused on encounters; actually seeing other parties. What effect, however, does the evidence of man's presence have upon satisfaction level? To conclude this chapter, we now turn to a brief examination of the effects of depreciative user behavior upon the objective of defining wilderness recreation carrying capacity.

#### Depreciative Behavior Aspects of Capacity

By the very nature of the wilderness environment, where the works and evidence of man are minimal, the depreciative action of users are made more noticeable. Depreciative behavior, as used here,

describes that behavior which may violate institutional restrictions, accepted social norms, or both. Behavior, in the sense of human actions which do not affect the physical environment (for example, such things as playing volleyball in the wilderness or playing a loud portable radio) is not discussed here, although such actions certainly bear on the way in which persons react to others. Attention focused on two forms of depreciative behavior; littering and campsite deterioration. Campsite deterioration is in many ways an ecological dimension of the carrying capacity problem. However, it is included here since it is often enhanced and accelerated by negligent human actions and behavior and is an element of the wilderness environment that potentially can greatly affect the quality of a wilderness trip for the visitor.

Some of the previously cited wilderness studies have mentioned user complaints about littering and campsite deterioration. The Wildland Research Center noted that "littered or rundown campsites was in general the most frequent complaint."<sup>1</sup> Forty per cent of the users in the Mount Marcy and the High Sierra expressed annoyance at these features. Thorsell has reported that trash left at trail shelter locations in the backcountry of Waterton Lakes National Park was a common complaint.<sup>2</sup> Merriam and Ammons reported that only two out of thirty-three persons sampled in the Mission Mountains Primitive Area

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<sup>1</sup>Wildland Research Center, Wilderness and Recreation, p. 143.

<sup>2</sup>Thorsell, Wilderness Recreational Use, p. 40.

and three out of forty-four in the Bob Marshall Wilderness Area complained about messy camps, "though there were many of these."<sup>1</sup> Although this could perhaps reflect an actual tolerance of depreciative behavior on the part of visitors to these areas, it certainly does not appear in keeping with other findings and probably is a result of the small sample size and questionnaire design.

#### Campsite Overuse

It was noted earlier that any use of an ecological complex results in some change of the environment. This is particularly true at the campsite where use is concentrated in a relatively small location over brief periods of time. Opportunities for deleterious effects upon both the ecology of the area and the satisfaction of the user are intensified. Based upon the earlier findings concerning the perception of the camping area as "territory" or an extension of personal space, where primary interaction was between the individual and the environment, it was hypothesized that visual evidence of campsite "wear and tear" would have an especially strong effect on user satisfaction.

This hypothesis was clearly substantiated, as can be seen in Table 30. Although the effects of camping at a site worn from overuse were perceived as bothersome in all areas, visitors in the western study areas were significantly more disturbed than BWCA respondents.

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<sup>1</sup>Merriam and Ammons, The Wilderness User in Three Montana Areas, p. 33.

Three reasons appear to underlie this result. First, the physical characteristics of most camping sites in the BWCA are considerably better adapted to sustaining high levels of use than those in the west. Many of the BWCA sites are located on the rocky outcrops along the lakes and are highly resistant to many of the harmful effects of use.

TABLE 30

VISITOR REACTION TO CAMPING AT A PLACE WORN  
FROM OVERUSE, BY STUDY AREA

| Study<br>Area | N   | Bother a<br>lot | Bother a<br>little | Enjoy<br>it | Doesn't<br>matter |
|---------------|-----|-----------------|--------------------|-------------|-------------------|
|               |     | %               | %                  | %           | %                 |
| BWCA          | 206 | 45.6            | 43.2               | 1.5         | 9.7               |
| Bob Marshall  | 120 | 59.2            | 35.0               | 0.0         | 5.8               |
| Bridger       | 144 | 68.1            | 30.6               | 0.0         | 1.4               |
| High Uintas   | 154 | 64.3            | 33.1               | 0.6         | 1.9               |
| Total         | 624 | 58.0            | 36.2               | 0.6         | 5.1               |

Chi square 32.86, 9 degrees of freedom, .001 > p.

Thus, although visitors still show a high degree of concern with camping at such locations (88 per cent would be bothered), evidence of such conditions is less prevalent than in the west. In the west, many of the camping locations have been developed on sites where effects of overuse are easily visible; soil erosion, soil compaction, and associated damage to the vegetative community are clearly recognizable by users. Sites at higher elevations are particularly susceptible to such damage and the recovery time for such locations

is long. The generally higher level of experience with sites damaged by overuse, then, may be a partial explanation for the greater concern expressed by the western visitors than those in the BWCA.

A second factor, closely related to the first, is that damage to western campsites is often the result of horses. The detrimental effects of trampling, tethering horses to trees, and horse manure are great on the physical resources. This is, however, a problem essentially unique to the western areas, with no comparable situation found in the BWCA. Again it would appear that past experience with such sites by western visitors tends to evoke a stronger reaction in regard to overused sites than that recorded for the BWCA.

Finally, as mentioned before, the western respondents evidence on the whole a more discerning and purist attitude about wilderness. Beat up campsites are probably not considered desirable in any context, but their presence in an environment where evidence of man is to be minimal makes them particularly distressing to those persons seeking pristine and natural surroundings.

The conclusions above regarding effects of horse use were reinforced in an examination of this question by the respondent's mode of travel. In comparing the response of backpackers and horseback riders, the former group expressed a somewhat greater level of negative reaction to overused campsite than did the horseback riders.<sup>1</sup>

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<sup>1</sup>A difference significant at the .10 level.



This difference is in keeping with earlier remarks concerning the generally adverse reaction of backpackers to horseback riders and the visible effects of horseback travel. Horseback riders, on the other hand, appear to display a slightly more tolerant attitude toward the adverse effects their stock causes.

Responses of strong purists in all areas closely resembled those obtained for the western study areas (98 per cent were bothered).

It appears clear then, that the undesirable effects associated with the overuse of camping locations are perceived largely in a very negative vein and differences in opinion about those effects are primarily matters of degree rather than direction. Much greater unanimity is present among users in regard to the perception of this element of carrying capacity, a reflection of the existence of some more generally accepted attitudes about the detrimental use of resources that we see developing today.<sup>1</sup>

### Littering

The remaining dimension of depreciative behavior to be investigated involved littering. Two aspects were studied; visitor attitudes toward finding litter in the wilderness and the manner in which littering compared with another dimension of carrying capacity, level of use.

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<sup>1</sup>Attitudes that are evidenced by growing public involvement in such areas as pollution control, landscape beautification, inner city rehabilitation, and a host of other concerns.

Persons were asked to indicate their reactions to finding litter along the trails and at campsites. The response was clearly and unequivocally negative. Ninety-nine per cent indicated it bothered them, either a lot or a little. This is probably the maximum reduction in error possible in this type of survey research, allowing for errors in coding, misinterpretation of the question, and so forth. Manipulating the independent variable had no effect; again, differences were only in terms of degree.

The response to this question was predictable to some extent. As discussed above, it represents the extension of some more generally held norms regarding littering in any situation. It does reveal a very high association between user value systems and the institutional intent embodied within the Wilderness Act.

It can be argued, correctly, that despite wide spread efforts, littering still occurs, both in our everyday environs as well as in the wilderness. Our understanding of this element of depreciative behavior is poor; in the wilderness context, the answer may lie in the lack of easily enforceable sanctions or there may be more complex explanations involving the individual's perception of norms and behavior.<sup>1</sup>

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<sup>1</sup>The answer may also be tied to the phenomenon of "the tyranny of small decisions." This concept, developed by the economist Kahn, contends that the misallocation of resources may occur when decisions regarding these resources are limited in size, scope, and time-perspective. To apply this to littering, if the President were presented with a method to effectively halt all littering, he almost certainly would adopt it. Since littering is the result of countless "small" decisions, however, the aggregated result tends to operate against optimum societal benefit. See Alfred E. Kahn, "The Tyranny of Small Decisions: Market Failures, Imperfections, and the Limits of Economics," *Kyklos*, XIX (1966), pp. 23-47. The reasoning is much the same as that outlined by Garrett Hardin, "The Tragedy of the Commons," *Science*, 162 (December, 1968), pp. 1243-1248.

Certainly part of the explanation may lie in situations where people litter because other refuse is already there.<sup>1</sup> If this indeed is the case, then a highly useful management action would be to invest considerable manpower and funds into an intensive clean-up campaign within present wilderness areas. Currently an emphasis is being placed on getting the public to adopt a "pack-in, pack-out" policy; that is, take out all those materials which are noncombustable (aluminum foil, tin cans, and so forth) that you packed in originally. The success or failure of this effort may hinge upon initially reducing litter accumulations now present in these areas.

A central contention throughout this study is that carrying capacity is a function of several different dimensions. As noted above, littering appears particularly important as a source of user dissatisfaction. The overwhelming negative reaction to littering was obtained in a situation where it was judged by itself. To test how users weighed two elements of dissatisfaction, respondents were asked the extent to which they agreed or disagreed with the statement, "Seeing too many people in the wilderness is more disturbing than finding a littered campsite."

The intense negative response obtained from users reacting to littering was mitigated to a degree. A full two-thirds, however, felt

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<sup>1</sup>Unpublished research at the University of Wisconsin and by the Pacific Northwest Forest and Range Experiment Station suggest this may be the case.

that a littered campsite represented a more disturbing situation than meeting too many people. The pattern of responses among the study areas was remarkably similar, further supporting the earlier statements regarding littering.<sup>1</sup>

The fact that the statement referred to a "littered campsite" may have intensified the extent of disagreement. It has been demonstrated that the camp location is a particularly important point in the user's behavioral environment and it may be expected that littering would represent an especially detrimental feature at this location.

As was found in the discussion of campsite overuse, strong purists did not differ from the over-all sample in their level of disagreement with the above statement. It was discovered, however, that the moderate purists showed a slightly greater tendency to find a littered campsite more disturbing than seeing too many people than either the strong purists or the over-all sample (71 per cent as compared to 67 per cent for the latter two samples). The statement presented an especially dissonance-laden situation to the strong purist, but the fact that the response of this group matched the over-all samples' further reinforces the concept that certain widely accepted value systems are probably in existence. It also introduces the possibility of a hierarchy of stimuli with ascending degrees of impact

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<sup>1</sup>It is interesting to note this regional uniformity in response, especially in light of the vague stimuli "too many people." Too many people is open to interpretation ranging from one other person to a great many other people. Despite this fact, respondents uniformly and quite emphatically disagreed with the statement.

upon user satisfaction. That is to say, the data suggests that the detrimental effects of depreciative behavior (in this case, littering) may override those associated with "crowding" or seeing too many people. Whether or not this occurs with the other dimensions of carrying capacity is largely conjecture at this point, but efforts should be directed toward investigating this possibility. The presence of such a hierarchy has obvious and important implications in terms of the establishment of management priorities, particularly during periods of limited financial resources and other administrative constraints.

#### Some Concluding Remarks

A major concern in this study was to determine the extent to which a common value system was held over space regarding those variables deemed critical to the computation of wilderness recreation carrying capacity. Construction of the purism scale was undertaken to yield a population for purposes of analysis whose value system toward wilderness was defined with reference to a common unit of measure. From this, then, attention could be focused on the degree to which the perceptions and attitudes of the strong purists toward the wilderness environment were commonly ascribed to over space.

As has been noted in the preceding discussion, significant differences exist between the strong purists in the four study areas on certain variables, whereas on others, the uniformity is extremely

high. Analysis of purist scores on the various variables by each study area with the Kruskal-Wallis one-way analysis of variance quantitatively supports this conclusion.

Examining the response of the strong purists in the four study areas more closely, however, provided some insight into this result. It appears that those items which require the strong purist to evaluate the wilderness environment in a more abstract sense, or more correctly, within a prescriptive-conceptual frame of reference are characterized by a spatial ascription that is unaffected by different kinds and levels of recreation use, resource variability, or situational characteristics. For example, the statement "Meeting people around the campfire at night should be part of any wilderness trip" calls for an evaluation as to what should be; and for the strong purists, this item is uniformly rejected.

Many other parts of the questionnaire probed specific aspects of the wilderness experience, however. To these, strong purists evidenced a considerable range of response between the four study areas. The distinguishing characteristic between these items and those discussed in the above paragraph appears related to certain characteristics unique to the different areas. As an example, strong purists adopt a much different attitude toward horses and horse facilities in the Bob Marshall (where horse use is predominant) than those in the Bridger (where hiking is the major method of travel). The fact that many of the strong purists in the Bob Marshall were traveling by horse and tended to



perceive their mode of travel as appropriate and in keeping with wilderness is an obvious contribution to this pattern of response.

Such a finding suggests that the basic concept of wilderness held by the strong purists is closely associated with institutional goals and aims. Variations in the size, composition, and utilization of these spatial units, however, appear to promote some fairly distinct differences in attitude and perception as to the appropriate methods for attaining these goals.

It seems clear at this point that establishing the carrying capacity of wilderness is not a simple matter of determining some level of use, then restricting further increases. Rather, capacity is a complex function of several distinct parameters of use which vary in their relevance to capacity determination both regionally and among users. It is possible, however, to begin to focus upon these parameters and to understand their relationship to the sustained production of a high quality wilderness experience, the product of the resource discussed herein.

#### Wilderness Quality

Up to this point, a conscious effort has been made to avoid the use of the term "high quality wilderness experience." It is a highly personal term, subject to widely different interpretations and its use has probably led to numerous arguments and disagreements regarding its exact nature. Its use here has certain important



qualifications. First, it does not imply that wilderness recreation represents one end of a quality continuum with, for example, some form of "Coney Island" recreation at the other end. Secondly, there does exist a range of quality within the recreational opportunities afforded by wilderness. Thus, it is possible to have a "low quality wilderness experience" as well as a "high quality" experience. Finally, quality is judged within an institutional framework (that presented by the Wilderness Act) and by the perceptions of those individuals defined herein as strong purists. A wilderness trip which involves few if any encounters with other parties in a physical environment where evidence of man's influence is minimal or lacking would possess the type of properties associated with a "high quality" experience, while a trip where one met numerous other groups, found litter scattered about, and encountered other evidence of man's presence would represent the type of situation we might term a "low quality" trip.

A major purpose then of a capacity policy is to insure maintenance of a "high quality" wilderness experience. In Chapter VII we shall attempt to deal in more specific terms with the manner in which the various parameters of use discussed so far bear on establishing such a policy. Accepting for the time being, however, the fact that recreational use of wilderness cannot be allowed to continue to increase, then we are faced with the need to develop processes for the allocation of the benefits of the wilderness resource among users.

In Chapter V discussion focuses on a variety of techniques to limit, restrict, or redistribute use as well as management and design inputs that represent potential techniques to enhance the capability of the wilderness resource to produce a "high quality" experience.

## CHAPTER V

### THE MAINTENANCE OF QUALITY: PERCEPTION OF RESTRICTIVE, REDISTRIBUTIVE, AND MANAGEMENT INPUT MEASURES

The benefits derived from a variety of our natural resources have frequently been treated as "free" goods. That is, direct costs to the consumers have either been totally lacking or, more commonly, distributed over such a large bloc of persons so as to make the cost to the individual negligible. Air and water are good examples; it is only recently that we are facing the imposition of severe costs for the continued supply of these resources at a high level of quality through increased product costs and taxes for pollution control.

Hardin has written of the "Tragedy of the Commons"<sup>1</sup> the tragedy being the results of individuals acting to maximize their benefits through the utilization of essentially fixed resource stocks (commons). The alternative to the continued unlimited use of the commons (and eventual destruction) lies in adopting some process of allocating the benefits of the commons among competing demands.<sup>2</sup>

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<sup>1</sup>Hardin, "The Tragedy of the Common," p. 1244.

<sup>2</sup>Hardin reviews several methods of effecting such an allocation he refers to as legitimate extensions of authority. For a critical analysis of Hardin's comments, see Beryl L. Crowe, "The Tragedy of the Commons Revisited," Science, 166 (November, 1969), pp. 1103-1107.

Hardin's discussion is pertinent to the topic of wilderness recreation carrying capacity and, in fact, he has discussed this elsewhere.<sup>1</sup> In Chapter II it was noted that neither the treatment of wilderness as "commons" nor the exclusion of use were feasible wilderness management alternatives. Given the presence of an essentially fixed store of areas capable of producing the type of experience associated with wilderness while meeting the preservation objectives detailed within the Wilderness Act demands that those responsible for the administration and management of wilderness must, at some time, evaluate and establish means of rationing use.

#### Past Investigations of Visitor Attitudes Toward Use Regulation

Numerous authors have devoted considerable attention to means of restricting, redistributing, or otherwise mitigating the effects of recreationists on the wilderness landscape. Wagar identified four broad measures that managers might adopt, singly or in combination, to provide high-quality recreation for high rates of use: (1) reduction of conflicts between competing uses; (2) reducing the destructiveness of people; (3) increasing the durability of areas; and (4) providing other opportunities. He avoided, however, the question of directly limiting use, concluding that "mounting visitor pressures make this a distasteful course of action."<sup>2</sup>

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<sup>1</sup>Hardin, "The Economics of Wilderness."

<sup>2</sup>Wagar, The Carrying Capacity of Wild Lands for Recreation, p. 12.

Lucas concluded, however, that while there may exist "some Malthusian-type of minimum satisfaction carrying capacity,"<sup>1</sup> other types of control, including direct limitations, would be preferable. Such controls could be effected through the use of permits, fees, or a combination of the two. More recently, Clawson and Knetsch have noted that the most serious problem is not whether recreation use should be limited, but how. They propose a hierarchy of alternative management options; (1) provision of additional areas; (2) employment of positive inducements to shift use; and (3) absolute restrictions upon entry.<sup>2</sup>

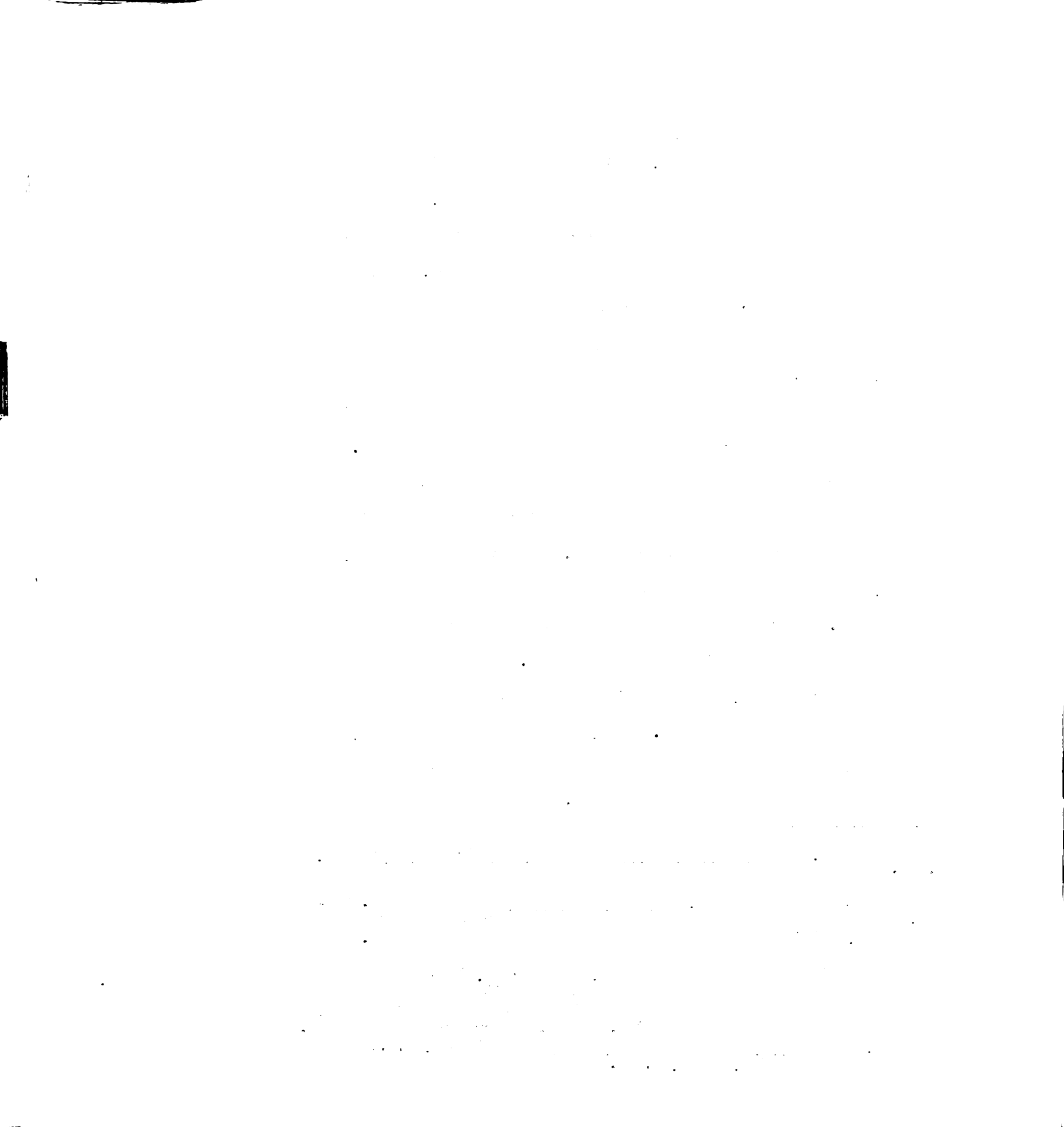
The concept of spatially redistributing use has often been cited as a potentially fruitful means of alleviating serious physical and esthetic impacts on recreational sites. As noted in Chapter II, however, Hendee has concluded that such efforts have largely been unsuccessful. One reason for this has been the inability to develop appropriate incentives to induce desired shifts. The use of fees has been suggested; however, too little is known about the relationship of cost to recreational behavior. Also, where fees have been used, their level has been such so as to generally encourage increased use rather than to encourage redistributing it.<sup>3</sup>

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<sup>1</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 32.

<sup>2</sup>Clawson and Knetsch, Economics of Outdoor Recreation, pp. 177-178. Their discussion concerns all phases of resource-based outdoor recreation, but is of particular relevance to the discussion here.

<sup>3</sup>Darling and Eichhorn point out, for example, that creation of the Land and Water Conservation Fund entrance permit (Golden Eagle Passport) reduced the season rate at most National Parks by more than half, thus acting as an inducement to entry. See F. Fraser Darling and Noel D. Eichhorn, Man and Nature in the National Parks (Washington, D.C.: The Conservation Foundation, 1967), p. 30.



A variation on the use of fees to encourage spatial shifts in use has been proposed in a recent methodological investigation of carrying capacity for the National Park Service. Rather than manipulating costs to encourage or discourage the use of a particular location, the authors propose the issuance of ration cards, similar to the rationing cards used for gasoline, meat, and other consumer items during World War II.<sup>1</sup> Each card would have the same number of points, but visits to popular and intensively used locations would require the use of more points than a visit to a less heavily used area. Such a system would, hopefully, require visitors to establish personal priorities for their pattern of use of an area. By choosing to visit the less popular areas, an individual would be able to have more total visits. Assuming that the choice process of recreationists approaches some degree of rationality, it would thus be able to predict some shifts in use away from areas of present heavy use to locations presently experiencing little or no use. This is also assuming that a shift of use to these lightly used areas is considered a desirable action. Redistributing use in such a fashion may simply redistribute the location of the problem rather than eliminate it.

There have been only a limited number of empirical investigations of user attitudes toward specific regulatory actions. The Wildland

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<sup>1</sup>Held, Brickler, and Wilcox, A Study to Develop Practical Techniques for Determining the Carrying Capacity of Natural Areas, p. 32.

Research Center asked respondents the maximum amount they would be willing to pay for an annual license fee to use wilderness. Although total revenue increased up to a cost of between \$3 and \$5 per person, the imposition of any license cost resulted in a reduction in the number of users. The authors note the introduction of a \$4 fee in California National Forests would have reduced the number of wilderness recreation visits to 59 per cent of the actual 1959 total.<sup>1</sup> The attitudes of the visitors toward such fees, however, were not examined and the visitors expressed willingness to pay is probably not a sufficient surrogate for their attitudes. Additionally, the over-all effect of fees upon use in this case was measured for an entire wilderness; the extent to which use could be shifted from one access to another on the same area is still unknown.

Hendee et al. analyzed three questionnaire items regarding rationing of human use, restricting horse use, and charging for use, respectively. The authors concluded "most wilderness users do not seem to feel that human use of backcountry areas needs to be restricted or that the use of pack animals needs to be restricted."<sup>2</sup> About 40 per cent of the sample favored a moderate charge for use of wilderness-type areas but one-third opposed the imposition of such charges.

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<sup>1</sup>Wildland Research Center, Wilderness and Recreation, p. 254.

<sup>2</sup>Hendee, et al., Wilderness Users in the Pacific Northwest, p. 60.



Currently then, we have only a little information regarding user attitudes about various use control measures and for all practical intents and purposes we have no data on how such measures might actually influence or modify current use patterns. This gap in information is a serious omission in light of the fairly broad agreement among wilderness managers and researchers that some form of use control or controls must be instituted, at least in certain areas, in the not too distant future. Manipulating use in space and/or in time, with a minimum loss of user satisfaction, requires a better understanding of both user attitudes toward the concept of regulation in a wilderness context and the effects such regulatory measures would have on the spatial behavior of users.

#### Visitor Perception of a "Carrying Capacity"

It has been suggested that the need to establish the carrying capacity of wilderness is recognized by most wilderness managers. Other investigators of natural resource problems, however, have discovered that a hiatus often exists between the problem perception of the professional or technician and that of the resource user.<sup>1</sup> An initial effort was thus made to determine whether visitors perceive there to be a level of use beyond which controls on further use may be necessary.

Visitors were asked the extent to which they agreed or disagreed with the statement "There should be restrictions on how many people can

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<sup>1</sup>A condition probably best detailed in Kates, Hazard and Choice Perception in Flood Plain Management, pp. 104-134.

be in a wilderness at any given time." A response showing agreement with the statement was interpreted to mean the respondent considered there was some level of use which represented "enough," and that when this level was reached, restrictions should be incorporated.

Over-all, responses split closely between those agreeing and those disagreeing. Analysis by study area, however (Table 31), revealed that in the Bob Marshall and the Bridger (where use intensities were the lowest) approximately half of those sampled avored instituting restrictions, while in the BWCA and the High Uintas (where use intensities were the highest), approximately half of the respondents opposed use controls.

TABLE 31

RESPONDENT REACTION TO "THERE SHOULD BE RESTRICTIONS ON HOW  
MANY PEOPLE CAN BE IN A WILDERNESS AT ANY  
GIVEN TIME," BY STUDY AREA

| Study<br>Area | N   | Strongly<br>Disagree | Disagree | Neutral | Agree | Strongly<br>Agree |
|---------------|-----|----------------------|----------|---------|-------|-------------------|
|               |     | %                    | %        | %       | %     | %                 |
| BWCA          | 203 | 18.2                 | 28.6     | 25.1    | 22.2  | 5.9               |
| Bob Marshall  | 120 | 9.2                  | 27.5     | 18.3    | 38.3  | 6.7               |
| Bridger       | 143 | 5.6                  | 16.8     | 30.8    | 37.8  | 9.1               |
| High Uintas   | 154 | 19.5                 | 23.4     | 24.7    | 29.2  | 3.2               |
| Total         | 620 | 13.9                 | 24.4     | 25.0    | 30.6  | 6.1               |

Chi square 38.43, 12 degrees of freedom, .001 > p.



It thus appears that in those areas where currently the probability of encountering others is low, visitors are more concerned with maintaining the low level of use through the use of regulations than those persons in areas where use is already quite high.

It is helpful to examine two other aspects of this problem, one a variable which was examined and the other, a culturally related characteristic of the study region. First, in the BWCA about 60 per cent of those persons disagreeing with the statement were traveling by motor propelled craft. These persons tended to show a somewhat greater negative posture regarding any use control methods than did the canoeists. This almost certainly reflects the canoeists' greater concern with the maintenance of the area as a wilderness, and their consequent willingness to accept control as a means of protecting the area.

Secondly, a fairly strong negative response to the potential need of controls was obtained from the High Uintas. The summer field assistant stationed in the area also reported some sharp and bitter denunciations of such measures by persons contacted. One explanation for this is the strong influence of Mormon cultural mores common to the Salt Lake City region.<sup>1</sup> The responses of such persons would reflect

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<sup>1</sup>Much of the area defined by Meinig as the "Mormon Cultural Region" exhibits a strong conservative political philosophy. For some of the underlying factors behind the coincidence of the religious region with the political region, see D. W. Meinig, "The Mormon Culture Region: Strategies and Patterns in the Geography of the American West, 1847-1964," Annals of the Association of American Geographers, LV (June, 1965), pp. 191-220.

their more general rejection of government intervention and control. It also follows earlier findings that fewer of the High Uintas visitors are strong purists, and thus less likely to perceive the inappropriateness of steadily increasing use on the wilderness environment.

The response of strong purists closely matched that obtained from the over-all sample in each area. In the BWCA and the High Uintas, about 40 per cent agreed with the concept of restricting use, whereas over 50 per cent in the Bob Marshall and Bridger concurred with it. Again, this represents a dissonance laden situation for the purist. The concept of an area when man's will and action is totally outside the constraints of our normally more restrictive society is an important facet of the total wilderness experience; so, however, is the continued preservation of areas that provide solitude and a physical environment largely unmodified by man. Arriving at a personal resolution of these mutually exclusive elements is undoubtedly a difficult and frustrating task for the strong purist.<sup>1</sup>

To test the extent to which persons would accept higher levels of use and reject controls on use, respondents were asked to consider the statement "It would be better to be able to go to the wilderness whenever you want to, even if it was badly crowded when you got there, than to have any kind of regulations on use." Presented with such an

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<sup>1</sup>Gamma for the relationship between purist score and response to the statement was only .20, further emphasizing the ambivalent attitude held by strong purists towards controls.

alternative, over 60 per cent of the visitors disagreed with the statement. As before, however, visitors to the BWCA and the High Uintas demonstrated a greater rejection of any controls on use, even to the point where use conditions were such so as to greatly affect the kind of experience normally associated with wilderness.

An especially interesting pattern of response was found in the BWCA. Table 32 examines responses by mode of travel. As can be seen, paddling canoeists evidenced a clear and definite rejection of the statement, while those traveling in motor propelled craft tended to accept the statement. It seems reasonable here to conclude that the paddling canoeists perceive that the institution of use controls will affect the motor propelled craft rather than themselves. Shifting the perceived impact on use controls from themselves to the motor canoeists and boaters is more than simple rationalization; periodic discussions and efforts to eliminate or further restrict motor craft lend justification to this interpretation. These efforts also probably explain in part the position taken by the motor craft users on the statement.

The data in Table 32 also provide further insight into the perception of wilderness by those traveling by the different modes of travel. The paddling canoeists consistently tend to adopt an attitudinal stance that reflects a greater concern for the maintenance of the wilderness environment and for opportunities for solitude. The motor canoeists and motor boaters, however, are less wilderness oriented and more inclined to react favorably to statements promoting activities, social interaction, and a generally less purist attitude.



TABLE 32

EXPRESSED LEVEL OF AGREEMENT WITH ACCEPTING CROWDING RATHER  
THAN USE CONTROLS, BY BWCA MODE OF TRAVEL

| Mode of<br>Travel | N   | Strongly<br>Disagree | Disagree | Neutral | Agree | Strongly<br>Agree |
|-------------------|-----|----------------------|----------|---------|-------|-------------------|
|                   |     | %                    | %        | %       | %     | %                 |
| Paddling Canoe    | 119 | 34.5                 | 38.7     | 8.4     | 14.3  | 4.2               |
| Motor Canoe       | 22  | 9.1                  | 18.2     | 22.7    | 27.3  | 22.7              |
| Motor Boat        | 60  | 5.0                  | 35.0     | 20.0    | 25.0  | 15.0              |
| Total             | 201 | 22.9                 | 35.3     | 13.4    | 18.9  | 9.5               |

Chi square 228.82, 8 degrees of freedom, .001 > p.

There was some variation in the pattern of responses obtained from the strong purists in each area. In each area, however, the response of strong purists showed a greater preference for use controls than found for the general sample in that area. In the Bob Marshall and the Bridger, 75 per cent rejected the statement. The strongest rejection, however, surprisingly came in the BWCA, where 81 per cent of the strong purists opposed the statement. Following earlier discussions, only about two-thirds of the strong purists in the High Uintas similarly responded. Notwithstanding these variations, however, it seems clear that strong purists are by and large cognizant of a carrying capacity for wilderness. This fact was further substantiated in response to the statement "If a wilderness area becomes overcrowded, restrictions on the number of people allowed to visit it should be enforced."





Approximately 80 per cent of the strong purists in each study area agreed with this statement, compared to 70 per cent of the moderate purists, and about 72 per cent of the over-all sample.

The recognition of some carrying capacity for wilderness on the part of visitors implies they also recognize the need to maintain use within certain limits.<sup>1</sup> Thus, the next stage in this study involved an examination of user attitudes about specific methods of regulating, redistributing, or otherwise controlling use.

#### The Perception of Use Regulation

A wide variety of techniques and measures exist which would aid wilderness managers in their efforts to keep wilderness use in line with carrying capacity. Broadly speaking, these measures can be broken into two main groups: (1) those which enable the managing agency to specifically control use (for example, permits of various types and fees); and (2) those which act to reduce use by placing greater demands upon the potential user (for example, manipulating access or the interior infrastructure of wilderness). These measures are not mutually exclusive and almost certainly, future decisions to control use will involve varying combinations of the two. In essence,

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<sup>1</sup>Additional evidence of this recognition is to be found in the recent announcement by the Sierra Club of plans to examine the effects of club trips on the natural environment, particularly in the Sierra Nevada. Also, the esthetic and psychological effects of large organized groups on other wilderness users are to be examined. See "Wilderness Use Study," Sierra Club Bulletin, 55 (January, 1970), p. 10.

however, they do represent different points along a continuum ranging from absolutely no control to one where persons are admitted almost on a turnstile basis.

### Specific Control Measures

As discussed at the outset of this chapter, several studies and articles on wilderness have suggested the use of such measures as permits and fees as means of controlling future increases in use. Respondents in this study were presented with a question which posed five different control systems and asked that if use of a wilderness were heavy and controls on use were being considered, how would they feel about each of the measures suggested in that question (see question 15, Appendix B). Table 34 presents the over-all response to each measure.

As can be seen, no control measure is favored by a majority of users. Important differences do exist, however, between the over-all responses to the individual measures, the responses obtained from each of the study areas, and the pattern of response obtained from the strong purists.

Assigning itineraries as to where people can travel and camp (Option 4, Table 33) was rejected strongly. The ability to directly regulate and manipulate the spatial behavior of visitors may have some appeal to wilderness managers; its regimenting nature and its virtual elimination of the individual's freedom to recapture the spirit of

spontaneous and unplanned travel makes it highly unpalatable to the user. In many ways, it is the antithesis to the sort of experience wilderness is to provide.

TABLE 33

## OVERALL VISITOR REACTION TO USE CONTROL MEASURES

| Control Measure                                                         | Percentage of Total |       |         |        |                 |
|-------------------------------------------------------------------------|---------------------|-------|---------|--------|-----------------|
|                                                                         | Strongly Favor      | Favor | Neutral | Oppose | Strongly Oppose |
| 1. Issue limited number of permits on a first come, first served basis. | 7.7                 | 20.3  | 18.0    | 28.8   | 25.3            |
| 2. Issue limited number of permits on a lottery basis.                  | 4.4                 | 14.1  | 19.5    | 32.7   | 29.2            |
| 3. Issue limited number of permits through a mail reservation system.   | 15.4                | 28.2  | 17.7    | 19.1   | 19.6            |
| 4. Issue permits that assign where people can visit and camp.           | 2.1                 | 6.3   | 11.4    | 34.6   | 45.5            |
| 5. Charge an entrance fee.                                              | 5.9                 | 16.8  | 20.0    | 22.3   | 35.0            |

Additionally, whereas approximately 20 per cent of the visitors were neutral in their reaction to the other control measures (and thus potentially receptive), respondents were quite emphatic in their feelings about this particular method.

In the Bob Marshall, 27 per cent of the visitors indicated either a favorable or neutral response to permits assigning routes of travel. This was the highest rate of acceptance favored for this particular measure. It appears to be a function of the large proportion of outfitted trips; about 45 per cent of the visitors reported they were traveling with an outfitter. Persons traveling with an outfitter generally are in essence following an itinerary submitted by the outfitter to the Forest Service for approval. Thus the form of control does not seem as unpalatable and restrictive to such persons as those who are traveling by themselves or in small groups and whose itineraries are their own prerogative.

An interesting difference in visitor acceptance of a first-come, first-served system and a mail reservation system was found. These two systems differ basically only in terms of convenience to the potential user. The former system requires that an individual go to some location to obtain his permit, the latter system permits him to use the mail. Both involve a limited number of permits, however. This basic difference was a sufficient factor, nonetheless, to affect response.

Over-all, the mail reservation system was considered to be the most acceptable method of controlling use; six out of ten visitors were in favor of it or neutral. The first-come, first-served system ranked second; 46 per cent of the sample responded favorably or neutrally. The greater acceptance of a mail reservation system seems linked to the relationship between the place of residence of the

visitors and the study area where sampled. As an example, 52 per cent of the visitors to the Bridger favored a mail reservation system and only 29 per cent supported the first-come, first-served system. In the Bob Marshall, the relative ranking of these two methods was the same, but there was less support for the mail reservation system (41 per cent) and greater support for the first-come, first-served technique (35 per cent). The Bob Marshall serves a fairly large local population, however, whereas the Bridger use population is largely a non-local one. It seems reasonable that local residents would tend to be more favorable to a system which required that an individual report personally to obtain a permit than one where his geographical advantage was offset by having to apply through the mail.

A fourth method examined was the lottery. Most sportsmen are familiar with such a system; many big-game seasons rely upon such a technique for allocating hunting permits. Additionally, it eliminates many of the advantages and disadvantages associated with an individual's location relative to the particular wilderness he desires to visit. It is, as Hardin notes, "eminently 'fair.'"<sup>1</sup>

Over-all visitor acceptance of a lottery, however, was remarkably low, only 18 per cent considered it favorable. The over-all figure was depressed by the especially low level of acceptance recorded in

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<sup>1</sup>Hardin, "The Economics of Wilderness," p. 23.

the BWCA; only nine per cent supported a lottery. Considering the three western areas as a whole, 23 per cent were favorably disposed to such a system.

This pattern of response follows a more general pattern found throughout this portion of the study. BWCA visitors tend to reject control measures more frequently than do their western counterparts. Presently, a free use permit is required for all visitors to the BWCA. Such permits are not restrictive in any sense; an unlimited number are available and their primary use is to provide accurate use estimates. It may very well be, however, that the inconvenience associated with stopping at a store to pick up a permit and the idea among users that these permits are an infringement upon their right to use the area is reflected in their more general rejection of any type of use control.

An additional factor that helps explain the over-all low level of acceptance is that persons may not be willing to leave the opportunity for visiting wilderness up to chance; with the other forms of control, the individual retains some degree of control over the outcome. He can "get in line" early to get his permit or he can make sure his mail application has an early postmark. In a lottery, these opportunities are lost.

The visitor population in the BWCA is probably less well acquainted with a lottery system as a means of allocating recreational opportunities than those persons visiting the western study areas. Nearly all western states utilize the lottery in one or more of their

hunting seasons; at present, none of the upper mid-west states does so.

The last use control measure examined involved the imposition of an entrance fee. No effort was made to assess what differences in use would occur at different prices; rather, we were concerned simply with user attitudes about the concept of charging for what has traditionally been a free good.

As Table 33 shows, the concept of a fee met with only limited acceptance; about one out of five persons favored such a method of control. There was a direct relationship between the acceptance of a fee and the percentage of each study area's sample with an income of \$10,000 or greater. It would thus appear that the acceptance of a fee is positively related to a higher income. It is likely, however, that other perhaps more salient factors are in operation. The Bridger and Bob Marshall visitors consistently show greater acceptance of all control measures while the BWCA and the High Uintas tend to be less favorably inclined to any control measure.

The responses given by the strong purists in each study area regarding these control measures tended to follow the same direction of the general sample, but generally displayed a more emphatic posture. There were some sharp differences between these respondents in the different study areas, however.

Strong purists in the High Uintas were significantly more inclined to accept a first-come, first-served permit system than those



in other areas. Situated only fifty miles from Salt Lake City, the area is probably considered by many visitors, including the strong purists, as a piece of "personal property" and a use regulation system that compliments their proximal location is perceived as a more desirable method of controlling use than systems which would ameliorate their geographical advantage.

Nearly one-third of the strong purists in the Bob Marshall (32.3 per cent) and one-quarter of those in the Bridger (27.7 per cent) favored a lottery system. This response may reflect a particularly strong level of commitment to wilderness preservation. In discussions with wilderness visitors the author has been surprised with the number of persons who indicate they would be willing to have a chance to go to the wilderness once every five years if it meant they would be guaranteed a high quality visit. The high level of acceptance of a lottery in the Bob Marshall and the Bridger may be underlain by such reasoning.

As was found for the over-all sample, strong purists in all areas tended to support the mail reservation system the most strongly. Similarly, they strongly rejected the concept of assigning where people can visit and camp. This suggests that the quality of spontaneity and freedom of choice is a very important element of the wilderness trip and its importance is not diminished appreciably by a person's general attitude about wilderness.

Strong purists had mixed feelings about charging a fee for the privilege of using wilderness. Although about 45 per cent of this group opposed the imposition of a fee in all the study areas, the percentage favoring it varied from 23 per cent in the BWCA to 53 per cent in the Bridger. The pattern of acceptance was identical to the pattern presented in Table 33 and the reasons presented in discussion of that table are appropriate here as well.

In review, then, the strong purists consistently adopt a somewhat more positive attitude toward the concept of use regulation. This is a particularly relevant factor for wilderness managers to consider. It suggests these individuals are cognizant of preservation objectives embodied within the Wilderness Act and are willing to modify their own personal desires for unlimited access in exchange for a management program that insures preservation of the wilderness environment. The method by which this limitation is to be effected may be difficult to arrive at; the decision as to whether it should or should not be undertaken seems answered.

#### "Indirect" Use Controls

The controls discussed to this point involve specific and direct impacts upon the user. It may be possible, however, to reduce the total level of use by placing greater demands upon the user, such as requiring greater skills, or more physical stamina.<sup>1</sup> Two potential

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<sup>1</sup>Ibid. Hardin argues that the best system of user allocation is one which involves admitting persons to wilderness based upon merit.

measures along these lines were investigated: (1) reducing the number of trails and signs (within the area) so that only those persons willing to make the effort could visit the area; and (2) blocking off the last few miles of the access roads so the trail to the wilderness would be longer.

#### Modification of Wilderness "Infrastructure"

A management decision to reduce or eliminate trail maintenance work and to eliminate signs, bridges, and other facilities intended for the visitor's benefit in essence may be considered a functional restriction. No direct restriction is placed on who or how many may enter. The success of this measure is related to the proposition that some percentage of the total use would be lost if users faced more primitive conditions of travel and where personal safety became a more important consideration. Success is also contingent upon the user's being aware of the interior conditions, a condition not explored in this study.

User reaction to this type of control tended to be distinctly more favorable than to direct restrictions on use. As Table 34 shows, about half of the visitors to all the study areas were either favorably inclined to such a management action, or indicated a neutral disposition towards such a measure. As suggested before, neutral responses are particularly significant to persons charged with wilderness management responsibilities, since such answers indicate a population whose

attitudes have as not yet crystallized and who are probably still receptive to lines of reasoning supporting or rejecting the action in question.

TABLE 34

VISITOR REACTION TO REDUCING NUMBER OF  
SIGNS AND TRAILS, BY STUDY AREA

| Study Area   | N   | Strongly Favor | Favor | Neutral | Oppose | Strongly Oppose |
|--------------|-----|----------------|-------|---------|--------|-----------------|
|              |     | %              | %     | %       | %      | %               |
| BWCA         | 205 | 23.9           | 22.9  | 15.6    | 20.5   | 17.1            |
| Bob Marshall | 114 | 20.5           | 18.4  | 19.3    | 39.5   | 12.3            |
| Bridger      | 143 | 23.8           | 23.8  | 21.0    | 21.7   | 9.8             |
| High Uintas  | 153 | 13.7           | 20.9  | 19.0    | 30.1   | 16.3            |
| Total        | 615 | 18.9           | 21.8  | 18.4    | 26.7   | 14.3            |

Chi square 29.69, 12 degrees of freedom, .01 > p > .001.

Visitors to the Bob Marshall and the High Uintas showed the least favorable response. This appears tied to the larger percentage of horseback riders in these two areas. To these groups, the presence of trails is more necessary than for those traveling on foot. Additionally, the elimination of trails would, in essence, close off certain areas to horses (for example, areas across which a talus slope must be crossed) and would greatly increase the possibility of injury to the horses. Examining this management alternative by mode of travel substantiated these notions; only about 25 per cent of those traveling by horseback felt this to be a favorable alternative.

The wording to this statement on the BWCA form was changed slightly to read "Leave portages rough so that only those persons willing to make the effort could visit the area." Surprisingly, persons traveling with motor propelled craft tended to favor such an action to the same degree as paddling canoeists. It had been hypothesized that on the basis of the generally lower propensity to favor any form of use controls, those traveling by motor would reject this more subtle technique. Additionally, these craft, particularly the motor boats, can be rather difficult to transport across a portage.

It is difficult to accurately assess the significance of this finding. Several potential explanations could be developed. It may be that the more favorable response is a result of the feeling that, as an alternative, leaving the portages rough is better than issuing permits. On the other hand, it may reflect a sincere belief that portages represent an obstacle which the boaters accept as a challenge. Or, with the availability of portage wheels, boaters may feel that leaving the portages rough would not represent a serious problem.

With the exception of strong purists in the Bob Marshall, this group showed a markedly higher level of favor towards reducing the number of trails and signs than found for the general sample. In the Bob Marshall, only 41 per cent favored this action whereas 55 per cent in each of the other areas responded this way. As has been discussed elsewhere, the large percentage of horseback riders among the strong purists in the Montana wilderness area certainly influenced this pattern of response.

The basically receptive attitude of strong purists toward this form of use control was to a great extent, predictable. It permits such persons to avoid expressing favor for additional restrictions, but would tend to contribute toward the alleviation of a problem these persons perceive as a serious one; that of overuse. At the same time, it promotes a management direction probably in close coincidence with the strong purists own concept of an area where facilities are minimal and where opportunities for cross-country wandering are enhanced. Gamma was .23, indicating a moderately strong relationship between purist score and acceptance of the alternative.

#### Manipulation of Access

A final method of restricting use involved making the wilderness spatially more remote by administratively extending the length of the entry trip. Visitors were asked their attitudes about blocking off the access road at some point so that the trip to the wilderness boundary was longer. In the BWCA, this would also entail an immediate portage.

Again by considering the favorable and neutral responses together, we found about 60 per cent of the western visitors accepted the concept. In the BWCA, however, less than four out of ten similarly responded. Motor boaters in particular objected to such an action; only 6 per cent favored the measure and only 14 per cent were neutral. Their response is almost certainly related to the need of portaging their boats and equipment under such a management policy, although their response is difficult to reconcile in light of the information obtained in Table 34.

In the western study areas, backpackers tended to be more favorably inclined toward such an action (37 per cent) than were horseback riders (25 per cent), despite the fact that the hikers would be facing some additional miles they would have to walk. Combining the neutral responses to the statement by these two groups erased the difference, however; about 60 per cent of each were favorable or neutral.

As is true with much of our present data about wilderness users, the underlying rationale for the responses obtained from the hikers and horsemen is not clear, but various explanations come to mind. The itinerary of horseback parties is more closely tied to campsite locations than is that of backpackers; there must be sufficient room to put out horses and there needs to be adequate forage. Blocking off the access road may mean a longer first day's ride to reach an adequate camping area for the horseback rider, whereas the hiker is much more free to camp somewhere along the way.

The effects upon esthetics of such an action may also differ between these two groups. Backpackers would still have considerable freedom to travel off-the-road to the original wilderness entry point (assuming no new trail is developed from the point where the access road is blocked). Horse parties, however, would generally be more restricted to following the old access road to the wilderness, especially in areas where extensive brush and shrubbery is adjacent to the road. A trip of perhaps 5 miles along a paved or gravel road on horseback is

generally not the type of esthetic experience a person going on a wilderness trip is seeking!

### Zoning

Separating incompatible uses in the wilderness has been cited in various other works as a method for providing users with an optimum level of satisfaction.<sup>1</sup> As was suggested in Chapter IV, it appears that zoning in the western study areas may have only limited value in terms of trying to enhance user esthetics. There may be, however, important ecological reasons for zoning; areas of particularly fragile soils may be zoned against horse use for example. In the BWCA, on the other hand, zoning areas to exclude motor boat use seems imperative if there is legitimate management concern with providing a high quality wilderness experience for canoeists.<sup>2</sup>

User attitudes toward the concept of zoning divided clearly along the line of study region. As Table 35 indicates, six out of ten BWCA visitors agreed with the concept of providing areas for the

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<sup>1</sup>For discussions on the use of zoning in wilderness, see Wild-land Research Center, Wilderness and Recreation, p. 303 and Lucas, The Recreational Capacity of the Quetico-Superior Area, pp. 28-31. Chapter 4 in Arthur H. Carhart, Planning for America's Wildlands (Harrisburg, Pennsylvania: The Telegraph Press, 1961), pp. 21-23 is also useful.

<sup>2</sup>Lucas wrote, "If the goal of maintenance by the Federal Government of one place in the United States for wilderness canoe travel is taken seriously, this boat use (motor craft) seems undesirable since motor boating is incompatible with wilderness canoeing," The Recreational Capacity of the Quetico-Superior Area, p. 29.



exclusive use of paddling canoeists and motor craft; in the western areas, only 25 per cent supported a similar concept of separating modes of travel.

TABLE 35

VISITOR AGREEMENT WITH ZONING ON BASIS  
OF MODE OF TRAVEL, BY STUDY AREA

| Study Area   | N   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--------------|-----|-------------------|----------|---------|-------|----------------|
|              |     | %                 | %        | %       | %     | %              |
| BWCA         | 203 | 12.8              | 13.8     | 12.8    | 31.5  | 29.1           |
| Bob Marshall | 120 | 20.0              | 42.5     | 23.3    | 12.5  | 1.7            |
| Bridger      | 144 | 19.4              | 30.6     | 14.6    | 22.2  | 13.2           |
| High Uintas  | 154 | 21.4              | 35.7     | 18.2    | 18.2  | 6.5            |
| Total        | 621 | 17.9              | 28.7     | 16.6    | 22.4  | 14.5           |

Chi square 101.02, 12 degrees of freedom, .001 > p.

The pattern of response obtained appears a reflection of current administrative practices. As was mentioned in Chapter IV, the Forest Service currently has in effect policies which exclude motor propelled craft from a portion of the BWCA.<sup>1</sup> Handout recreation maps and pamphlets have this information on them and probably most visitors are aware of these zones. There is in the west, however, no comparable form of land administration. Unfamiliarity with the technique probably contributes to the strong negative reactions toward it.

<sup>1</sup>U.S. Department of Agriculture, Forest Service, Management Handbook, Boundary Waters Canoe Area, 1969. (Mimeographed.)



Mode of travel, as might be expected from some of the earlier findings, was a powerful influence. Nearly three-fourths of the paddling canoeists (74 per cent) favored zoning areas against motor craft, whereas those using motor canoes or motor boats tended to be negative or neutral to the concept. In the west, backpackers were more favorable to the idea than horsemen (35 per cent and 10 per cent, respectively), reconfirming the earlier statement that backpackers tend to react more negatively towards horse parties than the reciprocal relationship. Certainly many of the backpackers see zoning as a means of alleviating trail dust, manure, and other relicts of horse travel they now contend with.

Strong purists closely followed the general sample in their response. In the BWCA, nearly eight out of ten (78.6 per cent) favored providing areas exclusively for the use of paddling canoeists. Such an attitude clearly reflects the concern of this group for the provision of areas that more nearly coincides with their perception of wilderness than the present legislatively defined Boundary Waters Canoe Area does.

In the western study areas, however, strong purists were basically disinclined to accept zoning. About 55 per cent of this group in each area disagreed with the statement. About one-quarter, however, favor zoning and it seems again that the somewhat ambivalent stance this group takes reflects their concern for the protection of the resource on the one hand and their rejection of authoritarian sanctions and controls on the other.

### Party Size Limitations

Evidence presented in Chapter IV suggested that the large parties have an extraordinary effect on both the esthetics of the experience for those they encounter as well as on the physical resource. Although these groups account for only a small percentage of the total use of wilderness, their effects are disproportional to their size.<sup>1</sup> One effective means of reducing these effects is to limit the size of the party to some level that minimizes detrimental esthetic and physical side effects.

In response to the question "Do you feel there should be a limit to the size of parties visiting the BWCA," visitors split almost evenly, with 49 per cent opposing such controls and 51 per cent favorably or neutrally disposed to such an action. Nearly 62 per cent of the paddling canoeists, however, supported such an action; 64 per cent of those traveling with motor craft opposed a party size limit. This again follows certain findings, both in this study and those published elsewhere, that the paddling canoeists are more concerned with solitude and tend to support management actions that insure this quality.

Generally, western wilderness users showed a somewhat greater receptivity to the idea of a party size limit. Visitors in these areas were asked to specify whether they preferred a limit on all

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<sup>1</sup>In this study parties of 15 people or more comprised only 6 per cent of the sample.

parties, horse parties only, or backpackers only. As Table 36 shows, 70 per cent of the Bridger users favored a party size limit, with nearly two-thirds of these persons favoring a limit on all parties. Support for a restriction on the size of horse parties was significantly greater in the Bridger than in the Bob Marshall or High Uintas, reflecting the larger number of persons traveling by stock in these latter two areas. Between 40 and 45 per cent of the users in these two areas do support a party size limit, however.

TABLE 36

WESTERN RESPONDENT ATTITUDES TOWARD  
A PARTY SIZE LIMIT

| Study Area   | N   | Percentage Favoring a Party Size Limit for |                            |                      | No Limit on Party Size | No Opinion |
|--------------|-----|--------------------------------------------|----------------------------|----------------------|------------------------|------------|
|              |     | Every one                                  | Only for Horseback Parties | Only for Backpackers |                        |            |
| Bob Marshall | 120 | 34.2                                       | 10.8                       | 0.0                  | 35.8                   | 19.2       |
| Bridger      | 144 | 41.7                                       | 28.5                       | 0.0                  | 20.1                   | 9.7        |
| High Uintas  | 154 | 23.4                                       | 16.9                       | 0.6                  | 46.1                   | 13.0       |
| Total        | 418 | 32.8                                       | 19.1                       | 0.2                  | 34.2                   | 13.6       |

Note the virtual rejection of controls on party size for backpacking parties only. There are few backpacking parties that have more than four or five people in them. The response (or lack of it) reflects an accurate perception on the part of visitors that such a



restriction would do little to alleviate problems of overuse. Only about one out of five specifically favored a restriction on the size of horse parties; it appears likely, however, that many of those who favored restrictions for everyone were motivated principally by their concern about the large horse parties.

#### Preferences for Party Size Limits

While at present there are no administrative or legislative regulations concerning maximum party size, certain private organizations have initiated such controls. The American Forestry Association, for example, sponsors a number of wilderness trail rides each summer; the number of guests on each of these trips is limited to between twenty and twenty-five. The Wilderness Society summer horse trips, on the other hand, are limited to eighteen guests.

Extending the number of people permitted per party to twenty-five was the maximum limit for 92 per cent of the over-all sample; in the Bob Marshall, 100 per cent of those sampled felt parties should have no more than twenty-five persons.

The primary group which a party size limit will affect is the horse party; backpacking groups tend to be small, averaging three to four persons. Thus the responses backpackers give to a proposed party size limit probably are based in large part on their perceived effect in controlling the size of horse parties. The perceived impact of control is shifted, and in this case, probably correctly, from

themselves to the horse parties. Analyzing the response of these two groups supports this idea; backpackers show a significantly greater level of support for a fairly restrictive size limit (twelve people) than do horsemen (see Table 37).

TABLE 37

BACKPACKER AND HORSEBACK RIDER RESPONSES TO  
MAXIMUM NUMBER OF PERSONS PER PARTY

| Mode<br>of<br>Travel | N   | Percentage Favoring Maximum<br>Party Size of: |      |      |       |       |      |
|----------------------|-----|-----------------------------------------------|------|------|-------|-------|------|
|                      |     | 1-2                                           | 3-6  | 7-12 | 13-25 | 26-50 | 51 > |
| Backpacker           | 139 | 2.2                                           | 17.3 | 43.2 | 30.2  | 4.3   | 2.9  |
| Horseback            | 65  | 0.0                                           | 3.1  | 52.3 | 41.5  | 1.5   | 1.5  |
| Total                | 204 | 1.5                                           | 12.7 | 46.1 | 33.8  | 3.4   | 2.5  |

Chi square 12.20, 5 degrees of freedom, .05 > p > .02.

Strong purists in all study areas tended to support the twelve person limit slightly more than the over-all sample, 63 per cent as opposed to 59 per cent, whereas moderate purists were slightly less so inclined (57 per cent).

Table 37 presents a paradoxical situation. Up to this point in the discussion, we have seen strong support for solitude, solid rejection of large parties; and a cognizance on the part of users of the detrimental ecological effects of too many people. Despite this,



however, we still find four out of ten supporting the idea that the maximum number of people per party should be at least thirteen people. What this may suggest is that although users are concerned with the general problem of overuse, there is a tendency to attempt to minimize the effects on the individual of any control measure. An individual may support the normative concept of a party size limit, but the specific level of that limit is set at a point where he feels it will not directly affect him.

#### An Acceptable Number of Horses

Visitors in the three western study areas were asked to also indicate the maximum number of horses that should be permitted in one party.

Almost three out of four backpackers (73 per cent) felt parties should have no more than 12 head of stock in them. Among horseback riders, however, almost 60 per cent responded that the minimum number of horses permitted should be 12 and nearly 15 per cent felt 25 animals should be the minimum.<sup>1</sup>

The percentages were closely associated with the responses obtained from the Bob Marshall and the Bridger (see Table 38). In the Bob Marshall, where horseback travel predominates, there is strong support for a more liberal maximum number of horses per party whereas

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<sup>1</sup>The difference between backpackers and horseback riders regarding maximum number of horses per party was significant at the .001 level.

in the Bridger nearly 75 per cent of the visitors feel that horse parties should be limited to a dozen stock animals. Interestingly enough in the High Uintas, where horse and foot travel is evenly divided, visitors tend to be slightly more in support of the twelve animal limit than those in the Bridger. Many of the horse parties in the High Uintas are made up of family groups and friends, with few fully outfitted trips (6 per cent of this sample). In the Bob Marshall, 44 per cent of those sampled were traveling with a commercial outfitter. These groups tend to be large and it appears that persons traveling with such groups probably support a stock limit in keeping with their own party. Note also that nearly one out of five Bob Marshall visitors supported a maximum size limit of fifty head of stock. This is particularly interesting in that nearly all large horse parties have at least fifty head of stock with them.

TABLE 38

MAXIMUM NUMBER OF STOCK ANIMALS PER PARTY,  
BY WESTERN STUDY AREA

| Study Area   | N   | Percentage Favoring Maximum Number of Stock at: |      |      |       |       |      |
|--------------|-----|-------------------------------------------------|------|------|-------|-------|------|
|              |     | 1-2                                             | 3-6  | 7-12 | 13-25 | 26-50 | 51 > |
| Bob Marshall | 53  | 0.0                                             | 5.7  | 26.4 | 49.1  | 18.9  | 0.0  |
| Bridger      | 99  | 9.1                                             | 23.2 | 41.4 | 20.2  | 4.0   | 2.0  |
| High Uintas  | 59  | 10.2                                            | 27.1 | 37.3 | 20.3  | 0.0   | 5.1  |
| Total        | 211 | 7.1                                             | 19.9 | 36.5 | 27.5  | 6.6   | 2.4  |

Chi square 46.72, 10 degrees of freedom, .001 > p.

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Proposed policy in Region One will limit the number of horses in any one party to fifty, a fact which will apparently alter the character of many of these parties, but an action which appears to have sound and broad user support.

A substantially greater percentage of strong purists in the Bridger and the High Uintas were in favor of the twelve animal maximum than those in the Bob Marshall (74 and 82 per cent, respectively, compared with 31 per cent). It is useful at this point to reiterate that individual use characteristics unique to a particular area tend to modify even the attitudes of the strong purists. The notion that the purists are characterized by areal homogeneity in terms of their management preferences seems definitely incorrect and this should be taken into account in efforts by wilderness managers to incorporate user opinion into policy formulation.

#### Future Controls: Necessary or Not?

The perception of resource problems and of areas of concern differs between those charged with administrative responsibilities and those who utilize the resources as individuals. Lucas<sup>1</sup> has documented this in the case of wilderness and Kates has demonstrated it in regard to water resources.<sup>2</sup>

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<sup>1</sup>Lucas, "Wilderness Perception and Use," pp. 399-402.

<sup>2</sup>Kates, Hazard and Choice Perception in Flood Plain Management, pp. 45-103.

With this in mind, it seems appropriate to question whether or not the need for use controls (of some form) is the result of the peculiar perception of the resource managers, that of the users, or both. Much of the contact managers have with users, unfortunately, occurs in the context of a problem; the user has some complaint, he has been charged with the violation of some regulation, etc. The resultant selective perception may result in a portrait of the average wilderness user by managers that is substantially different from the actual one. The manager interpretation of these contacts, nonetheless, may include among other things the perceived need for some type of use control.

On the other hand, there seems to be sufficient data, both in this study and elsewhere, to suggest that users are cognizant of a growing use problem in wilderness and sufficiently concerned to support some form of control.

To provide an additional look at this question, visitors were asked their feelings about allowing use to continue to increase, with no consideration whatsoever of any controls.

A most interesting pattern of response was obtained. As Table 39 indicates, there were sharp differences between the study areas, particularly the Bridger. There, nearly eight out of every ten persons sampled felt use could not be allowed to continue to increase unrestricted.

TABLE 39

VISITOR REACTION TO ALLOWING USE TO CONTINUE TO  
INCREASE WITHOUT CONTROLS, BY STUDY AREA

| Study Area   | N   | Strongly Favor | Favor | Neutral | Oppose | Strongly Oppose |
|--------------|-----|----------------|-------|---------|--------|-----------------|
|              |     | %              | %     | %       | %      | %               |
| BWCA         | 202 | 10.4           | 12.4  | 23.3    | 29.7   | 24.3            |
| Bob Marshall | 118 | 7.6            | 16.9  | 18.6    | 26.3   | 30.5            |
| Bridger      | 141 | 2.8            | 6.4   | 13.5    | 41.1   | 36.2            |
| High Uintas  | 150 | 13.3           | 12.0  | 28.7    | 30.0   | 16.0            |
| Total        | 611 | 8.8            | 11.8  | 21.4    | 31.8   | 26.2            |

Chi square 42.60, 12 degrees of freedom, .001 > p.

The propensity to recognize the need for use controls again seems closely linked to the percentage of each study area's sample classified as strong purists (see Table 8). The general antipathy previously found in the BWCA and the High Uintas is again shown. A quarter of those sampled in the Bob Marshall also expressed favor for letting use continue to increase. It is apparent that a substantial number of persons using this particular wilderness do not feel there is sufficient use pressure to warrant the consideration of use control. As Table 6 indicated, use intensity in the Bob Marshall is the least of all the study areas (14.3 acres per visitor day). Current use pressures give little evidence to visitors for the potential need of use controls; it is possible, however, that those persons who did consider use too heavy in the area have already ceased visiting it and turned to other areas for their wilderness experience (e.g., Canada).

The more sophisticated and demanding visitors, the strong purists, uniformly and emphatically reject the notion that use be allowed to continue unabated. Their perception of a need to regulate use further documents their great concern for the protection of wilderness; only about one out of ten favored letting use continue to increase. Moderate purists were about twice as likely to favor use continuing in the absence of any controls. Gamma between the purist score and this management alternative was .36.

Current Forest Service policy provides authority for the Regional Forester to:

Limit the number of visitors using a specific Wilderness when a wilderness resource is threatened or damaged by excessive numbers of people.<sup>1</sup>

The implementation, however, of restrictions on visitor numbers is viewed as a last-resort management effort that should be preceded by a full consideration of other potential means of offsetting the detrimental effects of man's use of the wilderness. In Chapter II, it was suggested that the construction of a definition of the carrying capacity of wilderness was based on several propositions. Among these was the consideration that capacity could be increased not only by inputs of land, but by other forms of management investments.

The Wilderness Act provides some rather restrictive constraints on measures that might be included under "other forms of management

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<sup>1</sup>U.S. Department of Agriculture, Forest Service, Forest Service Manual, Title 2300-Recreation Management, Section 2323.12c, May, 1969.

investments." Man's works are clearly intended to the minimal, the natural processes are to dominate. At the same time, there are "grey areas" in the legislation; certain types of development may tend to ameliorate the potentially more noticeable affects of man. Also included under this particular aspect would be the development of measures to reallocate or redistribute use. Present knowledge of recreational use patterns within wildernesses is scanty, but use is almost certainly highly concentrated in most wilderness areas in only a few locations. Obtaining a more even spatial distribution of use may make it possible for wilderness administrators to avoid the need of actually restricting use for some time, at least in many areas.

Visitor Attitudes Toward Managerial Inputs and  
Their Relation to Carrying Capacity

Respondents were presented with ten items (Appendix B, question 24) that dealt with various management decisions that could be made regarding wilderness. Each of the items noted, if implemented, would have one or more of the following results: (1) greater protection of the physical resources; (2) a better distribution of recreational use; (3) a better understanding of the wilderness resource; and (4) greater visitor safety and convenience. Table 40 presents the percentages of visitors to each study area favoring the individual items in addition to the responses of those individuals classified as strong purists. These users are identified specifically because of the particular relevance of their attitudes to wilderness policy decision-making.



TABLE 40

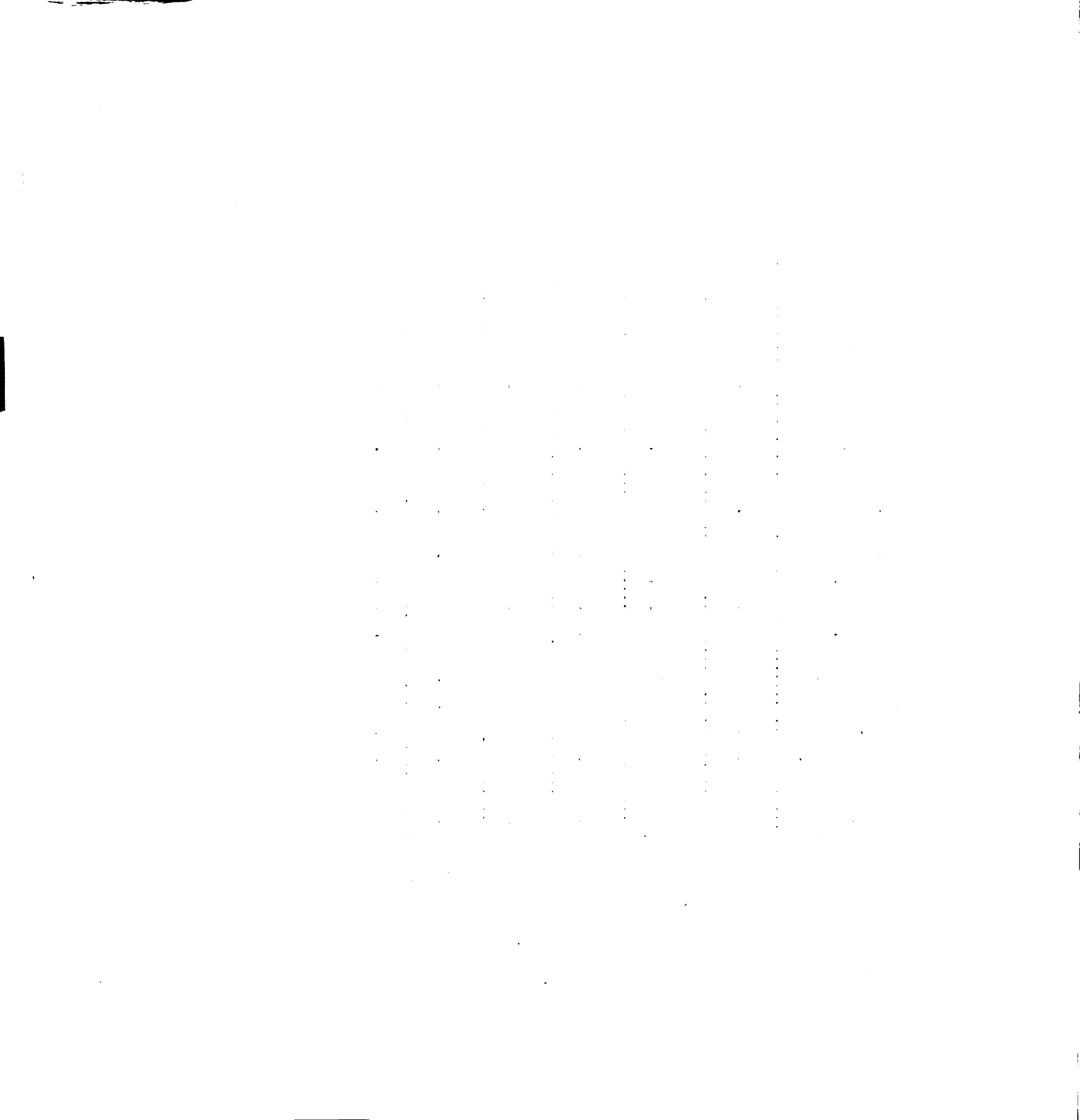
FAVORABLE VISITOR RESPONSE TO MANAGERIAL  
INPUTS, BY STUDY AREA AND STRONG PURISTS

| Management<br>Input                                   | Percentage Favoring Adoption |                            |                    |                           |                              | Gamma <sup>a</sup> |
|-------------------------------------------------------|------------------------------|----------------------------|--------------------|---------------------------|------------------------------|--------------------|
|                                                       | BWCA<br>(N=206)              | Bob<br>Marshall<br>(N=120) | Bridger<br>(N=144) | High<br>Uintas<br>(N=154) | Strong<br>Purists<br>(N=248) |                    |
| More high quality trails (portages).                  | 36.6                         | 35.0                       | 30.8               | 35.1                      | 25.9                         | .31                |
| More signs indicating place to camp. <sup>b</sup>     | --                           | 51.7                       | 30.3               | 25.7                      | 31.0                         | .41                |
| Portages to lakes presently undeveloped. <sup>c</sup> | 73.4                         | --                         | --                 | --                        | 73.8                         | .09                |
| More maps and pamphlets.                              | 60.1                         | 51.7                       | 60.4               | 54.9                      | 54.0                         | .05                |
| More campsites.                                       | 46.3                         | 22.0                       | 16.0               | 15.0                      | 17.3                         | .39                |
| Wilderness rangers.                                   | 69.8                         | 57.5                       | 68.0               | 66.5                      | 63.3                         | .03                |
| Hitching racks. <sup>b</sup>                          | --                           | 26.3                       | 4.2                | 15.7                      | 9.9                          | .46                |
| Small docks at portage landings. <sup>c</sup>         | 24.2                         | --                         | --                 | --                        | 4.8                          | .54                |
| Corrals. <sup>b</sup>                                 | --                           | 25.0                       | 4.2                | 11.1                      | 8.2                          | .43                |
| Canoe rests. <sup>c</sup>                             | 51.0                         | --                         | --                 | --                        | 42.9                         | .18                |
| Simple pit toilets.                                   | 63.1                         | 43.3                       | 22.4               | 25.3                      | 27.5                         | .31                |
| Wooden bridges across large rivers. <sup>b</sup>      | --                           | 66.7                       | 64.6               | 62.3                      | 57.3                         | .14                |

<sup>a</sup>Gamma is interpreted so that the higher the value, the greater the tendency of strong purists to oppose the management alternative under consideration.

<sup>b</sup>Listed on western questionnaire form only.

<sup>c</sup>Listed on BWCA questionnaire form only.



The strong purists provide a framework within which managers and administrators can evaluate the suitability of a given management input not only by institutional constraints, but also by the perceptions of the most discerning and demanding user group.

#### More High Quality Trails

Response to management providing additional high quality trails was fairly evenly mixed among those favoring, those rejecting, and those neutral to such an action. Only about one out of four strong purists, however, favored such a measure, although those in the Bob Marshall were slightly more so inclined. This appears linked to the greater amount of horse travel, whose access to wilderness is largely contingent on good trails.

With the apparent maldistribution of users in most wildernesses, managers and researchers alike are concerned with means of effecting a redistribution. If users desire a trail standard that is high; that is, trails that are wide, with a low gradient, and which use numerous switchbacks when it is necessary to gain elevation, etc., then the provision of such a development possibly would be a method to draw persons into areas presently used below capacity.

The pattern of response, however, suggests that such trails are not regarded as appropriate by the preponderant share of visitors, particularly the strong purists. Part of the reason for the fairly broad spread of response between favor, neutral, and oppose almost

certainly stems from the undefined phrase "high quality." Nonetheless, user attitude toward the concept of upgrading trails is generally negative and it appears that efforts to redistribute use by providing better trails would do little to spread out use, but would probably increase visitor dissatisfaction.

In the BWCA, the question was in reference to more high quality portages. Only about one-third of the paddling canoeists favored such an action whereas nearly half of those traveling in motor propelled craft supported it. Such a development is viewed by the canoeists as both an inappropriate element in wilderness as well as an action that would simply facilitate greater motor use of many lakes presently reached only by very rough portages.

The results regarding high quality trails coincide closely with those of Hendee. He found approximately twenty-five per cent of the visitors sampled felt that trails in remote backcountry areas should be high standard. Over-all, this study revealed a slightly higher level of agreement to providing high quality trails (35 per cent), but the tendency of strong purists to oppose such developments was almost identical to that found by Hendee.<sup>1</sup>

Visitors to the BWCA were asked their reaction to providing portages to lakes previously without them. As Table 40 shows, about

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<sup>1</sup>In Hendee's study, gamma between purist score and the trail quality item was .25; here, it was .31. See Hendee et al., Wilderness Users in the Pacific Northwest, p. 83.

three out of four persons favored this management action. However, paddling canoeists tended to be significantly less so inclined<sup>1</sup> and again it appears they perceive the effect of such an action as simply facilitating the distribution of motor craft rather than providing canoeists with additional opportunities.

#### More Signs Indicating Places to Camp

The importance of the campsite to the visitor's wilderness experience was detailed in Chapter IV. Additionally, by the very nature of the function which these locations serve, that is, accommodating visitors for extended periods of time, they are particularly susceptible to extensive ecological damage.

The present pattern of use of wilderness campsites is probably influenced to a considerable degree by the information provided on handout recreation maps of the wilderness area and by the user's own past experience. The sum effect of these sources is a concentration of use on a very few areas. Most wildernesses, however, abound with locations where a small party could set up a tent and have a camping location that would insure complete solitude. Often such locations are close to the main trail, but such factors as topography prevent the visitor from locating them easily. One method of spreading camping use out, to a degree, would be the placing of signs indicating the

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<sup>1</sup>A difference significant at the .05 level.

direction and location of such sites. Brown and Hunt have provided evidence that suggests that the use patterns of auto tourists can be modified by informational signing;<sup>1</sup> the effects of such a measure on wilderness recreationists remains to be tested.

Conceptually, however, the provision of directional signs to campsite locations was not well accepted by visitors. In the Bob Marshall, just over half responded favorably; this appears tied to the predominance of horseback travel in the area (although a similar response did not appear in the High Uintas, where horseback use accounted for half the sample). There is some basis for horseback riders desiring this kind of information. Visitors traveling by horse are probably less willing to leave the trail on the chance there may be a camping location nearby than persons backpacking. Perhaps more important than this, however, is the fact that signs represent the clear and irrevocable evidence of man; in a sense, they are the antithesis of the wilderness philosophy where modern man is given the opportunity to emulate his pioneer forefathers. The same line of reasoning is also relevant to the over-all rejection of high quality trails and is supported by the fairly strong association found between the purism score and the tendency to reject signs.

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<sup>1</sup>Perry J. Brown and John D. Hunt, "The Influence of Information Signs on Visitor Distribution and Use," Journal of Leisure Research, 1 (Winter, 1969), pp. 79-83.

### More Maps and Information Pamphlets

An alternative to influencing visitor use behavior by signs would be to make available maps and information pamphlets containing material concerning attractions, current trail information, campsites, fishing quality, etc. Such a measure eliminates the obtrusiveness of signs and requires that the user possess at least some minimum skills in map reading. Additionally, some basic interpretative data could be provided regarding the historical, biological, or geological features of the wilderness. Hendee et al. and Merriam and Ammons have reported finding visitor support for this type of guide book.<sup>1</sup>

Although there was basic agreement to the idea of providing additional such material favorable visitor response was not especially strong. Over-all, about six out of ten persons responded favorably, with strong purists slightly less so inclined. There was little association between response and purism score.

This pattern of response suggests that wilderness users, although not in opposition to the distribution of more maps and other information sources, may find the present sources adequate. On the other hand, we found a considerable amount of extemporaneous criticism of Forest Service maps and personal experience has shown that many are highly inaccurate. Also, most have only partial coverage of trail

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<sup>1</sup>Hendee et al., Wilderness Users in the Pacific Northwest, p. 48 and Merriam and Ammons, The Wilderness User in Three Montana Areas, p. 40.

systems and many are out-of-date. Visitor reaction to providing additional such material may be moderated somewhat by a feeling of "why continue mediocrity."

An additional factor that should be brought out regards the perceived consequence of providing such material. It appears that at least some visitors view the provision of additional maps as simply an agent that will tend to increase total use rather than redistribute visitors in such a manner so as to offset their present impact on both the physical environment and upon the solitude of others. There is probably some selfish concern here; a user may have a certain place he always goes to and he is concerned lest others "discover" it also. There is, however, an element of truth to concerns of such informational material tending to increase use. Wilderness travel should provide an opportunity for discovery and challenge; highly detailed maps eliminate this to some extent and also reduce the demands on visitors. Eliminating the possible unexpected occurrence, such as having to work one's way down a steep dangerous talus slope, might tend to attract more people.

#### More Campsites

Visitors to the three western study areas reacted quite negatively to this item. Some expressed confusion, since campsites in wilderness are not developed in the sense they are in an auto campground. Many are simply wherever the visitor decides to spend



the night. Nevertheless, as was noted earlier, certain locations have become recognized as camping locations, either through administrative efforts or simply through prolonged use.

The inclusion of the item was made on the basis that an active program of inventorying potential camp locations with such criteria in mind as some minimum amount of reasonably level ground, close to water, some minimum distance from the trail, and so forth could be utilized in management efforts to encourage use of new camping areas or of entire drainages presently little used. It is clear, however, that visitors in the western areas see little need for such action. BWCA visitors evidence a more favorable disposition to such an effort. In the Canoe Country, visitors do not have the same type of flexibility that western wilderness users have in finding a campsite. The very heavy recreational use of the area has largely uncovered most desirable camping areas and many visitors are probably hopeful that additional sites can yet be found.

#### Wilderness Rangers

All of the areas studied have had a program of seasonal Forest Service employees who are stationed throughout the summer season within the wilderness. These individuals are charged with a variety of responsibilities, but litter clean-up and visitor contact are probably two of the most important. Based upon the results in Table 40 the program appears to be fairly successful. Approximately two-thirds

of the respondents in each study area, except the Bob Marshall favored the provision of wilderness rangers.

This is an especially significant finding since it provides the managing agency with a convenient means of enforcing possible future use controls and also could potentially be invaluable in efforts to redistribute use. By maintaining up-to-date information on campsite availability, fishing quality, and so forth, the wilderness ranger could aid in providing visitors with information that would enhance the quality of their trip and also promote a more balanced pattern of use.

#### Hitching Racks and Corrals

Visitors to the three western areas were asked the degree to which they favored the provision of hitching racks and corrals for the use of recreation stock. Response to these two items was basically negative, but showed the influence of the predominant mode of travel.

Both of these measures are largely of benefit only to the visitor. They would help prevent much of the muddying that one now finds around many camp areas as well as confining the manure away from the camp. They afford little protection to the environment however; generally, in fact, they tend to accentuate and accelerate such problems as vegetation removal and soil compaction. Most persons traveling by horse or with packstock hobble or picket their animals and there is little need for specific structures to retain their animals. It is

apparent that the provision of such facilities would not be especially effective in motivating horse parties to use certain areas rather than others.

#### Small Docks at Portage Landing and Canoe Rests

Docks and canoe rests might be considered functional equivalents in the BWCA of hitching racks and corrals in the west. Over-all reaction to the facilities was somewhat mixed and interestingly enough showed no particular relation to mode of travel. Paddling canoeists were more favorable towards canoe rests, but not significantly so, even though these devices are not used by motor boaters. Docks appear to be viewed as not particularly necessary and their usefulness in terms of providing any resource protection is minimal. Neither facility appears to have particular relevance to management efforts to redistribute use.

#### Simple Pit Toilets

Water quality standards and the potential problems associated with the disposal of human waste are important elements to the question of carrying capacity. Despite all other considerations, if sanitation problems develop in an area, it may become necessary to consider the area has exceeded its carrying capacity.

Human health is not the only consideration here. Barton has pointed out that in the BWCA the release of high levels of nutrients and pollutants associated with increasing recreational use can result

in aquatic growth that have adverse effects on esthetics as well as on health.<sup>1</sup>

Other wilderness studies have found an over-all favorable visitor attitude toward the provision of simple toilet facilities. The Wildland Research Center reported that this was the only improvement desired by a majority of users; 66 per cent approved providing sanitary facilities.<sup>2</sup> This concurred with earlier findings by Bultena and Taves, who reported that 78 per cent of the canoeists sampled in the BWCA rated toilets as important.<sup>3</sup> Hendee et al. found that only about three out of ten persons opposed providing toilet facilities, but those classified as the more purist strongly opposed the idea.<sup>4</sup>

Visitor response to the provision of simple pit toilets varied fairly substantially between the BWCA and the western study areas, and to a lesser degree, among the three western areas. This pattern was expected; sanitation problems are more serious in the BWCA due to very limited soil cover and the extensive amount of water. Current management policy in the BWCA recognizes these problems and

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<sup>1</sup>Michael A. Barton, "Water Pollution in Remote Recreational Areas," Journal of Soil and Water Conservation, 24 (July-August, 1969), pp. 132-134.

<sup>2</sup>Wildland Research Center, Wilderness and Recreation, p. 161.

<sup>3</sup>Gordon L. Bultena and Marvin J. Taves, "Changing Wilderness Images and Forestry Policy," Journal of Forestry, 59 (March, 1961), p. 169.

<sup>4</sup>Hendee et al., Wilderness Users in the Pacific Northwest, p. 54.

simple latrines are provided throughout the area. In the western areas, disposal of human waste is more easily accommodated. There are still some toilets in the Bob Marshall and this may help explain the greater level of expressed favor for such facilities there. Familiarity with a particular type of development appears to foster a certain tolerance or perhaps in some cases, even an expectation for it. The association between purist score and the rejection of pit toilets is fairly strong, essentially matching the gamma of  $-.32$  found by Hendee.

Current Region One wilderness policy is closely in line with the apparent values of users. Pit toilets will be provided in cases where sanitation problems would otherwise arise. If and when such a condition occurs, a hiatus between user values and administrative policy may develop, unless users are aware of the problem and cognizant of the consequences. For the time being in the west, however, such facilities seem to offer little, either as a protection for the resource or for the user.

### Simple Wooden Bridges

Nearly two out of every three persons favored the provision of simple wooden bridges across large rivers. The basis for this response probably varied from one individual to another, but it is likely that safety was a principal rationale. Such bridges also have special relevance to management, however, as potential techniques

to assisting in the redistribution of use. In certain cases, the construction of a bridge across a river which cannot be safely forded could serve to direct use into areas that may at present be little used. In essence, the functional distance of such areas could be materially reduced with a more balanced pattern of use the result.<sup>1</sup>

Strong purists tend to be somewhat less favorable to such structures and this is to be expected, since bridges obviously represent the work of man and are probably somewhat out-of-keeping with a philosophy that keynotes an unmodified landscape.

Managerial Inputs and Carrying Capacity:  
Some Additional Remarks

Based upon the findings here substantial coincidence exists between the preservation objectives detailed within the Wilderness Act and the attitudes of users toward the various actions discussed above. With increasing levels of use upon the wilderness resource, it can be expected that pressures may develop to provide certain inputs to protect those qualities that prompted formal preservation legislation originally.

Despite the fact that institutional constraints limit the potential range of adoption, it is of interest and value to examine the above items, particularly in terms of how they may affect the

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<sup>1</sup>Bridges could thus be described as space-adjusting techniques since they both "shorten the effective distance of travel" and "permit intensification of space employment beyond that possible on the land surface provided by nature." Edward A. Ackerman, Geography as a Fundamental Research Discipline, Department of Geography, Research Paper No. 53 (Chicago: Department of Geography, 1958), p. 26.

spatial organization of human use within the wilderness. Optimally, the utilization of what has been termed "managerial inputs" should have a sociofugal impact upon use; that is, it should encourage the dispersion and segregation of users. It is entirely possible, however, that a decision viewed by wilderness managers as a means of ameliorating or modifying man's adverse impact upon the wilderness environment may, in actuality, serve a sociopetal function, attracting persons to a particular location, and as a consequence, intensifying the original problem, introducing new ones, or both.

Those managerial actions which involve direct and visible modifications of the wilderness landscape are largely rejected by all visitors, but especially by strong purists. The one exception to this concerns bridges; it appears that attitudes toward safety override their concern with completely replicating the experience that the pioneers faced in the wilderness. Those actions which influence use in a more subtle, less direct manner, however, seem to enjoy substantial support. The distribution of better, more informative maps and the establishment of a system of wilderness rangers represent two ways that adverse human impacts on both other wilderness users and the wilderness environment could be greatly alleviated.

Given the present administrative constraints, however, as well as the basically negative attitude of visitors, especially strong purists, toward physical modifications, it seems unlikely that managerial inputs represent a method of appreciably enhancing

capacity. Additionally, claims by administrators and managers that such developments are necessary because visitors "want this" or "demand that" appear unfounded. The promulgation of such statements may lie more with the administrator's perception of wilderness than with an accurate assessment of the wilderness user's needs and desires.



## CHAPTER VI

### PATTERNS OF RECREATIONAL USE IN RELATION TO THE PERCEPTION OF CARRYING CAPACITY

Two basic objectives formulate the organization of this chapter. First, we seek to determine the extent to which wilderness visitors considered that use had exceeded carrying capacity. As has previously been suggested, it is possible that the idea of overuse is a function of the perceptions of managers rather than recreationists, and it is at this point we attempt to determine how users do perceive the increasing level of wilderness recreation use. Additionally, we shall attempt to show how the perception of an area as overused affects the spatial behavior of the user.

Second, we shall attempt to cartographically define those areas within each of the study areas where it appears that the capacity has been reached or exceeded. Additionally, those specific elements that contribute to the perception of overuse will be examined.

#### The Perception of "Crowding"

Visitors were asked to express whether or not, in their opinion, the area they visited had seemed "crowded."<sup>1</sup> In response to this,

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<sup>1</sup>It was recognized that the term "crowded" could bias response, in the sense that it is a term with definite negative connotations surrounding its use. However, the study was concerned with determining whether use was generating adverse reactions on the part of visitors; if it were not, then it was felt that the use of the term "crowding"

nearly one out of every four visitors replied "yes" (23.8 per cent). In other words, a quarter of the persons sampled perceived that the character of use encountered was such that the area or at least a portion of it, was not providing a high quality wilderness experience, an explicit management goal of the Wilderness Act.

As might be expected, response to this question varied greatly between study areas and between different types of users. Visitors to the Bridger again evidenced a more critical appraisal of their surroundings; a full 33 per cent felt crowding was a problem in the area. This despite the fact that the intensity of use in the Bridger (see Table 6) was substantially less than that found in the BWCA or the High Uintas.

Although the intensity of use computed in Table 6 was admittedly a very rough index, it did show a fair degree of association with expressed perception of crowding. In the BWCA, where use intensity is the greatest, 28.1 per cent of the visitors felt crowding was a problem, whereas in the Bob Marshall, with the lightest intensity of use, only about one out of ten persons (10.8 per cent) expressed concern about crowding. However, in the High Uintas, where use

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would not elicit any sort of "false" response on the part of the respondent. If conditions were such that visitors perceived the situation in a negative vein, then it is likely they did consider the area "crowded." A possible synonym here would have been "used beyond capacity," but this may have been a confusing phrase, with some judging it in the sense of whether there was sufficient space to accommodate more people, others interpreting it in a more ecological perspective, and still others, from an esthetic standpoint.

intensity was nearly the same as in the BWCA, only 17.5 per cent of the visitors complained of crowding.

Earlier findings by Lucas that paddling canoeists were more sensitive to both increasing levels of use as well as other types of use than other visitors in the BWCA were further documented. As Table 41 indicates, nearly four out of ten canoeists complained of crowding, compared to less than two out of ten of those traveling in motor propelled craft.

TABLE 41

## THE PERCEPTION OF CROWDING, BY BWCA VISITORS

| Mode of Travel | N   | Was Area Crowded? |                           |                     |               |
|----------------|-----|-------------------|---------------------------|---------------------|---------------|
|                |     | No                | Yes, Only in a Few Places | Yes, in Most Places | Didn't Notice |
|                |     | %                 | %                         | %                   | %             |
| Paddling Canoe | 119 | 58.8              | 33.6                      | 4.2                 | 3.4           |
| Motor Canoe    | 22  | 68.2              | 27.3                      | 0.0                 | 4.5           |
| Motor Boat     | 63  | 87.3              | 11.1                      | 0.0                 | 1.6           |
| Total          | 204 | 68.6              | 26.0                      | 2.5                 | 2.9           |

Chi square 17.14, 6 degrees of freedom, .01 > p > .001.

This pattern of response is due not only to the paddling canoeist's greater sensitivity to use levels, but appears also related to the greater intolerance they hold for the motor propelled type of craft. This intolerance appears to be a non-reciprocating phenomena,



however; the concern with crowding expressed by the motor canoeists and motor boaters is probably confined to a function of numbers rather than types.

Hypotheses that backpackers represent a sort of western functional equivalent of the paddling canoeists are supported in that backpackers did complain about crowding more than others in the west, although their expression of concern was not as great as that found for paddling canoeists (Table 42). This, however, is in keeping with the less intense level of use that characterizes most of the western wildernesses.

TABLE 42

## THE PERCEPTION OF CROWDING BY WESTERN VISITORS

| Mode of Travel | N   | Was Area Crowded? |                                   |                             |                       |
|----------------|-----|-------------------|-----------------------------------|-----------------------------|-----------------------|
|                |     | No<br>%           | Yes, Only in<br>a Few Places<br>% | Yes, in Most<br>Places<br>% | Didn't<br>Notice<br>% |
| Backpacker     | 238 | 72.3              | 25.6                              | 2.1                         | 0.0                   |
| Horseback      | 168 | 83.9              | 13.1                              | 0.6                         | 2.4                   |
| Hiker-Stock    | 14  | 85.7              | 7.1                               | 0.0                         | 7.1                   |
| Total          | 420 | 77.4              | 20.0                              | 1.4                         | 1.2                   |

Chi square 21.56, 6 degrees of freedom,  $.01 > p > .001$ .

It would seem, as was the case in the BWCA, that the perception of crowding by backpackers is influenced not only by the level of use

encountered, but the type as well. Horseback riders appear to define crowding, however, largely in terms of use levels and do not display the adverse reactions toward other types of users (i.e., backpackers and hikers with stock) that backpackers do.

Additionally, in the BWCA and the western study areas, the paddling canoeists and the backpackers were disproportionately represented among the group defined as the strong purists, and as a consequence, it follows these groups would be more critical in their evaluation as to what constituted crowding.

This conclusion was fully supported when purist scores were examined as the independent variable. Strong purists perceived crowding to be much more of a problem than any of the other purist groups; the association between purist score and the degree to which crowding was perceived as a problem was .42.

#### The Effects of Crowding on Visitor Satisfaction

For those visitors who expressed a concern with crowding, an effort was made to determine the effect this concern had on satisfaction. Respondents were asked to indicate that if they felt the area was crowded, how much did it bother them; not at all, only a little, a moderate amount, or a lot.<sup>1</sup>

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<sup>1</sup>There is probably some grounds for legitimate concern as to whether a person can be concerned with crowding and yet indicate that it did not bother him. Semantically, the word "crowded" intuitively suggests a negative feeling (as was discussed in footnote 1 on page 234). This incongruity appeared to have been recognized by visitors, however; only 7 out of 148 replied "no" to the question.

For the four study areas as a whole, 85 per cent of those persons reporting crowding was a problem indicated they were bothered, either "a little" or "a moderate amount." Response over-all was evenly divided between these two options. In the Bridger, about 75 per cent of these persons were bothered a little or a moderate amount, and 22 per cent responded that crowding had bothered them a lot.

It seems clear that persons who perceive an area as crowded are adversely affected by that perception. Only a small percentage cite "crowding" in any of the study areas without a concomitant expression of annoyance. This was especially true for the strong purists; 36.3 per cent of this group (90 out of 248) reported crowding as a problem and only one person indicated that it did not adversely affect his satisfaction.

Additional evidence that persons traveling by motor canoe or boat are less sensitive to crowding was found. Only 16 of the 85 persons using motor propelled crafts complained of crowding and 4 of these persons reported that although they perceived the area as crowded, it did not adversely affect the enjoyment of their trip.

#### The Effects of Crowding on Route and Length of Stay

One of the principal concerns in focusing upon crowding was to ascertain the effects of this condition upon the spatial behavior of the wilderness visitor. Did conditions perceived as crowded cause alterations in the visitor's route of travel?

To determine this, those respondents who cited crowding as a problem were asked to indicate whether crowding had caused them to change the route of their trip, the duration of their wilderness trip, or both. Spatially segregating oneself from an area perceived as crowded, either by changing the planned route of travel or by actually terminating the trip early and leaving the area, was interpreted to be the strongest action open to the wilderness visitor. Such a course of action leads one to infer that the effects associated with crowding are of such magnitude they elicit an overt behavioral response on the part of the wilderness visitor.

It seems apparent, however, that most of the visitors simply tolerate the situations they perceive as crowded. Over-all, 79 per cent indicated they took no action to disassociate themselves from areas of crowding. The notable exception was the Bridger Wilderness where only 68 per cent were content to put up with overuse; nearly one out of three persons there altered their spatial behavior to offset what they considered to be a use situation detrimental to their enjoyment.

In the Canoe Country, only 2 out of the 16 persons traveling in motor propelled craft who mentioned crowding as a problem indicated this affected their itinerary. Nearly 20 per cent of the paddling canoeists, however, responded to crowding by altering their route or the length of their stay. This suggests that while both persons paddling canoes and those traveling by motor may recognize problems of



crowding in wilderness, the effects of crowding are of less concern to the latter group and there is less motivation to try and alleviate its impact. For the paddling canoeist, however, crowding represents a serious intrusion upon the enjoyment of the trip and, as a consequence, he is more likely to undertake measures that will offset or eliminate the problem. The small sample size makes statistical verification of these conclusions difficult; however, the percentages involved tend to support the general line of reasoning.

These conclusions also seem justified in light of the patterns of responses obtained in analyzing visitor reaction to crowding by purist score. As Table 43 indicates, strong purists were more inclined to evidence some overt response to crowding than were any of the other groups (ignoring the percentages for the non-purists, where sample size is only two). Again, those persons who are most perceptive and aware of crowding demonstrate a greater tendency to adopt measures that ameliorate the adverse effects of crowding upon quality.

The decision to shorten one's trip probably represents a more drastic reaction than altering its route. Although this latter action may mean the user will not have the opportunity to visit a particular area he was interested in seeing, he may discover some equally pleasing new location. On the other hand, cutting short the length of one's visit indicates the visitor apparently perceives no other alternative to contend with crowding and, rather than continuing to be faced with such a condition, terminates his visit. For these people the

"Malthusian-type of minimum satisfaction carrying capacity" Lucas mentioned has been reached.

TABLE 43

## THE REACTION TO CROWDING BY PURIST GROUPS

| Purist Group     | N <sup>a</sup> | None  | Changed Length of Stay | Changed Route of Trip | Changed Both Route and Length |
|------------------|----------------|-------|------------------------|-----------------------|-------------------------------|
|                  |                | %     | %                      | %                     | %                             |
| Strong Purists   | 90             | 71.1  | 7.8                    | 16.7                  | 4.4                           |
| Moderate Purists | 44             | 84.1  | 6.8                    | 6.8                   | 2.3                           |
| Neutralists      | 20             | 100.0 | 0.0                    | 0.0                   | 0.0                           |
| Non-purists      | 2              | 50.0  | 50.0                   | 0.0                   | 0.0                           |
| Total            | 156            | 78.2  | 7.1                    | 11.5                  | 3.2                           |

<sup>a</sup>N includes only those who indicated they had felt at least part of the area they had visited was crowded.

Chi square 15.59, 9 degrees of freedom, .10 > p > .05.

Personal experience, coupled with discussions with wilderness visitors suggests, however, that the phenomenon of crowding is generally a highly localized condition. Wilderness use very often tends to become highly skewed in its distribution within any wilderness, with many people visiting only a limited number of locations with the rest of the area utilized very scantily. To some degree, of course, this low level of intensity is a desirable feature for managers to maintain, since it helps insure the production of a high quality wilderness

2. The second part of the document focuses on the management of human resources, including recruitment, training, and performance evaluation. It emphasizes the importance of having a clear job description for each position and the need for ongoing communication between management and staff.

3. The third part of the document addresses the issue of risk management, discussing the various risks that a company may face and the strategies for mitigating them. It also touches on the importance of having a disaster recovery plan in place.

4. The fourth part of the document deals with the legal aspects of business operations, including compliance with local, national, and international laws. It also discusses the importance of having a legal counsel on retainer to handle any legal issues that may arise.

experience. Nevertheless, it appears clear that in many cases, substantial portions of a wilderness area experience little or no use whereas other areas, because of access, fishing, and the extent to which the public is aware of them, carry very high levels of use, levels which very often totally preclude the provision of a high quality wilderness experience. It is the problem of "effective" acreage cited in Chapter III.

This basic analysis of the problem of overuse in wilderness was substantiated by visitor perception of crowding. Most visitors who indicated they felt crowding had been a problem reported that it was confined to only a few places. Thus, the remainder of this chapter will attempt to define those locations in each of the study areas where visitors perceived crowding and relate this perception to the actual use conditions encountered.

#### The Areal Extent of Overuse

Visitors in each of the study areas were asked to indicate that if crowding had been a problem to note on the questionnaire those places they felt this had been the case. From this information then, it was possible to construct a map of each study area portraying where visitors considered that use had reached or exceeded capacity.

To accomplish this, an index of crowding (IC) was computed, where  $IC = \frac{TV}{TC}$ , with TC representing the total number of complaints reported by the individuals in any given area of concern (for example, a lake basin) and TV representing the total number of visitors sampled

who visited that particular area. This is admittedly a rather crude index; nevertheless it accomplishes the basic purpose of permitting the cartographic delineation of those areas which by the character of their use are eliciting expressions of dissatisfaction from visitors and which, because of this, represent the disfunctional organization of space within the wilderness.

From this information then, a series of isolines were constructed with the values of those lines representing the percentage of individuals who visited a particular area and described it as being "crowded." Thus it was possible to obtain a graphic portrayal of the areal extent of crowding and the relationship of its perception to access, attractions, and routes of travel.<sup>1</sup>

Additionally, the relationship between the average number of other parties encountered per day and visitors' expressions of concern about crowding was examined as was the relationship between the average number of other parties camped within sight or hearing per night and complaints of crowding. Specifically, we focused on two questions prompted by earlier conceptual findings: (1) did those persons who encountered an average of over two parties per day while traveling

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<sup>1</sup>There is some conceptual similarity to this approach and that suggested by Penfold, who conceived of plotting "isoprims" or lines connecting "points of equal degree of primitiveness." Although the computation of these lines was strictly a subjective effort by the author, the concept that wilderness quality has a spatial dimension is certainly valid. See Joseph W. Penfold, "The Outdoors, Quality, and Isoprims," in Wilderness: America's Living Heritage, ed. by David Brower (San Francisco: The Sierra Club, 1961), pp. 109-116.

significantly differ, in regard to their propensity to complain of crowding, from those who encountered an average of two or fewer parties per day; and (2) did those persons who camped in sight or hearing of at least one other party, on the average, complain of crowding significantly more often than those who were able to find camping locations offering complete solitude. Through such an analysis it would be possible to assess the degree of consistency between the use conditions visitors conceptually define as constituting overuse and their consequent attitudes and behavior when such levels are actually encountered.

#### Overuse and Crowding in the BWCA

As noted earlier, about 28 per cent of the users sampled in the BWCA complained of crowding. Referring to Figure 18 indicates, however, that the areas of perceived crowding were fairly limited in their areal extent, comprising the Moose Lake area, the Fall Lake entrance, the Saganaga Lake-Sea Gull area, and the Lac La Croix region. Additionally, the Lake One entry represents a problem area, but to a lesser degree.

The principal problem areas, however, are Moose Lake and the Fall Lake entry. These two large lakes lie immediately on the BWCA boundary, only a few miles from the town of Ely which serves as the major point of origination for many of the trips into the area. The consequent concentration of use on these lakes is to be expected to



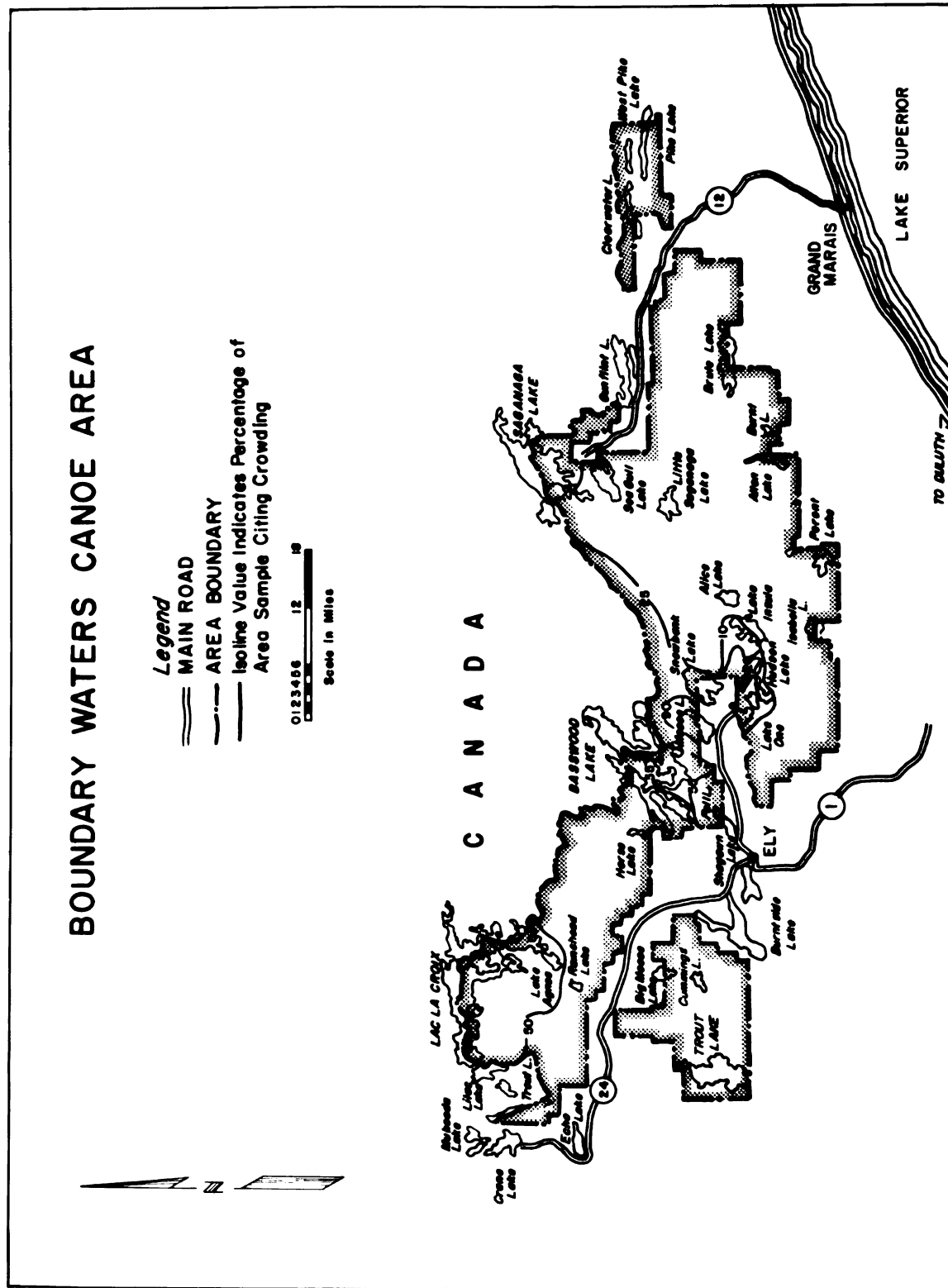


Fig.18 Zones of crowding within the BWCA



some extent, but it appears that it has reached such levels that many persons must endure an initial period of dissatisfaction until they have penetrated a few miles and use begins to disperse and drop off.

It is interesting to note that only about 10 per cent of the paddling canoeists sampled by Lucas considered the Moose Lake as "wilderness" whereas 90 per cent of this sample defined the area as crowded. Similarly, the area immediately adjacent to Fall Lake was considered "wilderness" by between 50 and 90 per cent of Lucas' paddling canoeist sample, and defined as crowded by 55 per cent of this sample.<sup>1</sup>

With the exception of the Saganaga Lake-Sea Gull area and Lac La Croix, the region of crowding is concentrated east of Ely. Access is well developed into this area. The Fernberg Road, extending about 20 miles east from Ely has recently been paved and greatly improved. The provision of improved access into this area will tend to intensify the already skewed spatial distribution of use. Certainly, use of the lakes from Lake One to Lake Insula will go up, as will complaints of overuse.

Both the Saganaga Lake-Sea Gull area and Lac La Croix were classified as "transitional" by Lucas in terms of the relationship between use and capacity. These lakes serve as important components of a considerable amount of Canadian-bound traffic and as use increases

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<sup>1</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 10.

in the BWCA, it seems a reasonable hypothesis that increased numbers of persons will have Canada as the destination of their trip.<sup>1</sup> Lakes that presently accommodate a considerable amount of this northward flow may reasonably expect future increases in both numbers of visitors as well as complaints about overuse.

The major exception to Lucas' earlier findings concerned Trout Lake. He defined the area as "overused"; no complaints of crowding were found in this study. This difference appears related to the sampling plan utilized in this study, however, rather than to an actual decline in use of the lake or to increased tolerance of others on the part of visitors.

It was interesting to find that earlier observations that carrying capacity was a function of not only use levels, but type, spatial locations, and depreciative behavior as well were clearly documented. In analyzing specific comments regarding overuse in the BWCA, it was striking the number of persons who defined crowding in terms of the simple presence of motor boats. Other specific complaints cited littering, campsite wear and tear, and the inability to find campsites away from others.

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<sup>1</sup>The flow of visitors, particularly paddling canoeists, to Canada has been coined the "Northness Hypothesis." The tendency to visit Canada has been demonstrated to be a partial function of total distance traveled on the wilderness trip. See Ernest E. Nelson and Jay M. Hughes, "Travel Distance and Joint Visitation to the Boundary Waters Canoe Area and Adjacent Canadian Wilderness," Minnesota Forestry Research Notes, No. 185 (January 15, 1968), 4 pp.

Visitors were quite specific in their indications that overuse is not uniformly spread throughout the area, but rather, tends to become focused in certain locales. One of the principal locations is around the portages from one lake to another, or around stretches of streams difficult to navigate. Use normally is constricted in these areas as travel patterns converge from a widely dispersed pattern into a narrow flow through some point. In addition, these zones force canoeists into contact with the motor craft which they normally probably try to avoid. The result is almost certainly an increased level of dissatisfaction for the paddling canoeists as well as the strong purists.

Examining the relationship between the average number of parties encountered per day and the number of complaints about crowding revealed a highly significant difference. Those persons who encountered an average of more than two parties per day tended to complain of crowding significantly more often than those seeing an average of less than two.<sup>1</sup> Computing the phi correlation coefficient for this association yielded a value of .35, also a significant value.<sup>2</sup>

An examination of the relationship between the average number of other parties camped within sight or hearing and the propensity to complain of crowding revealed a similarly significant association.

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<sup>1</sup>A difference significant at the .001 level.

<sup>2</sup>Where chi square is significant in a two by two matrix, the corresponding phi value is also significant. See J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, 1965), p. 335.

Those persons who camped at locations where, on the average, less than one other party was camped, were significantly less concerned about crowding than those who had at least one other party nearby each night.<sup>1</sup> These findings coupled together point out a fairly high level of consistency then, between the expressed attitudes of visitors toward use levels and their actual response to such conditions.

A notable characteristic of the areas defined by BWCA visitors as crowded concerns their linear nature. This is in large a reflection of topography; many of the lakes are long and narrow in dimension and in defining areas of crowding, many visitors utilize lakes as a unit of analysis. As will be shown in the western study areas, zones of crowding take on a more nodal dimension, with the exception of the Bob Marshall.

With the exception of the narrow portion of the BWCA north of the Fannberg Road, crowding is restricted essentially to narrow areas along the wilderness boundary. It is apparent that with an increasing number of portages, use declines, particularly motorized use, and there is a subsequent decline in the number of persons who complain of crowding. An exception can be noted along the chain of lakes between Lake One and Lake Insula. Here, two factors foster an increased extent of crowding; (1) the three portages are short and easy to move

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<sup>1</sup>These differences were again significant at the .001 level, with phi equal to .44.

motor boats around; and (2) there are essentially no other routes which branch off the main route. This channeling effect thus tends to contribute to the extended linear parameter of the overused zone.

#### Overuse and Crowding in the Bob Marshall

In the Bob Marshall Wilderness, the largest of the four study areas, two areas were delineated as crowded. First, an extenuated zone along both sides of the South Fork of the Flathead River was noted. This area has long been recognized as having a problem with overuse, and Flathead National Forest officials recently closed several of the camps along the river so that the damage from overuse might be corrected. The open, flat nature of the country and the attractiveness of the river itself have served to draw large numbers of visitors into the area for a number of years.

A second area was located along the east side of the wilderness in Gates Park. Like the South Fork of the Flathead River, this area has sustained moderately high levels of use for some time. Access into this area is either along the North Fork of the Sun River or over Headquarters Pass from the South Fork of the Teton River (see Figure 19).

Both of these areas are characterized by not only an apparent problem of excess use, but from a large amount of horse use and by the presence of administrative structures. Along the South Fork of the Flathead River, a Forest Service Ranger Station and an airstrip are located at Big Prairie, and another airstrip is at Black Bear. An

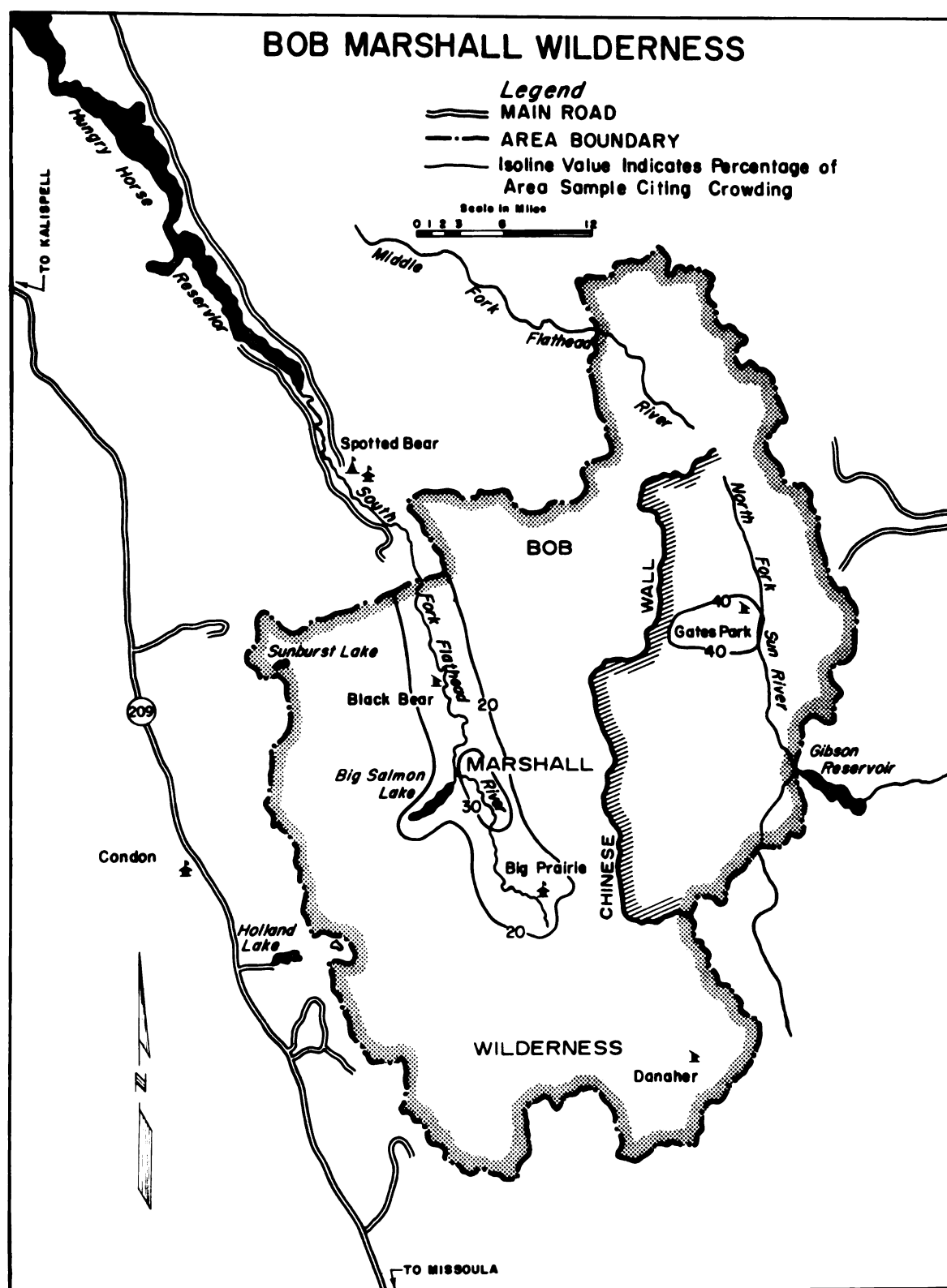
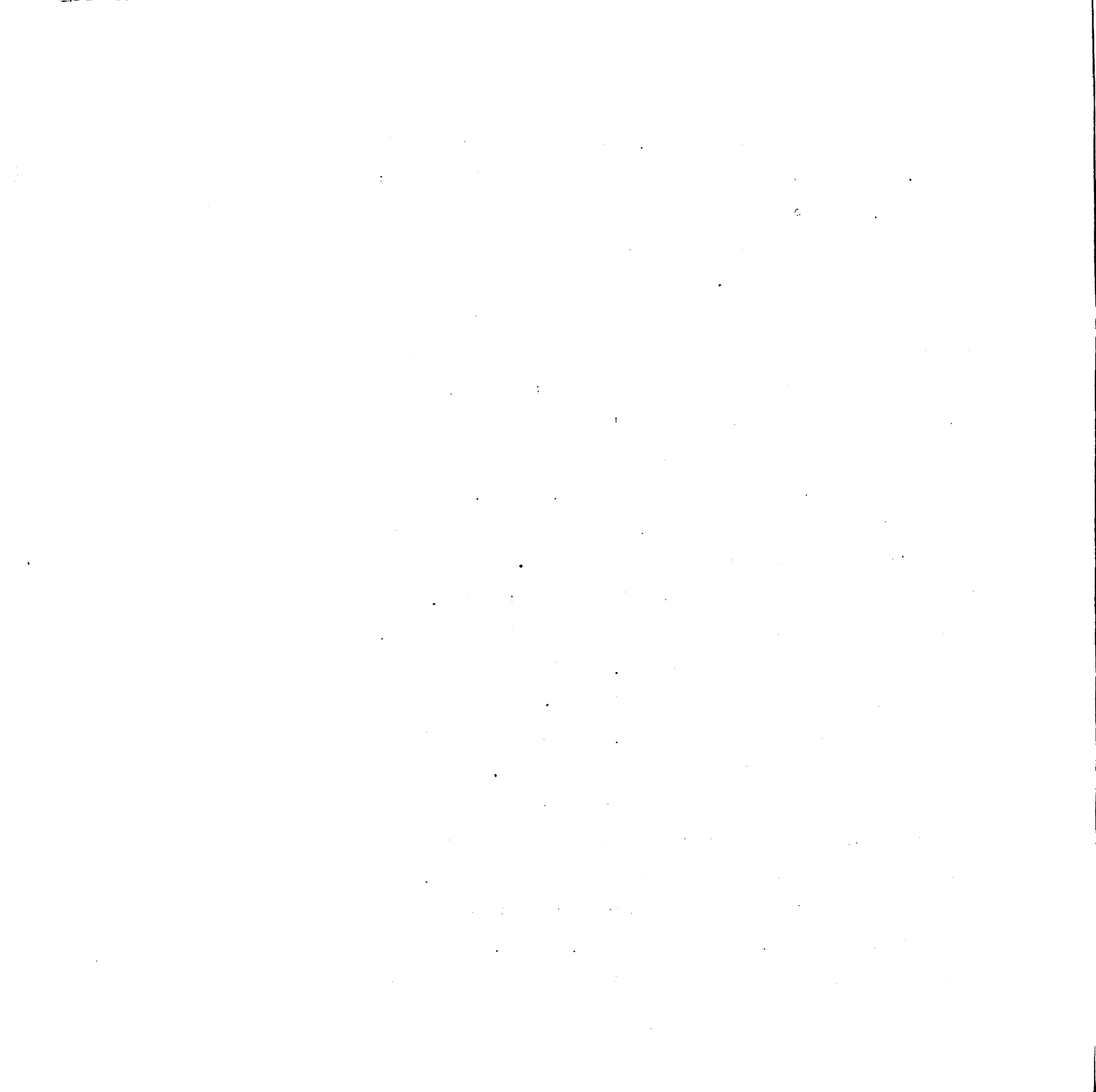


Fig. 19 Zones of Crowding within the Bob Marshall

airstrip is also located at Gates Park, although it is currently being removed. These airstrips have been restricted to administrative use; nonetheless, they represent extremely noticeable impacts on the land and the occasional aircraft landing or taking off can be seen and heard from some distance away.

The pattern of use along the South Fork of the Flathead seems characterized to a great degree by some type of southward inertia. Travel along this route can be very heavy at times; the flat, open nature of the area extends the individual's field of vision and it is not uncommon to have others in sight a good share of the time during peak periods of use. There does not seem to be, however, much use moving up into the adjoining drainages, where fishing is good and the opportunities for solitude are certainly much better. This suggests that much of the travel may be "destination-oriented"; that is, a certain location is settled upon by party members as the destination, and the trip is carried out to that point, even if use conditions make the enjoyment of a wilderness trip difficult. Perhaps the idea of penetrating into the area is important, a hypothesis somewhat akin to the "Northness Hypothesis" cited earlier in the BWCA.

The longitudinal boundary of the zone perceived as crowded along the South Fork of the Flathead is a marked departure from the pattern found in the other western areas. In most of the areas, lake basins form a convenient frame of reference for users to define the areal extent of crowding. In the Bob Marshall, however, the ridges paralleling the river on the east and west side form the boundaries.





This longitudinal aspect represents a serious impediment to the goal of managing for a high-quality wilderness experience. As noted earlier, the South Fork represents a major artery of travel into the wilderness and it is clear that use conditions are such that a considerable amount of penetration is necessary before many users can find a desirable experience.

Use problems appear to intensify somewhat near Big Salmon Lake and its junction with the South Fork. The attractions of a lakeside camping location and the opportunity for both stream and lake fishing probably make this an especially desirable location. It is paradoxical, however, that these attractive qualities tend to accelerate and accentuate those problems which will rapidly lower the desirability of this particular area (e.g., littering, campsite deterioration, too many people, etc.).

It was suggested in Chapter IV that the sharp reaction of Bob Marshall visitors to encountering others, particularly in the vicinity of the campsite, might represent empirical evidence of the relationship area size has to attitudes. This conceptual level relationship was thus examined further in analyzing the attitudes of Bob Marshall visitors about actual use conditions encountered.

Based upon the conceptual analysis in Chapter IV, two use levels seem critical in a discussion of carrying capacity. First, two encounters per day seems to be the maximum number possible for at least half the visitors to still have a satisfactory experience. In

analyzing the number of complaints lodged about crowding, those persons who had encountered an average of over two parties per day complained significantly more often than those who encountered fewer than two per day.<sup>1</sup>

A second use level examined concerned the average number of other parties that were camped within sight or hearing each night. As was the case with the relationship between complaints of crowding and meeting over two parties per day, those who had to camp near at least one other party each night were bothered by crowding to a significantly greater degree than others.<sup>2</sup>

It should be noted at this point that the examination of crowding in the Bob Marshall pertains only to the summer-use period. Forest Service estimations describe the wilderness as primarily a fall use area, principally for big game hunting. It seems very likely that both areas associated with overuse in the summer and the type of use conditions summer visitors perceive as contributing to crowding differ for the fall visitor.

#### Overuse and Crowding in the Bridger Wilderness

The 383,000 acre Bridger Wilderness is split almost exactly in half by an oblong zone defined by visitors as severely overused

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<sup>1</sup>A difference significant at the .001 level. Phi equaled .64.

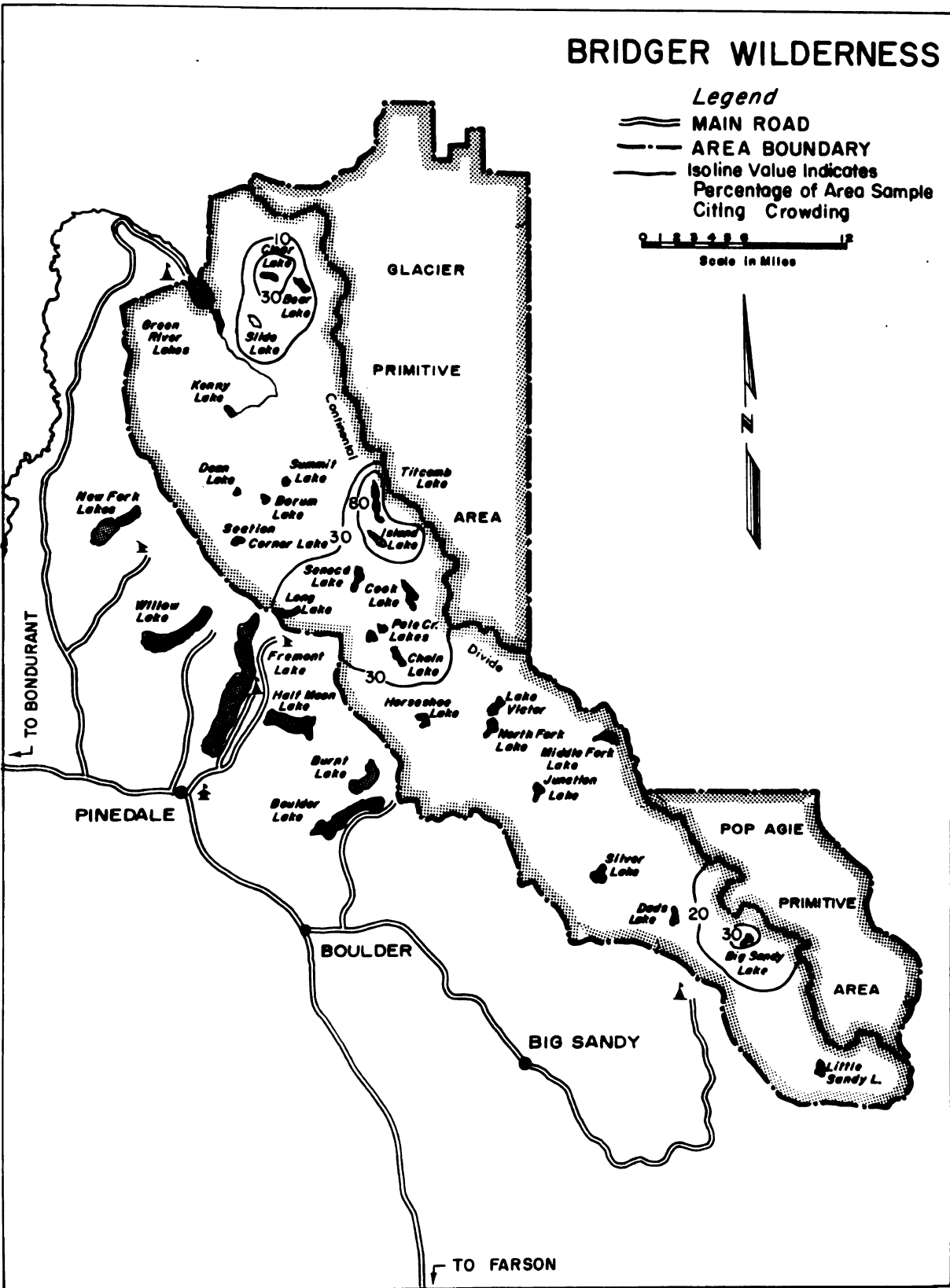
<sup>2</sup>Again this difference was significant at the .001 level, with phi equal to .55.

(see Figure 20). This zone centers on Island Lake and is fed by a well-maintained trail leading in from Elkheart Park, which has a Forest Service Information Center and a large parking lot. Considerable day use enters here, destined primarily for Long Lake, only a mile from the road end.

Two additional areas of overuse, although considerably smaller in their areal extent, lie at opposite ends of the wilderness. At the northwest end, the attraction of good fishing in the Slide Lake area coupled with its proximity to the road end at Green River Lake, operate to encourage heavy use. Similar conditions at the southeastern end create a problem of overuse in the Big Sandy Lake area.

Complaints about excessive trail traffic were inordinately common in the Bridger. This was particularly true in the Big Sandy area and along the trail from Elkheart Park to Island and Seneca Lakes. This may be related to encounters between those actively seeking an experience with the wilderness environment as opposed to those primarily interested in a day's good fishing in a mountain lake.

This concern with trail traffic was reflected in the examination of the relationship between the average number of parties encountered and the tendency to complain of crowding. As Table 44 indicates seeing over two parties per day greatly increased the probability of an individual complaining of overuse in the Bridger.



**Fig. 20 Zones of Crowding within the Bridger**

TABLE 44

THE RELATIONSHIP OF ACTUAL USE ENCOUNTERED TO THE  
PERCEPTION OF CROWDING IN THE BRIDGER

| Average Number<br>of Parties<br>Seen per Day | Number Expressing<br>Complaints with<br>Crowding | Number not Expressing<br>Complaints with<br>Crowding | Total |
|----------------------------------------------|--------------------------------------------------|------------------------------------------------------|-------|
| $\leq 2.0$                                   | 9                                                | 61                                                   | 70    |
| $> 2.0$                                      | 38                                               | 35                                                   | 73    |
| Total                                        | 47                                               | 96                                                   | 143   |

Chi square 24.88, 1 degree of freedom,  $.001 > p$ .  $\phi = .42$ .

Only slightly less significant was the relationship found between complaints of overuse and those who camped on the average near more than one other party and those who camped near none (Table 45). The relatively strong negative disposition to even fairly low intensities of use is in keeping with earlier conclusions that Bridger visitors hold an image of wilderness that is quite "pure" in its content. This was, of course, also reflected in the large percentage of Bridger visitors classified as strong purists.

In defining capacity, in part, as the ability of an area to provide a high quality wilderness experience, it became necessary to examine one additional aspect in the Bridger. Under the terms of the Wilderness Act:

. . . the grazing of livestock, where established prior to the effective date of this Act, shall be permitted



to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture.<sup>1</sup>

TABLE 45

THE RELATIONSHIP OF OTHER PARTIES CAMPED NEARBY AND THE PERCEPTION OF CROWDING IN THE BRIDGER

| Average Number of Other Parties Camped Nearby | Number Expressing Concern with Crowding | Number not Expressing Concern with Crowding | Total |
|-----------------------------------------------|-----------------------------------------|---------------------------------------------|-------|
| $\leq 0.4$                                    | 15                                      | 54                                          | 69    |
| $> 0.5$                                       | 33                                      | 41                                          | 74    |
| Total                                         | 48                                      | 95                                          | 143   |

Chi square 8.36, 1 degree of freedom,  $.01 > p > .001$ .  
 $\phi = .24$ .

Currently in the Bridger there is an extensive amount of sheep grazing. Allotments have been established to hold numbers of sheep in line with grazing capacity, but it is apparent from data obtained in this study that the animals are contributing to a serious decline in visitor satisfaction. There are at least three main sources of friction: (1) the damage caused by sheep grazing on alpine meadows and the consequent effect upon esthetics; (2) other evidence of the sheep's presence, such as odor, manure, and dust; and (3) competition for forage with recreational pack stock. Sheep grazing is declining,

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<sup>1</sup>The Wilderness Act, p. 6.

however; personnel on the Bridger Forest indicate over a 50 per cent decline between 1940 and the present.<sup>1</sup> Increasing costs of such grazing will probably continue this decline. Until its elimination, however, it can be expected to remain a serious source of dissatisfaction to the visitors and its impact upon carrying capacity will remain great. As one visitor commented in his questionnaire: "The sheep, of course, lent their noxious presence to an otherwise superb area."

As was found in the other western study areas there is an increase in the level of complaints about crowding in the latter portion of the summer that is considerably beyond what would normally be expected from the general upswing in use. This appears related to two major causes in the Bridger. First, there is an intensified amount of day use along the peripheral area of the wilderness, but in some cases extending into the area for several miles. Fishing and general outdoor enjoyment appear to be principal motives for much of this use. Its effect, however, is to create a situation of frequent encounters along the trunk trails leading into the area. The levels are apparently high enough to offset the generally greater level of tolerance for other users on the trails and at the periphery of the wilderness found in Chapter IV as well as to prompt many persons who normally are not concerned about overuse problems to lodge complaints.

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<sup>1</sup>Bridger National Forest, Wilderness Patrolman Handbook.  
(Typewritten.)



Secondly, complaints are also prompted by the accumulated evidence of visitors from the earlier portion of the use season. Comments from visitors contacted in late August and early September such as "looked heavily used" and "lots of evidence of heavy use" tend to strengthen this conclusion.

#### Overuse and Crowding in the High Uintas

Visitors identified three major units in the High Uintas where use had reached sufficient proportions to elicit complaints of crowding. As Figure 21 shows these areas are closely associated with both clustering of lakes as well as relative closeness to access points into the primitive area.

It should again be pointed out that "crowding" is not necessarily defined by visitors in quantitative terms only; numerous persons indicated that a particular area was "crowded" in terms of seeing a large Scout party, horses, or litter scattered about.

Just over one out of every ten persons camping in Naturalist Basin and the Brinton Meadows area felt crowding was a problem; in the Brown Duck area, however, this rose to 40 per cent. Perception of crowding at individual lakes rose in all three areas. This was to be expected since most persons indicated lakes as overnight camping areas, and earlier discussions had clearly indicated the reduced tolerance of other users around one's campsite.

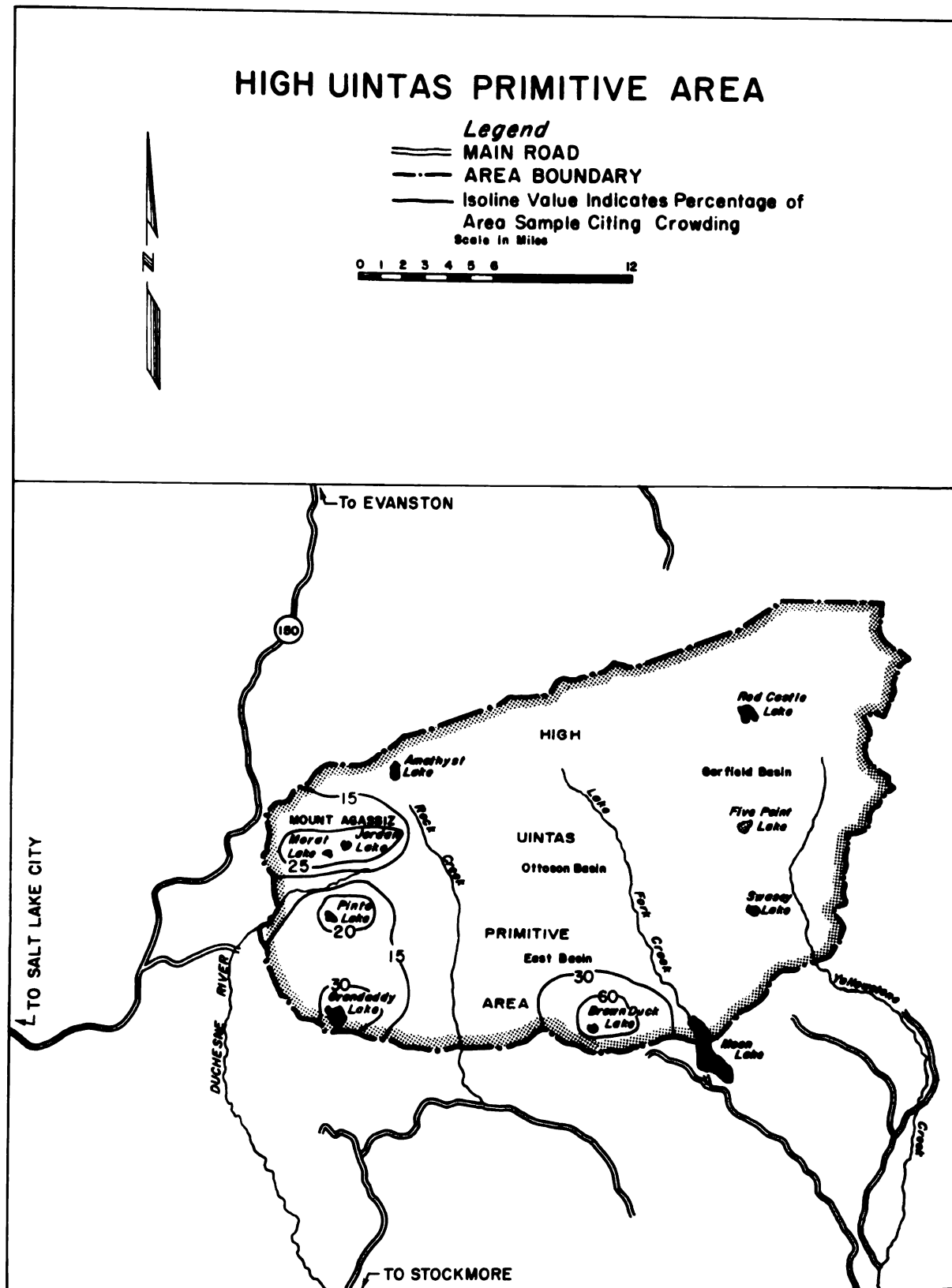


Fig. 21 Zones of crowding within the High Uintas

Several persons commented they felt the first few miles of the access trails were crowded, particularly along the Highline trail, but "this was to be expected." This type of response suggests that a person can notice some dissonant elements in his immediate environment, but due to mitigating forces related to the particular spatial location of the event not suffer any special deleterious effect. It also concurs with the earlier conclusion, based upon a more conceptual level investigation, that users appear to zone wilderness into some sort of "peripheral" area and a "core" area. Expectation of encounters with others is higher in this peripheral zone and visitors appear to be more willing to accept others in this area than in the core area. No one, for example, indicated that seeing too many people near their campsite did not bother them.

Concomitant with the observation that the perception of crowding is restricted to three rather distinct areal units is the reciprocal conclusion: A substantial proportion of the area does not experience the level or type of use visitors perceive as crowded. As suggested earlier, wilderness use is highly skewed in its spatial distribution (and temporal, as well). It is interesting to note that the three areas of crowding are all immediately adjacent to the Primitive Area boundary, and in the case of Naturalist Basin, a major state highway lies within a few miles of the area. Hence, it seems probable that internal maldistribution of wilderness use may be closely associated with the extent of external access to the area.

Also relevant to this matter is the fact that all three areas possess a number of lakes which provide good fishing opportunities. The chance for good fishing, coupled with nearness to the road end, but in an environment still largely unmodified by man, is a powerful attractant to the potential recreationist. The level of concern for overuse, however, suggests that the very qualities that lend attractiveness to the area may be operating simultaneously to create a condition of reduced quality.

The high alpine basins in the primitive area are focal points of activity. Here is where the lakes and their fishing resource are found; here is where considerable horsefeed is located. As a consequence, the perceived extent of crowding coincides to a large degree with physiographic boundaries, and as Figure 21 indicates, it takes on a more circular, nodal appearance. Interestingly enough, little use seems to be occurring along the major streams in the area; the attraction of high mountain lake fishing apparently accounts for this.

Proposals for including the High Uintas Primitive Area in the National Wilderness Preservation System have included a substantial acreage addition at the eastern end of the present area. The inclusion of this area will probably have little effect in terms of offsetting present overuse problems for two reasons: (1) the present problem areas are located some distance away from the proposed addition and east-west trail development is poor; and (2) the de facto area

proposed for addition is almost certainly supporting a considerable amount of use at present.

As mentioned above, wilderness use is highly skewed in its temporal distribution. The consequence of this is that visitor concern with crowding may actually be limited to fairly brief intervals of time, when use reaches especially high levels. This certainly appears to be the case in the High Uintas. Between August 19 and September 1, 39 per cent of the total sample was contacted in the area. In this same period, however, over 60 per cent of the total number of complaints about crowding were received. A more complete commentary will be made on the relevance of this finding in the last chapter; for the time being it will suffice to note that efforts directed at a temporal redistribution of use, given the constraints of inclement weather and so forth, may offer substantial returns in management concerns with the question of carrying capacity.

The relationship between the actual level of use encountered and visitor expressions of dissatisfaction with crowding closely followed earlier conceptual findings and those in the other study areas. Analyzing the average number of parties encountered per day compared to the number of expressions of crowding revealed a fairly significant relationship ( $p > .05$ ). Encountering an average of over two parties per day yielded a markedly greater level of visitor dissatisfaction with crowding than for those persons seeing an average of no more than two.

An almost identical relationship was found between the average number of other parties camped within sight or hearing of an individual and his propensity to complain about crowding. Only 4 persons out of the 51 sampled who reported no other camps within sight or hearing of their own complained about crowding.<sup>1</sup> However, 21 out of 101 persons who camped near others were motivated to complain of crowding, a difference significant at the .05 level.<sup>2</sup> Phi equaled .16.

Thus in the High Uintas actual expressions of dissatisfaction and concern about crowding appear to be significantly linked to conceptual expressions previously determined.

#### Wilderness and Overuse: Some Concluding Comments

Each of the four areas studied proved to have certain areas perceived by visitors as crowded and, as a consequence, incapable of fully providing the type of experience for which they were designated. Mapping these areas thus provides an image of the areal extent of the hiatus between managerial intent and management goal realization. Zones of crowding tend to take on a linear or nodal dimension which in turn appears linked to the configuration of the surrounding

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<sup>1</sup>These complaints generally were focused upon the consequences of past use, such as litter, damaged vegetation, and so forth, further indicating the broad connotative definitions assigned to the term "crowded."

<sup>2</sup>Sample size here is 151 compared to 154 on other tables. Three persons indicated camping locations outside the Primitive Area boundary and were thus excluded from this tabulation.

physiography. This is not to suggest that physiography determines the extent of crowding; rather, it simply serves as a convenient frame of reference for the user to express boundaries for areas he perceives as crowded.

Visitor expressions of crowding were not limited to situations of excessive use; numerous complaints were recorded in all areas about littering, the presence of large parties, and in the case of the BWCA, about motor boats. In addition, there was considerable visitor dissatisfaction about nonnormative behavior in the wilderness (e.g., loud, noisy groups) and it is apparent this form of depreciative behavior is an important source of visitor dissatisfaction.

Two factors are associated with the problem of crowding. First, well-developed access, both exterior (that is, up to the wilderness boundary) and interior (the transportation network within the wilderness boundary) tends to focus use at certain locations. With word of mouth serving as an apparently important source of information regarding locations to visit within wilderness, those areas with presently the highest levels of use probably tend to attract a disproportionately large segment of those visiting the area for the first time. This effect, however, might be mitigated as use reaches such levels so as to create more obvious and serious problems.

A second major factor concerns fishing. Considered as the primary objective or as an incidental activity, fishing is undoubtedly an important facet of the wilderness trip. Even in those situations

where it is a secondary objective, its presence (or absence) is a salient factor in an individual's trip plan. In lakes and rivers that lie in proximity to the wilderness boundary, the presence of good fishing is a powerful attractant, not only to those concerned with a wilderness experience, but to those who simply are looking for good fishing. One possible technique for dealing with the problem would be some type of "subsistence limit"; that is, limit the catch to only those that will be used for food on the wilderness trip itself.

To this point in the discussion, we have analyzed conceptual definitions of carrying capacity, possible methods of restricting or reallocating use, and the specific extent of overuse in each of the four study areas. How does this information, however, relate to the task of establishing a carrying capacity for wilderness? In Chapter VII, we turn to a discussion of the management relevance of the information uncovered so far and the manner in which it relates to the over-all problem of resource decision-making.



## CHAPTER VII

### MANAGERIAL AND CONCEPTUAL SOLUTIONS TO THE CARRYING CAPACITY PROBLEM

In this final chapter we return to the initial impetus underlying the origin of this study. Given our present understanding of the multifaceted nature of wilderness recreation carrying capacity, how can this data be codified into a framework which the wilderness manager can utilize to formulate a carrying capacity policy?

Like virtually all resource decisions, such a task will involve a consideration of values. Thus, to adequately approach the problem we initially turn to a discussion of the role of values in resource decision-making.

#### The Role of Values in Resource Decision-Making

A growing number of studies of natural resources have explicitly investigated the role of public attitudes and values upon resource utilization and policy formulation. Geographers have made a particularly noticeable contribution to these efforts.<sup>1</sup>

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<sup>1</sup>Recent examples include Louis Hamill, "The Process of Making Good Decisions About the Use of the Environment of Man," Natural Resources Journal, 8 (April, 1968), pp. 279-301; Roger E. Kasperson, "Political Behavior and the Decision-Making Process in the Allocation of Water Resources Between Recreational and Municipal Use," Natural Resources Journal, 9 (April, 1969), pp. 176-211; and Gilbert F. White, "Formation and Role of Public Attitudes," in Environmental Quality in a Growing Economy, ed. by Henry Jarrett (Baltimore: The Johns Hopkins Press, 1966), pp. 105-127. Additional works may be found in the University of Chicago, Department of Geography Research Series.

One element in resource decision-making seems clear. The degree to which the decision relative to some path of action regarding a resource is judged as a success is directly related to the degree it is in coincidence with the values that resource users hold for that resource. Ultimately then, resource decision-making becomes a matter of value judgment.

Value judgment is generally conceived of as a somewhat less than desirable method of selecting some course of action. The inference is often that such decisions are marked by personal biases, prejudices, and other shortcomings. In a recent monograph, however, Meehan has rigorously demonstrated that value judgments are the only tool at man's disposal for dealing with the environment.<sup>1</sup> Value judgments, Meehan argues, represent one of four basic instruments for achieving human goals with reference to the environment. This group includes description (the organization of perceptions into classes and the establishment of linkages between these classes), forecasts (the creation of anticipations about future events in the environment, but lacking why events occur), explanation (the generation not only of expectations about change, but also ways in which variables interact to produce these changes), and finally, value judgment (the expression of preference among real options).<sup>2</sup>

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<sup>1</sup>Eugene J. Meehan, Value Judgment and Social Science (Homewood, Illinois: The Dorsey Press, 1969), p. 6.

<sup>2</sup>Ibid., pp. 19-21. Emphasis added.

Value judgments, by their very nature, are prescriptions of future action. Resource managers then, must examine their decisions regarding some course of action (or inaction) in light of the consequences it will bring to bear upon the society of tomorrow. Again turning to Meehan, consequences become the operational basis for a more detailed definition of value judgment:

Value judgment involves a choice among alternative sets of consequences for human beings that can be generated by human action or behavior in a given situation. The choice is judged by its consequences. . . .<sup>1</sup>

How then are consequences measured? The ranking of a series of alternative consequences must be tied to the objectives that the decision-maker has identified and defined.<sup>2</sup> The decision-maker, in this case, may be either an individual or some aggregate body, such as a federal agency.

The relationship between values, consequences, and objectives is complex and interwoven. Objectives must certainly reflect the value systems within which they are to be made. As noted above, the consequences of actions are judged by the extent to which they meet objectives, and as logically follows, by the extent they coincide with expressed values.

There are at least two sources of weakness in this scheme. First, evaluating consequences where the temporal interest is in the

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<sup>1</sup>Ibid., p. 40.

<sup>2</sup>Hamill, "The Process of Making Good Decisions About the Use of the Environment of Man," p. 290.

future presupposes some understanding of the values considered relevant by future generations. As Price has noted:

Questions involving the conservation of natural resources hinge on the concepts and values of the future. Both are elements of culture; the values always, and the concepts often, lack objective foundations which are free from the thought patterns of a particular society.<sup>1</sup>

One obvious solution to this problem lies in adopting a strategy that does not preempt the alternatives or options available to future generations. This path underlies much of the current interest in option demand, which ascribes certain economic values to retaining future options regarding resource decisions.<sup>2</sup> A corollary to this line of reasoning is a consideration of consequences that will not unduly risk future levels of living; that is, an espousal of a value system which minimizes risk and uncertainty for future generations.<sup>3</sup>

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<sup>1</sup>Edward T. Price, "Values and Concepts in Conservation," Annals of the Association of American Geographers, XLV (March, 1955), p. 65. Intertemporal differences in values and the problems of relating values advanced by past societies to the problems experienced by present societies is discussed in Barnaby C. Keeney, "The Bridge of Values," Science, 169 (July 3, 1970), p. 27.

<sup>2</sup>Option demand is discussed cogently by Krutilla in "Conservation Reconsidered," pp. 780-782.

<sup>3</sup>This point is examined, albeit briefly, by Philip M. Hauser, "The Crucial Value Problems," in Perspectives on Conservation: Essays on America's Natural Resources, ed. by Henry Jarrett (Baltimore: The Johns Hopkins Press, 1958), pp. 102-103. It is also cited as a justification of a greatly reduced rate of population growth rate by Paul R. Erlich in The Population Bomb (New York: Ballentine Books, Inc., 1968), pp. 197-198.

A second, more critical problem, briefly noted in Chapter II, concerns the multiplicity of values that exist regarding the environment. In developing courses of action, whose values are utilized to guide management decision-making? As has been demonstrated here, a wide range of value systems are found among the wilderness visitors. Additionally, there are others whose value system regarding wilderness would call for total elimination of such areas.

The answer would appear to lie in the identification of what is relevant. Relevance, in turn, is measured by the objectives settled upon by the decision-maker. That which serves to meet stated objectives thus becomes the foundation from which management decisions can be directed.

This brings us to the point where we can relate this conceptual scheme of the relation of values to resource decision-making to the empirical effort reported in this study. Three steps need to be examined: (1) whose value systems will be considered in the computation of wilderness recreation carrying capacity; (2) what objectives are we striving to fulfill; and (3) what are the probable consequences stemming from (1) and (2).

#### The Relevant User Value System

In Chapter III the value of segmenting the wilderness user population was reviewed. The task of attempting to maximize the benefits (which are a function of the individual's value system) to

each and every wilderness visitor is a physical and mathematical impossibility.<sup>1</sup> As an alternative, striving to accomplish the widest possible use would certainly result in the deterioration and eventual destruction of a system of areas where the display of natural forces is the preeminent management objective.

Concern with this latter possibility, then, underlies the rationale and motivation of the purism scale. By selectively considering the attitudes and perceptions of a population which has the most highly developed appreciation of wilderness values recreation use may be maintained at a level consistent with the preservation objectives of the Wilderness Act while also insuring the availability of a high quality wilderness experience. Thus, in examining the question of wilderness recreation carrying capacity, we will focus attention on the strong purists.

#### The Objectives of a Wilderness Recreation Carrying Capacity Policy

The objectives of a policy concerning wilderness recreation carrying capacity are expressed within an institutionalized format (the Wilderness Act) as well as within the value systems espoused by the strong purists. There is, of course, a reciprocal relationship involved here; the Wilderness Act was created out of a consensus of

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<sup>1</sup>Orris C. Herfindahl, What is Conservation?, Resources for the Future Reprint No. 30 (Washington, D.C.: Resources for the Future, Inc., 1961), p. 2. Although the possibility of maximizing the aggregate value to a subset of users should not be summarily dismissed at this time.

values held by persons strongly concerned with preserving some remnants of primitive America and the Act, in turn, legislatively protects and guarantees the values which strong purists deem as desirable (examples of the primitive landscape, solitude, etc.).

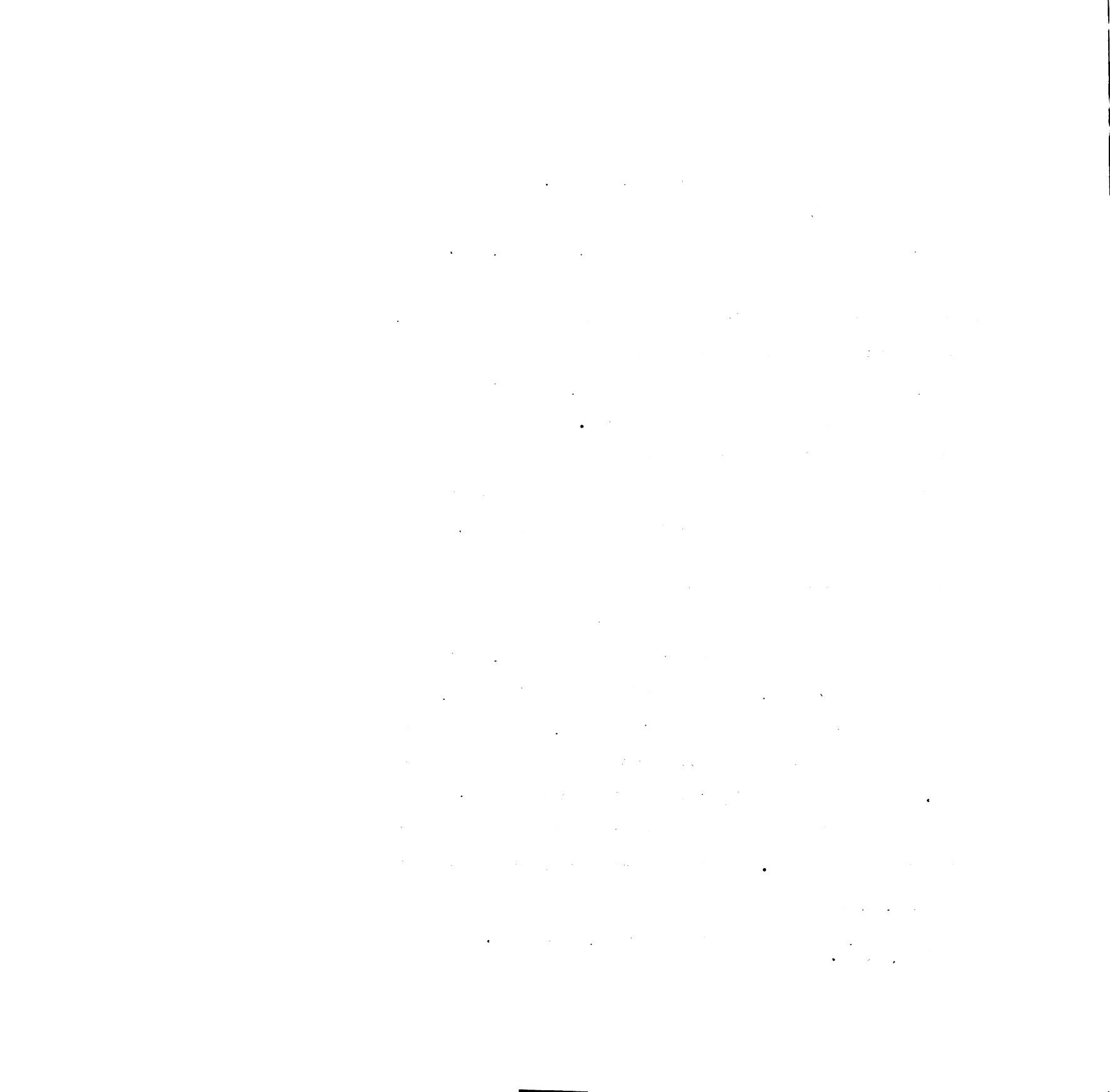
This consensus between the objectives embodied within institutional policy and the objectives espoused by the strong purists presents an unusual but fortuitous circumstance to the wilderness manager. However, while the general goals may be similar, unquestionably there remain significant differences regarding means. Solicitation of user attitudes and objectives thus remains an important method of minimizing resource manager and resource user differences regarding the appropriate techniques and alternatives for attaining a common objective.

#### The Consequences of Carrying Capacity

Earlier reference was made to Hardin's evaluation of the three options open to wilderness managers regarding future use.<sup>1</sup> Given institutional constraints, both legislative and administrative, as well as the constraints endorsed by the strong purists, it is clear that a carrying capacity must be instituted for the elements of the wilderness system. The consequence of inaction on this matter is clear; the gradual deterioration of a system of primitive landscapes where solitude is a salient quality. The implementation of a carrying capacity

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<sup>1</sup>Hardin, "The Economics of Wilderness," pp. 21-22. See footnote 3, p. 57.





policy, however, will also have certain consequences that should be briefly noted.

First, it will be a necessary step in fulfilling the objectives of the Wilderness Act. Only through the implementation of a policy that weighs esthetic and physical capacity considerations in light of these objectives can the system be maintained. Any other action (except, perhaps, total closure) can only yield a series of disparate units, characterized by varying degrees of human influence, and varying levels of inability to provide high quality wilderness recreation experiences.

A second consequence is that the development of a carrying capacity policy based upon the attitudes and perceptions of strong purists will mean a level of use somewhat less than what is deemed "full capacity" by many persons. One almost certain result of this will be increased pressure on the managing agencies to maximize recreational output from these lands by admitting more people. This will demand the dissemination of wilderness management objectives not only to wilderness users, but to other outdoor recreationists, industrial interests, and the general public, along with the manner in which such objectives mesh with over-all resource management objectives and plans.

A consequence closely tied to the above discussion will involve the provision of other opportunities for those seeking the more primitive styles of outdoor recreation. Included would be not

only wilderness but areas where an emphasis would be placed on providing recreation experiences in a natural type of environment. In such areas many of the improvements discussed in Chapter V under managerial inputs would be entirely appropriate. It may be expected that demand and support for such areas will increase, with an accompanying crystallization in attitudes among the public and managing agencies about appropriate areas for such management, types of facilities, and so forth.<sup>1</sup>

Assuming then that the wilderness administrator undertakes the task of establishing the carrying capacity of an area under his jurisdiction, what steps and considerations might be undertaken to enhance the ability of the wilderness to provide a high quality experience?

Two broad alternative courses of action appear to be available. First, there are a variety of actions (for which there exist sufficient data to support and administrative authority to act now) that would eliminate or ameliorate current sources of visitor dissatisfaction. Secondly, the decision can be made to restrict the number of wilderness visitors at some point. These actions are not, of course, mutually exclusive. To examine them in more depth, however, let us detail some specific steps that might be undertaken under the first item.

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<sup>1</sup>Considerable interest has already developed for such units called variously "pioneer," "frontier," and "backcountry" areas. Several proposals are currently under study by the Forest Service and a number of such areas have been administratively designated under Regulation U-3(a).

### Measures to Increase Capacity

Below are twelve broad areas of action in which wilderness managers should initiate action as soon as possible. Each of these courses of action lie within the constraints of the Wilderness Act and are endorsed by strong purists. Their implementation would markedly improve the ability of wilderness to provide a high quality experience to the user while insuring the management objective of resource preservation and thus postpone the time when rationing will be needed.

#### Control Party Size

The extraordinary impact of large parties on visitor satisfaction and wilderness ecology and the adverse effect of such groups on both managers' and users' objectives clearly warrants restrictions on the number of persons and stock. A party size limit of twelve individuals appears to be about the largest group possible consistent with protecting the quality of the experience for others such a party might meet.

Stock numbers must also be controlled. A party of twelve people traveling by horse presently require an additional 15 to 20 animals for packing purposes (assuming a one week trip). Administrators should cooperate with commercial outfitters to limit pack stock to about one animal for each guest. The adoption of some of the new, light camping gear currently available would greatly facilitate this

effort. Whenever feasible, the pack animals should travel separately from the main party, joining with them only at the campsite. It would be preferable that the two groups travel by different routes, and in many cases, this is already done. This would tend to reduce both the impact on the physical environment as well as on other parties that might be encountered. The spatial diffusion and reduction of ecological and esthetic impacts should be encouraged.

Commercial outfitters operating on National Forest lands are presently regulated in terms of itineraries and number of stock allowed through the issuance of special-use permits. Such a system provides a convenient framework for wilderness managers to further offset the deleterious effects of large parties. When more than one large party is in the wilderness at the same time, it would seem advisable to keep them separated by at least one day's travel (10 to 15 miles).

There does not appear to be a similar convenient opportunity for dealing with the large private horse parties. There would need to be a concomitant effort by wilderness administrators to encourage these groups to visit ranger stations before starting a trip so that itineraries would not unduly overlap those of commercial outfitters or other private groups. If it appears that such a pattern could not be arranged, then groups should be directed to other alternatives (adjoining de facto wilderness, for example) or requested to delay starting their trip until such time that they could be accommodated in the area with a minimum impact on other parties.

### Elimination and Control of Littering

The presence of litter is a serious source of dissatisfaction to all wilderness visitors. Therefore, effort should immediately be directed along two lines. First, clean-up of residual litter coupled with a continuing program of clean-up should be undertaken. As suggested earlier, the presence of litter may contribute to continuing accumulation. With the removal of past accumulations, however, future problems may diminish greatly.

Secondly, a strict program of enforcement should be undertaken. Present legal mechanisms for dealing with a person observed littering in a wilderness are unwieldly and time-consuming, with the person who observes the violation presenting evidence to the District Ranger who in turn takes the case to a Federal Commissioner. A summons is then issued and the case is finally brought to court.

It seems likely this process may discourage the vigorous prosecution of offenders. A more reasonable process would be to provide wilderness rangers and others normally working in the wilderness with authority to issue summons at the scene of the violation. The case could then be brought immediately before the Federal Commissioner for a ruling. This process is similar to current practices by the National Park Service and has proved to be an expeditious and effective method of dealing with such problems as speeding and littering in the National Parks.

### Provide Wilderness Users a Greater Basis for Choice

The skewed nature of the distribution of wilderness recreationists within any area has been cited. Certainly part of this is related to patterns of exterior access and this will be discussed shortly. However, it appears that present use patterns are also related to the information concerning alternative opportunities and attractions that the visitor possesses. The decision as to where to go and what to do for many people has become what White calls "the most elementary form of choice--the reaffirmation of the past."<sup>1</sup> That is, many persons probably tend to simply follow past routes with which they are familiar.

It is clear that additional sources of information may be one method of effecting new use patterns. Such data as attractions, fishing opportunities, especially scenic hikes, campsites that provide complete solitude, available horse feed, and so forth should be made available to the users through new, improved maps and/or guidebooks.

Such publications would have two important functions. First, they could represent an important management tool, particularly if it can be demonstrated that patterns of use can be influenced through the input of additional information relevant to the wilderness visitor.<sup>2</sup>

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<sup>1</sup>Gilbert F. White, "The Choice of Use in Resource Management," Natural Resources Journal, 1 (March, 1961), p. 28.

<sup>2</sup>This possibility may be explored in 1971 in the Spanish Peaks Primitive Area. An effort will be made to develop a recreational map providing a comprehensive store of information for distribution to the public. Use patterns will then be obtained through a mail questionnaire

Secondly, such publications represent a potential means of enhancing visitor satisfaction and understanding of wilderness. By providing data concerning the area's diversity as well as information concerning the nature of the biological and geological elements of the environment, the total quality of the experience can probably be enhanced.

An additional aspect that warrants attention here concerns the provision of information about other wildernesses and about wilderness-like areas. Nearly one out of five in this study's sample were classified as "neutralists" or "non-purists." Obviously these persons seek the type of experience and opportunity associated with areas other than wilderness. Another 40 per cent were defined as "moderate purists" and the type of experience they desire could probably be largely met in areas managed for a primitive kind of recreation, but outside the constraints of the Wilderness Act. Providing such information will require the utilization of media other than the maps or guidebooks suggested above. Literature describing details about alternative opportunities and readily available to the public should be developed.

#### Eliminate Motor Craft in the BWCA

Despite their protected position within the Wilderness Act, it is imperative that if the objective of providing outstanding opportunities

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and compared to patterns obtained from a current study. Allowing for variations in weather conditions between the two years, it should be possible to obtain some measure of the effect of such information on patterns of use.

for solitude in a primitive environment is an important goal of the Wilderness Act, motor craft in the BWCA be eliminated. Lucas noted almost ten years ago that elimination of motor craft beyond the second lake from the boundary would greatly increase capacity<sup>1</sup> and his observation seems even more pertinent today.

It is in a sense paradoxical that in an area designated as a "Canoe Area," the objective of providing an opportunity for primitive canoeing and camping is hampered by the presence of motor boats. The resolution of this conflict will be difficult, given the legislative recognition of motor craft as permissible in the BWCA, but efforts should be directed to amending the Wilderness Act to phase out their presence. Their continued presence will only result in a much earlier need to place absolute restrictions on the number of persons permitted to visit the area, a fact which should be stressed by administrators.

Critically Examine the Extent and Quality of Access at  
the Wilderness Boundary

There has been a tendency within the Forest Service to perceive the wilderness boundary as an effective barrier to potentially deleterious effects stemming from management decisions on lands outside the wilderness. This is particularly true in terms of the development of roads adjacent to the wilderness boundary. Too often the areal

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<sup>1</sup>Lucas, The Recreational Capacity of the Quetico-Superior Area, p. 25.



repercussions of such roads have been underestimated or apparently not considered at all.

Certainly part of this problem stems from the lack of crystallized and definitive policy guidelines regarding wilderness. Management decisions regarding road construction near wilderness have often been guided by principles more applicable to mass recreation facilities where providing means for large numbers of persons to get to the area are important. As has been discussed several times previously, however, the objectives of management for wilderness call for the provision of a special type of opportunity that is difficult to achieve under heavy pressures of use. The improvement of the Fernberg Road in the BWCA is a case in point. Past use records indicate that lakes adjacent to the road, particularly Fall Lake and Moose Lake, have sustained very high levels. It was generally recognized by Forest Service officials that use was excessive. But, in response to this, access was improved on the rationale of accommodating the heavy traffic. The improvement, however, will only make it easier for additional traffic to move into the area and the use problems on Fall Lake and Moose Lake will be further aggravated. The idea that the last few miles of driving could be a prelude, a slowing down from the conventional world needs consideration.

There would appear to be three actions available to managers to offset the heavy use conditions that may develop along the wilderness boundary. First, future transportation plans should call for the

termination of road ends about two miles from the wilderness boundary.<sup>1</sup> Where roads are presently immediately adjacent to the boundary, serious consideration should be given to blocking off the last few miles. If it proves necessary for roads to be built into this zone (for example, to harvest timber) these roads should be closed to public use.

Although terminating roads away from the wilderness boundary would tend to reduce the impact of casual visitors upon the physical elements of the wilderness environment, the problem of congestion would simply be displaced outward. Thus a second action would involve the provision of trails with branches leading off from them. By providing trails that branch off from the main trunk route, use could be more readily dispersed and the dissatisfaction the wilderness visitor experiences from encounters reduced. There would often be physical limitations to the extent this could be done; however, where feasible it offers an effective means of lowering the probability of encountering others without actual restrictions on use.

A third action involves efforts to obtain a more equitable distribution of use between access points. This is an area careful consideration must be given; moving use from one area to another may

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<sup>1</sup>Two miles would generally mean about a one hour hike to the wilderness boundary, sufficient to substantially reduce most day use in the wilderness proper.



only spatially relocate the problem rather than eliminate it.<sup>1</sup> The highly skewed nature of visitor concentration at the access point, however, certainly warrants an effort to effect some redistribution. Such a result could be obtained from developing or improving access to areas presently not utilized (keeping in mind factor one discussed above). Included under this action would be development of overnight facilities at the trail head or the provision of facilities designed especially for horse parties (corrals, stock unloading ramps, etc.). Providing better information to visitors regarding alternative access locations is another alternative. Better maps and road signs are obvious but often neglected methods of doing this. Always to be kept in mind, however, is the fact that redistributing use at the access points will have a consequent impact upon levels and patterns of use within the wilderness.

#### Elimination of Structures

This recommendation is simply a reaffirmation of the legislative direction provided by the Wilderness Act.<sup>2</sup> All structures which are not necessary for the administration of the Wilderness Act should be removed at the earliest possible time. The Act provides

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<sup>1</sup>Perhaps simulation studies of traffic flows could be developed as management tools to test results of proposed redistributing measures in advance to avoid this problem.

<sup>2</sup>See Section 4, Part C. "Prohibition of Certain Uses," Appendix A.

rather specific guidelines on this matter and evidence from Chapter V suggests that strong purists are largely in agreement with institutional constraints.

#### Continuation of the Wilderness Ranger Program

The stationing of seasonal personnel within the wilderness boundary appears to be a satisfactory means of providing wilderness administrators with up-to-date information regarding use problems. They are also an effective agent in helping clean up litter and providing information to visitors. Their presence is supported by strong purists and as long as they continue to be perceived as performing an important function (in protecting the wilderness resource and its ability to provide a high quality experience), visitor support will probably continue. In wildernesses where such a program is not currently underway, efforts along this line should be undertaken immediately.

#### Cooperation With State Fish and Game Agencies in the Establishment of Harvest Regulations

Fishing is unquestionably an important component of the recreational use of wilderness. The opportunity to fish in a natural setting where chances of success are usually quite good is a powerful attractant to many people. This is particularly true when the stream or lake lies close to the wilderness boundary within easy traveling distance to the day hiker. The consequence of this is increased trail traffic and accelerated deterioration of the physical environment.

Much of this day-use pressure could be reduced or eliminated by modifications of creel limits. Presently many states have a ten fish a day or twenty in possession limit. Under the terms of the Wilderness Act, fish and game regulations remain under the jurisdiction of the respective state. Through cooperative efforts, however, between state and federal agencies, limits on lakes and streams within wilderness could be readjusted to permit only the taking of fish for use on the wilderness trip itself. Such a policy would discourage use of the wilderness by the casual visitor interested only in catching the limit, but would permit the continuation of fishing as an important part of the wilderness trip. Enforcement poses some problems here, but should not be viewed as an insurmountable constraint.

The hunting situation appears to be quite different. There is probably less of the casual, one day type of use that characterizes fishing. Additionally, big game seasons normally occur in the fall when weather is worsening and the intensities of use in most areas do not approach those found in the spring and summer fishing period.<sup>1</sup> Whereas fishing use is concentrated along stream and lake shores, thus accelerating resource damage, hunting use is probably dispersed quite widely.

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<sup>1</sup>This does not necessarily mean carrying capacity becomes an irrelevant issue during the hunting period. The entire manner in which capacity is defined as well as the geographical location of the problem are probably quite different for hunters. This topic will be the focus of a future research effort by the Wilderness Research Project.

Encourage "Off-Season" Use of Wilderness

Overuse and crowding evidence considerably periodicity. In most of the western wildernesses, the month of August, particularly the middle portion, experiences a disproportional amount of the total use, with a consequent rise in the extent of crowding. A management alternative that should be pursued involves an attempt to temporally redistribute use into periods where use is presently low.

One method of doing this would involve an information and education program designed to convey to potential visitors the opportunities "off-season" use would have. Greater opportunities for solitude, fall coloring, wildflowers, the migration of wildlife, and other features could be stressed as values which "off-season" use could provide. Such information could be provided through brochures, personal contact, or through the various conservation and outdoor recreation organizations.

A second method would again involve working through state fish and game associations. By manipulating the opening and closing of various seasons, some temporal redistribution could be effected. This would be particularly true of hunters. By delaying the opening of the big game season (primarily elk, moose, goat, and sheep) fall use in some areas could be entirely eliminated. Conversely, an early opening would increase the level and duration of use in an area. Staggering seasons might spread out peaks in use.

There would also be opportunities to spatially shift use. Where physical resource damage may accompany extended use in some drainage or larger area, an early closing or even total closure to hunting could be utilized to protect the resource. This would be particularly important where early fall rain or snow aggravates soil instability or other physical conditions.

### Zoning

It was noted in Chapter V that the use of zoning in the western wilderness areas may be an important management tool in alleviating resource damage and enhancing visitor satisfaction. Opportunities to both spatially and temporally redistribute use would be available.

Certain areas in many of the mountain wilderness areas are incapable of withstanding horse use in the early part of the use period. As snows melt off and spring and early summer rains occur the chances of excessive resource damage to saturated soils are greatly increased. These areas could be zoned against horse travel, perhaps for the entire season or for those periods when chances for damage are greatest.

There would seem to be little purpose in zoning areas against backpacker use. Little resource damage is associated with these persons and they appear to have little impact upon satisfaction of horseback riders.



On the other hand, there is strong justification for entirely closing off some areas to all visitors, at least for a portion of the use season. An example can be cited in the BWCA. Evidence has been presented demonstrating that the presence of visitors on islands in the BWCA is a major factor in nest abandonment by loons.<sup>1</sup> The critical nesting period for these birds is between mid-May and mid-June. This is also the period of considerable fishing pressure, particularly by local residents. The resulting conflict has resulted in a steady decline in hatch success.

The problem is complicated by two other factors. Loons are quite territorial in their nesting behavior, with generally no more than one nest per small lake. Additionally, they nest throughout the BWCA. Closing the entire area may not be feasible; however, it does appear that if the loon is deemed an element of the wilderness environment worth preserving, some protection must be provided.

One solution would lie in closing off at least some areas within the BWCA to use until after the middle of June. This would afford some of the loons adequate solitude from humans to successfully hatch their eggs. A second, related solution would be to delay opening the fishing season in some areas. This would be tantamount to closing

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<sup>1</sup>Catherine H. Ream, Research on Loon Productivity and Pesticide Residues, Report to the Bureau of Sport Fisheries and Wildlife (Department of the Interior, Washington, D.C.: May 15, 1968), 25 pp.

an area to all use in the early part of the use season, but would eliminate the need to actually impose physical restriction on travel.

#### The Closure of Damaged Campsites

Terminating use on sites damaged from overuse is a mandatory action in light of the requisites of the Wilderness Act as well as in terms of their effect upon quality. As was noted earlier, such an action has been carried out in the Bob Marshall; personal experience in the other study areas suggests further closures are needed.

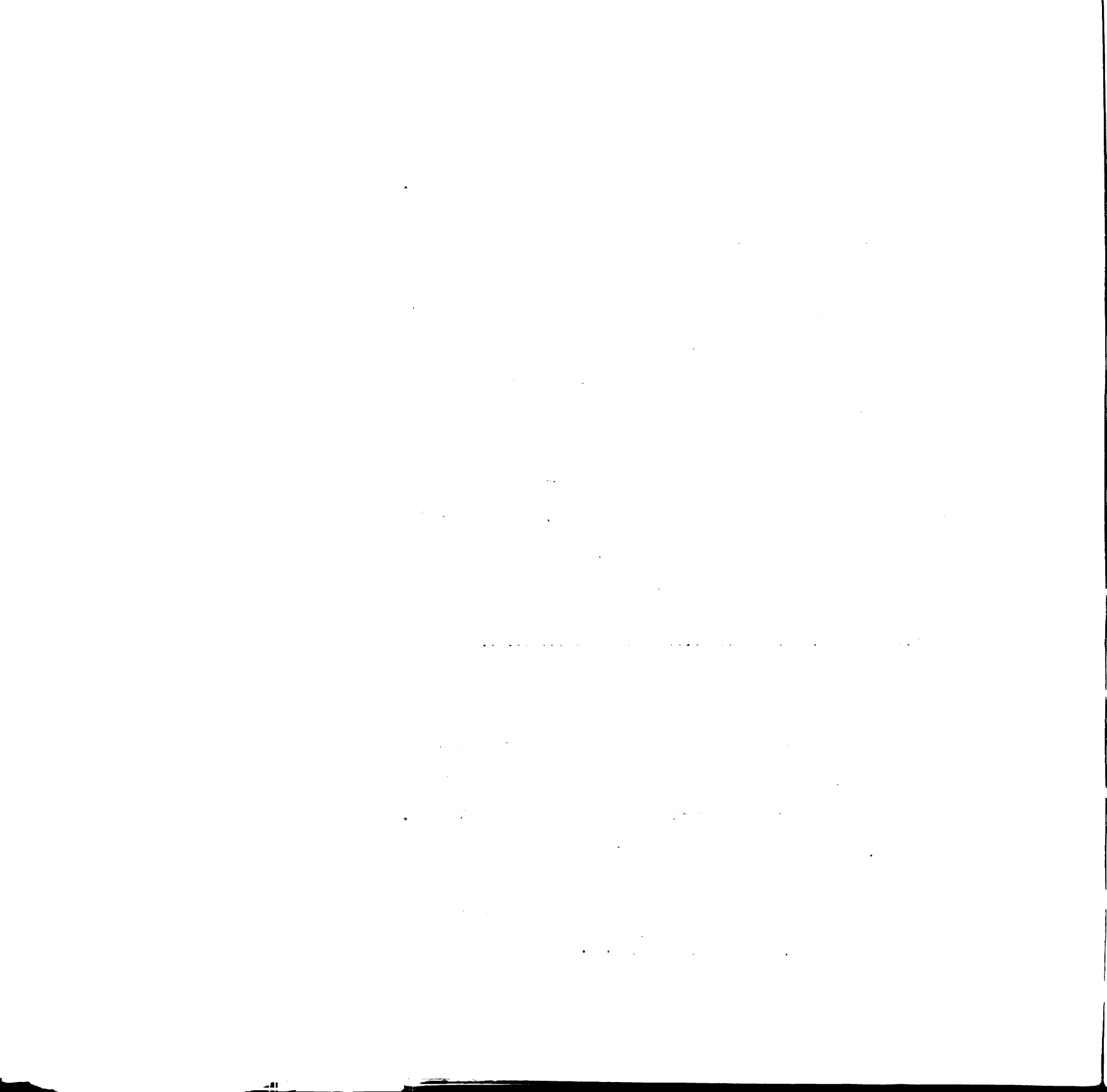
A program of campsite closures will need to be complemented by an effort to provide visitors with information regarding what sites are closed as well as alternative camping locations. Such information could be provided through the ranger stations, trail registration boxes, the wilderness ranger, or all of these.

#### Strive to Communicate the Objectives of the Wilderness System

Perhaps one of the most significant actions that could be undertaken by administrators in their effort to enhance capacity is to attempt to upgrade public understanding of the objectives of a wilderness system. The manner in which the preservation objectives mesh with over-all resource conservation planning should be stressed.<sup>1</sup> In particular, the concept that wilderness represents one type of

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<sup>1</sup>For a good statement on the relationship of preservation to conservation, see Charles A. Connaughton, "Preservation and Conservation," American Forests, 75 (March, 1969), p. 8.



opportunity along a continuum of environments evidencing varying human influence must be amplified.

Along these lines, more effort could be directed at communicating norms of wilderness behavior. It was noted earlier that many complaints were made concerning behavior perceived as inappropriate in the wilderness environment. Modifying human behavior is a difficult task, but a clearer public understanding of the purposes of the wilderness system may be one method of achieving such a change. Such an understanding will require a comprehensive program of public education, utilizing the talents and expertise of persons trained in communications theory and public opinion analysis. Failure to pursue such a program may lead to a growing disparity between public perception of the purposes of wilderness and management objectives and intent.

#### The Decision to Restrict Use

Implementation of the preceding twelve items would effectively eliminate a variety of conditions that presently restrict the ability of wilderness to yield an optimum experience for strong purists. Nonetheless, these measures must be regarded as basically short-range in nature. If the projections and predictions of future increases in wilderness recreation use are accurate or even partly so, the necessity of restricting use in most wilderness will eventually arrive. Do we presently have the kinds of information to deal with this eventuality?

Like so many questions in conservation and resource management, the answer lies somewhere between "yes" and "no." Based upon the data herein, however, we now appear to be at a point where construction of a model for estimating carrying capacity can be outlined, at least in a crude fashion.

A Probabilistic Model for the Calculation  
of Carrying Capacity<sup>1</sup>

In the absence of rigidly controlled itineraries required for all visitors, it will be possible to maintain an experience of solitude or near solitude for wilderness visitors only in a probabilistic sense. With our knowledge of the differential esthetic impact of various kinds of groups on wilderness visitors, it appears that administrators should strive to achieve a situation, for example, where the probability is that any party will encounter a maximum of two other parties per day. This is an extremely complex task for administrators, however. The following discussion suggests a methodology for determining the relationship between total use in any wilderness, the probability of encountering others, and satisfaction.

The objective is to maximize aggregate utility for the wilderness user. For the purposes of this study, the "utiles" are units of satisfaction and the wilderness users of relevance to managers are the strong purists.

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<sup>1</sup>I am indebted to Robert C. Lucas and John V. Krutilla for their thoughts and suggestions in the development of this methodology.

There are two steps in this methodology. First, it is necessary to determine the percentage of full satisfaction experienced by each strong purist for no encounters and the extent of change experienced with one encounter, two, and so forth. Theoretically of course, it would be necessary to gain this type of data for a variety of situations; for the reactions about backpackers and horseback riders, for encounters on the trail and those at the campsite, etc. This type of information was approached in question 16 (see Appendix B), but there is a critical difference. We have determined in this study the direction of attitude change associated with varying numbers of encounters, but we are unable to assess how much satisfaction is lost or gained. Our present information is ordinal in level; we must elevate it to an interval measurement.

Fortunately recent findings in the field of psychophysics provide a methodology for doing this. Stevens has outlined substantial empirical evidence demonstrating that a technique called "magnitude estimation" is capable of gauging consensus about various subjective dimensions.<sup>1</sup> By allowing the respondent to assign any arbitrary value he desires to an initial stimulus, then assign values to other stimuli that exhibit proportionately greater or lesser impact on the observer, one is able to obtain a series of attitude judgments measured at a

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<sup>1</sup>S. S. Stevens, "A Metric for the Social Consensus," Science, 151 (February 4, 1966), pp. 530-541. A substantial bibliography on relevant work is included.

true interval level. Testing the results gained in such a fashion against more common attitude scales, such as Thurstone's, yields a high degree of correlation.

Utilizing such a technique would make it possible, then, to gain a measure not only of whether one encounter heightened or depressed visitor satisfaction, but also how much it was heightened or depressed. The present difficulty lies in developing a method of eliciting such information from the visitor. It requires a considerable degree of abstraction on the respondent's part. Stevens' work and that of other social scientists utilizing magnitude estimation, however, suggests such an effort should be undertaken in connection with the problem of determining carrying capacities for wilderness recreation.

The second step necessary to provide a model for estimating wilderness recreation carrying capacity involves the development of a simulation model that will provide the probabilities associated with encounters with different kinds of parties, the number of encounters with each different kind of group, the locations of these encounters, and so on.<sup>1</sup> This is a major hurdle but its potential

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<sup>1</sup>Substantial progress has been made in the application of computer technology and systems theory to the study of recreation systems. See, for example, Roy I. Wolfe, Parameters of Recreational Travel in Ontario: A Progress Report. Report to the Ontario Department of Highways, D.H.O. Report RB111, Ontario, Canada, March, 1966 (Ontario, Canada: Department of Highways, 1966), 37 pp., and by the same author, A Theory of Recreational Highway Traffic, Report to the Ontario Department of Highways, D.H.O. Report RR128, Ontario, Canada, May, 1967 (Ontario, Canada: Department of Highways, 1967), 45 pp.; J. B. Ellis, A Systems Model for Recreational Travel in Ontario:

impact upon wilderness management is so great that attention must be directed at compiling the kinds of information necessary to the construction of such a model.<sup>1</sup>

A critical first step is determining the necessary input to such a model. It would be necessary to have a reasonably accurate estimate of a number of items, including among other things:

The distribution of each different type of party at each access point into the wilderness.

The distribution (use pattern) of each type of group within the interior wilderness.

A reasonably accurate estimate of variations in week-day and weekend flows of traffic within the wilderness. (In some wildernesses marked increases in weekend use will be found whereas some areas will show little variation in flow throughout the week.)

A frequency distribution of the length of stay for each type of party. (How many stay only one day, how many for two days, and so forth?)

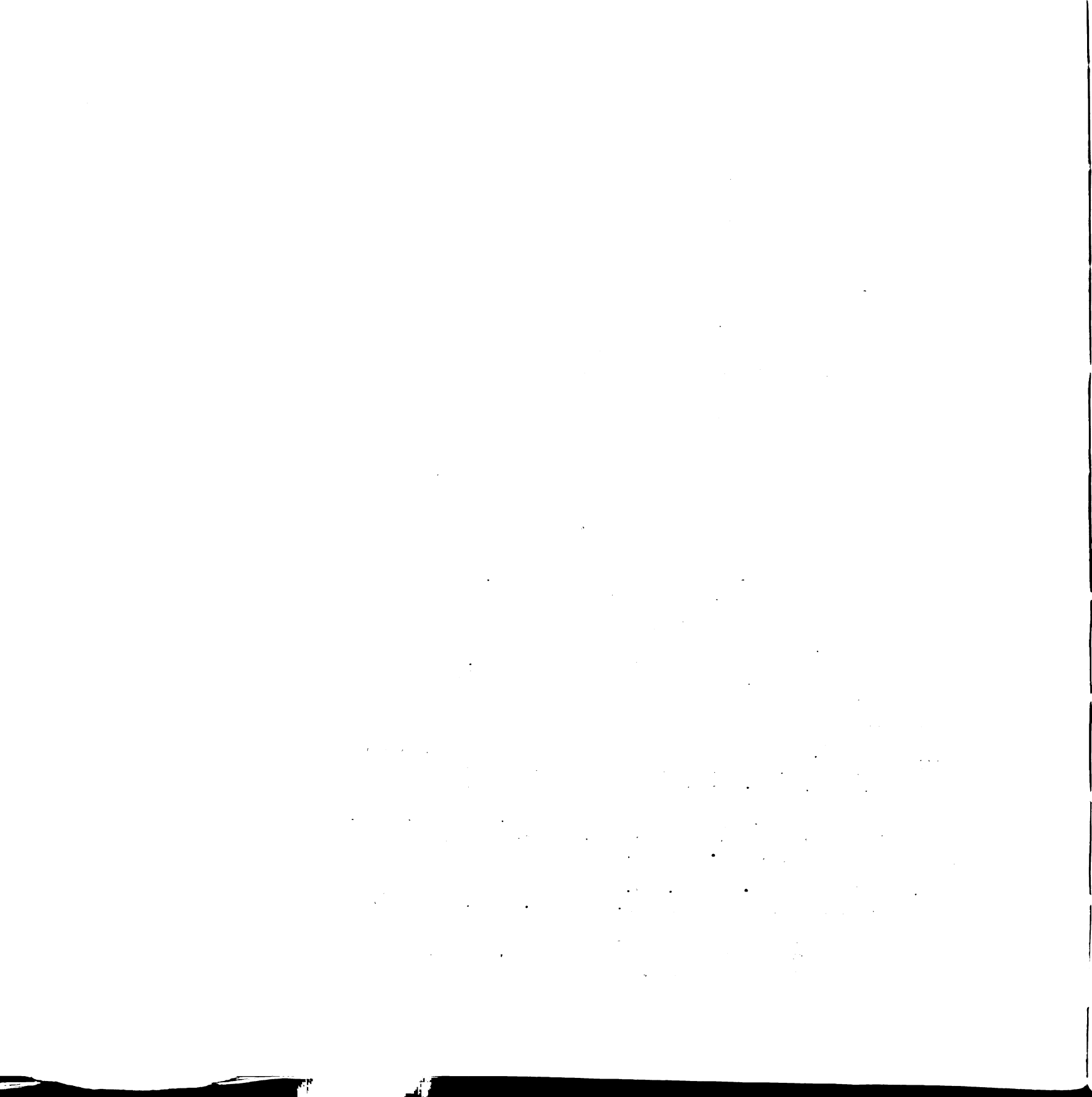
A reasonably accurate estimate of off-trail traffic: Generally, determining the travel patterns for developed arteries will account for nearly all use, but in some areas, off trail traffic may be significant.

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A Progress Report, Report to the Ontario Department of Highways, D.H.O. Report RR126, Ontario, Canada, July, 1967 (Ontario, Canada: Department of Highways, 1967), 32 pp.; J. B. Ellis and C. S. VanDoren, "A Comparative Evaluation of Gravity and System Theory Models for Statewide Recreational Travel Flow," Journal of Regional Science, 6 (Winter, 1966), pp. 57-70; David N. Milstein, Leslie M. Reid, et al., Michigan Outdoor Recreation Demand Study, Vols. I and II, Technical Report No. 6 to the Michigan Department of Conservation and Michigan Department of Commerce (June, 1966); and Frank J. Cesario, Jr., "Operations Research in Outdoor Recreation," Journal of Leisure Research, 1 (Winter, 1969), pp. 33-51.

<sup>1</sup>Currently the Wilderness Research Project is exploring a collaborative effort along these lines with Dr. John V. Krutilla and his staff at Resources for the Future.





Utilizing this type of information, it would be possible to generate recreation traffic flows along travel corridors throughout a given wilderness. Based on these flows for any assumed number of recreation days--and their distribution both spatially and temporally (for any given management policy)--the probability of various number of encounters could be estimated. From these probability estimates coupled with data obtained from step one the expected value of the wilderness resource could be calculated for any given number of visitor days. By varying the postulated number of recreation days permitted the carrying capacity which maximizes the expected value of the wilderness could be computed.

There remains, of course, a great deal to be done before such a model becomes operational. However, as was noted earlier, if we consider the maximization of utility as an important goal of wilderness management, then the ends not only justify, but necessitate the means. The above methodology outlines a means of quantitatively evaluating the trade-off between the decision to allow some increase in the level of use and the average level of satisfaction. An additional benefit of this procedure is a reduction in the problem of interpersonal utility. If we established the PRS (percentage of full satisfaction) value based on the responses of the entire visitor population, we would face the problem of weighing a number of different value systems.

Instead, we concentrate on the strong purists whose value system in regard to wilderness is much more similar.<sup>1</sup>

For initial purposes of testing, it would seem to be useful to operationally assume all parties in the system are small, back-packing groups. This would insure a higher degree of uniformity in terms of the effect of the group encountered upon satisfaction. Any operational model will need to account for the variable impact between different kinds of parties, different sizes, and so forth. Probably the most sensitive differences will be found between those encounters which occur on the trail as opposed to those which occur near the campsite. Intuitively, it seems that the maximum utility for encounters in the purview of the campsite may represent the critical measure for carrying capacity.<sup>2</sup> Perhaps some composite PFS value, differentially weighing the different types of encounters and their varying spatial occurrence may have to be developed.

#### Addendum

In the continuing effort by geographers to understand man's use and occupancy of the environment, attention has turned to the

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<sup>1</sup>Interpersonal utility problems commonly arise when dealing with different levels of income; a \$5 expenditure for a person earning \$5,000 a year obviously has a different significance than for a person earning \$50,000. The problem is similar here except value systems rather than income levels are involved.

<sup>2</sup>This would be so since the PFS value would probably tend to be depressed at a much steeper rate than under any other condition.

methodologies and theoretical concepts developed within a broad range of social sciences. The result of this action has been an enhancement in the explanatory function of geography. The gradual merging of what once were sharply delineated disciplinary lines has been, on the whole, a healthy process. Geography, however, remains distinguished as a discipline of integration and synthesis, organized about a common concern with spatial phenomena.

This characteristic lends itself well to the study of man and environment, as is reflected in both a review of the published literature as well as an examination of the expanding areas of geographic investigation. And, it is this multidisciplinary nature of geographic methodologies applied against a spatial backdrop that suggests the discipline holds considerable promise for studies of resource management and conservation.

The topic of concern in this study has been wilderness---a form of land use with which severe institutional constraints are associated as well as widely varying perceptual definitions. The basic problem to which this study has been addressed is to explain the extent of discrepancy between institutional objectives and the patterns of visitor utilization and to formulate means by which these two aspects can be related.

It is clear that the issue of carrying capacity in the wilderness context has been brought to the attention of administrators because of two factors: (1) the actions of visitors which lie contrary

to institutional objectives; and (2) the use patterns of visitors which tend to accentuate problems of congestion in certain locales. The alleviation of both these problems lies in the alteration or manipulation of human behavior.

Although any social scientist may look upon his research as an objective reporting of facts, he nevertheless must also account for a certain responsibility in its application. Virtually all social science research today has implications, implicit or explicit, for the manipulation of behavior. Attempts to influence behavior may be "good" or "bad," but they are always issues of ethics. This problem is perhaps especially noticeable in the wilderness situation, which many would see as the arena where one enjoys the fullest range of personal discretion.

Kelman has reflected upon this problem and concludes:

In order to promote the enhancement of freedom of choice as a positive goal, research will have to focus on the conditions favoring a person's ability to exercise choice and to maximize his individual values.<sup>1</sup>

In terms of the relevance of his statement to the research reported here, it seems desirable that the wilderness user be viewed as the primary agent of change rather than the administrator. Influence is still being exerted (for example, by providing more information

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<sup>1</sup>Herbert Kelman, A Time to Speak (San Francisco: Jossey-Bass Inc., 1968), p. 31. The question of manipulating human behavior is the focus of a proposed symposium by the American Academy for the Advancement of Science late in 1970. See William A. Hunt, "Human Behavior and Its Control," Science, 169 (August 28, 1970), pp. 901-902.

to the visitor), but individual choice is maintained. To the extent that this situation can be maintained in conjunction with the preservation goals of the Wilderness Act, it should be pursued with vigor. However, to fulfill the obligations to future generations imposed by the Wilderness Act (to insure them a maximum degree of choice), it may prove necessary to elevate the extent of manipulation of present users. If wilderness preservation is deemed a social good, such manipulation will be justified.

Over 40 years ago Aldo Leopold commented that the primary threat to wilderness lay not with the timber or agriculture interests, but rather with the decimation associated with increasingly large numbers of recreationists.<sup>1</sup> Based upon the rapid increases of recreational use in wilderness experienced in the past two decades, his prophecy may be approaching realization.

To avoid such a conclusion the effort described herein has attempted to provide a framework of information within which decisions could be formulated that would optimize the relation between man and resource. The establishment of priorities of actions and the enactment of decisions remains the prerogative of the policy maker. Nevertheless, continuing efforts by geographers and other social scientists are needed to enhance our understanding of man and his relationship to natural landscapes and to elevate decisions regarding this relationship from their intuitive, subjective past.

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<sup>1</sup>Aldo Leopold, "Wilderness as a Form of Land Use," Journal of Land and Public Utility Economics, 1 (1925), p. 402.

## APPENDICES

**APPENDIX A**

**THE WILDERNESS ACT**





Public Law 88-577  
88th Congress, S. 4  
September 3, 1964

## An Act

To establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

Wilderness Act.

### SHORT TITLE

SECTION 1. This Act may be cited as the "Wilderness Act".

### WILDERNESS SYSTEM ESTABLISHED STATEMENT OF POLICY

SEC. 2. (a) In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas", and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this Act or by a subsequent Act.

(b) The inclusion of an area in the National Wilderness Preservation System notwithstanding, the area shall continue to be managed by the Department and agency having jurisdiction thereof immediately before its inclusion in the National Wilderness Preservation System unless otherwise provided by Act of Congress. No appropriation shall be available for the payment of expenses or salaries for the administration of the National Wilderness Preservation System as a separate unit nor shall any appropriations be available for additional personnel stated as being required solely for the purpose of managing or administering areas solely because they are included within the National Wilderness Preservation System.

78 STAT. 890.

78 STAT. 891.

### DEFINITION OF WILDERNESS

(c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geo-

logical, or other features of scientific, educational, scenic, or historical value.

NATIONAL WILDERNESS PRESERVATION SYSTEM—EXTENT OF SYSTEM

SEC. 3. (a) All areas within the national forests classified at least 30 days before the effective date of this Act by the Secretary of Agriculture or the Chief of the Forest Service as "wilderness", "wild", or "cane" are hereby designated as wilderness areas. The Secretary of Agriculture shall—

(1) Within one year after the effective date of this Act, file a map and legal description of each wilderness area with the Interior and Insular Affairs Committees of the United States Senate and the House of Representatives, and such descriptions shall have the same force and effect as if included in this Act: *Provided, however,* That correction of clerical and typographical errors in such legal descriptions and maps may be made.

(2) Maintain, available to the public, records pertaining to said wilderness areas, including maps and legal descriptions, copies of regulations governing them, copies of public notices of, and reports submitted to Congress regarding pending additions, eliminations, or modifications. Maps, legal descriptions, and regulations pertaining to wilderness areas within their respective jurisdictions also shall be available to the public in the offices of regional foresters, national forest supervisors, and forest rangers.

Classification.

Presidential  
recommendation  
to Congress.

Congressional  
approval.

78 STAT. 891.  
78 STAT. 892.

(b) The Secretary of Agriculture shall, within ten years after the enactment of this Act, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on the effective date of this Act by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his findings to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed, together with maps and a definition of boundaries. Such advice shall be given with respect to not less than one-third of all the areas now classified as "primitive" within three years after the enactment of this Act, not less than two-thirds within seven years after the enactment of this Act, and the remaining areas within ten years after the enactment of this Act. Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress. Areas classified as "primitive" on the effective date of this Act shall continue to be administered under the rules and regulations affecting such areas on the effective date of this Act until Congress has determined otherwise. Any such area may be increased in size by the President at the time he submits his recommendations to the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it is proposed to increase the size of any such area by more than five thousand acres or by more than one thousand two hundred and eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominantly of wilderness value. Notwithstanding any other provisions of this Act, the Secretary of Agriculture may complete his review and delete such area as may be necessary, but not to exceed seven thousand acres, from the southern tip of the Gore Range-Eagles Nest Primitive Area,

September 3, 1964

- 3 -

Pub. Law 88-577

Colorado, if the Secretary determines that such action is in the public interest.

(c) Within ten years after the effective date of this Act the Secretary of the Interior shall review every roadless area of five thousand contiguous acres or more in the national parks, monuments and other units of the national park system and every such area of, and every roadless island within, the national wildlife refuges and game ranges, under his jurisdiction on the effective date of this Act and shall report to the President his recommendation as to the suitability or unsuitability of each such area or island for preservation as wilderness. The President shall advise the President of the Senate and the Speaker of the House of Representatives of his recommendation with respect to the designation as wilderness of each such area or island on which review has been completed, together with a map thereof and a definition of its boundaries. Such advice shall be given with respect to not less than one-third of the areas and islands to be reviewed under this subsection within three years after enactment of this Act, not less than two-thirds within seven years of enactment of this Act, and the remainder within ten years of enactment of this Act. A recommendation of the President for designation as wilderness shall become effective only if so provided by an Act of Congress. Nothing contained herein shall, by implication or otherwise, be construed to lessen the present statutory authority of the Secretary of the Interior with respect to the maintenance of roadless areas within units of the national park system.

Report to President.

Presidential recommendation to Congress.

Congressional approval.

(d) (1) The Secretary of Agriculture and the Secretary of the Interior shall, prior to submitting any recommendations to the President with respect to the suitability of any area for preservation as wilderness—

Suitability.

(A) give such public notice of the proposed action as they deem appropriate, including publication in the Federal Register and in a newspaper having general circulation in the area or areas in the vicinity of the affected land;

Publication in Federal Register.

(B) hold a public hearing or hearings at a location or locations convenient to the area affected. The hearings shall be announced through such means as the respective Secretaries involved deem appropriate, including notices in the Federal Register and in newspapers of general circulation in the area: *Provided*, That if the lands involved are located in more than one State, at least one hearing shall be held in each State in which a portion of the land lies;

Hearings.

Publication in Federal Register.

(C) at least thirty days before the date of a hearing advise the Governor of each State and the governing board of each county, or in Alaska the borough, in which the lands are located, and Federal departments and agencies concerned, and invite such officials and Federal agencies to submit their views on the proposed action at the hearing or by no later than thirty days following the date of the hearing.

78 STAT. 892.

78 STAT. 893.

(2) Any views submitted to the appropriate Secretary under the provisions of (1) of this subsection with respect to any area shall be included with any recommendations to the President and to Congress with respect to such area.

(e) Any modification or adjustment of boundaries of any wilderness area shall be recommended by the appropriate Secretary after public notice of such proposal and public hearing or hearings as provided in subsection (d) of this section. The proposed modification or adjustment shall then be recommended with map and description thereof to the President. The President shall advise the United States Senate and the House of Representatives of his recommendations with respect to such modification or adjustment and such recom-

Proposed modification.

mentations shall become effective only in the same manner as provided for in subsections (b) and (c) of this section.

#### USE OF WILDERNESS AREAS

SEC. 4. (a) The purposes of this Act are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge systems are established and administered and—

(1) Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established as set forth in the Act of June 4, 1897 (30 Stat. 11), and the Multiple-Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215).

16 USC 475.  
16 USC 528-531.

(2) Nothing in this Act shall modify the restrictions and provisions of the Shipstead-Nolan Act (Public Law 539, Seventy-first Congress, July 10, 1930; 46 Stat. 1020), the Thye-Blatnik Act (Public Law 733, Eightieth Congress, June 22, 1948; 62 Stat. 568), and the Humphrey-Thye-Blatnik-Andresen Act (Public Law 607, Eighty-fourth Congress, June 22, 1956; 70 Stat. 326), as applying to the Superior National Forest or the regulations of the Secretary of Agriculture.

16 USC 577-577b.

16 USC 577e-577h.  
16 USC 577d-1,  
577g-1, 577h.

(3) Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park, monument, or other unit of the national park system in accordance with the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of Congress which might pertain to or affect such area, including, but not limited to, the Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. 432 et seq.); section 3(2) of the Federal Power Act (16 U.S.C. 796(2)); and the Act of August 21, 1935 (49 Stat. 666; 16 U.S.C. 461 et seq.).

39 Stat. 535.  
16 USC 1 et seq.

41 Stat. 1063.  
49 Stat. 838.

(b) Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

78 STAT. 893.  
78 STAT. 894.

#### PROHIBITION OF CERTAIN USES

(c) Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

## SPECIAL PROVISIONS

(d) The following special provisions are hereby made:

(1) Within wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restrictions as the Secretary of Agriculture deems desirable. In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable.

(2) Nothing in this Act shall prevent within national forest wilderness areas any activity, including prospecting, for the purpose of gathering information about mineral or other resources, if such activity is carried on in a manner compatible with the preservation of the wilderness environment. Furthermore, in accordance with such program as the Secretary of the Interior shall develop and conduct in consultation with the Secretary of Agriculture, such areas shall be surveyed on a planned, recurring basis consistent with the concept of wilderness preservation by the Geological Survey and the Bureau of Mines to determine the mineral values, if any, that may be present; and the results of such surveys shall be made available to the public and submitted to the President and Congress.

(3) Notwithstanding any other provisions of this Act, until midnight December 31, 1983, the United States mining laws and all laws pertaining to mineral leasing shall, to the same extent as applicable prior to the effective date of this Act, extend to those national forest lands designated by this Act as "wilderness areas"; subject, however, to such reasonable regulations governing ingress and egress as may be prescribed by the Secretary of Agriculture consistent with the use of the land for mineral location and development and exploration, drilling, and production, and use of land for transmission lines, waterlines, telephone lines, or facilities necessary in exploring, drilling, producing, mining, and processing operations, including where essential the use of mechanized ground or air equipment and restoration as near as practicable of the surface of the land disturbed in performing prospecting, location, and, in oil and gas leasing, discovery work, exploration, drilling, and production, as soon as they have served their purpose. Mining locations lying within the boundaries of said wilderness areas shall be held and used solely for mining or processing operations and uses reasonably incident thereto; and hereafter, subject to valid existing rights, all patents issued under the mining laws of the United States affecting national forest lands designated by this Act as wilderness areas shall convey title to the mineral deposits within the claim, together with the right to cut and use so much of the mature timber therefrom as may be needed in the extraction, removal, and beneficiation of the mineral deposits, if needed timber is not otherwise reasonably available, and if the timber is cut under sound principles of forest management as defined by the national forest rules and regulations, but each such patent shall reserve to the United States all title in or to the surface of the lands and products thereof, and no use of the surface of the claim or the resources therefrom not reasonably required for carrying on mining or prospecting shall be allowed except as otherwise expressly provided in this Act: *Provided*, That, unless hereafter specifically authorized, no patent within wilderness areas designated by this Act shall issue after December 31, 1983, except for the valid claims existing on or before December 31, 1983. Mining claims located after the effective date of this Act within the boundaries of wilderness areas designated by this Act shall create no rights in excess of those rights which may be patented under the

Mineral leases,  
claims, etc.

78 STAT. 894.

78 STAT. 895.

provisions of this subsection. Mineral leases, permits, and licenses covering lands within national forest wilderness areas designated by this Act shall contain such reasonable stipulations as may be prescribed by the Secretary of Agriculture for the protection of the wilderness character of the land consistent with the use of the land for the purposes for which they are leased, permitted, or licensed. Subject to valid rights then existing, effective January 1, 1984, the minerals in lands designated by this Act as wilderness areas are withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral leasing and all amendments thereto.

Water resources.

(4) Within wilderness areas in the national forests designated by this Act, (1) the President may, within a specific area and in accordance with such regulations as he may deem desirable, authorize prospecting for water resources, the establishment and maintenance of reservoirs, water-conservation works, power projects, transmission lines, and other facilities needed in the public interest, including the road construction and maintenance essential to development and use thereof, upon his determination that such use or uses in the specific area will better serve the interests of the United States and the people thereof than will its denial; and (2) the grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture.

(5) Other provisions of this Act to the contrary notwithstanding, the management of the Boundary Waters Canoe Area, formerly designated as the Superior, Little Indian Sioux, and Caribou Roadless Areas, in the Superior National Forest, Minnesota, shall be in accordance with regulations established by the Secretary of Agriculture in accordance with the general purpose of maintaining, without unnecessary restrictions on other uses, including that of timber, the primitive character of the area, particularly in the vicinity of lakes, streams, and portages: *Provided*, That nothing in this Act shall preclude the continuance within the area of any already established use of motorboats.

(6) Commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas.

78 STAT. 895.

78 STAT. 896.

(7) Nothing in this Act shall constitute an express or implied claim or denial on the part of the Federal Government as to exemption from State water laws.

(8) Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests.

#### STATE AND PRIVATE LANDS WITHIN WILDERNESS AREAS

SEC. 5. (a) In any case where State-owned or privately owned land is completely surrounded by national forest lands within areas designated by this Act as wilderness, such State or private owner shall be given such rights as may be necessary to assure adequate access to such State-owned or privately owned land by such State or private owner and their successors in interest, or the State-owned land or privately owned land shall be exchanged for federally owned land in the same State of approximately equal value under authorities available to the Secretary of Agriculture: *Provided, however*, That the United States shall not transfer to a State or private owner any mineral interests unless the State or private owner relinquishes or

Transfers, restriction.

September 3, 1964 - 7 -

Pub. Law 88-577

78 STAT. 896.

causes to be relinquished to the United States the mineral interest in the surrounded land.

(b) In any case where valid mining claims or other valid occupancies are wholly within a designated national forest wilderness area, the Secretary of Agriculture shall, by reasonable regulations consistent with the preservation of the area as wilderness, permit ingress and egress to such surrounded areas by means which have been or are being customarily enjoyed with respect to other such areas similarly situated.

(c) Subject to the appropriation of funds by Congress, the Secretary of Agriculture is authorized to acquire privately owned land within the perimeter of any area designated by this Act as wilderness if (1) the owner concurs in such acquisition or (2) the acquisition is specifically authorized by Congress.

Acquisition.

#### GIFTS, BEQUESTS, AND CONTRIBUTIONS

SEC. 6. (a) The Secretary of Agriculture may accept gifts or bequests of land within wilderness areas designated by this Act for preservation as wilderness. The Secretary of Agriculture may also accept gifts or bequests of land adjacent to wilderness areas designated by this Act for preservation as wilderness if he has given sixty days advance notice thereof to the President of the Senate and the Speaker of the House of Representatives. Land accepted by the Secretary of Agriculture under this section shall become part of the wilderness area involved. Regulations with regard to any such land may be in accordance with such agreements, consistent with the policy of this Act, as are made at the time of such gift, or such conditions, consistent with such policy, as may be included in, and accepted with, such bequest.

(b) The Secretary of Agriculture or the Secretary of the Interior is authorized to accept private contributions and gifts to be used to further the purposes of this Act.

#### ANNUAL REPORTS

SEC. 7. At the opening of each session of Congress, the Secretaries of Agriculture and Interior shall jointly report to the President for transmission to Congress on the status of the wilderness system, including a list and descriptions of the areas in the system, regulations in effect, and other pertinent information, together with any recommendations they may care to make.

Approved September 3, 1964.

#### LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 1538 accompanying H. R. 9070 (Comm. on Interior & Insular Affairs) and No. 1829 (Comm. of Conference).

SENATE REPORT No. 109 (Comm. on Interior & Insular Affairs).

#### CONGRESSIONAL RECORD:

Vol. 109 (1963): Apr. 4, 8, considered in Senate.

Apr. 9, considered and passed Senate.

Vol. 110 (1964): July 28, considered in House.

July 30, considered and passed House, amended,  
in lieu of H. R. 9070.

Aug. 20, House and Senate agreed to conference  
report.

## APPENDIX B

### THE QUESTIONNAIRE

The questionnaire form included here represents that used in the mail. It differs from the field version only in terms of verb tense. It represents the form used in the west only; the BWCA form differed only in terms of references to modes of travel and some management practices.



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Wilderness is many things to many people. For the purpose of this questionnaire, we will define a wilderness as a natural, undeveloped area, with no roads, and which is essentially unchanged by man. This would include areas like the wilderness and primitive areas of the U. S. Forest Service as well as the primitive backcountry of the National Parks.

---

1. How many people were in your party? \_\_\_\_\_
  2. How many nights out did you spend on this trip? \_\_\_\_\_
  3. Who was in your party? (Check one)  
☐ Family  
☐ Family and friends  
☐ Friends and acquaintances
  4. Was this an organization-sponsored trip?  
☐ No                      ☐ Yes → If yes, what organization?
- 
5. Were you traveling with an outfitter?  
☐ No                      ☐ Yes

6. How often did your parents take you on the following kinds of camping trips (overnight trips)? (Check one answer for each kind of trip)

|                             | <u>Never</u>             | <u>Occa-<br/>sionally</u> | <u>Often</u>             | <u>Don't<br/>know</u>    |
|-----------------------------|--------------------------|---------------------------|--------------------------|--------------------------|
| a. On hiking or canoe trips | <input type="checkbox"/> | <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> |
| b. In auto campgrounds      | <input type="checkbox"/> | <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Other (please describe)  | <input type="checkbox"/> | <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> |

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7. Was this your first visit to a wilderness area?

☐ No                      ☐ Yes (If yes, go to question 8)

- a. At about what age did you first visit a wilderness area? \_\_\_\_\_
- b. Since your first wilderness trip, about how often have you gone on additional wilderness trips? (Check one)
- ☐ More than once a year
- ☐ About once a year
- ☐ About once every two years
- ☐ Less than once every two years
- c. About how many total wilderness trips had you been on, prior to this one? \_\_\_\_\_
- d. Had your prior wilderness experience been limited to this area, or had you visited a number of different areas? (Check one)
- ☐ Experience limited to this area
- ☐ Visited a number of other wilderness areas

8. What activities did you do while on this trip? \_\_\_\_\_
- 
- 

9. Was there any single activity that led you to visit this wilderness rather than some other recreational area?

☐ No                      ☐ Yes → If yes, what was it?

---

10. As you think of wilderness, how desirable or undesirable do you think each of the following things is:

|                                                                                              | <u>Very un-</u><br><u>desirable</u> | <u>Unde-</u><br><u>sirable</u> | <u>Neutral</u>           | <u>Desir-</u><br><u>able</u> | <u>Very de-</u><br><u>sirable</u> |
|----------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------|--------------------------|------------------------------|-----------------------------------|
| A. Absence of man-made features, except trails                                               | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| B. Lakes behind small man-made dams                                                          | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| C. Gravel roads                                                                              | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| D. Private cabins                                                                            | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| E. Stocking the area with kinds of game animals that were not native to the area             | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| F. Developed campsites with plank tables, cement fireplaces with metal grates, and outhouses | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| G. Lots of camping equipment to make camping easy and comfortable                            | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| H. Stocking the area with kinds of fish that were not native to the area                     | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| I. No motorized travel by visitors                                                           | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| J. Forests, flowers, and wildlife much the same as before the pioneers                       | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| K. Solitude (not seeing many other people except those in your own party)                    | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| L. Covers a large area (at least 25 square miles)                                            | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| M. Remote from towns or cities                                                               | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |
| N. Little evidence of other visitors before you                                              | <input type="checkbox"/>            | <input type="checkbox"/>       | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/>          |

11. Suppose that you go on a camping trip in the wilderness. During the second day out, you notice that two or three other parties have set up camps in the area around yours. Which of the following statements best describes what you would do? (Check one)

- ☐ I would stay. I would find the company of other campers enjoyable.
- ☐ I would stay. I don't care how many other camps are in the area.
- ☐ I would stay there as long as I originally planned, but probably would not enjoy my visit as much.
- ☐ I would stay there, but I would cut short the length of my visit.
- ☐ I would pack up my camp and look for another place in the wilderness to camp.
- ☐ I would pack up my camp and go home.
- ☐ Other (please describe) \_\_\_\_\_

- 11a. About how many other camps would you like set up near your own? (Let's say within sight or hearing.) \_\_\_\_\_

12. The following situations are things you might run across on any wilderness trip. Please check how you would feel about each of them:

|                                                                       | <u>It would<br/>bother me<br/>a lot</u> | <u>It would<br/>bother me<br/>a little</u> | <u>I would<br/>enjoy it</u> | <u>Doesn't<br/>matter</u> |
|-----------------------------------------------------------------------|-----------------------------------------|--------------------------------------------|-----------------------------|---------------------------|
| Meeting many people on the trail. .                                   | <input type="checkbox"/>                | <input type="checkbox"/>                   | <input type="checkbox"/>    | <input type="checkbox"/>  |
| Finding litter along the trails<br>and at campsites. . . . .          | <input type="checkbox"/>                | <input type="checkbox"/>                   | <input type="checkbox"/>    | <input type="checkbox"/>  |
| Camping at a place worn from<br>overuse . . . . .                     | <input type="checkbox"/>                | <input type="checkbox"/>                   | <input type="checkbox"/>    | <input type="checkbox"/>  |
| Meeting no one all day. . . . .                                       | <input type="checkbox"/>                | <input type="checkbox"/>                   | <input type="checkbox"/>    | <input type="checkbox"/>  |
| Camping at a place where several<br>other parties are camped. . . . . | <input type="checkbox"/>                | <input type="checkbox"/>                   | <input type="checkbox"/>    | <input type="checkbox"/>  |

13. When traveling in the wilderness you will usually see some other groups. Assuming you will meet other groups, indicate your personal preference for seeing each of the following groups: (Check one for each kind)

|                    | <u>Prefer to<br/>meet</u> | <u>Prefer not<br/>to meet</u> | <u>Doesn't make<br/>any difference</u> |
|--------------------|---------------------------|-------------------------------|----------------------------------------|
| Backpackers        | <input type="checkbox"/>  | <input type="checkbox"/>      | <input type="checkbox"/>               |
| Hikers, with stock | <input type="checkbox"/>  | <input type="checkbox"/>      | <input type="checkbox"/>               |
| Horseback riders   | <input type="checkbox"/>  | <input type="checkbox"/>      | <input type="checkbox"/>               |

14. Do you feel there should be a limit to the size of parties visiting wilderness areas? (Check one)

☐ No, none at all

☐ Yes, but only for horseback groups

☐ Yes, but only for backpackers

Yes, for all kinds of visitors

☐ No opinion

- 14a. If you answered "yes" to any of the above statements, what is the maximum number of people that should be allowed in one party? Circle one

[illegible]

- 14b. If you felt there should be a limit on the size of horseback parties, what is the maximum number of horses that should be permitted for one party? Circle one

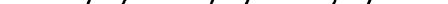
2    4    6    8    10    12    15    20    25    30    40    50    75    100    150  
200    300    400    500

15. If the use of a wilderness was very heavy, and controls on use were being considered, check how you would feel about each of the following management policies:

| Strongly<br>favor | Favor | Neutral | Oppose | Strongly<br>oppose |
|-------------------|-------|---------|--------|--------------------|
|-------------------|-------|---------|--------|--------------------|

A. Limit the number of people entering the wilderness area--

(1) by issuing a limited number of permits on a first-come, first-served basis



(2) by issuing a limited number of permits on a drawing (or lottery) basis

\_\_\_\_\_

(3) by issuing a limited number of permits through a mail reservation system

B. Charge an entrance fee

\_\_\_\_\_

C. Issue permits so that people could only visit and camp in the area assigned to them

\_\_\_\_\_

|                                                                                                                     | <u>Strongly</u><br><u>favor</u> | <u>Favor</u>             | <u>Neutral</u>           | <u>Oppose</u>            | <u>Strongly</u><br><u>oppose</u> |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------|--------------------------|--------------------------|----------------------------------|
| D. Reduce the number of trails and signs so that only those persons willing to make the effort could visit the area | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>         |
| E. Block off the last few miles of the access roads so the trail to the wilderness would be longer                  | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>         |
| F. Allow use to continue to increase without controls                                                               | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>         |
| G. Something else would be better. I would suggest:                                                                 | <hr/>                           |                          |                          |                          |                                  |

16. We are interested in finding out how you feel about the number of parties you might see while traveling in the wilderness. Please circle the symbol which shows your feelings about the number of parties indicated in each sentence. The first section concerns people who are backpacking; the second section is about horseback riders. A party would include from one or two up to about five people.

The symbols below are defined as follows:

VP . . . . Very Pleasant  
 P . . . . Pleasant  
 N . . . . Neutral (Don't care either way)  
 U . . . . Unpleasant  
 VU . . . . Very Unpleasant

---

Section I.

What would be your feelings about seeing no other parties each day, either backpackers or horseback riders . . . . VP P N U VU

What would be your feelings toward seeing one party of backpackers each day . . . . VP P N U VU

Toward seeing two parties of backpackers each day. . . . VP P N U VU

Toward seeing three parties of backpackers each day. . . . VP P N U VU

Toward seeing five parties of backpackers each day . . . . VP P N U VU

Toward seeing seven parties of backpackers each day. . . . VP P N U VU

Toward seeing nine parties of backpackers each day . . . . VP P N U VU

Section II.

What would be your feelings about seeing one party of  
horseback riders each day. . . . . VP P N U VU

Toward seeing two parties of horseback riders each  
day. . . . . VP P N U VU

Toward seeing three parties of horseback riders  
each day . . . . . VP P N U VU

Toward seeing five parties of horseback riders each  
day. . . . . VP P N U VU

Toward seeing seven parties of horseback riders  
each day . . . . . VP P N U VU

Toward seeing nine parties of horseback riders each  
day. . . . . VP P N U VU

17. For each of the following statements, please indicate how much you agree or disagree with it by circling one of the symbols following each statement. The symbols are defined as follows:

SD means "Strongly Disagree"

D means "Disagree"

N means "Neutral Feeling" or "Don't care either way"

A means "Agree"

SA means "Strongly Agree"

It's most enjoyable when you don't meet anyone in  
the wilderness . . . . . SD D N A SA

Meeting other people around the campfire at night  
should be part of any wilderness trip. . . . . SD D N A SA

You should see at least one group a day in the  
wilderness to get the most enjoyment out of your trip. . . SD D N A SA

There is a great deal of different between the kind  
of people who like to backpack in the wilderness  
and those who prefer to travel by horseback in the  
wilderness . . . . . SD D N A SA

Direction signs should be placed in wilderness  
areas. . . . . SD D N A SA

There should be restrictions on how many people can  
be in a wilderness at any given time . . . . . SD D N A SA

There should be areas of a wilderness designated for  
horseback use only and other areas for backpackers  
only . . . . . SD D N A SA

Both backpacking and horseback travel are entirely  
appropriate ways to travel in wilderness areas . . . . . SD D N A SA

If a wilderness area becomes overcrowded, restrictions  
on the number of people allowed to visit it should  
be enforced. . . . . SD D N A SA

While I am traveling in the wilderness (whether by  
foot or horseback), I prefer that the people I  
meet are traveling by the same means I am. . . . . SD D N A SA

Seeing too many people in the wilderness is more  
disturbing than finding a littered campsite. . . . . SD D N A SA

It is reasonable to expect that one should be able  
to visit a wilderness area and see few, if any,  
people . . . . . SD D N A SA

When staying out overnight in the wilderness it is  
most enjoyable not to be near anyone else. . . . . SD D N A SA

Seeing a large party (a dozen or more people from a  
club, etc.) reduces the feeling that you're out in  
the wilderness . . . . . SD D N A SA

Mile marker signs should be placed every mile along  
wilderness trails. . . . . SD D N A SA

It would be better to be able to go to the wilderness  
whenever you want to, even if it was badly crowded  
when you got there, than to have any kind of regula-  
tions on use . . . . . SD D N A SA

Wilderness recreation is the finest sort of  
recreation . . . . . SD D N A SA



A beautiful view would be just as impressive from a roadside overlook as from a trail deep inside the wilderness . . . . . SD D N A SA

18. Assuming that you will see some other people while traveling in the wilderness, which of the following situations would you prefer: (Check one for each statement)

Seeing one large party of 30 people during the day or ten parties of three people each, spaced through the day?

- ☐ One large party  
☐ Ten small parties  
☐ Makes no difference

Seeing one large party of 30 people over a week-long trip and no one else the rest of the week or three or four small parties every day for a week-long trip?

- ☐ One large party  
☐ Three or four small parties  
☐ Makes no difference

Seeing a lot of people within the first mile or so from where the trail takes off from the road and no one else the rest of the trip or several other parties in the area where I expect to camp?

- ☐ On the trail  
☐ Near my campsite  
☐ Makes no difference

Seeing one large party of 30 people during the day and no one else or one small party of three people and no one else?

- ☐ One large party  
☐ One small party  
☐ Makes no difference

Seeing one large party of 30 people during the day and no one else or five small parties of three people and no one else?

- ☐ One large party  
☐ Five small parties  
☐ Makes no difference

Now, we'd like to know something about the wilderness trip you took this summer (the one mentioned on the first page).

19. How many other parties did you see on this trip (let's say a party would include one or more people traveling together)? \_\_\_\_\_ How many of these were large parties (say, 10 or more people)? \_\_\_\_\_ How many of the parties had horses? \_\_\_\_\_

- 19a. Would you please look at the map included with this questionnaire. Could you please note below the places you camped (the name of the nearest lake or mountain will do), how many nights you spent at each place, and how many other parties were camped in the same area each night (within sight or hearing). Your best guess or estimate will be O.K.

| <u>Places Camped</u> | <u>Nights</u> | <u>Other Parties</u> |
|----------------------|---------------|----------------------|
| _____                | _____         | _____                |
| _____                | _____         | _____                |
| _____                | _____         | _____                |
| _____                | _____         | _____                |
| _____                | _____         | _____                |
| _____                | _____         | _____                |
| _____                | _____         | _____                |

20. Did you feel that the wilderness area you visited was too crowded?  
(Check one)

- ☐ No, it didn't appear overcrowded to me  
☐ Yes, but only in a few areas  
☐ Yes, it was overcrowded in most places  
☐ I didn't notice one way or the other

- 20a. If you felt that the area was overcrowded, did it bother you?  
(Check one)

- ☐ No, not at all  
☐ Only a little  
☐ A moderate amount  
☐ It bothered me a lot

- 20b. If you felt crowding was a problem in the wilderness area you visited, could you please note the places you felt were overcrowded? (A very simple description of the place will be enough; something like, "around Smith Lake," or "on the trail between Jones Pass and Brown Lake.")

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- 20c. If you felt that the area was crowded, did you in any way change the route of your trip or the length of your stay? (Check one)

- ☐ No  
☐ Length of trip  
☐ Route of trip  
☐ Both

21. When looking for a spot to camp, which of the following locations would you like best? (Check one)

- ☐ A spot out of sight and hearing of all other campers.  
☐ A place some distance from other campers; seeing or hearing them, however, wouldn't bother me.  
☐ A place near other campers. They would add enjoyment to my wilderness trip.  
☐ It doesn't make any difference to me.

22. What are your feelings about the trail system in this area? \_\_\_\_\_

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---

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23. What are your feelings about the number and kind of signs in this area?

---

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24. The following is a list of things that might be provided in wilderness areas. Check how you would feel about each of them.

|                                                                                              | <u>Strongly</u><br><u>favor</u> | <u>Favor</u>             | <u>Doesn't</u><br><u>matter</u> | <u>Oppose</u>            | <u>Strongly</u><br><u>oppose</u> |
|----------------------------------------------------------------------------------------------|---------------------------------|--------------------------|---------------------------------|--------------------------|----------------------------------|
| A. More high quality trails                                                                  | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| B. More signs indicating places to camp off the trail                                        | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| C. More maps and pamphlets about the area                                                    | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| D. More campsites                                                                            | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| E. Wilderness rangers, who provide visitor information, help keep the wilderness clean, etc. | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| F. Hitching racks                                                                            | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| G. Corrals                                                                                   | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| H. Simple pit toilets                                                                        | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| I. Simple wooden bridges across large rivers                                                 | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |
| J. Split log picnic tables at campsites                                                      | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>        | <input type="checkbox"/> | <input type="checkbox"/>         |

Finally, in order to make comparisons between the many kinds of visitors to wilderness areas, we would like some general information about you.

25. Do you belong to any organizations that are primarily concerned with conservation or outdoor recreation?

☐ No

☐ Yes →

If yes, please list them:

---



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26. Where did you spend most of your life before age 18. (Check one)

- ☐ Farm or rural area  
☐ Small town (5,000 or less)  
☐ Small city (5,000 - 50,000)  
☐ Large city (50,000 - 500,000)  
☐ Very large city (over 500,000)  
☐ Suburb--within 15 miles of large or very large city

27. What is your occupation (what kind of work do you do)? (If still in school, indicate "student")

---

28. Your age \_\_\_\_\_

29. Male ☐ Female ☐

30. What was the last year of school completed. (Please circle)

| <u>Elementary</u><br><u>School</u> | <u>High school</u> |    |    |    |    | <u>College</u> |    |    |              |  |
|------------------------------------|--------------------|----|----|----|----|----------------|----|----|--------------|--|
| 8 (or less)                        | 9                  | 10 | 11 | 12 | 13 | 14             | 15 | 16 | 17 (or more) |  |

31. Please check your total family income, before taxes.

- |                                            |                                            |
|--------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> less than \$3,000 | <input type="checkbox"/> \$8,000-\$8,999   |
| <input type="checkbox"/> \$3,000-\$4,999   | <input type="checkbox"/> \$9,000-\$9,999   |
| <input type="checkbox"/> \$5,000-\$5,999   | <input type="checkbox"/> \$10,000-\$14,999 |
| <input type="checkbox"/> \$6,000-\$6,999   | <input type="checkbox"/> \$15,000-\$24,999 |
| <input type="checkbox"/> \$7,000-\$7,999   | <input type="checkbox"/> over \$25,000     |

--Thank you very much--

## **APPENDIX C**

### **SAMPLING CALENDAR**

Below are listed each of the trail sampling locations in each study area. Also presented are the calendars of sampling activity in each area.

BWCA Sample Locations

| <u>Strata I</u>              | <u>Strata II</u> <sup>2</sup> |
|------------------------------|-------------------------------|
| 1. Moose Lake A <sup>1</sup> | 5. Saganaga Lake              |
| 2. Moose Lake B              | 6. Clearwater Lake            |
| 3. Fall Lake A               | 7. Trout Lake                 |
| 4. Fall Lake B               | 8. Kawishiwi Lake             |
|                              | 9. Crane Lake                 |
|                              | 10. Sawbill Lake              |
|                              | 11. East Bearskin Lake        |
|                              | 12. West Bearskin Lake        |
|                              | 13. Moose River               |
|                              | 14. Lake One                  |
|                              | 15. Magnetic Lake             |

---

<sup>1</sup>The "A" locations on Moose and Fall Lakes represents one of the landings selected for sampling; the "B" locations, the second. As was noted in the text, there were several locations on each of these lakes where landings were made. Two locations were selected on each for the purposes of sampling.

<sup>2</sup>Although there were 18 locations that qualified as Strata II entries, the process of randomly selecting the Strata II sampling locations accounted for only 11 of the possible 18.

BWCA Sampling Calendar

| Period          | Sun | Mon    | Tu  | Wed    | Th  | Fri | Sat    |
|-----------------|-----|--------|-----|--------|-----|-----|--------|
| May 22-24       | -   | -      | -   | -      | 14  | 1   | 3      |
| May 25-31       | 7   | off    | 2   | 4      | 7   | 10  | 14     |
| June 15-21      | 9   | 7      | 10  | 4      | 1   | off | off    |
| June 22-28      | off | off    | 2   | travel | 8   | 6   | 5      |
| July 13-19      | 1   | 2      | off | off    | 10  | 3   | travel |
| July 20-26      | 11  | 5      | 12  | 10     | off | off | 8      |
| Aug. 24-30      | 3   | off    | off | 9      | 13  | 1   | 2      |
| Aug. 31-Sept. 6 | 4   | travel | 5   | off    | off | 15  | 12     |

Bob Marshall Sample LocationsStrata I

1. Holland Lake A
2. Benchmark A
3. Gibson

Strata II

4. South Fork Flathead
5. Holland Lake B
6. Benchmark B
7. South Fork Teton
8. Middle Fork Teton
9. Silvertip
10. Inspiration Pass
11. Smith Creek
12. Pyramid Pass
13. West Fork Teton



Bob Marshall Sampling Calendar<sup>1</sup>

| Period          | Sun | Mon | Tu  | Wed | Th  | Fri | Sat |
|-----------------|-----|-----|-----|-----|-----|-----|-----|
| June 24-28      | -   | -   | 8   | 3   | 6   | 2   | off |
| June 29-July 5  | 5   | 1   | off | off | 10  | 9   | 4   |
| July 6-12       | 11  | off | off | 1   | 12  | 2   | 3   |
| July 13-19      | 7   | off | off | 13  | 8   | 3   | 6   |
| July 20-26      | 2   | 5   | 1   | off | off | 10  | 9   |
| July 27-Aug. 2  | 4   | 11  | 1   | 12  | 2   | off | off |
| Aug. 3-9        | off | 3   | 7   | 13  | off | off | 8   |
| Aug. 10-16      | off | off | 3   | 6   | 2   | 5   | 1   |
| Aug. 17-23      | 10  | 9   | off | off | 4   | 11  | 1   |
| Aug. 24-30      | 12  | 2   | 3   | off | off | 7   | 13  |
| Aug. 31-Sept. 6 | 8   | 3   | 6   | 2   | off | off | 5   |
| Sept. 7         | 1   |     |     |     |     |     |     |

Bridger Sampling Locations

- |                     |                       |
|---------------------|-----------------------|
| 1. Green River Lake | 5. Willow Creek       |
| 2. Elkhart Park     | 6. Boulder Lake B     |
| 3. Boulder Lake A   | 7. Mud Lake           |
| 4. Big Sandy        | 8. New Fork           |
|                     | 9. Spring Creek Lodge |
|                     | 10. Little Sandy      |

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<sup>1</sup>On this calendar and on the other western study area calendars, Independence Day (July 4, Friday) and Labor Day (September 1, Monday) were treated as weekend days.

Bridger Sampling Calendar

| Period          | Sun | Mon | Tu  | Wed | Th  | Fri | Sat |
|-----------------|-----|-----|-----|-----|-----|-----|-----|
| June 24-28      | -   | -   | 5   | 2   | 6   | 3   | off |
| June 29-July 5  | 7   | 4   | off | off | 10  | 4   | 9   |
| July 6-12       | 3   | off | off | 6   | 2   | 8   | 1   |
| July 13-19      | 5   | off | off | 2   | 6   | 3   | 7   |
| July 20-26      | 4   | 10  | 4   | off | off | 9   | 3   |
| July 27-Aug. 2  | 2   | 6   | 8   | 1   | 5   | off | off |
| Aug. 3-9        | off | 2   | 6   | 3   | off | off | 7   |
| Aug. 10-16      | off | off | 4   | 10  | 4   | 9   | 2   |
| Aug. 17-23      | 3   | 6   | off | off | 8   | 1   | 5   |
| Aug. 24-30      | 2   | 6   | 3   | off | off | 7   | 4   |
| Aug. 31-Sept. 6 | 10  | 4   | 9   | 3   | off | off | 2   |
| Sept. 7         | 6   |     |     |     |     |     |     |

High Uintas Sampling Locations

| <u>Strata I</u>     | <u>Strata II</u>         |
|---------------------|--------------------------|
| 1. Highline         | 7. China Meadows         |
| 2. Hades Canyon     | 8. Swayse Hole Trail     |
| 3. Packer's Camp    | 9. Henry's Fork Trail    |
| 4. Duck Trail       | 10. East Fork Bear River |
| 5. Lake Fork Trail  | 11. Stillwater           |
| 6. Swift Creek Camp | 12. Mirror Lake          |

High Uintas Sampling Calendar

| Period          | Sun | Mon | Tu  | Wed | Th  | Fri | Sat |
|-----------------|-----|-----|-----|-----|-----|-----|-----|
| June 24-28      | -   | -   | 2   | 8   | 1   | 11  | off |
| June 29-July 5  | 7   | 9   | off | off | 10  | 1   | 12  |
| July 6-12       | 2   | off | off | 3   | 4   | 5   | 8   |
| July 13-19      | 6   | off | off | 8   | 6   | 5   | 4   |
| July 20-26      | 3   | 2   | 12  | off | off | 1   | 11  |
| July 27-Aug. 2  | 7   | 9   | 10  | 1   | 12  | off | off |
| Aug. 3-9        | off | 2   | 3   | 4   | off | off | 5   |
| Aug. 10-16      | off | off | 8   | 6   | 8   | 6   | 5   |
| Aug. 17-23      | 4   | 3   | off | off | 2   | 12  | 1   |
| Aug. 24-30      | 11  | 7   | 9   | off | off | 10  | 1   |
| Aug. 31-Sept. 6 | 12  | 2   | 3   | 4   | off | off | 8   |
| Sept. 7         | 5   |     |     |     |     |     |     |

## **APPENDIX D**

### **ANALYSIS OF MAIL QUESTIONNAIRE RESPONSE**

As discussed in Chapter III, mail questionnaires were utilized to gather information from persons who did not have time to complete a form in the field. The following table provides an analysis of response rates to the original mail questionnaire and for the two follow-up contacts.

The over-all response of 78 per cent is very good, particularly when considering questionnaire length. The table also documents the importance of follow-up contacts in increasing response to mail questionnaires. A new questionnaire was included with each follow-up, as was a handout recreation map of the study area the visitor had been contacted at. Respondents were not asked to return the maps. Enclosed was a franked, addressed envelope for use in returning the questionnaire.

The first follow-up letter was sent approximately one month after the original questionnaire had been mailed, the second follow-up was sent at the end of the second month. No one indicated any problems with recall on questions concerning specific aspects of their trip.

TABLE 46  
PATTERN OF RESPONSE TO MAIL QUESTIONNAIRE

| Study Area   | Total Number Mailed | Percentage Response to First Mailing | Percentage Response to First Follow-up | Percentage Response to Second Follow-up | Percentage Total Non-Response | Percentage Over-all Response |
|--------------|---------------------|--------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------|------------------------------|
| BWCA         | 44                  | 38.6                                 | 25.0                                   | 9.1                                     | 27.3                          | 72.7                         |
| Bob Marshall | 59                  | 66.1                                 | 3.4                                    | 3.4                                     | 27.1                          | 79.9                         |
| Bridger      | 65                  | 63.1                                 | 20.0                                   | 6.2                                     | 10.7                          | 89.3                         |
| High Uintas  | 80                  | 46.3                                 | 21.3                                   | 7.5                                     | 25.0                          | 75.0                         |
| Total        | 248                 | 54.0                                 | 17.3                                   | 6.5                                     | 22.2                          | 77.8                         |

## APPENDIX E

### COVER AND FOLLOW-UP LETTERS

1. Cover letter to original questionnaire
2. First follow-up letter
3. Second follow-up letter

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION  
FORESTRY SCIENCES LABORATORY, DRAWER 7  
MISSOULA, MONTANA 59801

4900



Dear

We need your assistance; your opinions count.

The enclosed questionnaire has been designed to find out what your attitudes and ideas are regarding our wilderness areas. Your experience in the use of such areas has undoubtedly given you some opinions which would be of great assistance to the administrators of these areas.

All of the following questions refer to your trip into the

\_\_\_\_\_ in \_\_\_\_\_ of  
the summer of 1969.

Would each person to whom this envelope was addressed please complete one of the enclosed questionnaires. All of the questionnaires (if more than one was sent to this address) may be returned in the enclosed self-addressed stamped envelope.

Thank you very much for your interest and cooperation.

Sincerely,

GEORGE H. STANKEY  
Associate Geographer  
Wilderness Research Project

P.S. If you would like to receive a summary of this study, please write "report requested" on the backside of this page, along with your return address.



UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION  
FORESTRY SCIENCES LABORATORY, DRAWER 7  
MISSOULA, MONTANA 59801

4900



A few weeks ago you were mailed a questionnaire dealing with your recent trip into the  
Possibly this has either been lost in the normal shuffle of things or has just slipped your mind.

Your answers are vital to the success of this research project.

I have enclosed another questionnaire (one for each person to whom this letter was addressed) and self-addressed stamped envelope. Let me stress that this study will in no way link you as an individual with your answers; all material is strictly confidential.

It is my hope that the twenty minutes or so of your time spent in filling out the questionnaire will contribute to the better management of our wilderness areas for you and others.

Thank you very much.

Sincerely,

GEORGE H. STANKEY  
Research Social Scientist

Enclosure

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION  
FORESTRY SCIENCES LABORATORY, DRAWER 7  
MISSOULA, MONTANA 59801

4900



Dear

At present, we have received close to 80 percent of the questionnaires mailed in our wilderness user study. The remaining questionnaires are critical to the scientific validity of the findings; the information we will gain from your questionnaire will greatly aid the Forest Service in making decisions regarding the protection and management of your wilderness areas.

Please complete the enclosed questionnaire as soon as possible and return it to our office in the enclosed self-addressed stamped envelope. Please answer the questions in reference to your trip into the

If you have already completed and returned your questionnaire, please disregard this letter.

Sincerely,

GEORGE H. STANKEY  
Research Social Scientist  
Wilderness Management Research

Enclosures

## **APPENDIX F**

### **SPECIAL MAIL QUESTIONNAIRE TO NON-RESPONDENTS**

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION  
FORESTRY SCIENCES LABORATORY, DRAWER 7  
MISSOULA, MONTANA 59801

4900



Dear

We are in the final stages of completing our study of visitors to the  
In order to insure that our data is accurate, we would greatly appreciate your taking a very few minutes to complete the enclosed one-page questionnaire. When completed, return it to our office in the enclosed self-addressed stamped envelope.

A summary report of this study will be available later this year. If you would like to receive one, please check the box below.

Sincerely,

GEORGE H. STANKEY  
Research Social Scientist  
Wilderness Management Research

Enclosure

☐ Please send report.



1. How many people were in your party? \_\_\_\_\_
2. Was this your first wilderness visit? ☐ No ☐ Yes
3. Was there any single recreational activity that led you to visit this wilderness rather than some other area? ☐ No ☐ Yes If yes,  
what was it? \_\_\_\_\_
4. As you think of wilderness, how desirable or undesirable do you think each of the following things are: (VU = Very Undesirable; U = Undesirable; N = Neutral; D = Desirable; VD = Very Desirable)

- |                                                               | VU                       | U                        | N                        | D                        | VD                       |
|---------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A. Absence of man-made features, except trails                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| B. Stocking the area with game animals not native to the area | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| C. No motorized travel by visitors                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| D. Solitude (not seeing other people)                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| E. Little evidence of other visitors before you               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
5. About how many other camps would you like set up near your own? (Let's say, within sight or hearing) \_\_\_\_\_

6. Did you feel the wilderness area was too crowded:
- ☐ No ☐ Yes, but only in a few places.
- ☐ Yes, in most places. ☐ Did not really notice.

7. The following is a list of things that might be provided in wilderness areas. Check how you would feel about each of them: (SF = Strongly Favor; F = Favor; N = Neutral; O = Oppose; SO = Strongly Oppose)

- |                                                                                | SF                       | F                        | N                        | O                        | SO                       |
|--------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A. High-quality trails                                                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| B. More maps and pamphlets about the area                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| C. Wilderness rangers, who provide information, help keep the area clean, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| D. Simple pit toilets                                                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

8. Do you belong to any conservation or outdoor recreation clubs? \_\_\_\_\_
- 

9. Your age \_\_\_\_\_



## **APPENDIX G**

### **ANALYSIS OF NON-RESPONSE**





Persons who did not respond to the mail questionnaire were sent a one-page version of the longer form. This form contained nine questions which were considered to be of importance in determining whether non-respondents differed significantly from respondents (see Appendix F for the short form).

Only two questions elicited significantly different responses. Non-respondents tended to feel that "little evidence of others before you" was not necessarily as desirable a feature of wilderness as respondents felt it was ( $\chi^2 = .02 > p > .01$ ). They also were much more likely to consider their wilderness trip as a single purpose endeavor (primarily fishing) than were respondents ( $\chi^2 = .001 > p$ ).

On all the other items tested, however, non-respondents demonstrated no statistically significant differences from respondents and it was concluded that the rate of non-response did not seriously affect the conclusions reached in the study.

## BIBLIOGRAPHY



## BIBLIOGRAPHY

### Books

- Ackerman, Edward A. Geography as a Fundamental Research Discipline. Department of Geography Research Paper No. 53. Chicago: Department of Geography, 1958.
- Ardrey, Robert. The Territorial Imperative. New York: Athenum, 1966.
- Barnett, Harold J., and Morse, Chandler. Scarcity and Growth: The Economics of Natural Resource Availability. Baltimore: The Johns Hopkins Press, 1963.
- Bonney, Orrin H., and Bonney, Lorraine. Field Book--The Wind River Range. Houston, Texas: By the Author, 625 East 14th Street, 1960.
- Carhart, Arthur H. Planning for America's Wildlands. Harrisburg, Pennsylvania: The Telegraph Press, 1961.
- Carroll, Peter N. Puritanism and the Wilderness: The Intellectual Significance of the New England Frontier, 1629-1700. New York: Columbia University Press, 1969.
- Catlin, George. North American Indians: Being Letters and Notes on Their Manners, Customs, and Conditions, Written during Eight Years' Travel amongst the Wildest Tribes in North America, 1832-1839. Vol. I. Philadelphia: Hubbard Brothers, 1913.
- Ciriacy-Wantrup, S. V. Resource Conservation: Economics and Policies. Berkeley: University of California Press, 1963.
- Clawson, Marion, and Knetsch, Jack L. Economics of Outdoor Recreation. Baltimore: The Johns Hopkins Press, 1966.
- Darling, F. Fraser, and Eichhorn, Noel D. Man and Nature in the National Parks. Washington, D.C.: The Conservation Foundation, 1967.
- Erlich, Paul R. The Population Bomb. New York: Ballentine Books, Inc., 1968.



- Festinger, Leon. A Theory of Cognitive Dissonance. New York: Row, Peterson, and Company, 1957.
- Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill Book Company, 1965.
- Hall, Edward T. The Hidden Dimension. Garden City, New York: Doubleday, 1966.
- Huth, Hans. Nature and the American. Berkeley: University of California Press, 1957.
- Ise, John. Our National Park Policy: A Critical History. Baltimore: The Johns Hopkins Press, 1961.
- Jennings, Eugene F. An Anatomy of Leadership: Princes, Heroes, and Supermen. New York: Harper and Brothers, 1960.
- Kates, Robert W. Hazard and Choice Perception in Flood Plain Management. Department of Geography Research Paper No. 78. Chicago: Department of Geography, 1962.
- Kelman, Herbert. A Time to Speak. San Francisco: Jossey-Bass, Inc., 1968.
- Kish, Leslie. Survey Sampling. New York: John Wiley & Sons, Inc., 1967.
- Koffka, Kurt. Principles of Gestalt Psychology. New York: Harcourt and Brace, 1935.
- Meehan, Eugene J. Value Judgment and Social Science. Homewood, Illinois: The Dorsey Press, 1969.
- Murphy, Gordon, and Likert, Rensis. Public Opinion and the Individual. New York: Harper and Brothers, 1938.
- Nash, Roderick. Wilderness and the American Mind. New Haven: Yale University Press, 1967.
- Odum, Eugene P. Fundamentals of Ecology. Philadelphia: W. B. Saunders Company, 1959.
- Oppenheim, A. N. Questionnaire Design and Attitude Measurement. New York: Basic Books, Inc., 1966.
- Pomfret, John E. The Geographic Pattern of Mankind. New York: Appleton-Century Company, 1935.

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- Saarinen, Thomas F. Perception of the Drought Hazard on the Great Plains. Department of Geography Research Paper No. 106. Chicago: Department of Geography, 1966.
- Segall, Marshall H., Campbell, Donald T., and Herskovits, Melville J. The Influence of Culture on Visual Perception. New York: Bobbs Merrill Company, 1966.
- Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Company, 1956.
- Sommer, Robert. Personal Space: The Behavioral Basis of Design. Englewood Cliffs, New Jersey: Prentice-Hall, 1969.
- Tilden, Freeman. The National Parks: What They Mean to You and Me. New York: Alfred A. Knopf, 1965.
- Vogt, William. Road to Survival. New York: William Sloane Associates, Inc., 1948.
- Wagner, Philip. The Human Use of the Earth. Glencoe, Illinois: The Free Press, 1960.
- Zimmerman, Erich. World Resources and Industries. New York: Harper and Brothers, 1933.

#### Articles

- Argow, Keith A., and Mayo, Selz C. "The Sociology of Informal Groups and Their Significance to Conservation Opinion." Journal of Forestry, 65 (March, 1967), 176-179.
- Barker, Roger G. "On the Nature of the Environment." Journal of Social Issues, XIX (October, 1963), 17-38.
- Barton, Michael A. "Water Pollution in Remote Recreational Areas." Journal of Soil and Water Conservation, 24 (July-August, 1969), 132-134.
- Beazley, Ronald. "Conservation Decisionmaking: A Rationalization." Natural Resource Journal, 7 (July, 1967), 345-360.



- Blaut, James. "A Study of Cultural Determinants of Soil Erosion and Conservation in the Blue Mountains of Jamaica." Social and Economic Studies, VIII (1959), 402-420.
- Brandborg, Stewart M. "On the Carrying Capacity of Wilderness." Living Wilderness, 82 (Summer-Fall, 1963), 29-31.
- Brown, Perry J., and Hunt, John D. "The Influence of Information Signs on Visitor Distribution and Use." Journal of Leisure Research, 1 (Winter, 1969), 79-83.
- Bultena, Gordon L., and Taves, Marvin J. "Changing Wilderness Images and Forestry Policy." Journal of Forestry, 59 (March, 1961), 167-171.
- Carol, Hans. "C. J. Jung and the Need for Roots." Landscape, 14 (Spring, 1965), 2.
- Catton, William R., Jr. "Motivations of Wilderness Users." Pulp and Paper Magazine of Canada (December, 1969), 121-126.
- Cesario, Frank J., Jr. "Operations Research in Outdoor Recreation." Journal of Leisure Research, 1 (Winter, 1969), 33-51.
- Chein, Isidor. "The Environment as a Determinant of Behavior." Journal of Social Psychology, 39 (February, 1954), 115-127.
- Connaughton, Charles A. "Preservation and Conservation." American Forests, 75 (March, 1969), 8.
- Costner, Herbert L. "Criteria for Measures of Association." American Sociological Review, 30 (June, 1965), 341-353.
- Crowe, Beryl L. "The Tragedy of the Commons Revisited." Science, 166 (November, 1969), 1103-1107.
- Denevan, William M. "Aboriginal Drained-Field Cultivation in the Americas." Science, 169 (August 11, 1970), 647-654.
- Dotzenko, A. D., Papamichos, N. T., and Romine, D. S. "Effect of Recreational Use on Soil and Moisture Conditions in Rocky Mountain National Park." Journal of Soil and Water Conservation, 22 (1967), 196-197.
- Edwards, Allen L., and Kenney, Kathryn C. "A Comparison of the Thurstone and Likert Techniques of Attitude Scale Construction." Journal of Applied Psychology, 30 (1946), 72-83.



- Ellis, J. B., and Van Doren, C. S. "A Comparative Evaluation of Gravity and System Theory Models for Statewide Recreational Travel Flow." Journal of Regional Science, 6 (Winter, 1966), 57-70.
- Fendrich, James M. "Perceived Reference Group Support: Racial Attitudes and Overt Behavior." American Sociological Review, 32 (December, 1967), 960-970.
- Firey, Walter. "Sentiment and Symbolism as Ecological Variables." American Sociological Review, 10 (February, 1945), 140-148.
- Fisher, Joseph L. Notes on the Value of Research on the Wilderness Part of Wildland. Resources for the Future Reprint No. 23. Washington, D.C.: Resources for the Future, Inc., 1960.
- Fonaroff, L. Schuyler. "Conservation and Stock Reduction on the Navajo Tribal Range." Geographical Review, LII (April, 1963), 200-223.
- Fried, Marc, and Gleicher, Peggy. "Some Sources of Residential Dissatisfaction in an Urban Slum." Journal of American Institute of Planners, 27 (November, 1961), 305-315.
- Frissell, Sidney S., Jr., and Duncan, Donald P. "Campsite Preference and Deterioration in the Quetico-Superior Canoe Country." Journal of Forestry, 63 (April, 1965), 256-260.
- Goodman, Leo A., and Kruskal, William H. "Measures of Association for Cross Classifications." Journal of the American Statistical Association, 49 (December, 1954), 732-764.
- Goodman, Leo A., and Kruskal, William H. "Measures of Association for Cross Classifications: III. Approximate Sampling Theory." Journal of the American Statistical Association, 58 (June, 1963), 310-364.
- Hall, Edward T. "Proxemics." Man's Image in Medicine and Anthropology. Edited by New York Academy of Medicine. New York: International Universities Press, 1963.
- Hamill, Louis. "The Process of Making Good Decisions About the Use of the Environment of Man." Natural Resources Journal, 8 (April, 1968), 279-301.
- Hardin, Garrett. "The Economics of Wilderness." Natural History, 78 (June-July, 1969), 20-27.

- Hardin, Garrett. "The Tragedy of the Commons." Science, 162 (December, 1968), 1243-1248.
- Harry, Joseph, Gale, Richard, and Hendee, John. "Conservation: An Upper-Middle Class Social Movement." Journal of Leisure Research, 3 (Summer, 1969), 246-254.
- Hauser, Philip M. "The Crucial Value Problems." Perspectives on Conservation: Essays on America's Natural Resources. Edited by Henry Jarrett. Baltimore: The Johns Hopkins Press, 1958.
- Herfindahl, Orris C. What is Conservation? Resources for the Future Reprint No. 30. Washington, D.C.: Resources for the Future, Inc., 1961.
- Hunt, William A. "Human Behavior and Its Control." Science, 169 (August 28, 1970), 901-902.
- Kahn, Alfred E. "The Tyranny of Small Decisions: Market Failures, Imperfections, and the Limits of Economics." Kyklos, XIX (1966), 23-47.
- Kasperson, Roger E. "Political Behavior and the Decision-Making Process in the Allocation of Water Resources Between Recreational and Municipal Use." Natural Resources Journal, 9 (April, 1969), 176-211.
- Kates, Robert W. "Stimulus and Symbol: The View from the Bridge." Journal of Social Issues, XXII (October, 1966), 21-28.
- Keeney, Barnaby C. "The Bridge of Values." Science, 169 (July 3, 1970), 27.
- Kirk, William. "Historical Geography and the Concept of the Behavioral Environment." Indian Geographical Journal, Silver Jubilee Edition. Edited by George Kuriyan. Madras: Indian Geographical Society, 1952.
- Kirk, William. "Problems of Geography." Geography, XLVII (1963), 357-371.
- Knetsch, Jack L. "Assessing the Demand for Outdoor Recreation." Journal of Leisure Research, 1 (Winter, 1969), 85-87.
- Krutilla, John V. "Balancing Extractive Industry with Wildlife Habitat." Transactions of the Thirty-third North American Wildlife and Natural Resource Conference. Washington, D.C., 1968.



- Krutilla, John V. "Conservation Reconsidered." American Economic Review, LVII (September, 1967), 777-786.
- Krutilla, John V. "Some Environmental Effects of Economic Development." Daedalus, 96 (Fall, 1967), 1058-1070.
- LaPage, Wilbur F. "The Camper Views the Interview." Journal of Leisure Research, 1 (Spring, 1969), 181-186.
- Leopold, Aldo. "The Wilderness and Its Place in Forest Recreational Policy." Journal of Forestry, 19 (November, 1921), 718-721.
- Leopold, Aldo. "Wilderness as a Form of Land Use." Journal of Land and Public Utility Economics, 1 (1925), 398-404.
- Likert, Rensis. "A Technique for the Measurement of Attitudes." Archives of Psychology, 149 (1932), 7-35.
- Lowenthal, David. "Geography, Experience, and Imagination: Towards a Geographic Epistemology." Annals of the Association of American Geographers, LI (September, 1963), 241-260.
- Lowenthal, David. "Is Wilderness 'Paradise Enow'? Images of Nature in America." Columbia University Forum, 7 (Spring, 1964), 34-40.
- Lowenthal, David. "Not Every Prospect Pleases: What is Our Criterion for Scenic Beauty?" Landscape (Winter, 1962-63), 19-23.
- Lucas, Robert C. "The Contribution of Environmental Research to Wilderness Policy Decisions." Journal of Social Issues, XXII (October, 1966), 116-126.
- Lucas, Robert C. "Wilderness Perception and Use: The Example of the Boundary Waters Canoe Area." Natural Resources Journal, 3 (October, 1964), 394-411.
- Lutz, H. J. "Soil Conditions of Picnic Grounds in Public Forest Parks." Journal of Forestry, 43 (February, 1945), 121-127.
- Matore, Georges. "Existential Space." Landscape, 15 (Spring, 1966), 5-6.
- McCloskey, Michael. "The Wilderness Act of 1964: Its Background and Meaning." Oregon Law Review, 45 (July, 1966), 288-321.



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- Meinig, Donald W. "The Mormon Culture Region: Strategies and Patterns in the Geography of the American West, 1847-1964." Annals of the Association of American Geographers, LV (June, 1965), 191-220.
- Mikesell, Marvin W. "The Borderlands of Geography as a Social Science." Interdisciplinary Relationships in the Social Sciences. Edited by Muzafer Sherif and Carolyn W. Sherif. Chicago: Aldine Publishing Company, 1969.
- Penfold, Joseph W. "The Outdoors, Quality and Isoprimas." Wilderness: America's Living Heritage. Edited by David Brower. San Francisco: The Sierra Club, 1961, 109-116.
- Price, Edward T. "Values and Concepts in Conservation." Annals of the Association of American Geographers, XLV (March, 1955), 64-84.
- Quinney, Dean N. "Small Private Forest Landownership in the United States--Individual and Social Perception." Natural Resources Journal, 3 (October, 1964), 379-393.
- Robinson, Warren C. "A Critical Note on the New Conservationism." Land Economics. XLV (November, 1969), 453-456.
- Sommer, Robert. "Man's Proximate Environment." Journal of Social Issues, XXII (October, 1966), 59-70.
- Sonnenfeld, Joseph. "Variable Values in Space and Landscape: An Inquiry into the Nature of Environmental Necessity." Journal of Social Issues, XVII (October, 1966), 71-82.
- Spoehr, Alexander. "Cultural Differences in the Interpretation of Natural Resources." Man's Role in Changing the Face of the Earth. Edited by William Thomas. Chicago: University of Chicago Press, 1956.
- Stea, David. "Space, Territory, and Human Movements." Landscape, 15 (Autumn, 1965), 13-16.
- Stevens, S. S. "A Metric for the Social Consensus." Science, 151 (February 4, 1966), 530-541.
- Stone, Gregory P., and Taves, Marvin J. "Camping in the Wilderness." Mass Leisure. Edited by Eric Larrabee and Rolf Meyersohn. Glencoe, Illinois: The Free Press, 1958.

- Street, John M. "An Evaluation of the Concept of Carrying Capacity." The Professional Geographer, XXI (March, 1969), 104-107.
- "The Sierra Club--Growth of a Hope." Sierra Club Bulletin, 54 (April, 1969), 12-13.
- Thompson, Roger C. "Politics in the Wilderness: New York's Adirondack Forest Preserve." Forest History, 6 (Winter, 1963), 14-23.
- Thoreau, Henry David. "Walking." The American Environment: Readings in the History of Conservation. Edited by Roderick Nash. Reading, Massachusetts: Addison-Wesley Publishing Company, 1968.
- "Through the Corridors of Time." Man's Role in Changing the Face of the Earth. Edited by William L. Thomas, Jr. Chicago: University of Chicago Press, 1956.
- Tuan, Yi-Fu. "Attitudes Toward Environment: Themes and Approaches." Environmental Perception and Behavior. Edited by David Lowenthal. Chicago: Department of Geography, 1967.
- Wagar, J. Alan. The Carrying Capacity of Wildlands for Recreation. Forest Science Monograph 7. Washington, D.C.: Society of American Foresters, 1964.
- White, Gilbert F. "Formation and Role of Public Attitudes." Environmental Quality in a Growing Economy. Edited by Henry Jarrett. Baltimore: The Johns Hopkins Press, 1966.
- White, Gilbert F. "The Choice of Use in Resource Management." Natural Resources Journal, 1 (March, 1961), 23-40.
- Wildavsky, Aaron. "Aesthetic Power or the Triumph of the Sensitive Minority Over the Vulgar Mass: A Political Analysis of the New Economics." Daedalus, 96 (Fall, 1967), 1115-1128.
- "Wilderness Use Study." Sierra Club Bulletin, 55 (January, 1970), 10.
- Wirth, Conrad. "National Parks." First World Conference on National Parks. Edited by Alexander B. Adams. Washington, D.C.: Government Printing Office, 1962.
- Wolpert, Julian. "The Decision Process in Spatial Context." Annals of the Association of American Geographers, 54 (December, 1964), 537-558.

Zahniser, Howard, and Nadel, Michael. "Parks and Wilderness."  
America's Natural Resources. Edited by Charles H. Callison.  
 New York: The Ronald Press Company, 1967.

### Reports

Ad Hoc Committee on Geography. The Science of Geography. Washington, D.C.: National Academy of Sciences-National Research Council, 1965.

Bowman, Isaiah. Geography in Relation to the Social Sciences. Report of the Commission on the Social Studies, Part V. New York: Charles Scribner's Sons, 1934.

Ellis, J. B. A Systems Model for Recreational Traffic in Ontario: A Progress Report. Report to the Ontario Department of Highways, D.H.O. Report RR 126, Ontario, Canada, July, 1967. Ontario, Canada: Department of Highways, 1967.

Gannon, Colin A. Towards a Strategy for Conservation in a World of Technological Change. RSRI Discussion Paper Series No. 24. Philadelphia: Regional Science Research Institute, 1968.

Gibbons, Robert P., and Heady, Harold F. The Influence of Modern Man on the Vegetation of Yosemite Valley. Manual 36. Berkeley: University of California Division of Agricultural Science, 1964.

Gordon Lusty Survey Research Ltd. A Study of Visitor Attitudes Toward Quetico Provincial Park. Don Mills, Ontario: Gordon Lusty Survey Research Ltd., 1968.

Held, R. Burnell; Brickler, Stanley, and Wilcox, Arthur T. A Study to Develop Practical Techniques for Determining the Carrying Capacity of Natural Areas in the National Park System. Report to the National Park Service, Washington, D.C. November 15, 1969.

McCool, Stephen F., and Merriam, Lawrence C., Jr. Travel Method Preferences of Boundary Water Canoe Area Campers. Minnesota Forestry Research Notes No. 219. St. Paul: University of Minnesota School of Forestry, 1970.

McCool, Stephen F., Merriam, Lawrence C., Jr., and Cushwa, Charles T. The Condition of Wilderness Campsites in the Boundary Waters Canoe Area. Minnesota Forestry Research Note No. 22. St. Paul: University of Minnesota School of Forestry, 1969.



- Meinecke, E. P. A Report Upon the Effect of Excessive Tourist Travel on the California Redwood Parks. Report to the California Department of Natural Resources, Sacramento, California, 1928. Sacramento: California State Printing Office, 1928.
- Merriam, Lawrence C., Jr. A Land Use Study of the Bob Marshall Wilderness Area. Montana Forest and Conservation Experiment Station Bulletin No. 26. Missoula: University of Montana, 1963.
- Merriam, Lawrence C., Jr., and Ammons, Robert B. The Wilderness User in Three Montana Areas. St. Paul: School of Forestry, University of Minnesota, 1967.
- Milstein, David N., and Reid, Leslie. Michigan Outdoor Recreation Demand Study. Technical Report No. 6 to the Michigan Department of Conservation and Michigan Department of Commerce, Vols. I and II. Lansing: State Resource Planning Division, 1966.
- Nelson, Ernest E., and Hughes Jay M. Travel Distance and Joint Visitation to the Boundary Waters Canoe Area and Adjacent Canadian Wilderness. Minnesota Forestry Research Notes No. 185. St. Paul: University of Minnesota School of Forestry, January, 1969.
- Thorsell, J. W. Wilderness Recreational Use. Waterton Lakes National Park Visitor Use Survey, Part II. Ottawa: Parks Planning Division, 1967.
- Wolfe, Roy I. A Theory of Recreational Highway Traffic. Report to the Ontario Department of Highways, D.H.O. Report RR 128, Ontario, Canada, May, 1967. Ontario, Canada: Department of Highways, 1967.
- Wolfe, Roy I. Parameters of Recreational Travel in Ontario: A Progress Report. Report to the Ontario Department of Highways, D.H.O. Report RB 111, Ontario, Canada, March, 1966. Ontario, Canada: Department of Highways, 1966.

#### U.S. Government Publications

- Alden, W. C. Physiography and Glacial Geology of Western Montana and Adjacent Areas. Geological Survey Professional Paper 231. Washington, D.C.: Government Printing Office, 1953.



- Burch, William R., Jr., and Wenger, Wiley D. The Social Characteristics of Participants in Three Styles of Family Camping. U.S. Forest Service Research Paper PNW-48. Portland: Pacific Northwest Forest and Range Experiment Station, 1967.
- Dana, Samuel T. Problem Analysis Research in Forest Recreation. Washington, D.C.: U.S. Department of Agriculture, 1957.
- Hendee, John C., Catton, William R., Jr., Marlow, Larry D., and Brockman, C. Frank. Wilderness Users in the Pacific Northwest-- Their Characteristics, Values, and Management Preferences. U.S. Forest Service Research Paper PNW-61. Portland: Pacific Northwest Forest and Range Experiment Station, 1968.
- LaPage, Wilbur F. Some Observations on Campground Trampling and Ground Cover Response. U.S. Forest Service Research Paper NE-68. Upper Darby, Pennsylvania: Northeast Forest Experiment Station, 1967.
- Lucas, Robert C. Recreational Use of the Quetico-Superior Area. U.S. Forest Service Research Paper IS-8. St. Paul: Lake States Forest Experiment Station, 1964.
- Lucas, Robert C. The Recreational Capacity of the Quetico-Superior Area. U.S. Forest Service Research Paper IS-15. St. Paul: Lake States Forest Experiment Station, 1964.
- Outdoor Recreation Resources Review Commission. Outdoor Recreation for America. Washington, D.C.: Government Printing Office, 1962.
- Ream, Catherine H. Research on Loon Productivity and Pesticide Residues. Report to the Bureau of Sport Fisheries and Wildlife. Washington, D.C.: Department of the Interior, 1968.
- U.S. Department of Agriculture. Forest Service. Outdoor Recreation in the National Forests. Agricultural Information Bulletin 301. Washington, D.C.: Government Printing Office.
- U.S. Department of Agriculture. Forest Service. The National Forest Outdoor Recreation Resources Review Work Plan. Washington, D.C.: Government Printing Office, 1959.
- U.S. Department of Commerce. Bureau of the Census. Statistical Abstract of the United States, 1965. Washington, D.C.: Government Printing Office, 1966.



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- U.S. Department of Commerce. Bureau of the Census. United States Census of Population: 1960. Vol. I, United States Summary.
- U.S. Department of Interior. Fish and Wildlife Service. Second Annual Status Report on Wilderness Reviews Within National Wildlife Refuge System. Washington, D.C.: Government Printing Office, 1970.
- U.S. Department of Interior. National Park Service. Areas of the National Park System Included in the Wilderness Study Program. 1970. (Mimeographed.)
- Wenger, Wiley D., Jr., and Gregerson, Hans M. The Effect of Non-response on Representativeness of Wilderness-Trail Register Information. U.S. Forest Service Research Paper PNW-17. Portland: Pacific Northwest Forest and Range Experiment Station, 1964.
- Wildland Research Center. Wilderness and Recreation--A Report on Resources, Values, and Problems. Outdoor Recreation Resources Review Commission, Vol. 3. Washington, D.C.: Government Printing Office, 1962.

#### Papers Presented

- Bates, Marston. The Human Environment. The Horace M. Albright Conservation Lectureship, Vol. II. Berkeley: University of California School of Forestry and Conservation, 1962.
- Dubos, Rene Jules. The Genius of the Place. The Horace M. Albright Conservation Lectureship, Vol. X. Berkeley: University of California School of Forestry and Conservation, 1970.
- Emerson, Richard M. "Games: Rules, Outcomes, and Motivation." Paper presented at the American Academy for the Advancement of Science Symposium: Psychology and Sociology of Sport, Dallas, Texas, December, 1968.
- Hawkes, H. Bowman. "The Paradoxes of the Conservation Movement." Paper presented at the 24th Annual Frederick William Reynolds Lecture, Salt Lake City, Utah, February 11, 1960.
- Hendee, John C., Steinburn, Thomas, and Catton, William R., Jr. "Wildernism--The Development, Dimensions, and Use of an Attitude Scale." Paper presented at the annual meeting of the Rural Sociological Society, San Francisco, California, August 26, 1967.

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Mills, Archie. "Back Country and the Hand of Man." Paper presented at the national meeting of the American Society of Range Management, Seattle, Washington, February, 1967.

Sonnenfeld, Joseph. "Geography, Perception, and the Behavioral Environment." Paper presented at the meeting of the American Academy for the Advancement of Science, Dallas, Texas, December 27, 1968.

### Proceedings

Clawson, Marion, and Knetsch, Jack L. "Recreation Research: Some Basic Analytical Concepts and Suggested Framework for Research Programs." Proceedings of the National Conference on Outdoor Recreation Research. Ann Arbor: Ann Arbor Publishers, 1963.

Dana, Samuel T. "Conference Summation." Proceedings of the National Conference on Outdoor Recreation Research. Ann Arbor: Ann Arbor Publishers, 1963.

Gilligan, James P. "The Contradiction of Wilderness Preservation in a Democracy." Proceedings of the Society of American Foresters. Milwaukee, Wisconsin, 1954.

Scott-Williams, Bettie Willard. "Effects of Visitor Use on the Ecosystems of Rocky Mountain National Park, Colorado, U.S.A." Proceedings and Papers of the IUCN 10th Technical Meeting. Lucerne, Switzerland, 1966.

### Congressional Documents

U.S. Congress. House. An Act to Authorize and Direct that the National Forests be Managed Under Principles of Multiple-Use and to Produce a Sustained Yield of Products and Services, and for Other Purposes. H.R. 10572, 86th Cong., 1st Sess., 1960.

U.S. Congress. House. An Act to Authorize That Certain Lands Exclusively Administered by the Secretary of the Interior be Classified in order to Provide for Their Disposal or Interim Management Under Principles of Multiple-Use and to Produce a Sustained Yield of Products and Services, and for Other Purposes. H.R. 5159, 88th Cong., 1st Sess., 1964.

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- U.S. Congress. House. Committee on Merchant Marine and Fisheries. The Preservation of Wilderness Areas, by C. Frank Keyser. Legislative Reference Service Report 19. Washington, D.C.: Government Printing Office, 1949.
- U.S. Congress. House. The Sixth Annual Report on the Status of the National Wilderness Preservation System for the Calendar Year 1969. House Doc. 91-372, 91st Cong., 2d Sess., 1970.
- U.S. Congress. Senate. An Act to Establish a National Wilderness Preservation System for the Permanent Good of the Whole People, and for Other Purposes. S. 4, 88th Cong., 1st Sess., 1964.

#### Unpublished Materials

- Burch, William R. "Nature as Symbol and Expression in American Life: A Sociological Exploration." Unpublished Ph.D. dissertation, University of Minnesota, 1964.
- Chubb, Michael. "Outdoor Recreation Land Capacity: Concepts, Usage, and Definitions." Unpublished M.S. thesis, Michigan State University, 1964.
- Gilligan, James P. "The Development of Policy and Administration of Forest Service Primitive and Wilderness Areas in the United States." Unpublished Ph.D. dissertation, University of Michigan, 1953.
- Krutilla, John V. Draft of testimony presented to the Federal Power Commission concerning construction of the High Mountain Sheep Dam, Hells Canyon. 1970.
- Lucas, Robert C. "The Quetico-Superior Area: Recreational Use in Relation to Capacity." Unpublished Ph.D. dissertation, University of Minnesota, 1962.
- Wagar, J. Alan. "The Carrying Capacity of Wildlands for Recreation." Unpublished Ph.D. dissertation, University of Michigan, 1961.
- Wilcox, Arthur T., and Held, R. Burnell. "A Study to Develop Practical Techniques for Determining the Carrying Capacity of Natural Areas in the National Park System." Unpublished study plan on file at the Center for Research and Education, Estes Park, Colorado, 1967.



Miscellaneous

Bridger National Forest. Wilderness Patrolman Handbook. (Typewritten.)

Burton, Ian, Kates, Robert W., and White, Gilbert. The Human Ecology of Extreme Geophysical Events. Natural Hazard Working Paper No. 1. Toronto: Department of Geography, 1968.

Letter from Sierra Club, San Francisco, California, January 28, 1970.

U.S. Department of Agriculture. Forest Service. Forest Service Manual, Recreation Information Handbook, Chapter 124, Terms.

U.S. Department of Agriculture. Forest Service. Forest Service Manual. Recreation Management. May, 1969. Washington, D.C. (Mimeographed.)

U.S. Department of Agriculture. Forest Service. Management Handbook, Boundary Waters Canoe Area. Milwaukee, Wisconsin, 1969. (Mimeographed.)





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