Influence of Boat Density Levels on Boaters' Satisfaction at Hyrum Lake, Utah

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INFLUENCE OF BOAT DENSITY LEVELS
ON BOATERS' SATISFACTION AT
HYRUM LAKE, UTAH

by

Floyd Alma Powell

A thesis submitted in partial fulfillment of
the requirement for the degree
of
MASTER OF SCIENCE
in
Health, Physical Education and Recreation

Approved:

UTAH STATE UNIVERSITY
Logan, Utah
1998
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ABSTRACT

Influence of Boat Density Levels on Boaters' Satisfaction at Hyrum Lake, Utah

by

Floyd Alma Powell, Master of Science

Utah State University, 1998

Major Professor: Dr. Dennis A. Nelson
Department: Health, Physical Education and Recreation

The purpose of this study was to evaluate the effects of boat density on boaters' satisfaction at Hyrum Lake State Park, Utah. The study evaluated relationships between boaters' satisfaction with their Hyrum Lake experience and density of boats at different locations on the lake and among participants in different boating activities.

The participants in this study were boaters who used Hyrum Lake between May and September of 1996. An oral, on-site interview survey was randomly given to 282 boaters as they left the lake for the day. The surveys were conducted on high-density days (weekends) and low-density days (weekdays), which were also randomly selected.

Correlation analysis and analysis of variance (ANOVA) were performed. The study found no significant relationships between density and satisfaction associated with either lake location or activity. Satisfaction did not differ between
activities; however, participants in two activities (fishing and water skiing) did report higher satisfaction while using the boat ramp than for other locations on the lake.

When a Welch t' test was performed comparing boating density ≤ 44 with boating density ≥ 45 boats, even though there was no statistically significant difference, a suggested trend did appear. The results indicate a slightly higher satisfaction rating among water skiers when density was 44 or fewer boats. Conversely, personal watercraft (PWC) users indicated that their satisfaction levels were higher when boating density was ≥ 45 boats. This would suggest that PWC users may be satisfied at boat densities much higher than other users could accept.

Although 74% of all the boaters surveyed wanted to set a limit (carrying capacity) on the number of boats allowed on the lake at one time, the carrying capacity will not be immediately implemented, because the data found no statistically significant difference in satisfaction levels with higher boat densities.
DEDICATION

I would like to dedicate this thesis to my parents, Elmo and Jessie Powell, for their constant encouragement and support, both emotionally and financially. I must also include my dear wife, Kate, for having faith in me that I would be able to complete this project. I am grateful for her countless hours and days of being home alone with the children while I have been at the university working on my thesis, even on my days off from work. Thanks for your understanding while I pursued my educational goals. I do appreciate your love, patience, and continued prayers. I love you all very much.

Floyd A. Powell
ACKNOWLEDGMENTS

I would like to thank the late Dr. Richard Schreyer, who first gave me the desire to pursue a master's degree. He took the time to get me motivated to the idea that a master's degree would be beneficial for my future.

I would also like to thank Dr. Art Jones and Dr. Dennis Nelson for their endless support and encouragement. Whether it was reading a rough draft or just a friendly pat on the back, they were always there for me.

I would like to thank the management of Hyrum Lake State Park for all of their assistance and cooperation. I appreciated the amount of interest they showed in my thesis study.

Finally, a special thanks to Dr. Mark Brunson, for without his help, this may not have been possible. His continued help, explanations, and suggestions on how to make my thesis a better product have always been welcomed. I feel a great friendship has developed out of this ordeal.

It also seems appropriate to thank my fellow classmates for encouragement to stick with it. I had many fellow students to look up to for their help, example, and accomplishments, such as Dan Robertson and my brother, Ralph Powell. Thanks to you all.

Floyd A. Powell
# CONTENTS

| ABSTRACT | iii |
| DEDICATION | v |
| ACKNOWLEDGMENTS | vi |
| LIST OF TABLES | ix |
| LIST OF FIGURES | x |

## CHAPTER

### I. INTRODUCTION

1. Purpose of Study 3
2. Research Questions 6
3. Hypotheses 7

### II. REVIEW OF LITERATURE

1. Crowding 8
2. Satisfaction 11
3. Carrying Capacity 14
4. Conflict 16
5. State and Local Studies 18

### III. METHODOLOGY

1. Procedures 22
2. Sample Population 25
3. Research Design 26
4. Instrumentation 26
5. Data Analysis 27
6. Research Design 28

### IV. RESULTS

1. Population 29
2. Density--Satisfaction Relationships 33

### V. DISCUSSION

1. Recommendations for Future Research 43
2. Conclusion 44
REFERENCES ......................................................... 47
APPENDICES .......................................................... 57
Appendix A. Hyrum Lake Boating Study 1996 .... 58
Appendix B. Most Satisfying Aspect of Boating Trip .................. 63
Appendix C. Least Satisfying Aspect of Boating Trip ................. 64
Appendix D. Suggestions for Improved Management of Hyrum Lake ...... 65
Appendix E. Analysis of Variance for Table 8 .................. 67
Appendix F. Analysis of Variance for Table 9 .................. 68
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Demographics and Recreation Participation Characteristics of Respondents</th>
<th>29</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Respondents' Assessments of the Quality of Their Experiences</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Respondents' Assessments of Their Crowding Experiences</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>Respondents' Assessments of Their Hyrum Lake Experiences</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>Behavior and Courtesy Effects on Satisfaction Regarding Overall Density</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>Correlation of Overall Boat Density with Satisfaction at Different Locations of Hyrum Lake</td>
<td>34</td>
</tr>
<tr>
<td>7</td>
<td>Crosstab Comparisons with Overall Satisfaction and Feeling Crowded with Different Activities</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>Differences in Satisfaction Rating by Respondents in Different Activities at the Same Locations of Hyrum Lake</td>
<td>36</td>
</tr>
<tr>
<td>9</td>
<td>Differences in Satisfaction Rating by Respondents at Different Locations of Hyrum Lake, by Activity</td>
<td>38</td>
</tr>
<tr>
<td>10</td>
<td>Satisfaction Ratings of Respondents in Different Activities and Different Locations of Hyrum Lake, in Comparison to Boat Density ≤ 44 and ≥ 45</td>
<td>39</td>
</tr>
<tr>
<td>11</td>
<td>Support for a Limit on Boats at Hyrum Lake</td>
<td>45</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hypothetical relationship between increasing visitor use and satisfaction</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Five-point Likert-type satisfaction scale</td>
<td>10</td>
</tr>
</tbody>
</table>
People may do things they do not enjoy in some areas of their lives, but when it comes to recreation they seek freedom of choice. There may be some constraints, but generally people choose recreation activities they enjoy and avoid those they do not. Americans are seeking recreational opportunities as never before. The choices of recreational activities are as numerous as an individual can imagine. People purposefully choose different settings for their recreational activities with the expectation of achieving a particular recreation experience (Stankey, 1980). Studies have shown that individuals who are involved in outdoor recreational activities of choice appear to be more satisfied with the quality of life (O'Leary, 1997).

Water-based recreation is one of the top preferences of outdoor recreation in the United States. Water-based recreation includes swimming, motor boating, sailing, canoeing, fishing, waterskiing, sailboarding, and personal watercraft use. A report from the USDA Forest Service shows that in 1983, 33.6 million people in the United States participated in motor boating alone, and in 1995, that number was up to 47 million people, which indicated an upward popularity trend of 40% (Super, 1997).

One reason the number of recreational boaters is increasing in the state of Utah is because the population is
growing rapidly. The population in 1990 was 1,729,000 and
grew to 1,959,000 in 1995 (Hall, 1996).

Every year an increasing number of Utahns are choosing
recreational boating as an ideal way to relax with family
and friends M. Tullius (personal communication, April 22,
included boating growth rate in every state. Woolley (1996)
reported that the number of registered boats (all motorized
watercraft) in the state of Utah has increased each year.
He reported that in 1990 there were 59,859 registered boats,
while in 1995 that number increased to 75,748.

Cache County, where Hyrum Lake is located, is also
experiencing population growth. In 1996 the population was
estimated at 82,500 people and was growing at an annual
growth rate of 2.9% ("Utah's Birthrate," 1996).

Recreational boaters have always been able to enjoy
natural lakes and rivers for water-based recreation;
however, these waterways are a limited natural resource.
With the building of dams for storage of water, both
drinking and irrigation, along with flood control,
opportunities for water-based recreation have increased even
more. With the increasing number of individuals who want to
enjoy their leisure time at a lake or river, many of these
areas are experiencing perceived crowding. The overcrowding
of lakes and rivers threatens public health and detracts
from one's recreational experience (Kusler, 1972).
The locations for water-based recreation, however, are not increasing enough to keep up with the population growth. Since 1980 there have only been three new dams constructed in Utah: Upper Stillwater, Red Fleet, and Jordanelle (Pinnock, 1996). Since Jordanelle Lake is close to the Wasatch Front (highest population area in Utah), the managers realized it would be very popular for boaters; therefore, they set a regulation for the number of boats that would be allowed on the lake at one time, called a carrying capacity (Pinnock, 1996).

Visitor use at Hyrum Lake State Park, Utah, has always been on a steady increase. During the boating season which begins on Memorial Day and ends on Labor Day, visitation was 65,118 in 1994 and increased to 65,802 in 1995 (Carlson, 1996). A growing number of boaters are reporting frequent incidents of near accidents because of the number of boaters on the lake. Therefore, some boaters are dispersing to other mountain lakes that have previously been for fishing only and not multiple use recreation (Gyllenskog 1996).

Purpose of the Study

This study focused on boaters' satisfaction in relation to the density (number) of boats using Hyrum Lake. In trying to determine optimum recreation carrying capacity, one must define the amount of recreational use that reflects the level most appropriate for both the protection of the
resources and the satisfaction of the participants. This concept involves two major elements, physical carrying capacity and social carrying capacity. Physical carrying capacity is the capacity level most appropriate for resource protection. Social carrying capacity is the effect of visitors on the capacity of the resources to yield a satisfying experience to other users (Warren & Rea, 1989).

Carrying capacity for boating areas is affected by the amount of time the watercraft spends moving. The highest impacts come from activities such as personal watercraft use and waterskiing. In other pursuits, such as still fishing from a boat, sight seeing, and swimming from a boat, the watercraft is used simply as a means to reach a destination and consequently their impact is likely to be much lower (Adams, 1993).

Warren and Rea (1989) concluded that water skiers require 12 acres to perform their activity, and power boaters require 9 acres to satisfactorily and safely perform their activity, for an average of 10.5 acres per boat for the two activities. Hyrum State Park visitation reports indicate the activity on Hyrum Lake consists mostly of power boaters, water skiers, and personal watercraft, suggesting that the required use range is likely to be approximately 10.5 acres per boat (Carlsen, 1996).

Hyrum Lake is the recreational choice for hundreds of boaters every year, whether it is because of the setting,
proximity, or other attractions. It seems that people will still launch their boats, no matter how crowded it looks. As a result, boaters complain and report how close other boats come to them, causing near accidents and threatening their safety (Gyllenskog, 1996).

Figure 1 (Alldrege, 1973) shows hypothetical curves indicating that visitor use and crowding are related: increasing numbers of visits cause increasing percentage of visitors to report feeling crowded (Manning, McCool, & Graefe 1995). Wagar (1964) pointed out that as more people visit a park or recreation area, not only can the environmental resources of the area be affected, but also the quality of the visitor's experience. His research showed that an increasing number of visitors caused greater social impact as measured by crowding and related variables.

Currently, the policy at Hyrum Lake is open boating: allowing as many boaters to use the lake as visit on any given day. If, as the number of boats increase, boaters' satisfaction is perceived to decrease, this can lead to negative attitudes and behavior. If the criteria for allocating bodies of water is the greatest good for the greatest number (Kusler, 1972), it would be helpful to know what the boaters' satisfaction level is regarding boat density.

This study hypothesized that as boat density increased on Hyrum Lake, boaters' perceived satisfaction would
Research Questions

1. Will a density-based carrying capacity reduce crowding perceptions of boaters experiencing low satisfaction levels?
2. Will different types of boaters satisfaction level decline as boating density increases?

Hypotheses

1. Boat density is positively correlated with satisfaction at the following areas:
   - boat ramp, launching their boat
   - while boating on the lake
   - along the shoreline and beach areas
   - boat ramp, while retrieving their boat from the lake

2. Because different types of users have different motives and different styles of participation, they will differ in perception of satisfaction during their recreational experiences as boating density increases.
CHAPTER II
REVIEW OF LITERATURE

A review was conducted of relevant literature pertaining to boating, water recreation, satisfaction, carrying capacity, crowding, and conflict, along with state and federal documents pertaining to this study. The following sources were searched using Silver Platter and MERLIN databases at Utah State University. Other sources included specific journal indexes and reference lists from published literature reviews and the Internet. Additional information was obtained through Leisure, Recreation and Tourism ABSTRACTS along with the Social Science Citation index. This review will examine four areas including crowding, carrying capacity, conflicts, and satisfaction.

Crowding

Drogin (1991) defined crowding as an experiential state affected by situational, social, and personal factors i.e., the negative evaluative judgment that a given density is excessive and that it impairs an individual's satisfaction performance.

Thus, crowding is seen as a psychological experience in which the physical component of density is a necessary, but not a sufficient, antecedent condition (Schaeffer & Patterson, 1980).

Norms represent shared expectations of users and can
influence individual perceptions of behavioral and situational conditions. Different user groups may have different expectations and norms about appropriate numbers of users for a particular setting and recreational activity (Drogin, 1991). Violations of situationally specific norms of appropriate behavior contribute to a sense of crowding (Stankey, 1989). There appears to be considerable consensus on what constitutes crowding among like-minded groups, but not necessarily between groups or across the population as a whole (Stankey & Manning, 1986). Several studies have shown that selected groups of recreationists shared personal, attitudinal, and behavioral characteristics that lead to shared norms regarding crowding (Shelby & Heberlein, 1984).

When there are too many people in a recreation setting, the situation has been described by users and managers as "crowded" or even as "overcrowded." Crowding has been defined as a negative evaluation of a certain density or number of encounters (Altman, 1975; Desor, 1972; Schmidt & Keating, 1979; Stokols, 1972). Sometimes even scientists used the word crowding when they really meant high density. Density is a descriptive term that refers to the number of people per unit area, measured by counting the number of people and measuring the space that they occupy. Crowding, on the other hand, involves a value judgment that the specified number is too many (Galle, Gove, & McPherson, 1972; Langer & Saegert, 1977). The normative approach to crowding suggests that
density is not interpreted as negatively as crowding until it is perceived to interfere with one's objectives or values.

People perceive that an area or lake is crowded when the number of actual encounters exceeds the number of contacts expected and/or the number preferred (Shelby, Heberlein, Vaske, & Alfano, 1983).

Perceived crowding is a psychological dimension that exists in the minds of individuals; it is usually measured directly by self-report techniques. For this study, crowding was measured by asking boaters if they felt crowded during their current boating trip. They were asked to rate such situations as: if they felt crowded at different locations, boats coming too close, if waves and noise were a concern, safety, and if the behavior of other boats made them feel crowded.

Responses were recorded on the 5-point Likert-type scale (Figure 2). A Likert-type scale was used because research has proven it to be the most accurate (Gay, 1992).

Each response was associated with a point value, and an individual's score was determined by summing the point value

<table>
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<th>Not at all Satisfied</th>
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<th>Neutral</th>
<th>Moderately Satisfied</th>
<th>Extremely Satisfied</th>
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Figure 2. Five-point Likert-type satisfaction scale.
for each statement (Gay, 1992). By plotting perceived crowding against use or encounter levels, it was possible to look for abrupt shifts called break points. That point may be considered a social carrying capacity based on perceived crowding as an evaluative standard (Hendee, Stankey, & Lucas, 1978).

Satisfaction

A great deal of research has been done on assessment of individual satisfaction in different sectors of life, that is, job, family retirement, and leisure. Leisure satisfaction has been defined as the positive perceptions or feelings which an individual forms, elicits, or gains as a result of engaging in leisure activities. This positive feeling of contentment results from satisfaction of felt or unfelt needs of the individual (Beard & Ragheb, 1980).

In approaching the situation of boaters’ satisfaction and boat density on lakes and reservoirs, several articles and studies are available. Involved with this study are the factors that influence boaters’ satisfaction or dissatisfaction compared with perceived crowding.

Satisfaction has often been identified as the principal product of the recreation experience (Driver & Tocher, 1970). Maximization of satisfaction, along with the pursuit of happiness, is the major goal of recreation resource management (Lucas & Stankey, 1974). In fact, satisfaction is
probably the most commonly used indicator of quality in the recreation experience (Drogin, Graefe, & Titre, 1990).

Recreation behaviors are largely voluntary and therefore self-selected, so users choose activities that are satisfying for them. As a result, they will tend to show high satisfaction levels regardless of use level. That people voluntarily select an activity and make a substantial investment of money and time may also lead to a positive evaluation of the experience, as dissonance theory suggests (Festinger, 1957). This effect may be more pronounced in activities that require large expenditures of time or money (boating) and less pronounced for more everyday recreational activities (Manning and Ciali, 1980).

Drogin (1991) suggested that recreational satisfaction is influenced by a variety of objective and subjective factors, attenuating the correlation between density and satisfaction. The geographic characteristics of the resource, for example, may limit the amount of contact individuals have with others. Studies examining this possibility have focused on the relationship between visitor contacts and satisfaction.

Heberlein and Shelby (1977) suggested that some people may rationalize and report that they had a good time regardless of conditions, since recreation activities are voluntarily selected and sometimes involve a substantial investment of time, money, and effort. Therefore, people
may be inclined to rate their recreational experience high regardless of actual conditions to reduce internal conflicts. This then may explain why reported satisfaction of recreationists is often not related to density. Schreyer, Roggenbuck, McCool, Royer and Miller (1976) suggested that first-time users of an area tend to accept what they find as normal, whereas repeat visitors evaluate what they find against past experience. Evidence also supports that more experienced users are more sensitive to higher use density (West, 1981).

Lucas (1964) seemed to think that tolerance for meeting another group would depend, at least to some extent, on the other group's characteristics. Studies support this view empirically, with the biggest difference coming in their mode of travel, motor boat versus canoe and hikers versus horseback.

Titre and Mills (1982) reported specific forms of bothersome behavior were, in decreasing order: noise, yelling, and loud behavior; littering and polluting lakes; and noncompliance with rules.

Safe conditions contribute significantly to people's enjoyment and satisfaction of water activities by reducing fear, anxiety, and stress. This in turn will enhance the quality of the recreational experience (O'Connell, 1996).
Carrying Capacity

Carrying capacity has a rich history in the natural resource professions, substantially predating its serious adoption in the field of outdoor recreation. In particular, the term has received wide use in wildlife and range management where it refers to the number of animals of any one species that can be maintained in a given habitat (Dasmann, 1964).

In the mid-30s, Lowell Sumner, a National Park Service wildlife technician, may have been the first to suggest applying the concept of carrying capacity to humans in an outdoor recreation setting when he questioned how large of a crowd can be turned loose in a wilderness without destroying its essential qualities (Sumner, 1936). Two decades later, the term carrying capacity was listed as one of the eight major principles in recreation in determining optimum use. Now it is listed as a formal part of outdoor recreation research (Dana, 1957).

Carrying capacity has commanded its share of attention. Shelby and Heberlein (1986) cited a recent bibliography review containing over 2,000 published and unpublished papers that had relevance to issues of carrying capacity. Yet despite this considerable research effort, carrying capacity has retained something of a rainbow illusion; its promise is always just beyond the next hill (Stankey, 1988).

Carrying capacity today is reflected in four main
types, as identified by Shelby and Heberlein (1986). Ecological capacity is concerned with the effects of use levels on the ecosystem (e.g., damage to vegetation and soil compaction); physical capacity relates to the amount of space available within an undeveloped, natural area (e.g., the number of people that can camp along a beach); facility capacity is concerned with the number of people who can use a visitor facility within a specified period of time; and social capacity is related to impacts that detract from or change the recreation experience. However, it was toward social carrying capacity that this study directed its primary concern. Social capacity means the level of use of a resource or area beyond which the user's expectation of the experience is not realized and does not achieve satisfaction (O'Connell, 1996). Social carrying capacity is often the most limiting factor, and is typically the most difficult capacity to determine.

Wagar (1964) noted that there must be some management objective on which to base a satisfactory level of quality. Therefore, he suggested that as more people visit an area, not only are the environmental resources affected but also the quality of the recreation experience. Increasing use was seen to affect visitor satisfaction, the effects varying depending on visitor needs and motivations. Thus, a carrying capacity is not a fixed number and will vary over time and may vary with each given situation.
In setting a carrying capacity, if people are uncomfortable, constrained, or unsafe in their recreation, then a maximum number may be too high. Capacity of a classroom, for example, might be lowered to the number of seats available. This is an optimal or a best number because people can sit comfortably and use the aisles in case of emergency. An optimum level trades higher number for other benefits, in this case, comfort and safety.

To set a carrying capacity, one needs to know which number of encounters is more desirable; some sort of evaluative standard is needed. But evaluative standards defining important social aspects of recreation experience have been more difficult. This is likely because it is easier for people to accept standards that appear to be based on objective data, such as those for establishing water quality, than standards that appear to be based on subjective impressions, such as those for establishing the quality of a recreation experience (Shelby & Heberlein, 1986). Carrying capacity of a waterway is to provide an opportunity for certain types of satisfactory and safe experiences to take place.

Conflict

Since recreation is a behavior initiated to achieve certain motives or goals, conflict can occur if an individual suffers an inability to achieve one or more of
these goals. Conflict results if the individual blames another for interfering with these goals (Ruddell, 1989).

Brown (1977) discussed that those seeking exercise, for example, may be unaffected by seeing other people, while those seeking solitude are negatively affected, and those seeking companionship would have their satisfaction positively affected and not feel crowded at all.

Most conflicts do not revolve around resource questions, but rather around questions about values. In many cases, we spend time and effort collecting data about the physical environment when the conflict is essentially human and is unlikely to be resolved by biological information (Jacob & Schreyer, 1980).

Consider deer hunting, for example. Some hunters want no interference, so they prefer to see no one, although they may tolerate seeing four or five other hunters during the day in the field. In contrast, others believe that more hunters move the deer and increase the likelihood of success. This group prefers to see 15 other hunters and can tolerate from 5 to 35 contacts in a day (Heberlein & Laybourne, 1978).

Lee (1975) found that the amount of horse manure and the presence of litter on a trail had a bigger effect on perceived crowding than actual contacts with other parties.

Jackson and Wong (1982) suggested that goal interference was one of the primary reasons for cross-
country skiers to dislike snowmobilers. The study reported that sampled cross-country skiers experienced a high degree of conflict due to their encounters with snowmobilers, whereas the snowmobilers did not report experiencing conflict due to their encounters with cross-country skiers.

State and Local Studies

In 1994, the Division of Utah State Parks and Recreation, in conjunction with the University of Utah, conducted a survey of 612 registered boaters in the state of Utah. The study asked the question, "Are Utah's Waters Crowded?" The results were: Very Crowded = 20%, Crowded = 26%, Somewhat Crowded = 42%, Little Crowded = 9%, Not at all Crowded 2% (Woolley, 1995). The findings show that almost half of the registered boat users in Utah felt the waters are crowded, with an additional 42% feeling somewhat crowded when they recreate on Utah waters. The satisfaction level of Utah boaters seems threatened since 88% of the boaters already feel crowded, especially since all indications point to more and more boats being registered each year.

During the construction of Jordanelle State Park, a carrying capacity was set for the new Jordanelle Lake. After reading several literature reviews and studies from the Forest Service, Bureau of Reclamation, and Bureau of Land Management, Park Manager Steve Carpenter (1995), with the support of Utah State Parks and Recreation Director
Courtland Nelson, set the carrying capacity at a maximum of 300 boats to be on the lake at one time. One reason this carrying capacity was initiated was that one of the goals for Utah State Parks and Recreation was to provide the customer with quality service and satisfaction. This figure was derived by dividing the number of surface acres (3,000) by 10 acres per boat, which calculates to 300 boats. The figure 10 acre per boat came from a national average that was used in previous studies (Warren & Rea, 1989).

A plan by Pascoe (1995) for determining a vessel carrying capacity for Quail Creek State Park recommended that the number of vessels on Quail Creek Lake not exceed 45 to 50 boats at any one time. This number was also arrived at by computing 10 surface acres of water per vessel. These figures are set below maximum surface acres to allow for the fluctuating water levels that occur each year, so as not to have to reset the number of boats allowed each week or month as the water recedes.

As of July 17, 1996, Utah State Parks and Recreation has also set a boat limit of 300 boats on Deer Creek Lake. This lake has several access points and will be much more difficult to control (M. Tullius, personal communication April 22, 1996).

Jordanelle, Quail Creek, and Deer Creek have already established a carrying capacity of 10 acres per boat. To be in keeping with this set standard, the recommended carrying
capacity on Hyrum Lake would more than likely follow the same regulation. By administering a satisfaction level survey, it will be determined whether the sensitivity point is above or below 10 acres per boat at Hyrum Lake. The sensitivity point is when boaters' satisfaction level starts to decline. Some may keep boating and just be a little dissatisfied, or they may be so dissatisfied that they leave the lake entirely and go and do something else (displacement). When the number of boaters on the lake increases the satisfaction level is expected to decrease.

Thirty miles to the south of Hyrum Lake, the Wasatch-Cache National Forest Ranger District conducted a study to determine the high water carrying capacity of Pineview Reservoir. Welsh (1991), the district ranger who studied boating capacity at Pineview Reservoir, conducted a public sensitivity analysis and set a standard of 7.5 acres per boat (acres/boat). When the number of boats on the reservoir has exceeded 7.5 acres per boat the boaters' satisfaction level decreases, and the boaters have become more sensitive to the situation. Those involved with the study signed a decision notice stating that 430 vessels would be permitted on the reservoir at one time, based on the water level. There was also a provision for lowering the vessel capacity as water levels drop in the reservoir. This critical measure, especially during low water years, will reduce
congestion and corresponding safety problems experienced at Pineview Reservoir during peak use days.
A user survey (questionnaire) was developed in order to obtain information from those who are actually using Hyrum Lake. This way the person being interviewed could provide insight based on recent experience while the interviewer could observe actual conditions and record information on a first-hand basis (O'Connell, 1996). Lee Gyllenskog, Hyrum State Park manager (personal communication, May 1997), concluded that an on-site survey was far more productive in reaching the boating public than the public input meeting that was held.

Procedures

A boating satisfaction survey used by Drogin, and supervised by Graefe, for a study at Berlin Lake, Ohio, (Drogin, 1991) was adapted and modified with their permission to fit the survey at Hyrum Lake. This survey was implemented by trained personnel and administered to boaters on Hyrum Lake. Sampling days were selected at random. The survey questions were asked of the first boater who left the lake starting at 12:00 noon, then the first boater every 30 minutes after that until 8:00 pm. The boaters were interviewed as they left the lake regarding their boating experience for that day. The survey interview was conducted in the parking lot as the boaters prepared their boats for
transport. The survey determined if the boat users felt that the lake was crowded by the use of other boaters. They were asked if they felt their satisfaction level increased, decreased, or stayed the same in relationship to the boating density.

Three locations of the Lake were evaluated for possible congestion of boaters:
1. Boat launch area--while unloading and loading their boats.
2. Lake area--while operating on the water of the lake.
3. Shore line area--while subjects were mooring their boats and socializing along the beaches.

The interviewers consisted of Parks and Recreation students at Utah State University, and summer seasonal employees at Hyrum State Park, who were Natural Resource students at Utah State University. The survey was supervised by Shawn Holmes, an environmental studies student, who was working on his internship for the Forest Resources Department at Utah State University.

Since effective communication during the interview was critical, the interviewers were well trained before the study began. Before the first formal question was asked, time was spent in establishing rapport and putting the interviewee at ease. The purpose of the study was explained and strict confidentiality of responses assured (Gay, 1992).
The survey was conducted on randomly selected days between May 25 and September 6, 1996. A pilot survey was also conducted during the first part of May 1996 to work out any unforeseen problems and to give the students a chance to become familiar with the survey process.

The surveys were administered on one randomly selected weekday and one weekend day of the week. The boating season did include one long weekend, Friday, July 5, which was included in the weekend sampling of July 6 and 7. The four holidays that fall in between the boating season were included in the survey sample as a regular summer season. The holidays consisted of May 27, Memorial Day; July 4, Independence Day; July 24, Pioneer Day (Utah state holiday); and September 2, Labor Day. External variables were noted (e.g., weather, time of day, and free park day).

The number of boats on the lake at one time was calculated by counting the number of boat trailers for all water vessels (i.e., power boats, personal watercraft). This study did not include nonmotorized boats such as kayaks, canoes, and inflatable rubber boats. This was an accurate way to arrive at the number of boats, since there is only one boat ramp on the lake to launch or to retrieve boats. The large parking lot adjacent to the launch ramp provided the only parking where the boaters could park their trailers. A small percentage of the boaters park their boat trailers in the campgrounds while they are camping at the
park. The campgrounds and parking lot are laid out in such a way that a systematic count was obtained. This count was conducted, every 2 hours on survey days, by the campground host while he lived at the park.

Boat density calculations were obtained by dividing the surface acres by the number of boats. The surface acreage of the lake was obtained from a daily log that was kept by the South Cache Water Users and the Bureau of Reclamation. Since Hyrum Lake reservoir was primarily constructed for irrigation use, the water level was well monitored (Pinnock, 1996).

Sample Population

The sample population was park visitors who used the lake at Hyrum State Park. Boaters were randomly selected according to the established procedure to conduct an on-site oral interview. The principal candidate to answer the survey questions was the main operator of the boat (one person per boat) as he/she left the lake for the day. The first boat to leave the lake at 12:00 noon was surveyed, and every half hour after that, the first boater to leave was surveyed until 8:00 pm. On the weekday surveys, when the boating density was less than 10 boats, one of the boaters was randomly selected for the interview. The sample population was large, so therefore a good random sampling was obtained.
Research Design

The most common procedure for the boaters was to pull their boats into the parking lot to tie their vessels down and wipe them off. At this point the surveys were administered. Nearly every boat leaving the lake had several people (friends or family members) aboard to help wipe off and tie down the boat. While the main operator was directing his attention to the survey questions, the other people were taking care of the boat. This way the visitors had time and were willing to answer survey questions. Of the 283 boaters approached by the interviewers, only one declined to answer the questions, resulting in a 99.6% success rate.

Instrumentation

Using properly trained volunteers was the key in gathering reliable and valid information. Each volunteer was instructed on the importance of reading each question exactly as it was written in the survey script. The interviewing protocol was followed as outlined by Borg and Gall (1994).

The satisfaction scale from the survey was designed to determine what the individual believed, perceived, or felt. Instructions and advisement were given to the volunteers to assure the collection of unbiased data. Follow-up interviews throughout the summer with the volunteers doing the surveys
insured that all surveys were being conducted in the same manner.

Data Analysis

Satisfaction level is often hard to determine. The same situation may vary from person to person as far as satisfaction levels for a recreational activity. Research has shown that satisfaction is probably the most commonly used indicator of quality in the recreation experience (Driver & Tocher 1970).

The on-site survey method of collecting data has been shown to be reliable from previous studies in determining satisfaction levels in boaters (Vaske, Donnelly, & Heberlein, 1980; Vaske, Donnelly, Heberlein, & Shelby, 1982). During this process, information was collected regarding any changes in people's personal satisfaction level towards other boaters and conditions that existed on the lake. The surveys were analyzed and the correlation between the boating density and boaters' satisfaction was evaluated. Attention was focused on boaters' satisfaction level at the launch ramp, while boating on the lake, and along the shoreline and beaches.
Research Design

The research design consisted of interpretation of the information gathered by the on-site survey. The survey included questions about demographics, and boaters' perceptions and questions designed to gather information indicating whether certain conditions increased or decreased their satisfaction. The implementation of a 5-point Likert-type satisfaction scale aided in analyzing the data.
CHAPTER IV

RESULTS

Population

The study population consisted of boaters that used Hyrum Lake during the summer of 1996. Table 1 describes demographic characteristics and boating participation.

Table 1

Demographic and Recreation Participation Characteristics of Respondents

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>246</td>
<td>87</td>
</tr>
<tr>
<td>Females</td>
<td>36</td>
<td>13</td>
</tr>
<tr>
<td>Activities boaters participated in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterskiing(kneeboard, tube, etc.)</td>
<td>141</td>
<td>50.2</td>
</tr>
<tr>
<td>Pleasure boating</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>Trolling</td>
<td>11</td>
<td>04</td>
</tr>
<tr>
<td>Still fishing from boat</td>
<td>45</td>
<td>16</td>
</tr>
<tr>
<td>Personal Water Craft</td>
<td>48</td>
<td>17</td>
</tr>
<tr>
<td>Swimming from boat</td>
<td>4</td>
<td>01.4</td>
</tr>
<tr>
<td>Sailing</td>
<td>1</td>
<td>00.4</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>01</td>
</tr>
<tr>
<td>Miles Traveled to Hyrum Lake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01 - 18 miles</td>
<td>186</td>
<td>66.2</td>
</tr>
<tr>
<td>19 - 48 miles</td>
<td>38</td>
<td>13.5</td>
</tr>
<tr>
<td>49 - 88 miles</td>
<td>44</td>
<td>15.7</td>
</tr>
<tr>
<td>89 miles and over</td>
<td>13</td>
<td>04.6</td>
</tr>
<tr>
<td>Average years boating</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Average length of stay</td>
<td>4.5 hours</td>
<td></td>
</tr>
</tbody>
</table>
patterns (complete survey responses are shown in Appendix A) of the 282 people in the sample group. The study population consisted mainly of males with fairly high experience levels, and primarily of waterskiers followed by personal watercraft users, with the majority of the visitors coming from the Cache Valley area.

Table 2 summarizes respondents' evaluations of their Hyrum Lake recreation experiences. These data show that visitors typically rate the quality of their experience relatively high, greater than 7 (≥ 7 on a scale of 1 to 10, with 10 being high or a perfect trip).

Table 2

Respondents' Assessments of the Quality of Their Experiences

<table>
<thead>
<tr>
<th>Quality Scale</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>48</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>75</td>
<td>27</td>
</tr>
<tr>
<td>9</td>
<td>46</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>59</td>
<td>21</td>
</tr>
</tbody>
</table>

Note. Mean quality boating experience rating = 7.75.
Tables 3 and 4 summarize that more than half reported feeling crowded at least occasionally, while only 32% said that crowding had detracted from their experiences. Similarly, more than 80% feel safe often or very often and fewer than 25% felt that boat density had negatively affected their experiences.

Safety is a key element in boaters' satisfaction. Survey responses indicated that the majority of the boaters felt safe while on Hyrum Lake. Moreover, there was no significant difference in different activities in relation to satisfaction with safety and overall boat density (Table 4).

Table 3
Respondents' Assessments of Their Crowding Experiences

<table>
<thead>
<tr>
<th>Rating Scale</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.16 &quot;Reported frequency of feeling crowded.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>125</td>
<td>44.2</td>
</tr>
<tr>
<td>Occasionally</td>
<td>75</td>
<td>26.5</td>
</tr>
<tr>
<td>Often</td>
<td>49</td>
<td>17.3</td>
</tr>
<tr>
<td>Very often</td>
<td>32</td>
<td>11.3</td>
</tr>
<tr>
<td>&quot;How did this affect your satisfaction?&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detracted from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>48</td>
<td>17.0</td>
</tr>
<tr>
<td>(2)</td>
<td>44</td>
<td>15.5</td>
</tr>
<tr>
<td>No affect on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>108</td>
<td>38.2</td>
</tr>
<tr>
<td>(4)</td>
<td>17</td>
<td>06.0</td>
</tr>
<tr>
<td>Added to my</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>64</td>
<td>22.6</td>
</tr>
</tbody>
</table>
Table 4

Respondents' Assessments of Their Hyrum Lake Experiences

<table>
<thead>
<tr>
<th>Rating Scale</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.17 &quot;Influence/feeling that safe boating conditions existed.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>12</td>
<td>04.2</td>
</tr>
<tr>
<td>Occasionally</td>
<td>42</td>
<td>14.8</td>
</tr>
<tr>
<td>Often</td>
<td>76</td>
<td>26.9</td>
</tr>
<tr>
<td>Very often</td>
<td>151</td>
<td>53.4</td>
</tr>
<tr>
<td>&quot;How did this affect your Satisfaction?&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detracted from (1)</td>
<td>26</td>
<td>09.2</td>
</tr>
<tr>
<td>(2)</td>
<td>21</td>
<td>07.4</td>
</tr>
<tr>
<td>No affect on (3)</td>
<td>68</td>
<td>24.0</td>
</tr>
<tr>
<td>(4)</td>
<td>43</td>
<td>15.2</td>
</tr>
<tr>
<td>Added to my (5)</td>
<td>123</td>
<td>43.6</td>
</tr>
<tr>
<td>Q.21 &quot;Influence of Boaters Density on Overall Satisfaction.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced my (1)</td>
<td>24</td>
<td>08.5</td>
</tr>
<tr>
<td>(2)</td>
<td>44</td>
<td>15.5</td>
</tr>
<tr>
<td>No affect on (3)</td>
<td>95</td>
<td>33.6</td>
</tr>
<tr>
<td>(4)</td>
<td>48</td>
<td>17.0</td>
</tr>
<tr>
<td>Increased my (5)</td>
<td>71</td>
<td>25.1</td>
</tr>
</tbody>
</table>

Table 5 points out that 51% answered that other boaters' behavior and courtesy actually increased their satisfaction, with an additional 29% indicating a neutral response as far as their satisfaction. This shows that 80% of the people surveyed appreciated the behavior and courtesy of the other boaters at Hyrum Lake.
Table 5

Behavior and Courtesy Effects on Satisfaction Regarding Overall Density

<table>
<thead>
<tr>
<th>Rating Scale</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. 20 “On the average, how did the behavior and courtesy of other boaters affect your satisfaction level today?”</td>
<td></td>
</tr>
<tr>
<td>Detracted from</td>
<td>Number</td>
</tr>
<tr>
<td>(1)</td>
<td>23</td>
</tr>
<tr>
<td>(2)</td>
<td>35</td>
</tr>
<tr>
<td>No Affect on</td>
<td>(3)</td>
</tr>
<tr>
<td>(4)</td>
<td>66</td>
</tr>
<tr>
<td>Added to my</td>
<td>(5)</td>
</tr>
</tbody>
</table>

Density--Satisfaction Relationships

Correlation analysis was used to determine the relationship between overall boat density and satisfaction at these four locations of Hyrum Lake:

1. boat ramp--launching the boat, start of trip
2. while on the lake
3. along the shoreline and beaches
4. boat ramp--retrieving the boat, end of trip

The case data represent all 282 random samples during high- and low-density days. The correlation method was used to analyze the research data because it tests for relationships between pairs of variables that are theoretically (or in practice) expected to co-vary. In this case, theory indicated that density is believed to be a
predictor of satisfaction (Manning, 1986; Shelby &
Heberlein, 1986).

A low relationship between satisfaction and density was
determined by the low correlation coefficient $r$ for each
location. Also by using a significant level of $p < .05$, the
analysis found no significant relationship between the
number of boats on the lake and boaters' reported levels of
satisfaction, at any of the four locations (Table 6).

Table 7 suggests that boaters were disproportionately
likely to say density detracted from their experiences
($p = .035 \rightarrow < .05$ significant), while PWC users show a
different distribution indicating that density was not
likely to detract from their experience.

Table 6

**Correlation of Overall Boat Density with Satisfaction at Different Locations of Hyrum Lake**

<table>
<thead>
<tr>
<th>Location</th>
<th>$r$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat ramp, put-in</td>
<td>.074</td>
<td>.218</td>
</tr>
<tr>
<td>On the lake</td>
<td>.097</td>
<td>.105</td>
</tr>
<tr>
<td>On shore &amp; beach</td>
<td>.009</td>
<td>.881</td>
</tr>
<tr>
<td>Boat ramp, take-out</td>
<td>.041</td>
<td>.490</td>
</tr>
</tbody>
</table>

*Note.* Pearson $r = \text{correlation coefficient.}$
Table 7
Crosstab Comparisons with Overall Satisfaction and Feeling Crowded with Different Activities

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Boating</th>
<th>Fishing</th>
<th>PWC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detracted from (1)</td>
<td>38</td>
<td>7</td>
<td>3</td>
<td>48</td>
</tr>
<tr>
<td>(2)</td>
<td>31</td>
<td>10</td>
<td>3</td>
<td>44</td>
</tr>
<tr>
<td>No Effect on (3)</td>
<td>63</td>
<td>21</td>
<td>24</td>
<td>108</td>
</tr>
<tr>
<td>(4)</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Added to my (5)</td>
<td>36</td>
<td>14</td>
<td>15</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>176</td>
<td>55</td>
<td>51</td>
<td>282</td>
</tr>
</tbody>
</table>

Note. Chi Squared = 16.565, p = .035

Hyrum Lake boaters participate in different activities while boating, primarily water skiing, fishing, and personal watercraft use. Other studies have found that responses to crowding vary between activities (Gramann & Burdge, 1981); for example, it has been suggested that participants in consumptive recreation activities such as fishing may be more susceptible to use density problems due to competition for fishing locations (Shelby, Vaske, & Heberlein, 1989). Therefore, an analysis of variance (ANOVA) was used to determine whether there was a significant difference in satisfaction rating among participants in three different types of activities at each of the four locations (Table 8).
Table 8
Differences in Satisfaction Ratings by Respondents in Different Activities at the Same Locations of Hyrum Lake

<table>
<thead>
<tr>
<th>Location</th>
<th>Satisfaction means /SD</th>
<th>E ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boat</td>
<td>Angler</td>
<td>PWC</td>
</tr>
<tr>
<td>Ramp, put-in</td>
<td>4.44</td>
<td>4.61</td>
<td>4.56</td>
</tr>
<tr>
<td></td>
<td>.853</td>
<td>.782</td>
<td>.831</td>
</tr>
<tr>
<td>On lake</td>
<td>4.04</td>
<td>4.05</td>
<td>4.31</td>
</tr>
<tr>
<td></td>
<td>.987</td>
<td>.911</td>
<td>.927</td>
</tr>
<tr>
<td>On shore</td>
<td>4.05</td>
<td>3.87</td>
<td>4.13</td>
</tr>
<tr>
<td></td>
<td>.981</td>
<td>1.05</td>
<td>1.06</td>
</tr>
<tr>
<td>Ramp, take-out</td>
<td>4.45</td>
<td>4.41</td>
<td>4.35</td>
</tr>
<tr>
<td></td>
<td>.762</td>
<td>1.01</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Note. Satisfaction Scale: 1) Not at All 2) Slightly 3) Neutral 4) Moderately 5) Extremely

If the E ratio is statistically significant (p < .05), this tells us that members of different populations are likely to differ significantly in their assessment of the dependent variable (satisfaction) at the same locations on the lake. The greater the difference in relationship, the larger the F ratio (Borg & Gall, 1989). Table 8, and Table 14 in appendix E, shows the results of the ANOVA (F test). There was no significant difference in reported satisfaction ratings when compared across activity groups at any of the
four locations tested. Therefore the hypothesis was not supported.

Research has also shown that sensitivity to social impacts can be greater at some locations within a recreation setting than at others (Shelby, & Heberlein, 1986; Stankey, 1973); for example, wilderness hikers tend to be more sensitive to crowding in camp than on the trail. Also a study at Berlin and Raystown Lakes found that crowding varies significantly at different points of the boating experience (Drogin, Graefe, & Titre, 1990). Boaters felt most crowded while actually out on the lake, noting increased sensitivity to crowding at interior locations versus access points (Drogin et al., 1990).

Therefore, an ANOVA was performed to determine whether satisfaction means were higher at some parts of Hyrum Lake than others (Table 9, and Table 15 in appendix F). A protected least significant differences (LSD) test was performed to identify which differences in reported satisfaction were statistically significant. Boaters (waterskiers) and anglers reported significantly lower satisfaction on the lake and along the shore than on the ramp; however, there were no significant differences in ratings by PWC users at different locations.

The fact that differences in reported satisfaction exist, by themselves, does not mean that crowding is the reason for the lower ratings on shore or on the lake.
Table 9

Differences in Satisfaction Rating by Respondents at Different Locations of Hyrum Lake, by Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Satisfaction means /SD</th>
<th>Ramp start</th>
<th>Lake</th>
<th>Shore</th>
<th>Ramp end</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boaters</td>
<td></td>
<td>4.44ᵃ</td>
<td>4.04ᵇ</td>
<td>4.05ᵇ</td>
<td>4.45ᵃ</td>
<td>11.60</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.853</td>
<td>.987</td>
<td>.981</td>
<td>.761</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anglers</td>
<td></td>
<td>4.61ᵃ</td>
<td>4.05ᵇ</td>
<td>3.87ᵇ</td>
<td>4.41ᵃ</td>
<td>7.05</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.781</td>
<td>.911</td>
<td>1.05</td>
<td>1.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWC</td>
<td></td>
<td>4.56</td>
<td>4.31</td>
<td>4.31</td>
<td>4.35</td>
<td>1.73</td>
<td>.162</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.830</td>
<td>.927</td>
<td>1.06</td>
<td>1.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. ᵃ,ᵇ = Different subscripts indicate least significant differences (LSD) in mean satisfaction rating.

Therefore, to test for interactive effects of density and activity, a Welch t' test (Glass, & Hopkins, 1996) was performed (Table 10). This test, designed for situations where there are unequal sample sizes and variances, allowed us to check the significant differences in satisfaction for high- and low-density situations, while controlling for both activity and location. Satisfaction means were compared when boater density was below versus at or above 45 boats. The boating density figures were selected because of the state of Utah standard of 10 acres per boat. With Hyrum Lake covering 450 surface acres, the two comparisons would represent densities above and below the state standard on carrying capacity. This analysis could detect no
Table 10

Satisfaction Ratings of Respondents in Different Activities and Different Locations of Hyrum Lake, in Comparison to Boat Density <=44 and >=45

<table>
<thead>
<tr>
<th>Location &amp; activities</th>
<th>Satisfaction mean</th>
<th>t'</th>
<th>v'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;44 Boats</td>
<td>≥ 45 Boats</td>
<td></td>
</tr>
<tr>
<td>Ramp, launching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boating</td>
<td>4.49</td>
<td>4.33</td>
<td>1.31</td>
</tr>
<tr>
<td>Fishing</td>
<td>4.55</td>
<td>4.83</td>
<td>1.60</td>
</tr>
<tr>
<td>PWC</td>
<td>4.50</td>
<td>4.81</td>
<td>1.39</td>
</tr>
<tr>
<td>On the lake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boating</td>
<td>4.19</td>
<td>3.71</td>
<td>3.07</td>
</tr>
<tr>
<td>Fishing</td>
<td>3.95</td>
<td>4.41</td>
<td>1.91</td>
</tr>
<tr>
<td>PWC</td>
<td>4.20</td>
<td>4.41</td>
<td>1.02</td>
</tr>
<tr>
<td>Shore &amp; beach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boating</td>
<td>4.05</td>
<td>4.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Fishing</td>
<td>3.83</td>
<td>4.00</td>
<td>0.54</td>
</tr>
<tr>
<td>PWC</td>
<td>4.05</td>
<td>4.45</td>
<td>1.14</td>
</tr>
<tr>
<td>Ramp, retrieving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boating</td>
<td>4.53</td>
<td>4.26</td>
<td>2.36</td>
</tr>
<tr>
<td>Fishing</td>
<td>4.51</td>
<td>4.08</td>
<td>0.94</td>
</tr>
<tr>
<td>PWC</td>
<td>4.32</td>
<td>4.45</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Note. Satisfaction Scale: 1) Not at All 2) Slightly 3) Neutral 4) Moderately 5) Extremely

alpha = .05 t' critical, v' = rounded degrees of freedom; differences are considered significant if:
when v' = 1, t' = 12.706; when v' = 2, t' = 4.303

significant difference in satisfaction, no matter what the density was at any of the locations or the activities. Therefore, the second hypothesis is not supported.
Even though there was not enough difference in the data to show statistical significance, these findings suggest a slight trend for such satisfaction ratings to be higher among boaters (water skiers, etc.) when density was 44 or fewer boats.

However, in all four locations the satisfaction mean for personal watercraft users was higher when the boat density was 45 and over. This suggests that PWC use and boater use are inverse of each other when determining satisfaction, which means that PWC users may enjoy the lake more when there is a higher density of boaters.
CHAPTER V
DISCUSSION

The purpose of this study was to ascertain whether boating density has an effect on boaters' satisfaction. This study looked at several aspects of satisfaction with regard to boat use at Hyrum Lake.

Descriptive statistics show that Hyrum Lake visitors report high levels of satisfaction with their boating experience. Few respondents reported feeling crowded more than occasionally during their visits. Although some visitors reported that user numbers detracted from their experience, most said that density was unrelated to, or even added to, their experience (Appendices B and C).

Further analysis found no relationship between actual user densities and satisfaction at any location on the lake. Participants in water skiing, fishing, or PWC use were no more likely than others to report differences in satisfaction, but anglers and skiers were less likely to feel satisfied with conditions on the lake or shore than at the ramp. However, this was apparently not due to crowding concerns, or there was no difference in this effect on high- and low-use days.

There are studies that would lead one to believe satisfaction is related more to the behavior of other recreators, rather than the number encountered (West, 1982). Drogin et al. (1990) indicated that expanding enforcement of
existing regulations and offering educational programs aimed at making offending boaters aware of the impact of their actions are more likely to bring about satisfaction than not having enforcement or education.

Other studies bring up alternatives to setting a carrying capacity. O'Connell (1996) has suggested that keeping incompatible activities separate can increase satisfaction. At Hyrum Lake that might be accomplished by separating the lake into different areas, such as waterskiing from fishing and sailing from personal watercraft users.

Providing more education about proper use of the lake may help to boost user satisfaction (Drogin et al., 1990). Programs, handouts, and brochures could be directed towards educating recreators and making them aware of their role in helping ensure that other waterway users have a safe and enjoyable experience.

Studies consistently find low correlations between perceived crowding and overall satisfaction with users' experience (Graefe, Vaske, & Kuss, 1984; Shelby & Heberlein, 1986). Shelby and Heberlein (1986) believe that people have positive experiences in the face of steadily increasing use.

Researchers hypothesize that recreationists who are not satisfied with their experience because of less than desirable setting (density) attributes go elsewhere and are
replaced with individuals who are satisfied with the setting. Those who leave and come back are still less satisfied than those who never left (Manning, 1986).

Stankey (1988) indicated that satisfaction can be higher if information regarding visitor density is provided, before the visitor arrives at the site. When visitors know that the area will probably be crowded when they get there, they will know what to expect and will accept the situation better.

Recreationists with a high level of tolerance would be less influenced by unrealistic expectations and would be more willing to accommodate unexpected circumstances regarding the number of encounters with other recreators. Conversely, less tolerant recreationists with unrealistic expectations would be inflexible and most likely to experience goal interference or conflict (Ivy, Stewart, & Lue, 1992).

Recommendations for Future Research

There are many different research possibilities and implementations that could be used from this study. A strong recommendation is to study the influence of personal watercraft users' activity on other recreationists' safety and satisfaction, specifically focusing on operators who rent personal watercrafts. It has been found that the individuals who rent personal watercrafts usually have no
formal training or experience and cause a large percentage of the accidents, either with other personal watercrafts, boats, or swimmers (Holland, Pybas, & Sanders, 1992).

Conclusion

In summary, the principle of carrying capacity is consistently being discussed in many recreational areas. Although other lakes in Utah have already established a carrying capacity (maximum use density), it does not seem likely that one will be set at Hyrum Lake anytime soon. The results from this study indicated that there are no significant correlations between boat density and boaters' satisfaction.

One of the closing questions in the survey asked if boaters were in favor of setting a limit (carrying capacity) on the number of boats allowed on the lake at one time.

The result was a surprising 74% who said yes, a limit should be set (Table 11). The conclusion was that the current users of Hyrum Lake want to keep the lake no busier than it is now and to try to keep the boating experiences that they are having now as safe and enjoyable as possible. This would suggest that the current boating population do not want to allow any more new recreationists on the lake. A few of the people surveyed thought that the lake should be reserved for local use only. It is significant that almost
Table 11

Support for a Limit on Boats at Hyrum Lake

<table>
<thead>
<tr>
<th>Rating scale</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>21</td>
<td>07.4</td>
</tr>
<tr>
<td>Disagree</td>
<td>17</td>
<td>06.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>35</td>
<td>12.4</td>
</tr>
<tr>
<td>Agree</td>
<td>77</td>
<td>27.2</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>132</td>
<td>46.6</td>
</tr>
</tbody>
</table>

Q.22 "Would you be in favor of setting a limit on the number of boats allowed on Hyrum Lake at one time?"

three fourths of the people surveyed wanted to set a carrying capacity, realizing that they may even be the ones who are turned away at the gate.

Several months after this study was conducted, a public input meeting was held and the same results were found. Although some boaters feel a crowding problem does seem to exist at Hyrum Lake, the Hyrum Lake State Park manager does not believe that an immediate boat limit needs to be established. In lieu of setting a strict and possibly unpopular carrying capacity at Hyrum Lake, other possibilities are being examined (Appendix D). Education of boaters and stepping up law enforcement patrol on the lake have already been initiated in an effort to increase safety and satisfaction.

In a publication by Noe, Hammitt, and Bixler (1997, p. 323), Gary Everhardt, former United States National Park
Service Director, is quoted as saying, "We need to be more sensitive to the need of the public and how we can better accommodate them, without destroying the very thing they came to experience." This should be the goal of every outdoor recreation manager.
REFERENCES


Policy Studies, School of Natural Resources, College of Agriculture and Life Science, University of Wisconsin.


APPENDICES
Appendix A

Hyrum Lake Boating Study 1996

INTRODUCE YOURSELF. SAY
I am with Utah State University. We are doing a study of boating at Hyrum Lake. Will you answer a few questions about your visit here today?

IF RESPONDENT REFUSES, SAY:
My questions will only take about 10 minutes. You were selected as part of a Random Sample, so your answers are very important. Your answers are confidential and will only be reported as statistics.

IF RESPONDENTS REFUSES AGAIN SAY:
Thank You, have a nice day.

RESPONDENT AGREES

WHO, (18 years of age or older) was the Main operator of the boat today? What is your age please? 37 Age.

Is the Respondent MALE 245 FEMALE 36

Before asking questions SAY,
So that the answers will be reliable, I need to read the questions exactly as they are written.

1. Where is your principal home residence? City___ ST
   * This information told you how far they traveled, (see Table 1)

2. How many YEARS have you been a boater? 13 years.

3. How would you RATE YOURSELF AS A BOATER?
      24 70 84 104

4. What time did you start boating today?
   (Launching Time)
   * This information told how long they boated, (see Table 1)
5. The following is a list of boating activities you may have 
participated in today. Please tell me which activities your 
group did?

- L 141 Water Skiing / Tube
- L 28 Pleasure Boating
- L 11 Trolling
- L 45 Still fishing from Boat
- L 48 Personal Water Craft
- L 4 Swimming from Boat
- L 1 Sailing
- L 3 Other

Out of these boating activities, which did your group do the 
**LONGEST**? Circle (L)

6. On a scale of 1 to 10 (with 10 being a perfect trip), how would 
you RATE the Quality of your boating experience today? 
Average of 7.75 rating.

7. What were the **MOST SATISFYING** aspects of your boat trip today? 
(See Appendix B)

8. What were the **LEAST SATISFYING** aspects of your boat trip today? 
(See Appendix C)

Using the SATISFACTION scale (refer to card), What was your 
satisfaction level while using the following **AREAS** today?

<table>
<thead>
<tr>
<th>Not at all Satisfied</th>
<th>Slightly Satisfied</th>
<th>Neutral</th>
<th>Moderately Satisfied</th>
<th>Extremely Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

9. 4.50 At the access area at the start of your trip?
10. 4.09 Out on the lake while boating?
11. 4.03 Along the shorelines and beaches?
12. 4.43 At the access area at the end of your trip?
   * See Chapter on Results page 29.

IN THIS SECTION, WE WOULD LIKE TO KNOW HOW CERTAIN EXPERIENCES 
AFFECTED YOUR SATISFACTION ON THIS TRIP. (Refer to card)

13. Part A:
   While you were boating, how often on the average were you with 
in talking distance (20-30 yards) of other Boaters, 
Waterskiers, Personal Water Craft (PWC - Jet Skies) etc.?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (71)</td>
<td>2 (129)</td>
<td>3 (37)</td>
<td>4 (45)</td>
</tr>
</tbody>
</table>
Part B:
How did this affect your satisfaction level?

<table>
<thead>
<tr>
<th>Detracted from SATISFACTION</th>
<th>No Affect on SATISFACTION</th>
<th>Added to my SATISFACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (65)</td>
<td>2 (37)</td>
<td>3 (124)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (39)</td>
</tr>
</tbody>
</table>

14. Part A:
While you were boating, how often did you have to maneuver to avoid physical contact with other Boaters, Waterskiers, PWC?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (93)</td>
<td>2 (114)</td>
<td>3 (49)</td>
<td>4 (26)</td>
</tr>
</tbody>
</table>

Part B: How did this affect your satisfaction level?

<table>
<thead>
<tr>
<th>Detracted from SATISFACTION</th>
<th>No Affect on SATISFACTION</th>
<th>Added to my SATISFACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (50)</td>
<td>2 (53)</td>
<td>3 (138)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (14)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (27)</td>
</tr>
</tbody>
</table>

15. Part A:
While you were boating how often on the average, did you make contact with the wakes of other Boaters, Waterskiers, PWC etc.?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (15)</td>
<td>2 (73)</td>
<td>3 (63)</td>
<td>4 (131)</td>
</tr>
</tbody>
</table>

Part B:
How did this affect your satisfaction level?

<table>
<thead>
<tr>
<th>Detracted from SATISFACTION</th>
<th>No Affect on SATISFACTION</th>
<th>Added to my SATISFACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (92)</td>
<td>2 (53)</td>
<td>3 (87)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (29)</td>
</tr>
</tbody>
</table>

16. Part A:
While you were boating today, did you feel the Lake was Crowded?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (125)</td>
<td>2 (75)</td>
<td>3 (49)</td>
<td>4 (32)</td>
</tr>
</tbody>
</table>
Part B:
How did this affect your satisfaction?

<table>
<thead>
<tr>
<th>Detracted from</th>
<th>No Affect on</th>
<th>Added to my</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATISFACTION</td>
<td>SATISFACTION</td>
<td>SATISFACTION</td>
</tr>
<tr>
<td>1 (48)</td>
<td>2 (44)</td>
<td>3 (108)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (64)</td>
</tr>
</tbody>
</table>

17. Part A:
While you were on the Lake today, did you feel Boating Conditions were SAFE?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (12)</td>
<td>2 (42)</td>
<td>3 (76)</td>
<td>4 (151)</td>
</tr>
</tbody>
</table>

Part B:
How did this affect your satisfaction?

<table>
<thead>
<tr>
<th>Detracted from</th>
<th>No Affect on</th>
<th>Added to my</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATISFACTION</td>
<td>SATISFACTION</td>
<td>SATISFACTION</td>
</tr>
<tr>
<td>1 (26)</td>
<td>2 (21)</td>
<td>3 (68)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (43)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (123)</td>
</tr>
</tbody>
</table>

18. Part A:
While you were boating today, did you avoid certain parts of the Lake?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (160)</td>
<td>2 (75)</td>
<td>3 (30)</td>
<td>4 (17)</td>
</tr>
</tbody>
</table>

Part B:
How did this affect your satisfaction?

<table>
<thead>
<tr>
<th>Detracted from</th>
<th>No Affect on</th>
<th>Added to my</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATISFACTION</td>
<td>SATISFACTION</td>
<td>SATISFACTION</td>
</tr>
<tr>
<td>1 (15)</td>
<td>2 (38)</td>
<td>3 (177)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (19)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (33)</td>
</tr>
</tbody>
</table>

19. Part A:
While you were boating today, did you stay off the Lake for part of the day, because of boating conditions?

<table>
<thead>
<tr>
<th>Never</th>
<th>Occasionally</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (245)</td>
<td>2 (22)</td>
<td>3 (9)</td>
<td>4 (6)</td>
</tr>
</tbody>
</table>
Part B:
How did this affect your Satisfaction?

Detracted from Satisfaction
1 (13) 2 (16) 3 (185) 4 (16) 5 (52)

20. On an Average, how did the behavior and courtesy of other boaters affect your satisfaction level today?

Detracted from Satisfaction
1 (23) 2 (35) 3 (80) 4 (66) 5 (78)

21. How did the number of Boaters at the Lake today, Affect your OVERALL Boating Satisfaction?

Reduced my Satisfaction
1 (24) 2 (44) 3 (95) 4 (48) 5 (71)

22. Would you be in favor of setting a limit on the number of boats allowed on Hyrum Lake at one time?

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree
1 (21) 2 (17) 3 (35) 4 (77) 5 (132)

23. Do you feel there are adequate law enforcement patrols on this lake?

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree
1 (15) 2 (27) 3 (67) 4 (79) 5 (94)

24. Do you have any other suggestions for improved management of Hyrum Lake?
(See Appendix D)

That was the last question. THANK YOU Very Much for talking with me 😊. DO YOU HAVE ANY FURTHER COMMENTS?__
Appendix B

Most Satisfying Aspect of Boating Trip

NOT CROWDED - few boats and people ......................... 77
WEATHER - warm day, sunny, smooth water .................. 97
Nature - being out of doors, relaxing,
getting out of the house ..................................... 44
FAMILY and FRIENDS ........................................... 34
Fishing - catching fish or watching family members
  catch fish ....................................................... 25
WATER SKIING - boating, PWC, tubing, knee boarding ...... 22
FUN - kind of a catch all term ................................. 14
LAUNCHING ....................................................... 6
LOTS of WAVES ................................................ 4
EVERYTHING WAS VERY SATISFACTORY .................... 4
GOING HOME - .................................................. 2
SWIMMING ....................................................... 2
Appendix C

Least Satisfying Aspect of Boating Trip

TOO CROWDED - too many people, boats and PWC's, non-courteous drivers, coming too close .................. 100
Of the 100 responses, 58 made specific mention of PWC, their behavior, coming too close, wild, not educated too the boating rules and ethics.

WEATHER - too cold, windy, too hot ....................... 43

CHOPPY & ROUGH WATER - wakes and waves ............... 28
This was caused by either:
1. Too crowded - boats, PWC
2. Weather - wind

PERSONAL - boat not working, ran out of food & drink, forgot things, items broke ....................... 32

FACILITIES - beaches (rocks, trash, glass), Lake size (reducing), water, bugs ........... 24

FISHING - slow or no fish .................................. 24

GOING HOME - wanted to stay longer ..................... 12
Appendix D

Suggestions for Improved Management of Hyrum Lake

WATER PATROL

more boat patrol (counter clockwise direction, tickets, slow wake speed, speed and proximity, swimming area) ........................................... 37
better control of PWC ........................................... 26
more specific regulations for PWC ............................... 6
no seasonal employees enforcing the laws ...................... 1
more park rangers on duty ...................................... 1

BETTER EDUCATION

education for PWC operators .................................... 15
education for boat operators .................................... 5
boaters & PWC education (etiquette) ............................ 5
more visible boating regulations ................................. 3
educate boaters at boat launch .................................. 1
mandatory boating safety classes ............................... 1

LIMITS

limit number of total vessels ................................. 13
limit number of PWC ........................................... 12
designate water activity / lake areas ........................... 10
limit odd/even days for boaters & PWC ....................... 7
ban PWC ......................................................... 5
no limits ........................................... 4

timed activities - morning for fishing /
evening for water skiing ........... 2

separate limits for PWC and boats .............. 1

limit vessels wakes (waves effects fishermen) .... 1

limit vessels or motor size ..................... 1

boating by reservation .......................... 1

limit users (people) on lake ..................... 1

extend water skiing hours past sunset ............ 1
Table 14

Analysis of Variance for Differences in Satisfaction Rating by Respondents in Different Activities at the Same Locations of Hyrum Lake

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Squares</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp, put-in</td>
<td>1.577</td>
<td>2</td>
<td>.788</td>
<td>1.128</td>
</tr>
<tr>
<td>within</td>
<td>194.923</td>
<td>279</td>
<td>.700</td>
<td>1.128</td>
</tr>
<tr>
<td>On Lake</td>
<td>3.064</td>
<td>2</td>
<td>1.532</td>
<td>1.654</td>
</tr>
<tr>
<td>within</td>
<td>258.538</td>
<td>279</td>
<td>.927</td>
<td>1.654</td>
</tr>
<tr>
<td>On shore</td>
<td>2.025</td>
<td>2</td>
<td>1.012</td>
<td>.992</td>
</tr>
<tr>
<td>within</td>
<td>284.688</td>
<td>279</td>
<td>1.020</td>
<td>.992</td>
</tr>
<tr>
<td>Ramp, take-out</td>
<td>.370</td>
<td>2</td>
<td>.184</td>
<td>.246</td>
</tr>
<tr>
<td>within</td>
<td>208.570</td>
<td>279</td>
<td>.750</td>
<td>.246</td>
</tr>
</tbody>
</table>
Appendix F

Analysis of Variance for Table 9

Table 15

Analysis of Variance for Differences in Satisfaction Rating by Respondents at Different Locations of Hyrum Lake, by Activity

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Squares</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp, put-in within</td>
<td>1.576</td>
<td>2</td>
<td>.788</td>
<td>1.128</td>
</tr>
<tr>
<td>On Lake within</td>
<td>3.064</td>
<td>2</td>
<td>1.532</td>
<td>1.653</td>
</tr>
<tr>
<td>On shore within</td>
<td>2.025</td>
<td>2</td>
<td>1.012</td>
<td>.992</td>
</tr>
<tr>
<td>Ramp, take-out within</td>
<td>.367</td>
<td>2</td>
<td>.184</td>
<td>.246</td>
</tr>
</tbody>
</table>