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A MULTI-PHASE, MIXED-METHOD REGIONAL ANALYSIS OF LAKE AND
RESERVOIR BASED RECREATIONAL OPPORTUNITIES IN UTAH

by

William S. Spain

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Human Dimensions of Ecosystem Science and Management

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2012

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ABSTRACT

A Multi-Phase, Mixed-Method Regional Analysis of Lake and
Reservoir Based Recreational Opportunities in Utah

by

William S. Spain, Doctor of Philosophy

Utah State University, 2012

Major Professor: Dr. Steven W. Burr
Department: Environment and Society

Planning and managing outdoor recreational resources at larger spatial scales, conceptualized as a regional approach to recreation planning and management, is studied. Considering and understanding the role of spatial scale has been beneficial to the field of ecology; however, the importance of spatial scale has rarely been considered in the recreation resource management literature. A regional approach to planning and management is differentiated from a site-specific approach as managers and planners must consider the implications of management actions or policies at a larger spatial scale than a single park, recreation area, lake, or reservoir. For this study, the provision of boating opportunities at Utah lakes and reservoirs is considered.

Multiple data collection techniques, both quantitative and qualitative, were applied in this study. Additionally, two distinct groups of respondents participated: (1) park managers and their staff; and (2) boaters (individuals who own boats registered in Utah). Data were collected at three different spatial scales: (1) lake or reservoir level

(site); regional level; and (3) state level. Multiple analytical approaches were used to ascertain both groups' perspectives towards a variety of topics important to recreation management including content analysis and cluster analysis, as well as considering experience use history.

The results suggest implementing a regional approach is more complicated and inclusive than providing a wide range of recreational opportunities. The organizational capacity of the managing agencies, along with their ability to cooperate with other governmental and private organizations, is also important. Also, considering larger spatial scales increases an agency's options to address various challenges such as conflict, displacement, recreation succession, and homogenization and sub-optimization. As such, when prescriptive decisions about where various recreational opportunities ought to be provided, management problems and issues and agency capacity should also be considered. This dissertation also provides a model for conducting regional analyses.

(239 pages)

PUBLIC ABSTRACT

A Multi-Phase, Mixed-Method Regional Analysis of Lake and Reservoir Based Recreational Opportunities in Utah

William S. Spain

Managing and planning for human use at lakes and reservoirs creates challenges for land and water management agencies in Utah and the country as a whole. In spite of increased attention and research, management problems such as conflicts, accidents, and site impacts continue to occur. These problems have been exasperated by an 800% increase in the number of registered boats statewide over the past 50 years. As such, developing new strategies to address the broad array of management challenges could be beneficial to the recreation management of lakes and reservoirs. This study, conducted in collaboration with Utah State Parks, considers the role of spatial scale in regards to managing these water bodies in Utah.

Understanding the role of spatial scale has been beneficial to the field of ecology; However, it has rarely been considered in regards to managing outdoor recreation areas. Consistent with studies in ecology, data was collected at various spatial scales. Additionally, two distinct groups of respondents participated: (1) park managers and their staff, and (2) visitors (individuals who own boats registered in Utah).

Overall, consistent with ecology, the results suggest that considering larger spatial scales change what factors are the most important and also what management actions are the most appropriate. In short, managers need to consider the implications for their on-site actions to adjacent water bodies and to the state at large. In addition, the results suggest implementing a regional approach is more complicated and inclusive than just the provision of recreation. The organizational capacity of the managing agencies, along with their ability to cooperate with other governmental and private organizations, is also important. However, considering larger spatial scales also increases an agency's options to address various challenges. As such, recommendations on how a regional approach would be implemented in Utah are included. Finally, this dissertation provides a model for how future regional analyses should be conducted.

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CHAPTER I

INTRODUCTION

From 2005 through 2008, Institute for Outdoor Recreation and Tourism (IORT) researchers at Utah State University, in cooperation with the Utah Department of Natural Resources Division of Parks and Recreation (State Parks), conducted a multi-phase, mixed-method regional analysis to assess managerial aspects important to water-based recreation management in Utah. A unique aspect of this dissertation is the consideration of planning and managing recreational water bodies regionally. Outdoor recreation studies considering the role of spatial scale in planning and management are rare (Morse, Hall, & Kruger, 2008). A regional approach to planning and managing recreational resources has been rarely considered, and there is a gap in the literature. Jubanville and Becker (1983) suggest single-site planning can lead to a loss of diversity of opportunities over time if the larger context is not considered. Fish and Bury (1981) suggested that the National Wilderness Preservation System should be managed systematically rather than site-by-site in order to better meet the multiple objectives and provide for a diverse array of experiences. McCool, Clark, and Stankey (2007) noted determining the regional effects of site-level decisions as a key contemporary resource management issue. Cole (2007) has suggested addressing large-scale wilderness management issues requires the consideration of larger spatial scales, while case-by-case approaches may not be helpful, but even detrimental. This dissertation explores the notion of a regional approach to planning and management and its application to reservoir- and lake-based opportunities in Utah.

Background

The State of Utah, along with federal agencies, private utilities, and local entities (e.g., irrigation districts), manage numerous lakes and reservoirs in the state. State Parks is charged with addressing use issues and user concerns associated with water-based recreation as well as enforcing boating regulations throughout Utah, regardless of who manages the lake or reservoir.

As identified in the *Utah Boating Program: Strategic Plan* (Utah Department of Natural Resources, Division of Parks and Recreation, 2010), the number of registered watercraft in Utah has increased by nearly 800 percent since 1959, when the State Boating Act was passed; there are currently over 70,000 boats registered in the state. Overall, the steady increase in the number of boats continued through the early 2000s; however, the number of registered boats in the state has leveled off in the past decade. National recreation trends are tracked as a part of the National Survey of Recreation and the Environment. The researchers (Cordell et al., 2004) evaluated the changes in participation of a variety of outdoor recreation activities, and the Mountain region (of which Utah is a part) saw the greatest increase in boating from 1994-2001, and jet-skiing participation more than doubled. The authors then compared recreation participation by state, and Utah had the highest proportion (37%) of respondents in all of the western states that went motorboating in the previous year. While the boater population has increased during the previous 50 years, the number of lakes and reservoirs available for recreational use in Utah has not increased substantially. Subsequently, the potential for visitor conflicts, crowding, and other management problems and issues has increased.

A telephone survey of registered boat owners in Utah, completed by IORT in 1999 (Reiter, Blahna, & Smith, 2001), found that 78% of the respondents experienced conflict while boating in Utah. Of particular concern to boaters was personal watercraft (PWC) use; over 80% of the respondents cited reckless PWC operators as a moderate or major concern, and over 60% of the respondents stated they should be regulated differently than other boats. In fact, about one-fourth (25.3%) of the respondents did not support the use of PWC on Utah water bodies. Additionally, increasing use along with standardized facility development appears to have led to homogenization of opportunities at many lakes and reservoirs.

In northern Utah, boaters at eight different reservoirs were asked what they would do if they could not get on the lake due to use restrictions, and over 60% of the respondents said they would definitely or probably still go boating, and most listed nearby State Park water bodies as alternatives (Reiter, Blahna, Toman, & Bahr, 2000; Reiter, Blahna, & Zimmerman, 2002). This indicates that setting a capacity at one site may exacerbate problems at a nearby site. Further, motor boaters may be displaced to an area that is relatively quiet and popular with anglers and increase conflict at that lake or reservoir. These studies also showed that proximity to home was an important reason individuals chose to boat on the study reservoirs. Social interaction was also important, while avoiding crowds was not as important. Finally, these studies showed that while many boaters perceived the need for use limits, most of the reasons given for this opinion were user conflicts, not crowding or the perception there were too many boaters on the water.

The management of these lakes and reservoirs creates challenges for the agencies responsible for the provision of recreation. Given these challenges, State Parks was interested in investigating how applying a regional approach to planning and management could assist the agency in the provision of boating opportunities. In Utah, boating is managed by the Utah State Parks Boating Program (Boating Program); the program addresses statewide boating management issues with a focus on facilities, education, and enforcement while aiming to provide quality boating experiences (Utah Department of Natural Resources, Division of Parks and Recreation, 2010). The Boating Program provides organizational structure to potentially manage boating opportunities at larger spatial scales as opposed to managing lakes or reservoirs independent of each other.

Regional Approach to Recreation Management

In this section, the notion of a regional approach to recreation management and planning is introduced. First, the notion of spatial scale is discussed based on insights from ecology. Then, suppositions about how a regional approach and regional analysis may be conducted are provided. Next, a regional approach is differentiated from a site-specific management approach, an approach that is often the default for natural resource agencies. Also, a regional approach is discussed in light of several recreation resource issues including distribution of use, recreation succession, providing for a wide range of recreation experiences, and visitor conflict.

A regional approach implies that a larger spatial scale (than an individual site or area) is considered when making management decisions. Scale is divided into two

components: spatial and temporal; the focus of this study is spatial scale. O'Neill and King (1998) defined spatial scale as the physical dimensions of "entities or phenomenon" (p. 7). Previous studies in ecology enlighten the implications of studying phenomena at varying scales. First, O'Neill and King (1998) suggested when the scale of analysis is changed substantially, not only does the area under study become larger or smaller - the dominant processes change. For example, ecological studies have shown as the spatial scale increases, competition between species as an explanatory factor loses significance to climate. Although this may seem remote to recreation resource management, it suggests the possibility that issues and problems confronted at a state level are different than those at an individual park or water body. This implies that a different research approach may be necessary to understand the issue(s) of interest. Also, a management action or policy that may appear appropriate at one park or water body may not be an appropriate tool to apply statewide, or vice versa.

Second, interactions between proximate water bodies are important to consider, such as visitor displacement. For example, management actions such as setting use limits may displace visitors to another site and thus change conditions there (McCool & Cole, 2001). Involuntary displacement caused by management actions is particularly salient to a regional approach because this is a situation where the managing agency has the most control. Previous studies have shown that if use limits prevented boaters from accessing lakes or reservoirs in Utah, most would simply boat at another proximate water body (Reiter et al., 2000, 2002). The implementation of use limits as a site-specific strategy appears to be of special concern to managing regionally for the following two primary reasons: (1) visitors displaced by use limits may simply move to a proximate reservoir

and change social conditions at those locations; (2) considering a larger spatial scale would suggest that perhaps a use limit should only be set where an objective of maintaining minimal encounters was a goal. Next, when conducting larger scale studies, a coarse-filter approach may become more appropriate (Haufler, Mehl, & Roloff, 1999) due to potentially overwhelming data needs. Also, considering the role of scale and recreation management may allow for better integration with other natural resource issues (Morse et al., 2008). Finally, a regional approach may increase the resiliency of the system. Resiliency is the capacity of a system to absorb disturbances while maintaining structure and function (Walker & Salt, 2006). Aside from ecology, the notion of regionalism in the urban and regional planning literature suggests unique governance structures, such as regional agencies, may be more appropriate to address regional challenges (Beatley & Manning, 1998; Calthorpe & Fulton, 2001; Daniels, 1999).

When conducting a regional approach, administrators and managers of multiple recreation areas in a defined geographic area would work and plan together to address potential management challenges and determine and implement management objectives consistent with providing a wide range of recreational experiences. This approach assumes there are interrelationships between proximate recreational areas and perhaps between areas even relatively far from one another. Simply put, a regional approach acknowledges what happens at one reservoir or park may affect what happens at another. For example, the impact of prohibiting PWCs at one lake or reservoir, as was done at Lake Powell in the early 2000s, on proximate water bodies would be considered. Therefore, managers and planners must consider the implications of specific management actions or policies at a larger spatial scale than a single park or reservoir. Also, the

potential for simplifying management procedures exists by decreasing the number of opportunities provided at one lake or reservoir. In short, no particular park or water body should provide for every potential opportunity or experience. Yearout, Seamons, and Lee (1977) have stated that managers who attempt to place the recreation area they manage in a regional context will be frustrated by the lack of regional information about what opportunities are available or currently in short supply.

This would suggest the need for regional analyses to be conducted prior to implementing a regional approach. A regional analysis implies that a larger context than one individual site is considered in analysis and interactions between proximate sites (i.e. lakes and reservoirs) are considered. However, there are few guidelines as to how to conduct regional analyses (Blahna, 2007; Stewart & Cole, 2003). One framework is provided by McCool and Cole (2001): (1) define region; (2) define desired range of experiences and scarce opportunities; and (3) allocate experiences in a prescriptive manner. The framework provided by McCool and Cole focuses on just the provision of recreation opportunities and experiences. Perhaps regional analyses should also consider potential management problems or issues that may be better addressed at larger spatial scales and how an organization may implement a regional approach.

A regional approach is different than a site-specific management approach; site-specific management implies managers and planners address issues and problems at particular sites (such as an individual lake or reservoir) with little regard to the regional context. Site specific management is often a default management approach rather than one that is consciously considered and implemented. Several independent “small decisions” made locally without regional consideration can result in a large-scale post-

hoc decision or policy and may have unintended negative consequences (Kahn, 1966; Odum, 1982). A regional approach is worth considering because site-specific management may run the risk of decreasing the range of recreational opportunities regionally (Haas, 2001). Traditionally, resource managers have focused on problems or issues at distinct points or locales (Johnson & Herring, 1999) and not at larger spatial scales. McCool and Cole (2001) have argued that, without consideration of regional implications, implicit decisions are made at a site or area that can lead to the homogenization of recreational opportunities and subsequent suboptimal provision of opportunities. They suggest that applying the same management action(s) to all recreation areas in a region, visitors will experience the same social conditions. Schreyer (1985) argued that there had been a decrease in the range of river-based recreational experiences in the western United States due to site-level decisions made without considering the regional context.

Managers and planners must decide what level of access to provide at parks and recreation areas. They may face criticism both if they are perceived as providing unlimited access or limiting access. Cortner and Moote (1999) discussed policy paradoxes including the idea of “tension.” By viewing two goals as in tension, policies can be set to balance conflicting goals as opposed to viewing goals as zero sum trade-offs. For example, when allocating recreational experiences, managers and planners balance preferred conditions (e.g., opportunities for solitude) with frequent access (McCool & Cole, 2001). Conceptually, both of these opportunities can be met regionally as one park may provide for preferred conditions while another provides access; however, both opportunities may not be met at the same park or locale, particularly

during the peak season. However, the park which provides for preferred conditions may limit access in one way or another. Cole (1997), although discussing management of wilderness areas, suggests little can be done to improve visitor experience by setting use limits at existing high use areas, because, unless the number of encounters is dramatically reduced, visitor experience will not be improved substantially. This may be even more important to consider for motorized boating; for example, the conditions at a small high-elevation lake which is good for fishing would change substantially with just one motorized watercraft on the water. Meanwhile, decreasing the number of craft on the small lake from 20 to 10, for example, would likely not improve conditions appreciably.

Recreation succession (or social succession) is a predictable (although not planned) sustained change in character that a recreation site or area may undergo over time (Schreyer, 1979); most often, the change is in favor of increased development and an increased level of recreation use. The result of recreation succession could be a decrease in the range of recreation opportunities provided regionally or statewide. If managers react similarly to increasing use, more crowd-tolerant visitors replace visitors who seek more primitive- or solitude-oriented experiences. Also, a regional approach provides managers an alternative to offering all types of opportunities at one site and thus may reduce the potential for conflict by providing an opportunity to spatially separate potentially conflicting activities or experiences.

There is a degree of similarity between a regional approach and the Recreation Opportunity Spectrum (ROS) that was developed by the U.S. Forest Service (USDA-FS) in the 1970s and is still widely applied (Cervený & Ryan, 2008; Clark & Stankey, 1979). Simply put, ROS determines what recreation settings exist and what should be provided

(McCool et al., 2007). ROS classifies and allocates experiences along a continuum from primitive to urban while visitors who seek different experiences can recreate within an appropriate setting. Perhaps most importantly, ROS acknowledges that recreation settings are multidimensional incorporating social, managerial, and biophysical factors; some of the factors managers can control or influence, but many they cannot. More recently, inspired by ROS, Haas, Aukerman, Lovejoy, and Welch (2004) provided a framework for zoning water bodies using a variety of social and managerial indicators called the Water Recreation Opportunity Spectrum (WROS). A regional approach is distinct in that a larger spatial scale is considered (in this case, statewide), and the recreation areas under consideration are not contiguous to one another.

In general, a major goal of recreation management is to provide opportunities that allow for a range of recreation experiences (Clark & Stankey, 1979; McCool et al., 2007; Shafer, 1969; Wagar, 1963; Warzecha, Manning, Lime, & Freimund, 2001). There is reason to believe that a regional approach that considers larger spatial scales are likely to provide a greater array of recreational opportunities compared to a site-specific management approach. Haufler (1999) discussed the importance of planning at an appropriate spatial scale in conservation planning and the necessity of scalar approaches that consider large enough areas to provide an appropriate mix of ecological communities. There is a parallel to the concept of maintaining a range of recreational experiences and opportunities and it supports the notion of conducting regional analyses and the necessity of considering more than one unit (e.g., lakes or reservoirs). Additionally, site-specific management may lead to a homogenization and sub-optimization of opportunities; further, management actions (or small decisions) that do

not consider the regional context run the risk of displacing recreationists to other sites.

A regional approach also allows for different recreation areas to meet different objectives and identify potentially conflicting uses or experiences and perhaps separate them spatially.

Study Area

The study area is the entire state of Utah. The state contains three physiographic provinces: (1) Basin and Range; (2) Rocky Mountain; and (3) Colorado Plateau (Johnson, 1989). The Basin and Range (Great Basin) comprises the western third of the state. This province includes mountain ranges with broad basins between them. Geologic faulting formed the mountains in this region, and the basins are filled with alluvium caused by eroding mountains. The Rocky Mountain region includes the Wasatch and Uinta Mountains in the central and northern portions of Utah. This region includes various forest types including maple-oak, spruce-fir, and alpine. The Colorado Plateau is a geologically diverse region that includes the Uinta Basin, Canyonlands, and High Plateaus with extensive canyons, cliffs, plateaus, and mountains. The state of Utah is generally very dry, with much of the state receiving less than 16 inches of precipitation annually, on average, statewide. However, a substantial portion of the Rocky Mountain province receives greater than 40 inches of precipitation (Johnson, 1989). As a result, the highest concentration of lakes and reservoirs are in this region. Overall, the vast majority of the population lives right at the boundary between the Rocky Mountain and Basin and Range provinces, known as the Wasatch Front. Settlement of this region was chosen, in part, as water is available throughout the year as snowmelt and springs feed rivers and

creeks that flow into the Basin and Range. Recreational boating takes place in all of these physiographic regions.

The population of Utah is about 2.7 million people, with nearly three-quarters of the population living along the Wasatch Front. The state is over 80% white and the population is increasing rapidly (about 2% annually). Hispanics make up the largest minority group in the state, representing about 13% of the population (US Census Bureau, 2011).

In general, the state of Utah provides a wide variety of natural resource based recreation opportunities. About 70% of the state is publicly owned and managed, and much of this land provides various recreation opportunities. Most opportunities are land-based providing access for hiking, mountain biking, and OHV-use, among other activities. In addition, most residents in the state have access to snow-based activities during the winter such as skiing and snowmobiling. Residents of the state, generally, have greater access to resource-based recreation opportunities compared to residents of the United States at large (Cordell et al., 1999). However, this is not the case for water-based opportunities as the state is dry, and the majority of the flat-water based recreational opportunities are provided by reservoirs built for irrigational and municipal use, and electricity production.

A unique aspect of this study is the focus on lands (or waters) primarily managed by a state agency as opposed to those managed by federal land or water management agencies. State parks in the United States often fill a provision gap between the dispersed opportunities offered on federal lands and the generally highly developed and programmed opportunities provided at a city or county level (Landrum, 2004). State park

systems vary greatly; in states with little federal land, state park systems provide some of the only public natural resource based recreation opportunities. In Utah, State Parks manages a relatively small proportion (95,000 acres - less than ½ percent) of the public land. Utah developed its system in 1957, relatively late compared to other states, and there is a special focus on developed opportunities.

Specifically, this dissertation focuses on lakes and reservoirs located throughout the state of Utah. Utah State Parks manages over 25 parks that are characterized as providing some type of water-based recreation; twenty-two of these parks provide lake- or reservoir-based recreation and are scattered throughout the state. Federal and locally managed water bodies in the state that also receive significant boating use are also considered.

As context, recreation may be seen as one of many benefits of the various water projects in Utah. It is worth noting the reservoirs under consideration were built for consumptive water uses, including irrigation and municipal water supply, and this affects the recreational uses (Platt & Munger, 1999). Impacts to recreation include, but are not limited to, reservoir drawdown during the recreation season. Therefore, recreation can be seen as an ancillary benefit of these water projects, and the result is recreation planners and managers at these facilities are subjected to the effects of consumptive water uses. Future potential climate change may affect the provision of water-based recreation as climate models suggest decreased precipitation and warmer temperatures in the Interior West (Wagner, 2009). The models are in greater agreement regarding increased temperatures compared to decreased precipitation. Regardless warmer temperatures would lead to the snow melting earlier in the spring and increased evaporation on the

various lakes and reservoirs. This is a challenge to water-based recreation managers as the water levels in the reservoirs may increase earlier in the season and lower earlier in the summer as well. It appears that projected human-induced climate changes may shorten the boating season, although the associated warmer temperatures may complicate this conclusion. Currently, some reservoirs are already inaccessible to some boats during dry years due to low water levels in July and August. It is conceivable under various climate change scenarios that this may become the norm rather than the exception. Increasing demand for water due to population growth in Utah may exasperate the effects (Rajagopalan et al., 2009).

Table 1 displays the State Park along with the size of the water body (at full-pool) and along with 2006 annual visitation. It should be noted that the visitation statistics do not differentiate boating use from other activities. Table 2 presents reservoirs in Utah where there are no State Parks but are visited by at least one percent of those who participated in the statewide boater survey (discussed later in the dissertation). Clearly, the largest reservoirs (at least partially) in the state are federally managed (Lake Powell and Flaming Gorge). It should be noted that State Parks does have law enforcement jurisdiction on these water bodies even though there are no State Parks present.

Research Purpose

For this study, principles from the ecological study of spatial scale and regionalism are applied to better understand regional recreation planning and management at Utah lakes and reservoirs. Few guidelines exist as to how a social science

Table 1

Lake- and Reservoir-Based State Parks in Utah

State Park	Surface Area at full pool (acres)	2006 Annual Visitation
Bear Lake	71,000	232,825
Deer Creek	2965	355,003
East Canyon	680	95,543
Escalante	145	40,451
Great Salt Lake	1,088,000	10,538
Gunlock	240	60,891
Huntington	225	47,848
Hyrum	440	67,980
Jordanelle	3300	198,592
Millsite	435	20,353
Otter Creek	3120	65,267
Palisade	66	211,646
Piute	3360	29,609
Quail Creek	590	108,482
Red Fleet	520	30,818
Rockport	500	117,683
Scofield	2800	102,276
Starvation	3495	54,389
Steineker	830	45,615
Utah Lake	96,600	265,271
Willard Bay	9900	325,933
Yuba	10,905	122,964

Table 2

Non-State Park Lakes and Reservoirs in Utah

Lake or Reservoir ^a	Surface Area at full pool (acres)	Organization responsible for recreation management
Lake Powell	170,240	National Park Service (NPS)
Strawberry	17,164	United States Forest Service (USFS)
Pineview	2870	USFS
Flaming Gorge	42,020	USFS
Echo	1394	Private
Current Creek	300	USFS
Mantua	554	Local
Fish Lake	2500	USFS
Navajo	714	USFS
Cleveland	185	USFS
Panguitch	1248	USFS
Lost Creek	365	Cooperative - State/Local/Federal
Joe's Valley	1183	USFS
Minersville	990	Beaver County

^a Includes water bodies where two or more respondents to the 2006 boating survey visited.

based study of spatial scale would be conducted; therefore, an exploratory approach is used in this dissertation. Consistent with studies from ecology, data is collected at multiple scales; and consistent with notions of regionalism, an intermediate planning level is developed to provide an alternative governance structure to address regional issues. Additionally, a whole-systems approach is applied by including both managers and visitors in the analyses. This dissertation explores: (1) what factors are important to a regional approach to recreation planning and management; (2) how future regional analyses should be conducted; and (3) if the framework provided by McCool and Cole (2001) as to how a regional analysis should be conducted is adequate.

Summary of Data Collection Phases

To complete this study, a mixed method research approach, incorporating four data collection phases, was conducted, and data were collected at three different spatial scales (individual park or water body, region, and statewide). Mixed-method approaches are research approaches where two or more research methods are applied to understand a phenomenon of interest (Neuman, 2003). Both qualitative and quantitative approaches were employed to investigate the concept of a regional approach to recreational management. The first phase was key-informant interviews of water-based State Park managers. Managers were interviewed by use of semi-structured interviews (interviewees were all asked the same questions but there was leeway for elaboration and follow-up questions). Second, regional meetings with state and federal representatives who were knowledgeable about recreational water use in Utah occurred. Six meetings, one in each boating region, were conducted to discuss regional and statewide

management issues. Also, boating regions were defined in cooperation with State Parks planning staff as a precursor to the meetings. The third phase of the planning process was a telephone survey of registered boat owners in Utah. The survey questionnaire contained items addressing boater demographics, boat ownership and trip activity patterns, preference for management actions, crowding and conflict issues, and management problems. Finally, an on-line survey was conducted to examine manager (the same group interviewed in the first phase) attitudes on registration funding priorities, management problems, and potential management actions. Several questions included on the online survey mirrored questions on the statewide boater survey in order to compare managers' and boaters' opinions and to assess managers' predictions.

In addition to collecting data at multiple scales, multiple perspectives were obtained including those of boaters and managers. A unique aspect of this dissertation is the incorporation of managers into the data collection phases; this has rarely been the case in recreation resource studies. Natural resources planning processes require input from various stakeholders in order to improve the likelihood of success (Cortner & Moote, 1999; Meffe, Nielson, Knight, & Schenborn, 2002); managers of natural resource areas are familiar with many of the issues related to operating parks and managing natural areas. These include financial constraints, relationships to local vendors and communities, and natural resource issues such as water quality. A management plan or action that substantially changes how a park is managed would be ill advised without the input and buy-in by the on-site manager. Admittedly, park managers may have biases, but they also have unique insight.

Organization of Dissertation

This dissertation incorporates a monograph format. After this chapter (Introduction), a review of pertinent literature is provided (Chapter II). Chapter III (Methods) describes the multi-phase research approach that was used to collect and analyze the data. Chapter IV (Results and Discussion) provides the results of the four data collection phases and discusses the key issues identified in the analyses. Chapter V (Conclusion) summarizes the findings from the analyses, and then implications for a regional approach are discussed, followed by recommendations for conducting future regional analyses.

CHAPTER II

REVIEW OF LITERATURE

The first section in this literature review is a review of the concept of spatial scale from ecology and how it relates to recreation planning and management. Next, the topic of regionalism, primarily from an urban planning perspective, is summarized. The third section introduces the primary topic of interest, a regional approach to recreation planning and management. The section discusses the shortcomings of site-specific management and summarizes the limited studies, both conceptual and empirical, that have considered regional planning and/or management of resource-based recreation areas. This is followed by a discussion on integrating recreation with other resource issues including water resource management issues and the potential ecological impacts of motorized boating. A unique aspect of this dissertation is the inclusion of recreation managers; as such, the next section reviews recreation-related studies where managers were participants in surveys. Managerial studies include those where managers are the only subjects and those where they are compared with visitors or where their predictions of their visitors are evaluated. Given the importance of visitor behavior to regional planning and management, studies applying a behavioral approach (Experience Use History – EUH) to understanding and segmenting visitors are reviewed.

Spatial Scale

Resource managers have, in general, focused on specific sites or areas and not at larger spatial scales when planning and managing public lands (Johnson & Herring,

1999). In recreation, this typically has meant parks and/or lakes and reservoirs have been managed often with little or no coordination with, or consideration for, proximate or regional recreational opportunities. Park-, river- or forest-specific management plans may reinforce this tendency (Schreyer, 1985). Spatial scale has become an important concept in ecology (Peterson & Parker, 1998; Wien, 1989), but is not often discussed in relation to recreation planning and management (Morse et al., 2008) although McCool and Cole (2001) recommend that recreation studies could benefit from considering the implications of spatial scale. Rotmans and Rothman (2003) note the concept of scale is a rather new issue in the social sciences, and grand theories or procedures have not yet been developed. Silver (2008) has argued that understanding scale should be an integral aspect to interdisciplinary resource management. First and foremost, there are indicators that scale is important to resource management and to recreation management specifically, but there are few empirical studies in which the implication of managing at larger spatial scales is considered. Freimund and Cole (2000) recommend research at larger scales to inform recreation (wilderness, in particular) management is necessary. Further, the authors suggest research and planning at larger scales will be challenging as institutional incentives are often directed at a manager's area of responsibility.

Given the lack of guidelines and literature related to regional recreation management, insights from applications in ecology are considered. First, the scale of analysis of a study effects what factors are important and what research approach may be appropriate (Vogt et al., 1997). In short, there are characteristics at large spatial scales that are likely not predictable based on studies completed at small spatial scales (Evans, Ostram, & Gibson, 2003). In ecology, sub-fields have been developed in large part based

on the scale of analysis (Turner, Gardner, & O'Neill, 2001). Hobbs (1998) described five levels of organization of ecological systems from population (smallest) to a regional level (largest) with three intermediate levels (landscape, ecosystem, and community). An ecological researcher will typically frame a research question appropriate at one of these levels, and the data collection and analytical techniques will vary based on the scale. As such, recreation management problems or challenges that are encountered at a statewide or regional level may be quite different than what is encountered at a local (or site) level, and the research approaches may need to vary to consider these challenges.

Large-scale management approaches have been shown to be more appropriate when attempting to conserve ecosystems or multiple species and suggest a management action or policy that may appear appropriate at one park or water body but may not be an appropriate tool to apply statewide, or vice versa. Hobbs (1998) has suggested that site-specific approaches to conservation are inadequate while landscape and/or regional perspectives need to be considered. Collecting data at multiple scales benefits the understanding of ecological phenomena and assists in developing larger-scale conservation strategies (Lindenmayer & Fischer, 2006). From a recreation planning and management perspective, it is possible that considering larger scales may assist agencies in providing and protecting a wide range of experiences by linking these experiences with biophysical factors.

Next, it becomes important to consider the interactions and interrelationships of lakes and reservoirs. Ecosystem science is concerned with interactions and connections between different aspects of the environment with a special focus on nutrient flows (Begon, Townsend, & Harper, 2006; Vogt et al., 1997). The implication for recreation

planning is, as the spatial scale of the study area increases, the area under study may then include eight or nine reservoirs rather than one or two. Therefore, the interrelationships (both biophysical and social) between boating areas may need to be considered. For one, many reservoirs in Utah are interconnected through the watershed (such as the Sevier and Weber River systems), and reservoir operations at one site may affect others within the system. Additionally, one social concept that indicates the importance of the interrelationships between lakes and reservoirs is visitor displacement (discussed later in the chapter).

Also, a coarse-filter research approach may be more appropriate when conducting large-scale analyses; otherwise the data needs may become unmanageable (Haufler et al. 1999). For example, coarse-filter approaches assume goals such as maintaining biodiversity can be met by maintaining viable ecosystems (Meffe et al., 2002). Coarse filter analyses are rarely discussed in relation to recreation planning, but are discussed in conservation planning (Baydack, Campa, & Haufler, 1999) and other domains. Coarse-filter approaches acknowledge that researchers conducting large-scale studies need to collect appropriate data to make meaningful decisions. The implication for a regional approach is identifying regional problems and identifying strategies that address them at the appropriate spatial scale. While implementing a regional approach, consistent with a coarse filter analysis, the analysis should focus on a limited number of problems or challenges.

Finally, a regional approach may increase the resiliency of the system to incur and address potential change. Resiliency is the capacity of a system to absorb disturbances while maintaining structure and function (Walker & Salt, 2006); further, considering and

managing at multiple scales is one method to increasing a system's resilience. From a recreation perspective, the number of management options available to an agency increases when regional and statewide levels are considered. Disturbances within the water-based systems in Utah include drought and potential changes due to future climate change.

Recreation resource studies have rarely considered issues of spatial scale. One recent study, although not empirical, argues for greater consideration of spatial scale in outdoor recreation management (Morse et al., 2008). They explicitly recommend that recreation management could be improved by applying concepts from ecology and that recreation planning and management could benefit from conducting analyses at multiple scales. In general, they critique two recreation management frameworks, ROS and Limits of Acceptable Change (LAC), as not appropriately integrating biophysical factors, in large part due to incongruent scales of analyses. Also, they argue that a greater consideration of spatial scale in recreation management may allow for better integration with other natural resource areas or concerns. Although the researchers are generally addressing issues of scale at a USFS district level (or smaller), the idea that scale as a fundamental issue in outdoor recreation planning is embraced.

Regionalism

The study of "regionalism" is prevalent in the urban planning literature. Regionalism is the notion that economic, social, and environmental problems do not manifest themselves neatly within jurisdictional boundaries, and solutions to these issues may require unique governmental agencies or structure (Pastor, Lester, & Scoggins,

2007). Regional agencies and strategies are developed to address issues that occur at scales larger than, for example, a city or county (Beatley & Manning, 1997; Calthorpe & Fulton, 2001; Daniels, 1999), but often smaller than a state. Regional agencies may develop in a multi-state metropolitan area such as Portland, Oregon or New York City because existing governmental structures do not exist to address interstate issues. These issues include air pollution, sprawl, transportation (mass transit), and poverty, among others. Any citywide policy would likely do little to address these issues; often poverty is concentrated in certain municipalities within a larger region and these cities do not necessarily have the resources to address it. Beatley and Manning (1997) suggested that environmental problems, in particular, cannot be addressed with existing political boundaries which, most often, do not reflect any meaningful natural system boundary such as a watershed.

An example pertinent to natural resources management is the Tahoe Regional Planning Agency (TRPA). The agency was created in 1969 as a bi-state (California and Nevada) agreement and ratified by Congress to address environmental issues in the Tahoe Basin. TRPA provides a legal means to address environmental issues in a two-state, multi-county region with a mix of federal, state, and local public lands, along with substantial privately held lands with extensive commercial development. A regional agency was clearly necessary to address a large lake, in this case, which is in two states. Consistent with a regional approach, the United States Forest Service (USFS) consolidated the portions of three existing National Forests (Eldorado, Tahoe, and Toiyabe) that were within the basin into one management unit, the Lake Tahoe Basin Management Unit (LTBMU) in 1973 (USDA-Forest Service, Tahoe Regional Planning

Agency, 2011). The LTBMU allows USFS to address regional issues, such as water quality, associated with Lake Tahoe coherently compared to three different National Forests. In all, regional approaches may require a unique governance structure that considers and addresses issues at larger scales.

Regional Approach to Recreation Planning and Management

In this section, the shortcomings of site-specific management are discussed. The second section summarizes the limited articles that have directly addressed a regional approach to management and/or planning.

Shortcomings of Site-Specific Management

Site-specific management implies managers and planners address issues and problems at particular sites (such as an individual lake or reservoir) with little regard to the regional context. Site-specific management is not necessarily a formalized management approach; rather, it is a default approach to managing recreation areas. Site-specific management may lead to a “tyranny of small decisions.” Kahn (1966) explored the notion of the “tyranny of small decisions” where many independent, rational “small” decisions lead to an undesirable state. Kahn provides the example of the railroad in central New York State; the railroad was the only reliable mode of transportation in and out of Ithaca given inclement weather. Over time, individual rational decisions to: (1) drive a personal car; (2) fly with a commercial airline; or (3) take the bus, diminished ridership on the train. Eventually, the railroad line was shut down; however, Kahn has suggested that the residents may have been willing to pay to avoid such an outcome.

Odum (1982) applied Kahn's thesis in an environmental domain and suggests several independent "small decisions" made locally without regional consideration can result in a large-scale post-hoc environmental decision or policy. Using Everglades National Park in Florida as an example, Odum described how small independent actions, such as building a drainage canal or a new retirement community, led to decreased surface water inflow into the National Park and subsequent environmental degradation. Importantly, Odum pointed out that no one chose to diminish environmental quality in the Everglades, and it is now difficult to make a "decision" to reverse the degradation. According to Odum, regional problems are highly susceptible to small decision "effects;" he went on to suggest the necessity of a "holistic" or "large-scale" perspective when considering environmental problems. The implication is management decisions must be made while being cognizant of the potential unexpected consequences and considering the larger regional context. In all, the results suggest there may be problems with site-specific management.

First, site-specific management may lead to social or recreation succession. Recreation succession is a predictable (although not planned) sustained change in character that a recreation site or area may undergo over time (Schreyer, 1979); most often, the change is in favor of increased development and an increased level of recreation use. For example, as recreation visitation increases in an area, more crowd-tolerant visitors replace existing visitors who sought more primitive or solitude-oriented experiences. Incremental facility "improvements" or "upgrades" often serve the newcomers seeking RV-camping, highly developed boat ramps, and concession services, for example. Incremental decisions (most often in favor of increased development) may

favor some potential visitors over others and lead to questions of equity (Schreyer & Knopf, 1984). Schreyer and Knopf suggested recreationists with few behavioral options (i.e., few or no substitutes) are subject to unmanaged change or succession. The implication is that without long-term strategic planning considering the regional context, some recreation opportunities will be lost (often more solitude oriented). However, measuring recreation succession is difficult without conducting a longitudinal study, given that it is a change over time.

Second, site-specific management may lead to visitor displacement and change conditions at proximate parks or water bodies. Visitor displacement can be temporal or spatial (Hall & Cole, 2007; Schneider, 2007). Temporal displacement implies visitor behavior changes as they visit the site either during the off-season or perhaps on a weekday or lower use weekend instead of a weekend with heavy use. For example, Gramann (2002) found some residents of western Washington choose to either not visit Mount Rainier or to visit in the off-season to avoid summer conditions, including crowding. Spatial displacement implies a visitor goes to another recreation site or area. Displacement is important to a regional approach because visitors who are displaced from one site may move to another site and thus change conditions there. The two types of displacement have been called voluntary and involuntary (Schindler, 1993). Examples of two different causes are as follows: (1) a visitor voluntarily chooses to leave a situation they view as unacceptable (Becker, 1981); or (2) a visitor responds involuntarily to a use or activity restriction by visiting a different recreation site or area (McCool & Cole, 2001). The key difference is a visitor does not have a choice to participate if a use or activity limitation is enforced at the particular recreation site or area. Most studies on

displacement have focused on visitors who have been voluntarily displaced by perceived crowding or other social conditions (Hall & Cole, 2007; Peden & Schuster, 2009). However, displacement caused by management actions, such as use limits or activity limits, are particularly salient to a regional approach because this is a situation where the managing agency has the most control. For the purposes of this dissertation, McCool and Cole (2001) provide a working definition: “Displacement is a process in which recreationists and their impacts move from one place to another, if management actions taken (or not taken) do not adequately serve the diversity of recreation tastes in the region” (pp. 3-4). It has been suggested some visitors may be displaced to areas where there is no organizational capacity to deal with them (McCool et al., 2007). An example in Utah might be a small reservoir managed by a local irrigation district that has no recreation staff and limited resources.

While displacement is a difficult phenomenon to track, studies of water-based recreation suggest the potential for displacement is substantial. Boaters at eight lakes and reservoirs in northern Utah were asked what they would do if they could not put their boat on the water due to use restrictions, and over 60% (higher at some reservoirs) of the boaters said they would definitely or probably still go boating, and most listed proximate lakes and reservoirs as their destination (Reiter et al., 2000, 2002). A similar phenomenon was observed on the South Fork of the Snake River. Reiter and colleagues (2002) asked river boaters on the South Fork (a river that does not have use restrictions) what they would do if they were not allowed on the river because of use restrictions. Roughly half of the respondents stated they would still boat locally, thus potentially impacting other nearby river reaches. Further, motor boaters may be displaced to an area

that is relatively quiet and popular with anglers or non-motorized boaters and increase the possibility of conflict at that lake or reservoir. Displacing boaters may also negatively impact a boater's experience. Robertson and Regula (1994) found displaced reservoir boaters in Iowa were less satisfied than those who were not. Shelby, Johnson, and Brunson (1990) evaluated whitewater boating opportunities in Oregon to assess how the rivers interrelate to one another. They concluded boaters who were not able to recreate on the first choice river would very likely choose an alternate river to boat; the most common factor identified in choosing another river was the proximity to their first choice. Brunson and Shelby (1993), when recommending directions for future research, suggest differentiating between hypothetical and actual substitutes (included sites chosen due to displacement) as the researchers note a discordance between intended recreational site choice and actual site choice.

Third, homogenization (recreation sites offering increasingly similar experiences) and sub-optimization (offering less than an optimal value regionally) of the delivery of recreation opportunities are also potential problems with site-specific management. McCool and Cole (2001) used multi-day whitewater trips on the Colorado Plateau to provide an example of homogenization and sub-optimization. Use limits have been set, over time, on the Colorado, Green, and San Juan Rivers without regard for the conditions at proximate boating locations. Although the managers along each of these river reaches made decisions that appear to be appropriate and rational locally, the authors point out this has resulted in a system where the experiences provided are all similar (but not optimal), and there is poor access (it is difficult to obtain a permit). There is no consideration for visitors who may seek social interaction and whose experience is not

dependent upon encountering few other groups. Alternatively, managers of the various whitewater boating opportunities could have collaborated to manage the various river reaches differently and thus provide for a wider range of recreational experiences.

Schreyer (1985) argued for managing rivers in a “regional context” to provide for the wide array of experiences. He asserts that managers have inappropriately “lumped” river runners into one category, while resource planning often suffers from “tunnel vision” as planning often focuses on single river reaches because management plans are developed for single areas. He also noted a decrease in the range of river-based opportunities throughout the western United States due to site-specific management decisions. In essence, when diverse demands are put on a river, it is difficult to decide what management actions or management objectives (e.g., provide for solitude experiences compared to other types of experiences) are appropriate. Schreyer suggested “...if one were to look at the whole array of...opportunities across a set of rivers that are more or less in the same region, it might be possible to provide a full range of opportunities” (p. 12). Even though many of the aforementioned studies are applied to river-based recreation, the concerns still seem very applicable to lakes and reservoirs. An example pertinent to reservoir and lake-based recreation in Utah would be proximate parks expanding developed facilities (such as boat ramps and campgrounds) in response to population growth; this act could have the effect of diminishing the range of experiences provided regionally. McCool (2000) suggested wilderness management could benefit from planning regionally, in part because each management unit is different enough that the recreation opportunities do vary and that management actions at one site may impact another. The author proposes that studies should be conducted at larger

spatial scales than the unit or site in order to better inform a systematic approach to managing wilderness.

Given that site-specific management is often a default approach to management, there is little argument for why it is prevalent. The main advantage to site-specific management may be that it is easier to implement, as it does not require extensive coordination between recreation managers. Recreation managers are often assigned to manage a distinct spatial area and there may be little (if any) incentive to consider a regional context to management, let alone coordinate at such a level. Also, managers are likely not really interested in “solving” issues that are outside their jurisdiction. Further, outdoor recreation research may contribute to site-specific management as studies, including crowding and place attachment studies, tend to focus on issues at a site level, and research questions are subsequently framed and addressed at the site level.

Regional Studies and Analyses

There has been little consideration in the academic literature for managing and planning outdoor recreation opportunities at larger spatial scales. This is perhaps surprising given that the major land management agencies have regional and state level organizational structures (Wellman & Probst, 2004). The USFS has a hierarchical organization including national, regional (state and multi-state), forest, and district levels. The Bureau of Land Management has three levels: National, State (although the eastern states with minimal BLM-land are combined into one office), and the field office (sub-state). The National Park Service, Bureau of Reclamation, and many state park agencies

also have hierarchical structures that suggest the organizational framework for potentially managing and planning at larger scales exists.

However, a few existing studies and concepts do provide some initial guidance on considering larger spatial scales and their implications. One concept, the Recreation Opportunity Spectrum (ROS) does take a spatial approach to planning and managing recreation opportunities. ROS is a management framework that considers recreation opportunities spatially, rather than at a specific site level. ROS was developed in the 1970s and is a management and planning framework that zones recreation uses based on a combination of social, managerial, and physical conditions (Clark & Stankey, 1979; Driver & Brown, 1978). ROS classifies, zones, and allocates experiences along a continuum or spectrum from primitive to urban (or modern) where visitors who seek different experiences can recreate within an appropriate setting. It is assumed by maintaining a wide range of conditions, a variety of recreation opportunities will be provided. Simply put, ROS determines what recreation settings exist and what should be provided. Additionally, the spatial nature of ROS also allows for integration with other resource issues such as watershed management (McCool et al., 2007). They also suggest that incremental changes, typically towards increased development, do still occur and also, agencies may tend to be more rigid in their implementation than is necessary. Generally, ROS is applied at a forest and district level within the USFS, and it is not necessarily clear that the larger regional context is considered when classifying forestlands.

Recently, the Water Recreation Opportunity Spectrum (WROS) was developed in coordination with the Bureau of Reclamation, and it applies the principles of ROS to

lakes and reservoirs. The WROS has six classes (Urban, Suburban, Rural Developed, Rural Natural, Semi-Primitive, and Primitive) that incorporates physical, managerial, and social attributes in order to inventory, plan, and manage water-based recreation settings (Haas et al., 2004). In general, the foundation to WROS is visitors are diverse, and a particular water body should not try to provide every single possible opportunity. The process interrelates what currently exists with what opportunities ought to be provided. The WROS handbook provides examples of collaborative zoning efforts that have occurred at rather large reservoirs in California, including Shasta Lake, San Luis Reservoir, Millerton Lake, and New Melones Lake. Generally, the waters within the reservoirs are classified between rural developed and semi-primitive with little or no urban, suburban, and primitive areas. This indicates the possibility that the range of opportunities that can be provided at reservoirs that allow for motorized access may be relatively narrow compared to a National Forest, for example. Currently, the application has been limited to individual water bodies, although the authors clearly see the regional context as important. Under WROS, planners consider the regional supply of the various types of opportunities (i.e., rural developed, rural natural, etc.) when making prescriptive decisions about what should be provided at a particular reservoir. The authors suggest temporal components play a factor in planning and management as seasonality (for example, due to ice and snow) can change an area's WROS classification.

Managing and planning regionally provides an alternative to offering all types of recreational opportunities at one site and, subsequently, an opportunity to spatially separate potentially conflicting recreational activities. Conflict is defined as "goal interference" attributed to someone else's behavior (Jacob & Schreyer, 1980). Conflict

may be between both visitors participating in the same activity (intra-activity) or different activities (inter-activity). As an example, if motorized users and non-motorized users were identified as being in conflict, these opportunities could be provided at different lakes or reservoirs (or at different locations within a lake or reservoir). Conflict may be asymmetric as well if one group experiences the conflict to a greater degree compared to another. As an example, an angler may experience conflict with a group of water-skiers near their boat while the water-skiers may be oblivious to the presence of the angler. Clark and Stankey (1979) suggested that ROS could conceivably minimize conflicts by separating “sharply dissimilar” opportunities. Daniels and Krannich (1990) expand on the idea of applying ROS to reduce goal incompatibility and manage conflict by spatially separating potentially conflicting uses. As such, potentially conflicting activities or experiences could be provided at different lakes or reservoirs within a region and the likelihood of conflict between these user groups’ decreases. Schreyer (1985) has suggested using this strategy to reduce conflict for river-based recreational opportunities. Planners or managers can take advantage of a unique attribute at a lake or reservoir that may be beneficial for a particular activity (e.g., wind for sailing or a cold water fishery) by emphasizing the related opportunities and perhaps providing other potentially conflicting opportunities at other proximate locations. In essence, a regional approach to management may provide managers with an additional conflict management tool.

Overall, there are few guidelines as to how a regional approach to management would be implemented or even how appropriate data would be collected to guide such an approach. According to Schreyer (1985), implementing a regional approach implies managers of individual locales (rivers or lakes and reservoirs) must consider the

importance of other pertinent recreational opportunities in the area. Also, interagency coordination would be necessary, and managers of multiple management units would be involved in the decision(s) about how to manage one unit. Yearout et al. (1977) suggested that rivers be managed systematically and provide a greater array of opportunities; some rivers could be identified as being appropriate to provide for solitude, while others could focus on “the white-water experience.” Moreover, they contend a river-by-river management approach will not be appropriate to meet future demand. But, managers who attempt to place the recreation area they manage in a regional context will be frustrated by the lack of regional information about what opportunities are available or currently in short supply. Stewart and Cole (2003) argue for regional analyses to assist in the provision of outdoor recreation opportunities. They suggest that prescriptive decisions about how an area ought to be managed or what management actions are appropriate should be made while considering a regional context. But, it is difficult to define how a regional analysis would be conducted (Blahna, 2007; Stewart & Cole, 2003). McCool and Cole (2001) do provide a suggestion as to how a regional analysis could be conducted: (1) define the region; (2) define the desired range of experiences and scarce opportunities; and (3) allocate experiences in a prescriptive manner. However, the approach recommended by McCool and Cole does not account for the potential to address management problems or issues, including conflict, by applying a regional approach.

One example of a regional analysis was completed on river-based recreational boating opportunities in Utah. Blahna and Reiter (2001) considered a regional context to the management of river-based boating in Utah; the researchers surveyed boaters on nine

river reaches throughout the state. River boaters along certain river reaches sought social interaction more than solitude on four of the river reaches, and the opposite was true on four other segments; one river reach was classified as “thrill seeking” while one river segment (Brown’s Hole below Flaming Gorge Dam) was suggested to be managed for fishing. They suggested the river segments be managed for different opportunities and that river managers implement objectives and actions that directly provide for those opportunities. For example, they recommended against setting use limits on rivers where solitude was not a primary objective because the use limits could have a detrimental effect to visitors on rivers where solitude was of greater concern by displacing visitors from the high use rivers. Rather, use limits should be set on the remote, difficult to access rivers where use is currently minimal. In this case, the researchers identified four different types of experiences and suggest implementing only management actions, in this case use limits, consistent with the objectives. One implication for a regional approach is management actions should only be implemented after the regional context has been considered. Further, it becomes apparent that larger-scale management strategies do in fact allow managers and planners to meet multiple goals and provide a more diverse array of opportunities. Also, agencies should set appropriate goals and objectives in a regional context to meet a range of desired experiences.

Integration with Other Natural Resource Issues

Larger-scale recreation planning and management approaches require understanding and integration with other natural resource issues and/or problems. Morse et al. (2008) suggested consideration for spatial scale may allow for better integration

between recreation planning and other resource disciplines and issues. Two issues are particularly relevant to water-based recreation management: (1) effects of other water uses on recreation; and (2) ecological impacts to water-based systems due to motorized boating.

Twenty-two of the 24 state parks considered in this dissertation are reservoirs, while water deliveries and dams enhance the two lakes, Bear and Utah Lakes. The reservoirs were built for irrigation and municipal purposes with recreation being an ancillary benefit. Kakoyannis and Stankey (2002, 2008) suggested that conflicts for competing water uses are likely to increase in the future, and they note the limited number of studies addressing the issue. Clearly, the interactions between other water uses, including irrigation and municipal, may affect recreation use on Utah water bodies.

The most obvious, and perhaps important, concern relates to reservoir drawdown; reservoir drawdown occurs when outflow (including evaporation) from a reservoir exceeds the inflow. Platt and Munger (1999) cited five factors important to recreation that changes in water levels may potentially affect; these include safety, water access, water quality, aesthetics, and crowding. It should be noted, however, the impact of the drawdown is not uniform across water bodies due to the following factors: physical characteristics of the lake such as the steepness of shoreline; usable range of water access facilities such as the boat ramps; the availability of substitute sites; the tolerance of visitor populations to the drawdown; and the variety of recreation activities occurring at the reservoir. Given that peak irrigation season matches the peak recreational use season, there is potential for negative impacts to recreation due to drawdown; a “bathtub ring” or

ugly shoreline can become apparent for the aesthetic value of the lake or reservoir (Platt & Munger, 1999).

A few studies (Bowker, Cordell, Hawks, & English, 1994; Cordell & Bergstrom, 1993; Jaakson 1973; Jakus, Dowell & Murray, 2000) have considered the impact of reservoir drawdown on recreation. Intuitively, the results confirm the impact of other water uses on recreation visitation and value is generally negative. Rischbieter (2004) evaluated the effects of reservoir operations on recreation opportunities at Lake Oroville and associated forebays and afterbays. The conclusions suggest the effects of reservoir drawdown may be numerous: (1) lower water levels were associated with a decrease in visitation; (2) lower water levels inhibited access to boat ramps; (3) boat-in campgrounds and swim areas became increasingly undesirable as these shoreline facilities became further and further from the water; and (4) water temperatures were colder than many recreationists desired in the forebays that are located below the tailwater of the main dam. It should be noted that the cold water was seen as beneficial to cold-water fisheries and to the anglers who seek out these fish. But, overall, the effects of reservoir operations on recreation appear to be negative.

Understanding the effects of reservoir drawdown is important to a regional approach because reservoirs can be so low during drought years that facilities such as marinas and boat ramps may become inoperable. This may, in turn, impact other reservoirs as visitors redistribute themselves. Of potential concern to water-based recreation managers and to water resource managers, in general, are the changes due to future projected climate change (Rajagopalan et al., 2009; Wagner, 2009). In general, it is expected that the interior West will have a shorter winter season with decreased

snowfall (even though some models project increased precipitation overall). The result will be that earlier spring run-offs will fill up reservoirs earlier in the spring and the reservoirs will likely begin to be drawn down earlier in the summer to meet irrigation and municipal water demands.

Although no ecological data was collected as a part of the study, it is worth considering the potential resource impacts due to motorized boating, because the vast majority of the registered boats in Utah are motorized. As such, considering the potential impact of their use may advise managers where the use is appropriate or inappropriate. Potential resource impacts due to power boating include erosion caused by wave action, increases in turbidity due to wave action and/or propeller activity, direct contact impacts including injury to aquatic animals, noise effects on birds and other wildlife, and chemical impacts, mostly caused by fuel leaks and two stroke engines (Hammitt & Cole, 1998; Mosisch & Arthington, 1998). However, the increasing use of four stroke motors compared to two-stroke has reduced the risk of water contamination due to fuel leaks (Asplund, 2000). Another concern with motorized boating (really, boating in general) is the dispersal of invasive aquatic species (Mosisch & Arthington, 1998); the zebra mussel is of special concern in Utah. Knight and Cole (1995) suggested that one boat may disturb as much wildlife as many boats due to their quick movement and noise. Previous studies in recreation ecology, a sub-discipline of ecology that measures the impact to ecological resources attributable to recreation use, suggest that initial recreation use has a disproportionately large negative effect on biophysical resources compared to subsequent use (Cole & Hall, 1992; Hammitt & Cole, 1998 Leung & Marion, 2000); it is not clear if this relationship applies to motorized boating use – although Knight and Cole (1995)

suggested that it might. Overall, it is important for managers to consider the potential ecological effects of various boating uses as decisions are made. From a regional perspective, if there is a lake or reservoir that appears to be especially susceptible to impacts from motorized uses, managers and planners could consider closures to motorized uses or direct use to other regional lakes or reservoirs. Closures may also be beneficial to recreational users whose experiences may be compromised by motorized use.

Summary

A major goal of recreation management is to provide opportunities that allow for a wide range of recreation experiences (Clark & Stankey, 1979; Haas et al., 2004; McCool et al., 2007; Shafer, 1969; Wagar, 1963; Warzecha et al., 2001). Wide ranges of recreational experiences are sought because recreationists have diverse needs, and varying settings may provide for those. Over time, a series of seemingly innocuous and rational (small) decisions may diminish the range of recreational opportunities. Therefore, site-specific management risks decreasing the range of recreational opportunities regionally as the larger context is not considered (Haas, 2001; Jubanville & Becker, 1983). There is reason to believe that a regional approach that considers larger spatial scales is likely to provide a greater array of recreational opportunities compared to a site-specific management approach. Additionally, site-specific management may lead to a homogenization and sub-optimization of opportunities. Further, management actions that do not consider the regional context run the risk of displacing recreationists to other

sites. There are few guidelines as to how to conduct a regional analysis or apply a regional approach to management.

Managerial Studies

A unique aspect of this dissertation is the inclusion of park managers in the study. The vast majority of empirical recreation resource studies have focused on visitors most often to ascertain their behavior, attitudes, or perceptions. Additionally, the limited studies that have included managers have generally been quantitative in nature, asking managers about their attitudes or to predict visitor preferences. More importantly, the existing studies have certainly not addressed the concept of regional recreation management. The existing managerial studies may be divided into three general categories: (1) studies focusing on managers; (2) studies comparing managers and visitors; and (3) studies where managers make predictions about visitor attributes or preferences.

Managerial Surveys

The first set of studies includes surveys of federal land managers involved in managing wilderness areas. The first apparent theme is agency mandates appear to influence the views of managers. Federal wilderness managers from the Forest Service, National Park Service, and Fish and Wildlife Service were surveyed with the purpose of assessing the use of various use regulations and manipulative actions (Bury & Fish, 1980; Fish & Bury, 1981). Managers were asked if they had implemented twenty-three different managerial controls in the wilderness area(s) they manage. The managerial

controls were divided into two broad categories: (1) regulatory; and (2) manipulative. Regulatory controls include limits on group size, access points, requiring reservations, restricting wildfires, among others. Alternatively, manipulative controls attempt to modify behavior by not improving access, for example, or advertising specific attributes of a wilderness area. It was concluded the agency's mission was important in understanding what actions were implemented. USFS staff preferred manipulative tools and were less likely to use regulatory tools than NPS or FWS managers. Many USFS respondents stated that wilderness rangers were educators rather than enforcement officers. The researchers also stated that USFS managers were tentative about placing restrictive controls on recreation use. The authors reviewed USFS policy statements regarding wilderness management, and the emphasis was on manipulative techniques compared to regulatory techniques, whereas the managers stated the Park Service tended to respond more forcefully to "overuse." They also reviewed formalized NPS policy and noted that there was extensive discussion regarding regulatory controls and minimal discussion of manipulative techniques. They also conclude that FWS managers discouraged recreation use in the wilderness areas they manage. A review of FWS policy documents found that wilderness areas could be closed if recreation use was found not to be compatible with wildlife management objectives. In short, recreation access is not a high priority for the FWS. The authors attribute the differences in manager views between the three agencies to differences in agency traditions and mandates.

Another study focused on managers of federal wilderness lands reinforces the view that federal land managers appear to be influenced by their agencies' mandates. Washburne and Cole (1983) surveyed federal wilderness managers throughout the United

States. Questionnaires were sent to managers of all wilderness units and BLM-managed primitive areas; managers were asked about potential social and biophysical impacts, and the application and effectiveness of various management techniques. A couple of problems were noted by a majority of managers, including a loss of solitude and resource degradation attributed to recreational use. The majority of respondents cited personal contact as the most effective management technique. The importance of differing agency philosophies, mandates, and traditions is clear as Forest Service managers are generally less aggressive than NPS in addressing management issues. The NPS tradition emphasizes resource protection and the agency is subsequently more willing to restrict access or apply regulatory approaches at the expense of the wilderness experience. Conversely, consistent with tradition, the USFS provides “unfettered” recreational experiences seeking to maximize the visitors’ freedom of choice.

There is some indication NPS managers perceive a wide range of management issues and may prefer direct management strategies compared to indirect strategies. The researchers surveyed 93 NPS staff responsible for backcountry management to obtain information about their perception of backcountry problems and potential management actions (Manning, Ballinger, Marion, & Roggenbuck, 1996; Marion, Roggenbuck, & Manning, 1993). NPS staff cited trail impacts as the most widespread problem, followed by campsite impacts, litter, and crowding. Many of the strategies that were perceived as effective could be classified as direct strategies, such as designating campsites or limiting group size, or engineering solutions such as trail maintenance or building restroom facilities in high use areas. The authors identified six trends important to recreation management based on the results of their study and the aforementioned study (Bury &

Fish, 1980; Fish & Bury, 1981). First, biophysical impacts were the most commonly cited impacts by managers. Second, negative visitor experiences and crowding appear to have increased over time. Third, carrying capacity is a “pervasive” issue, but the researchers suggest that the problem is unresolved. Fourth, use of both direct and indirect management actions has appeared to increase over time. Direct management actions include legal, regulatory means, such as boating safety and use limitations, and formal enforcement of behavior, while indirect ones attempt to influence behavior through educational and voluntary approaches, such as use of signage, interpretation, and informal social control. Fifth, wilderness day use and associated issues appear to be increasing. Finally, recreation management is becoming both more complex and sophisticated. The authors recommend that recreation managers could benefit from increased communication as ideas about effective management strategies to address the wide array of recreation problems and challenges.

Studies indicate managers may perceive a wide range of issues and problems and their perspective about management actions may vary due to the mandates and culture of their agency. It is not clear how well the findings of these studies apply to state managed lands and waters where motorized use is prevalent. The Utah State Parks’ mission emphasizes enhancing quality of life through conservation and providing recreational and cultural opportunities, while the Boating Program’s mission emphasizes a balanced approach to providing environmentally acceptable boating experiences (Utah Department of Natural Resources, Division of Parks and Recreation, 2010). It could be concluded that State Parks emphasizes recreation at least equally and perhaps to a greater degree, than the major federal management agencies. Clearly, Utah State Parks are substantially

different than federal wilderness areas, but it is not known if State Park managers are different than federal wilderness managers.

Studies Comparing Managers and Visitors

The second set of managerial studies compares the views of managers with visitors and/or the public. The studies have been quantitative in nature and suggest differences between the two groups are to be expected. First, managers may view natural aspects of parks or natural areas as more important than visitors. Merriam, Wald, and Ramsey (1972) compared professional (park managers and administrators) with public (campers) definitions of state parks in Minnesota. Both groups were positively oriented towards nature conservation as a reason for camping. Although their views were not totally dichotomous, visitors to the parks viewed facilities as more important, while administrators generally viewed the natural aspects as more important to the park. The authors cite three possible causes of conflict between visitors and managers: (1) difference in role as provider as visitors may only be concerned with their activity while managers may be more concerned with “preserving” the natural environment; (2) managers have more power and are organized while users are more numerous, but diffuse and unorganized; and (3) managers and visitors may define a park differently.

Managers appear to have broader views than visitors and foresee long-range planning issues. They are also aware of the multiple purposes of natural areas and are more knowledgeable about potential impacts attributed to recreation use. Peterson (1974) compared paddling canoeists with wilderness managers at the Boundary Waters Canoe Area (BWCA). Managers and canoeists have similar environmental dispositions about

what is proper use of BWCA. However, there were some interesting differences between the groups. First, visitors demand “natural purity” more than the managers but also favor more developed facilities. Canoeists viewed themselves as adventurers while managers viewed the wilderness as a daily matter of fact. Further, views toward the appropriateness of various activities in the BWCA were assessed; both groups agreed that fishing and canoeing were appropriate while mining and prospecting were not. However, managers approved of hunting while canoeists did not, and managers showed approval of snowmobiling, logging, and motorized canoeing while users generally did not. Peterson concludes managers view BWCA as an area to participate in a wide variety of activities while canoeists view BWCA for their specialized recreational purposes.

As part of a statewide comprehensive planning effort in Vermont, Manning and Frayser (1989) compared “elite” views (individuals with expertise or special interest in the subject) with a statewide representative sample of residents. Both elites and residents rated 57 items related to management of recreation resources in Vermont including quality, problems, funding sources, and expenditures. Twenty-five of the items showed statistically significant differences between the two groups. Experts more often cited “coordinated, forward-looking, and abstract” issues such as inadequate funding and liability as a problem compared to the residents, while both groups rated the present quality of recreation resources about the same. The authors concluded that the findings reflect “alternative community orientations.” In sum, managers have more information about park and natural area management than do visitors; because of this, these groups may view problems or the effectiveness of management actions differently. The authors conclude that much could be learned from the inclusion of “experts” (who work in the

recreation field) in future studies as few recreation studies have included their views or opinions.

Managers appear to be more in tune with (or more sensitive to) the impacts caused by recreational use compared to visitors. Downing and Clark (1979) compared dispersed-use visitors at two USFS districts in Washington state with forest managers representing federal, state, and private agencies and organizations in the Pacific Northwest. Both groups were asked if they felt that nine potential ecological impacts (due to recreational use) were either becoming a problem, or were currently a somewhat serious or serious problem. A substantially higher proportion of managers cited seven of the impacts as being a problem while two of the problems (water quality and human health issues caused by human waste) were cited by about an equal proportion of managers.

Manager Predictions of Visitor Attributes

The third set of studies includes those where managers are asked to predict aspects of the visitors. In general, there is some question about the ability of managers to accurately predict visitor attributes. Wellman, Dawson, and Roggenbuck (1982) evaluated managers' predictions of user motivations at Cape Hatteras National Seashore and Shenandoah National Park. Visitor survey responses regarding their motives for visiting were compared with manager's perceptions of user motives at these recreation areas. The authors found that managers at Cape Hatteras National Seashore were "substantially inaccurate" in predicting both pedestrian and off-road vehicle user motives. They also found that managers at Shenandoah National Park were fairly accurate

predicting user motives. The authors suggest that the “contemplative ideal of outdoor recreation” played a role in explaining this difference. This contemplative ideal is consistent with the views expressed by “preservationists from Olmstead to Abbey” (p. 8) and favors wilderness or nondeveloped area recreation and subsequent motives such as seeking privacy. The authors suggest that Shenandoah National Park is more similar to Yosemite and Yellowstone where the National Park ideal was created. The developed-area users at Cape Hatteras do not fit this ideal. Hendee and Harris (1970) compared wilderness managers’ predictions of the “typical wilderness user” with wilderness users using a wilderness purist scale. Managers predicted visitors were more inclined toward wilderness purism than they actually were.

In some cases, managers may not realize the potential benefits of certain recreation settings. Clark, Hendee, and Campbell (1971) compared visitors to highly developed campgrounds and managers of public lands in Washington state and found differences between the two groups. They concluded managers failed to recognize what the authors describe as the traditional goals associated with camping. In general, the managers did not see highly developed campgrounds as appropriate places to have an environmental experience. The visitors also did not see conditions such as noise and litter as much of a problem as did the managers. The authors suggest that the managers’ predictions of the visitors’ view were simply a reflection of the managers’ view. In addition, managers thought isolation and primitive environments as necessary while users saw developed areas as appropriate.

There may also be some question about how well managers predict the views of their visitors. Absher, McAvoy, Burdge, and Gramann (1988) compared both

commercial and public recreation managers' views towards various management issues with visitors along the Upper Mississippi River System between St. Louis and Minneapolis. Public managers were individuals who had recreation management responsibilities along the river stretch at various levels of government while commercial managers were those who managed private facilities or operations that depend on recreational use. The authors were interested in how well managers represented their clients. First, they concluded that public managers were slightly better at predicting visitors' views than were commercial managers. However, the authors do not believe that either group serves as an appropriate proxy for visitors with the implication that on-site user surveys are necessary in spite of their expense.

Managers were effective in predicting the motives at ski areas in Colorado. Rosenthal and Driver (1983) surveyed Forest Service employees who managed ski touring areas along with skiers in the Front Range of Colorado. Managers were asked to predict user motives for skiing while users were asked about nineteen experiential characteristics utilizing the Driver and associates Recreation Experience Preference (REP) scale. Only four of the experiential characteristics showed a statistical difference, and the differences were small. The authors conclude managers did a good job predicting users' experiential preference and suggest it may be easier for managers to predict experiential preferences compared to preferences for managerial actions.

Summary of Managerial Studies

Overall, studies comparing managers and visitors suggest differences between the two groups are to be expected. Also, the ability for managers to predict user

characteristics is questionable as study results have been inconsistent. These shortcomings have not only been limited to natural resource based recreation areas. Anderson and Blahna (1996) surveyed both visitors and staff at a historical farm to evaluate the farm staff's ability to predict user characteristics and motives. They concluded that the staff could fairly accurately predict user demographics and behavior while they were generally poor predictors of visitors' motives and their satisfaction with their visit. Further, there is reason to suspect managers are different than visitors and may perceive problems differently. Overall, previous research suggests that managers and visitors are likely to view many problems and perhaps management actions differently, and it is questionable if managers can accurately predict visitor attitudes.

It is important to consider agency mandates and culture when understanding the perspective of a recreation manager. Culhane (1981), when comparing the BLM and the USFS noted an "esprit de corp" in the USFS that did not exist in the BLM in spite of the fact that Culhane believed the agencies were equally professional. A classic study in organizational behavior, *The Forest Ranger*, completed by Kaufman (1960), merits brief discussion. The author evaluated the role of the Forest Ranger within the USFS. The forest ranger is the officer responsible for managing a forest district, and Kaufman believed there may be a tendency to deviate from directives made by central offices. As a method, the author travelled throughout the country and visited with and interviewed five forest rangers (and some of their staff) extensively. Kaufman explored the seemingly unlikely fact that, although USFS districts are remote and isolated from Washington DC, for the most part there was a remarkable similarity in the decisions made by the forest rangers throughout the country. Also, the agency was concerned that the forest rangers

may be “captured” by the local community, meaning they would be reticent to make a decision that could adversely affect the community in which they were working. The author concluded that a combination of training programs, manuals, procedures, and the potential for sanction kept the forest ranger from deviating from agency directives. Overall, the study enforces the notion that an agency’s mandates clearly may influence the views and actions of their staff.

It should be pointed out the studies discussed in this literature review have primarily been completed on managers who work for the federal land management agencies as studies focusing on managers who work for state agencies have not been a focus of previous research. Also, federal wilderness areas are very different than a lake or reservoir-based State Park in Utah. This is not to suggest that the State Park managers are necessarily different than the wilderness managers, but certainly the recreation opportunities they provide are.

Experience Use History

As previously discussed, an assumption of a regional approach is considering larger spatial scales can better provide a diversity of recreational experiences. Therefore, research techniques that identify various segments of visitors are necessary; one such technique (admittedly among many) is experience use history (EUH). Understanding how various segments of visitors choose a lake or reservoir or how they are different may inform regional management. For example, are certain visitors who boat more often more likely to choose certain types of lakes or reservoirs or have different attitudes compared to other visitors? EUH is a concept that allows the researcher to segment

visitors based on behavioral characteristics (Schreyer, Lime, & Williams, 1984).

Although a few studies have applied EUH principles over the past 25 years, the number of studies applying a social-psychological perspective far outweighs those applying behavioral approaches such as EUH (Manning, 2011). A regional approach assumes that managing at larger spatial scales improves the ability of the agency to provide for multiple experiences, and EUH is one of many concepts (including social-psychological ones) that can segment visitors to recreation areas. This, in turn, may help the agency identify how users are different and assess if existing programs and facilities are adequate to meet the varying demand.

Schreyer et al. (1984) completed the most noteworthy EUH study when comparing over 3000 river boaters who were surveyed on 13 different rivers in the United States. The researchers segmented the boaters based on three behavioral attributes (using a researcher defined “low” and “high” for each): (1) number of trips on the study river; (2) total number of rivers run; and (3) total number of river trips. From these three variables, six categories of boaters were created from the lowest EUH (novice) to the highest EUH (veterans). The researchers then used these categories to evaluate differences between the groups’ behavior, interpretation of experience, perception of conflict, and attitudes towards management. In short, statistically significant differences were found between the groups on all of the factors. The researchers concluded that use history was a factor that could be used to explain diversity within and among visitors to a similar environment. Using the same database, Schreyer and Lime (1984) divided the respondents based both on the total number of boating trips they had taken and whether or not they were boating on the study river for the first time.

In general, first-time boaters on the study river who had frequently boated elsewhere were more similar in some aspects to those who had boated on the study river more than one time. The authors suggest that determining exactly who is a novice (or any level of expertise for that matter) may not necessarily be a straightforward exercise. Given the importance of providing a diversity of recreational opportunities to a regional approach, perhaps an understanding of EUH may enlighten how various lakes and reservoirs could be managed to meet the diversity of experiences.

Although there have been few studies applying EUH as a factor to explain differences between groups, the studies have been mixed in assessing the importance of EUH in explaining differences between groups. Some studies suggest that past experience or behavior often conceptualized as EUH may influence recreationists' perceptions, motives and/or preferences (Schreyer & Beaulieu, 1986; Williams, Schreyer, & Knopf, 1990; Watson, Roggenbuck, & Williams, 1991). Although, in some cases, it has not proved useful in explaining differences, including substitute-fishing attributes in the Southern United States (Backlund, Hammitt, & Bixler, 2006) and perceptions of social and managerial conditions in wilderness areas in the Northeastern United States (Peden & Schuster, 2008). Additionally, Smith, Moore, and Burr (2009) found mixed success in using EUH to explain differences in understanding resource conditions and support for various management actions. In essence, EUH should be used to best elucidate differences between groups and to inform the management purpose, if any, associated with the study. However, it is not clear that differences will be apparent in every situation.

Summary of Chapter

As there are few formal guidelines as to how a regional study would be conducted, this dissertation is exploratory in nature. However, a few points are apparent based on studies from ecology, urban planning, and outdoor recreation. First, collecting data at multiple spatial scales will likely elucidate more and different issues than collecting at one spatial scale. Additionally, when considering larger spatial scales, understanding the interactions (if any) between proximate (and even distinct) lakes and reservoirs becomes important. Therefore, techniques that are able to elucidate interactions between recreation areas are necessary. Cluster analysis is one technique that may be effective in evaluating these interactions by determining what lakes and reservoirs have visitation in common.

Also, the incorporation of multiple viewpoints (managers and visitors/boaters) and applying a whole-systems approach may inform about the importance of different factors for consideration. For example, boaters are not likely to be aware of organizational issues (i.e., budgeting and staffing) associated with managing outdoor recreational areas and how these relate to managing regionally. Likewise, previous studies suggest managers are not necessarily good proxies for the visitors' attitudes or preferences. Therefore, in this research, managers and boaters are both interviewed separately and their views are compared.

CHAPTER III

METHODS

For this study, a multi-phase, mixed-method research approach was applied. A “boater” is an individual who owns a boat registered in Utah, while a “manager” is a park manager at a water-based State Park(s) in Utah. In this chapter, after providing a background on mixed-method research approaches, the four data collection phases are described, followed by a description of the various analytical techniques.

Mixed Method Research Approach

The field of ecology has benefited from studying phenomenon at multiple spatial scales and applying different research approaches at various spatial scales (Begon, et al., 2006; Peterson & Parker, 1998). As such, a mixed-method research approach collecting data at different scales is used in this dissertation. Tashakkori and Teddlie (2003) defined mixed-method research as any technique that uses both quantitative and qualitative data collection and analytical techniques, either in parallel or sequence. Clark, Creswell, Green, and Shope (2008) described three key features of mixed-method research approaches: (1) collect qualitative and quantitative data; (2) analyze at least two data sets; and (3) the data sets are integrated in a meaningful way. For this study, qualitative data (from managerial interviews) and quantitative data (from boater surveys conducted by phone and an on-line managerial survey) were both analyzed. Further, input from state and federal representatives familiar with recreational issues at regional meetings were also considered. A mixed-method, multi-phase approach was chosen for this study

because of the limited number of studies related to managing and planning recreation resources regionally and, thus, an exploratory approach was appropriate. Survey research provides the advantage of obtaining information from a large population with relative economy when properly sampled; one disadvantage is surveys may not penetrate the surface of some issues (Kerlinger & Lee, 2000). However, the disadvantages may be partially offset when conducting mixed-method approaches. Often, mixed-method approaches are used on the same population or sampling subjects; for example, respondents may both participate in a survey to measure their attitudes, and they may also be interviewed at length. In fact, this was the case for park managers as they participated in key-informant interviews in the first data collection phase and an online quantitative survey. The multiple-method approach used in this dissertation ascertains multiple perspectives from both managers and boaters.

In addition to obtaining multiple perspectives, the data are collected at multiple spatial scales. Determining an appropriate scale of analysis is a challenge (MacKenzie, 1996); in this case, the smallest spatial unit is a lake or reservoir (the term site is used interchangeably in this dissertation). The largest unit is the State, which is the largest spatial scale that could be considered as a practical matter given the boating program focuses on Utah. It was determined that an intermediate unit, boating region (see below), was necessary to manage regionally. Data were collected at the site-level (lake or reservoir) when interviewing managers (although the data were aggregated statewide for analysis). Regional level data was obtained in the second data collection phase when regional meetings were conducted. Statewide data was collected by use of a statewide

survey of registered boaters. Also, this study uses a multi-phase approach as results from previous data collection phases inform the later data collection phases.

Data Collection

Four data collection phases were completed for this study: (1) key-informant interviews of managers of recreational water bodies; (2) define boating regions/regional meetings with state and federal representatives who are knowledgeable about recreational water use in Utah; (3) a telephone survey of a sample of registered boat owners in Utah; and (4) a short on-line survey of state park managers. The four data collection phases provided the data to be analyzed to explore the topic of a regional approach and complete this dissertation. Table 3 displays the data collection phases, the level (spatial) that the data were collected from, and the analyses that were applied to each phase. Also, information about physical and managerial characteristics (e.g., surface area, elevation, RV hook-ups, etc.) associated with the various lakes and reservoirs were compiled for the cluster analysis (see later in chapter). Figure 1 presents a flow chart of the data collection phases and how these relate to the various analyses.

Phase 1: Managerial Key-Informant Interviews

Key-informant interviews of park managers were chosen as the first data collection phase. Qualitative research approaches are appropriate when a topic is being explored (Creswell, 2006). An exploratory qualitative approach was chosen for the following reasons: (1) a regional approach has been rarely considered in the academic literature; (2) the number of studies focusing on recreation managers is limited; (3) the

Table 3

Data Collection Phases and Analyses

Data Collection Phase	Level of Analysis	Analyses Supported
Phase 1: Managerial Key- Informant Interviews	Site	Content Analysis of Interviews / Triangulation
Phase 2: Define Regions and Conduct Regional Meetings	Regional	Descriptive / Triangulation
Phase 3: Telephone Survey of Registered Boat Owners	Statewide	Descriptive / Comparison of Managers and Boaters / Managers Predictions of and Comparison with Boaters Views / Cluster Analysis ^a / EUH Analysis / Triangulation
Phase 4: On-line Survey of State Park Managers	Statewide	Comparison of Managers and Boaters / Managers Predictions of and Comparison with Boaters Views / Triangulation

^a Existing data regarding the physical and managerial features associated with the various lakes and reservoirs were also considered for this analysis.

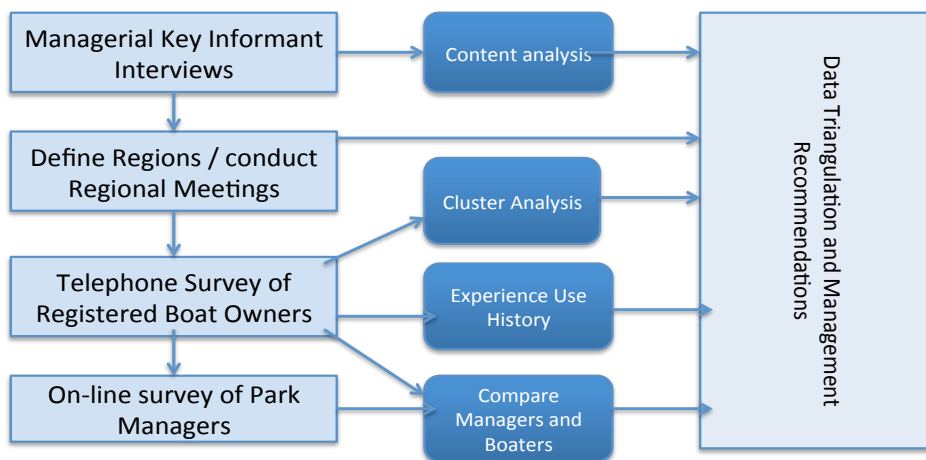


Figure 1. Data collection phases and analysis.

context (state managed recreation lands) has not been considered as often as federally managed lands or waters; (4) the phase of the research planning process was designed to be open to emerging issues; and (5) to help design subsequent quantitative data collection phases.

Most recreation resource studies use quantitative approaches with on-site intercept surveys being the most common method of collecting data. A qualitative research approach is distinct from a quantitative approach for a variety of reasons. In general, qualitative approaches allow for unanticipated issues to emerge and they allow a topic to be studied in greater depth, whereas quantitative approaches generally focus on testing or evaluating specific research questions and hypotheses. Denzin and Lincoln (2000) cited five reasons how qualitative approaches differ from quantitative approaches: qualitative approaches (1) use of positivism (the view that all knowable information is scientifically attainable) and post-positivism (the view that human conjecture is also important); (2) accept postmodern sensibilities; (3) capture the individual's point of view; (4) examine the constraints of everyday life; and (5) secure rich descriptions. Also, a qualitative approach using an inductive process can guide subsequent quantitative studies (Patton, 2002).

Key-informant interviews are a method of obtaining information about phenomena the researcher is not able to observe firsthand. Key-informants are individuals who are knowledgeable about the inquiry setting or phenomena. Strengths of key-informant interviews are as follows: (1) access to information about past events; (2) a lot of information may be obtained in a short amount of time; and (3) information unknown to the researcher before may become apparent. There are weaknesses to key-

informant interviews as well; for one, there is a very high likelihood the information obtained is biased (Berg, 2004; Patton, 2002). Key-informant interviews range from one extreme, an informal unstructured interview, to another extreme, a standardized interview where the same questions are repeated to each respondent (Patton, 2002). Offering a compromise along a continuum between the two extremes is the semi-structured interview where set questions are asked, but informal follow-ups, leeway for elaboration, and probes are included when appropriate.

A list of park managers was obtained from State Parks planning staff, and researchers contacted the managers to schedule the interviews. Managers were interviewed either face-to-face or by telephone. Fourteen of the interviews were conducted on-site while four were conducted over the telephone due to logistical reasons. The first two interviews served as pilot interviews as it was concluded that interviewing actual managers was the only appropriate way to test the instrument; only minor changes were made after the initial two interviews. Two researchers were present at each interview; one researcher conducted the interview while the other took field notes and asked follow-up questions when appropriate. All 18 State Park reservoir- and lake-based managers were interviewed. In many cases, qualitative studies utilize a sampling procedure called saturation; this implies that interviewing is terminated when the researcher stops learning anything new from the participants. For this study, the population ($N=18$) was small enough to justify completing a census (interviewing the entire population) and interviewing every manager was seen as necessary when considering the potentially unique aspects of every park. Managers were asked questions related to the following topics: background information, management policies, visitor

behavior, management challenges, recreational use issues, and accidents/incidents history. A copy of the final interview form is included in Appendix A. The interviews lasted between 50 minutes and 2 hours. Managerial interviews were recorded, transcribed, and coded. The recording quality of one interview was poor and subsequently not transcribed, but notes taken at the interview by the field researchers provided information for that interview.

Four representatives of federally managed water bodies participated in shorter interviews by telephone; however, the representatives had many other duties outside of recreation management, and some were not very knowledgeable about the recreation resources. Thus, the interviews with federal representatives provided little useful information and were not considered in analysis.

Phase 2: Defining Regions and Conducting Regional Meetings

The second data collection phase was conducting regional meetings throughout the state. Regional meeting are not a formalized data collection procedure; rather, for the purposes of this study, regional meeting are workshops where participants' perceptions of regional problems and issues were identified along with management recommendations. However, defining boating regions was necessary before conducting the meetings in order to determine what staff would be invited to attend each meeting.

Boating regions were developed in cooperation with State Parks. Boating regions occupy an intermediate spatial scale between the individual water body and the state. Boating regions can best be understood as a spatially defined area where the administrative function of providing a broad array of recreation opportunities and

addressing regional issues and problems would be shared. USU researchers attended State Parks annual boating meeting; attendees (who included park managers, rangers, and administrators) were asked to draw on a map their perspective of boating regions in the state. Participants were asked to consider the following criteria when developing their regions: logical day trips (visitor-shed), logical substitute boating locations, (i.e., where a boater may go if they could not get on their first choice lake or reservoir), and boating areas that provide a range of opportunities. The participants submitted their maps and these were reviewed by USU researchers and senior State Parks planning staff.

The six boating regions (and location of the regional meetings) were finalized in consultation with the agency's planning staff. Regions would be assumed to have some overlap with each other; for example, individuals who live close to a regional boundary may view boating options in multiple regions. Four reservoirs – Willard Bay, Starvation, Yuba, and Pineview – were difficult to classify as all three could logically be in two different regions. Willard Bay and Pineview could be in the Wasatch Front and Back region; in reality, these two reservoirs receive use from both regions, but it was seen to substantially increase the range of opportunities in the Northern region. Starvation and Yuba reservoirs could be in the Northeastern and Central Utah regions respectively; however, it was believed that most use at these two areas was from the Wasatch Front. Also, both parks have mandates to increase visitation in order to generate additional revenue, and presumably this use would come from the Wasatch Front. Researchers and planners considered dividing the Wasatch Front and Back area into two regions; however, there was no logical break point between the two potential regions. County lines, in most cases, were used to delineate regions with the only exception being Weber

County, which was split into two regions. Lake Powell was made into its own region as it was suggested that people would visit from all over the state and, in fact, from throughout the United States and Europe. A map of the six boating regions is provided as Figure 2.

Six meetings, one in each of the boating regions, were conducted to discuss regional and statewide management issues. Both state and federal land managers and staff familiar with water-based recreation issues in Utah attended the meetings. Meeting attendees (not including USU researchers) ranged from one to nine and included state park managers, state park rangers, state park law enforcement officers, state Department of Wildlife Resources (DWR) conservation officers, United State Forest Service land managers and staff, although the vast majority of attendees were State Park employees. Although federal representatives knowledgeable about boating in Utah were invited, many did not attend. This is likely due to the fact that they did not have the same incentive as the state employees who were asked to attend by senior planning staff within State Parks. Table 4 presents the location of the meeting along with the State Parks, other lakes and reservoirs, and counties located in each region. Regional meetings are not a formalized data collection technique; rather, they are an efficient way to obtain information at a regional level. The limitation of the regional meetings (similar to the key-informant interview) is the results represent the views of the managers in the managing agencies, and the results may be biased. However, given that the meetings were attended by more than just the park managers (i.e., federal land management agency employees, park rangers, etc.), a somewhat wider perspective could be obtained compared to the managerial interviews.

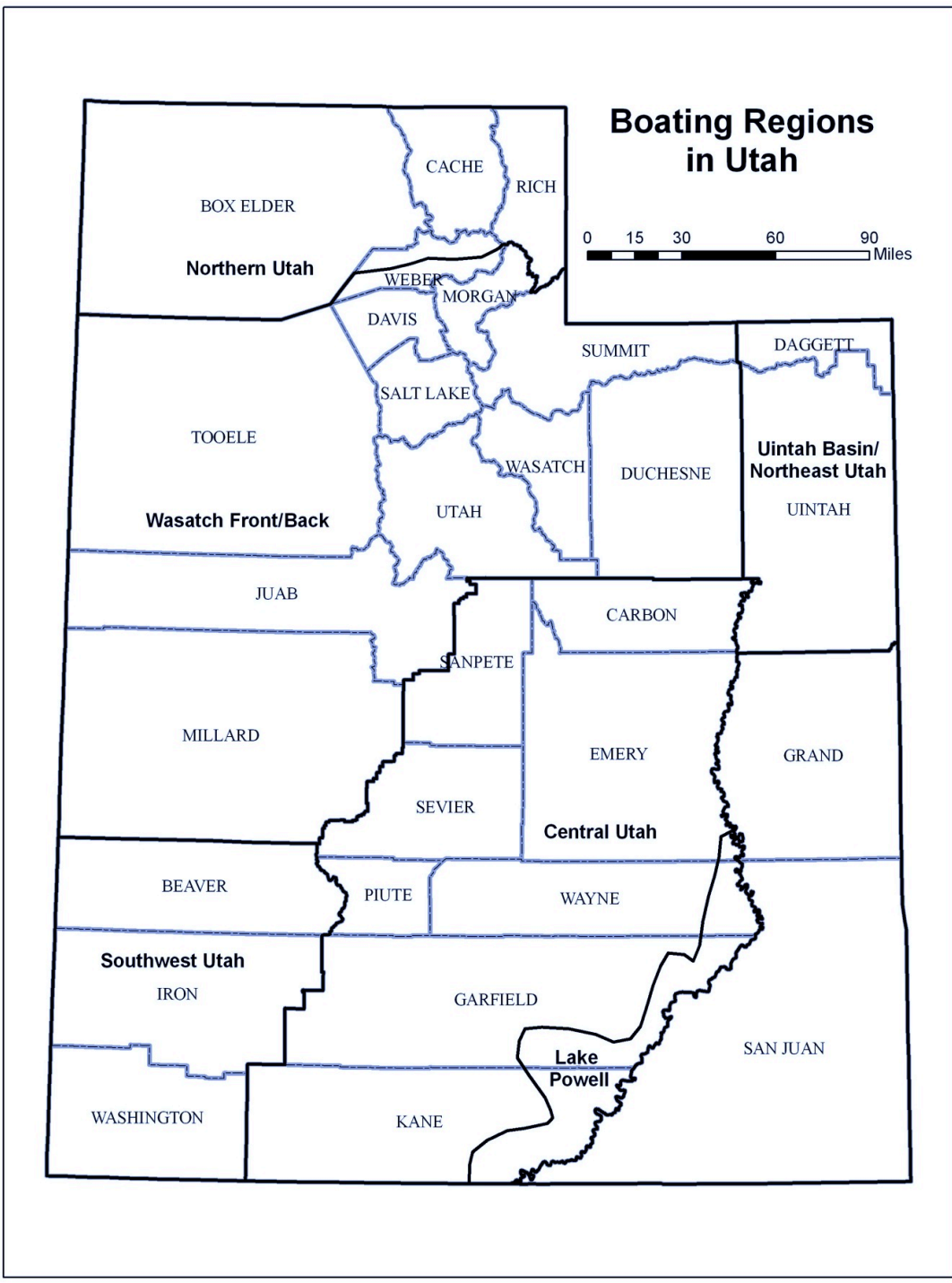


Figure 2. Boating regions in Utah.

Table 4

Regional Meeting Locations and Lakes and Reservoirs Considered

Region (Meeting Location)	State Parks	Other Lakes and Reservoirs	Counties
Southwest Utah (Sand Hollow State Park)	Gunlock Quail Creek Sand Hollow	None	Beaver Iron Washington
Northeastern Utah (Uintah County Building)	Red Fleet Steineker	Flaming Gorge	Daggett Uintah
Wasatch Front and Back (Department of Natural Resources Building)	Deer Creek East Canyon Great Salt Lake Jordanelle Rockport Starvation Yuba	Lost Creek Strawberry	Salt Lake Davis Morgan Summit Wasatch Utah Juab Weber (Southern)
Northern Utah (Hyrum State Park)	Bear Lake Hyrum Willard Bay	Pineview	Box Elder, Cache Rich Weber (Northern)
Central Utah (Palisade State Park)	Escalante Huntington Millsite Otter Creek Palisade Piute Scofield	Fish Lake	Utah San Pete Carbon Emery Sevier Piute Wayne Kane Garfield
Lake Powell (Utah State Park Office, Wahweap)	None	Lake Powell	Statewide

Note: Grand and San Juan Counties did not have any reservoir- or lake-based State Parks and were not addressed in the regions.

First, preliminary results from the first data collection phase (managerial interviews) were presented to the attendees, with special attention to issues related to the lakes and reservoirs within the region. Then, USU researchers facilitated an open

discussion of regional and statewide issues and management challenges. Meeting participants provided information about management challenges and then proposed recommendations to address these challenges and issues. The meetings were informal and allowed for interchanges between attendees and were between two and four hours in length. The regional meetings supplement the managerial key-informant interviews of State Park managers because the results are then aggregated at a regional level.

Phase 3: Telephone Survey of Registered Boat Owners in Utah

The third data collection phase was a statewide survey of registered boat owners in Utah. The survey questionnaire contained questions designed to gather boating data beneficial to the management and policy needs of State Parks. A list of registered boat owners from 2005 was obtained from the Utah Department of Motor Vehicles that included the boat owner's name and address. Duplicate names were removed to provide a list of the population of Utah boat owners, and to provide a single, equal opportunity for each registered boat owner to be randomly selected for participation in the survey. In 2005, there were over 62,000 boat owners who registered their vessel in Utah; this includes Utah residents who own a motorized craft or sailboat. Non-residents who operate their boat in Utah for more than 14 days in a year must also register. In order to obtain a 95% confidence level with a +/- 5% confidence interval, it was calculated a random sample of 385 respondents was needed to complete the survey. A simple random sample (SRS) was drawn, and businesses and individuals without listed phone numbers were removed. Kish (1965) stated that most statistical techniques assume an SRS, and it was possible to draw such a sample for this study. Individuals who boat in Utah but do

not register their boats are not in the population or sampling frame; these include out-of-state residents who boat fewer than 15 days a year in Utah and those (both in- and out-of-state residents) who do not comply with the registration regulations.

The original sample selected for the survey was 1,140 people who had listed telephone numbers. Due to disconnected and phones that went unanswered after 11 calls, 485 of these people were listed as non-contactable. The remaining 655 people were called up to 11 times until they either completed a survey or declined to participate. The number of completed surveys was 397, for a 60.6% response rate. The relatively high number of respondents without phones or with unlisted numbers may indicate non-permanent, seasonal residents or individuals who only use cell phones.

Discovery Research Group Inc. was contracted to implement the telephone survey. The survey was conducted during Fall 2006 and Winter 2007; the average survey took a little less than 18 minutes. The questionnaire contained items addressing boater demographics, boat ownership and trip activity patterns, preferences for boating fees, favorite and least favorite boating areas, and management actions. There were also questions designed to assess sources of boater education and safety information, acceptability of mandatory boat operator licensing, crowding problems on Utah's lakes, and problems or concerns on those lakes and reservoirs. Many of the questions replicated those that were included on a similar survey completed in 1999 to complete a comparison report for State Parks (Spain, Reiter, Blahna, & Burr, 2007a) and were not necessarily included to complete this dissertation. For several questions, respondents were asked to provide follow-up open-ended responses. Examples of questions where open ended responses were obtained include why a respondent did not support PWC-use on Utah

lakes and reservoirs, and why a respondent supported use limits. All of the open-ended responses replicated those from the 1999 survey in order to allow for comparison. As such, the responses were coded using the same categories developed for the 1999 boat owner survey (Reiter et al., 2001). Discovery Research Group provided data from the survey as an SPSS file, while open-ended questions were in Microsoft EXCEL format.

Attitudinal measures are used in this survey to measure the respondents' views towards various potential management actions and problems. The measurement of attitudes is extremely common in social science research. An attitude is defined as a relatively consistent, learned, favorable or unfavorable, response to an object (Fishbein & Azjen, 1975; Fishbein & Manfredo, 1992). In this case, the objects are potential management problems and actions. McCool and Lime (1988) provided the following reasons why understanding visitors, or in this case boaters', attitudes towards management are important. First, attitudes influence behavior, and opposition to certain management actions could lead to undesirable behavioral actions such as displacement. Second, understanding attitudes may assist in the application of policy; often recreation-related policy is broad (e.g., provide for resource protection and enjoyment), and how that is interpreted at one type of site to another may vary. Third, attitudes may guide the degree of control visitors believe managers should have in an area. Finally, measuring visitor attitudes may be useful in developing useful policies "...by identifying actions that visitors will accept rather than reject..." (p. 403). Schreyer and Knopf (1984) suggested unacceptable management actions and incremental changes may lead some visitors to be disenfranchised and be displaced to other sites as the initial site no longer provides the

opportunities they seek. Visitors who view management actions negatively may also choose another activity or do something totally different (Brunson & Shelby, 1993).

Specifically, boaters were also asked to rate their view towards potential boating problems and management actions in order to compare their views to the managers. Boaters then stated whether they thought the potential management problem was, on a four-point scale: “not a problem,” a “small problem,” a “moderate problem,” or a “major problem.” Respondents also rated their preference for various management actions at their favorite state park using a five-point scale from strongly disagree to strongly agree with a neutral category. Management actions were discussed during the earlier data collection phases (managerial interviews and regional meetings); however, the management actions were limited to those that a visitor would have the ability to assess. Boaters were asked to rate the action at their favorite state park to create a viable object; asking boaters about the implementation of management actions at Utah State parks in general would likely not be effective. Although questions regarding the use of a different type of turf or particular budgeting strategy may be important or of interest to a manager, it is likely most of the registered boaters would not have the knowledge or an opinion about these items. A copy of the survey is presented in Appendix B.

Phase 4: On-Line Survey of Managers of Lake- and Reservoir-Based State Parks

An on-line survey was conducted to examine manager attitudes towards various management issues. Several questions in this survey mirrored questions on the statewide boater survey in order to compare managers and boaters opinions. The on-line survey program “Survey Monkey” was used to complete the online managers’ survey.

Seventeen lake- and reservoir-based state park managers completed the survey, and a census was obtained. Similar to the boaters, managers were asked to rate their view of the expenditure of boater registration funds and the potential management problems and actions (listed in Table 5) so managers' and boaters' opinions could be compared. Managers were also asked to predict the boaters' view of the potential management actions at the park they manage using the same five-point scale. Managers were also asked about closures at the park(s) they manage, including the number of times, if any, the park they manage was closed due to a full parking lot. The average time to complete the online survey was about five minutes, and a census (entire population) of managers was obtained. Data from the online survey program was downloaded as a Microsoft EXCEL file. The population surveyed in this phase is the same as the first data collection phase. Although, it should be noted that one manager had retired and been replaced while the park manager at Great Salt Lake State Park was not surveyed because the questions on the survey did not apply to the management of that park. A copy of the survey is presented in Appendix C.

Analysis

Data from the aforementioned data collection phases were analyzed and, in one case, compared (manager and boater survey responses). Multiple analytical techniques were used to understand the regional implications associated with managing water-based recreation opportunities. Results from the first data collection phase (key-informant interviews) were analyzed using content analysis, and themes important to a regional approach were ascertained. Attendees at the regional meetings, the second data

Table 5

List of Items Included on Both Registered Boater and Managerial On-Line Survey

Potential Management Problems

Reckless personal watercraft operators
 Crowding at launch ramps & parking areas
 Reckless motorboat operators
 Too many boats on the water at one time
 Drug or alcohol abuse by boaters
 Safety problems on the water
 Fluctuating water levels
 Crowding at beaches and facilities

Potential Management Actions^a

Increase number of boater education programs
 Expand parking lot to allow more boats on the water
 Expand the boat ramp to increase the number of boats that could be launched at one time
 Increase fees to improve infrastructure
 Increase the number of law enforcement patrols on water
 Limit PWC to certain areas on the water
 Separate motor boats from PWC on the water
 Prohibit PWC, waterskiing, or similar activity for 2 weekdays during the week
 Add additional or create no-wake zones
 Prohibit PWC, waterskiing, or similar activity in the early morning or late evening
 Reduce the number of boats allowed on the water on some of the heavier use days

^a Used in management action matrix

collection phase, identified regional management challenges and provided a range of potential management actions. The results of the regional meetings were simply categorized and are not discussed in great detail, but were used to define regional issues and challenges along with ascertaining regional management considerations. The topics discussed and management considerations provided, pertinent to a regional approach, are summarized in the results.

Data from the third data collection phase, the statewide boater survey, were used to ascertain boaters' behavioral patterns and attitudes as well as to compare their views with the managers. Also, results of the statewide boater survey were used for both the

EUH and cluster analyses. Data from the fourth data collection phase, on-line managerial survey, were compared with the results of the boater survey. A matrix developed as a part of this study by comparing manager and boater views toward various management actions advises planners and managers as to what management actions to choose or what actions may need to be accompanied by educational strategies, or perhaps even avoided. It should be noted that results from all of the data collection phases were considered for the management implications and recommendations in the conclusion chapter.

Content Analysis of Key Informant Interviews

Content analysis was used to analyze 18 semi-structured key-informant interviews to obtain State Park managers' perspectives about regional recreational management at Utah water bodies. Content analysis includes a variety of techniques to evaluate written material (in this case, transcribed interviews) in a systematic way (Neuman, 2003). The interview transcriptions were coded in three phases (open coding, axial coding, selective coding) using the process discussed by Strauss (1987) and Strauss and Corbin (1990); others have interpreted and elaborated upon this approach (Berg, 2004; Creswell, 2006; Neuman, 2003). The first phase, open coding, breaks down the data into component parts (Strauss & Corbin, 1990); the codes were assigned and organized by theme. Each transcription was read in its entirety multiple times in this phase, and all quotes relevant or interesting were noted and marked. The second coding phase, axial coding, occurred with greater focus on the themes that had been developed in the first phase. Interconnectedness of themes was explored, along with the possibility of

developing subdivisions within the themes (Neuman, 2003). Special focus was given to items particularly relevant to a regional approach. After axial coding, the interview data was reduced to only those passages that had been selected and fit into key thematic categories. Finally, the selective coding phase was limited to analyzing portions of the interviews that had been reduced from earlier phases. Representative quotes highlighting the key issues were chosen in this phase. Although there was an initial guiding framework for this study (examining a regional approach to management), the analysis was open to unexpected or emergent issues similar to many qualitative analyses.

Statewide Boater Survey

Data collected during the statewide boater survey were used in multiple analyses in this dissertation. All of the data were analyzed using SPSS, a statistical package and database. First, descriptive statistics (including percentages, medians, and means) were produced for the demographic questions, activity participation, lake and reservoir visitation, favorite boating areas, and water-based State Park, and responses to questions about visitor displacement, conflict, use limits, and PWC-use.

Additionally, bi-variate (chi-square and correlation) analyses were used to enhance the results where appropriate. In one case, the correlation between the average number of trips to a lake or reservoir and the average distance from its visitors' home was calculated. Chi-square analysis, a non-parametric technique, tests the independence between two discrete or categorical variables (Tabachnick & Fidell, 2001). Chi-square analysis compares an expected frequency (for each cell) compared with the actual frequency. Chi-square analysis was used to elucidate potential statistically significant

differences in views between PWC-owners and non-owners towards policies related to PWC-use.

Comparing Managers and Boaters

Managers and boaters were compared to evaluate how boaters and managers may or may not be different. For this analysis, data were compared from the statewide boater survey and the on-line manager survey. Statistics were generated using the online computer program (Survey Monkey) and Microsoft EXCEL for the manager responses and Statistical Program for the Social Sciences (SPSS) for the boater responses. Generating inferential statistics for comparison was unnecessary as one group contained a census (all of the participants in the population).

Decisions regarding the provision of outdoor recreation opportunities are often made with a good deal of uncertainty. Managers make assumptions about their visitors' attitudes and behaviors because readily available research about recreational visitors usually does not exist. If park managers are making decisions that affect visitors, how well do they predict user preferences and perceptions, or do managers and boaters agree about identified boating problems or what the appropriate management actions are to address these? A wrong assumption may lead to providing an unnecessary opportunity or perhaps even displacing existing visitors (Schreyer & Knopf, 1984). For example, if most existing visitors prefer limited development, expanding a boat ramp and/or building new facilities may negatively affect them. Potential for conflict between visitors and managers exists if a manager's intuition is wrong and a management action is implemented that visitors generally oppose (Clark et al., 1971). Also, an action that both

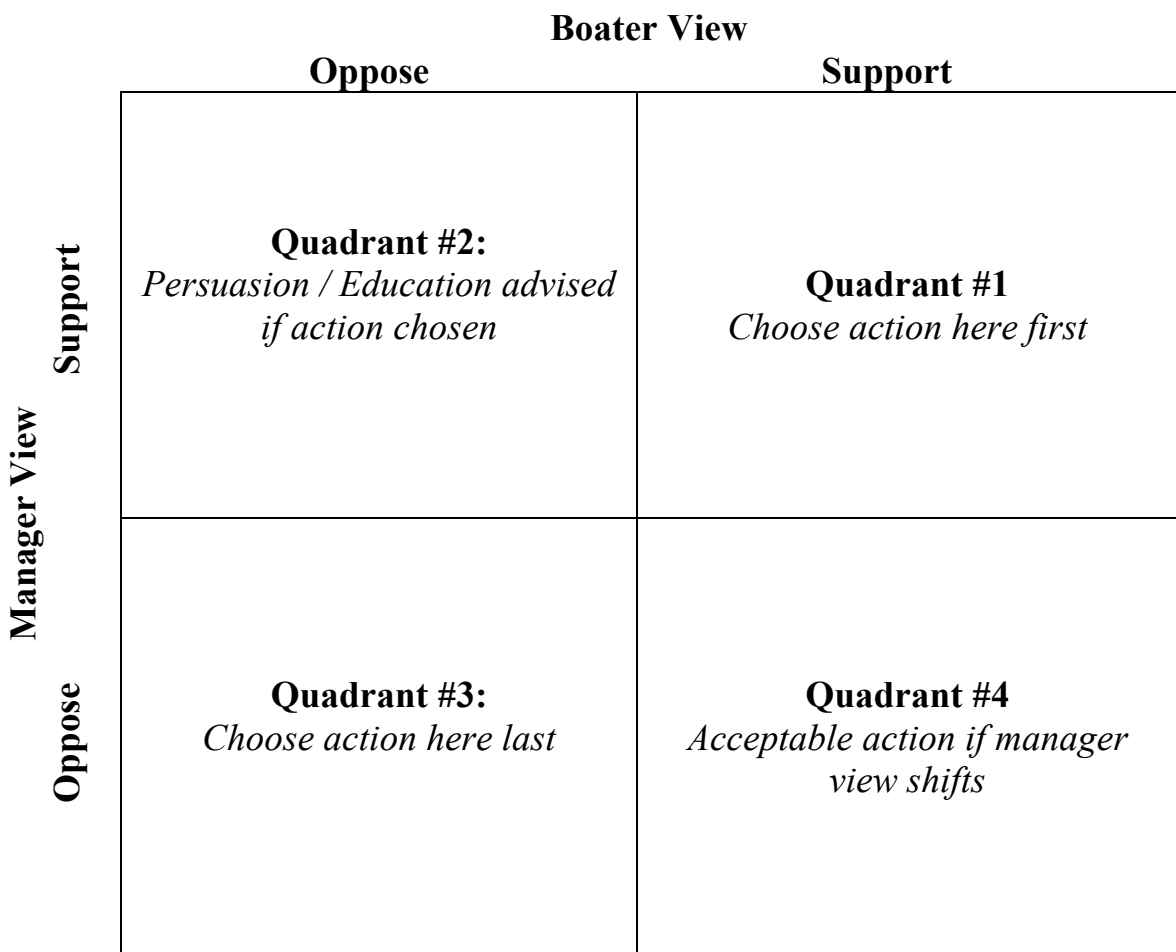
visitors and managers prefer is more likely to meet a desired objective compared to one both groups oppose.

Boater registration funds and potential management problems. Descriptive statistics (means and standard deviation) were generated to compare managers and boaters attitudes towards various potential management problems. Since inferential statistics were not used because one group is a census, it was necessary to develop criterion to evaluate potential differences between the two groups. For measurement purposes, the four categories on each scale are each one integer apart. Therefore it was concluded that a difference of 0.5 was the smallest potentially meaningful difference. As such, a 0.5 value or greater is used to determine if the mean responses are, indeed different.

Potential management actions and management action matrix. Similar to the potential management problems, descriptive statistics were generated to compare managers' and boaters' attitudes towards various potential management actions. Recommendations for management actions based solely on visitor surveys or managerial intuition alone may be of limited value. Managers may view an action as unenforceable or not feasible due to staffing or funding limitations, or the physical layout of a lake or reservoir may not allow for spatial zoning. Management actions are also limited by agency mandates and political realities. An action that would eliminate recreation use in an area is likely to go against agency mandates to provide for public or recreation use; natural resource agencies have mandates requiring recreation access (Landrum, 2004; Wellmen & Probst, 2004). Local political realities, such as an aversion to regulations, may also impede the implementation of certain management actions as well.

However, differences between the two were evaluated differently for management actions compared to the management problems. In this case, a five-point scale with a neutral category was used. If both groups means were either above (agree with the action) or below 3.0 (disagree with the action), it was concluded that the groups were in agreement. Whereas if one group was greater than 3.0 and one group was less, it was concluded they disagree on their view of the action.

A 2x2 managerial decision matrix was developed to better understand the acceptability and feasibility of various management actions by comparing boater and managers' attitudes. The matrix was developed using Microsoft EXCEL. Data were arrayed with the managers mean value on the y-axis and the boaters mean value on the x-axis; broadly, both groups agree on items in the first and third quadrant and disagree on those in the second and fourth quadrant. A management action that falls into the quadrant with both positive x- and y-values is an action that both groups have positive attitudes towards. A management action that has both positive and negative (i.e., positive y-value and negative x-value or vice versa) is an action for which there is disagreement. A management action that has both a negative y- and x-value is an action that both groups view negatively. Figure 3 provides a model for how various management actions, depending upon the quadrant, could be viewed by management. Management actions which are supported by both groups should be chosen first before actions in the other three quadrants (assuming they meet the same goal). In contrast, management actions opposed by both groups should be implemented after other actions have either been



Mean values are reported from “strongly disagree” (1) to “strongly agree” (5) with a management action while a (3) is a neutral response. Therefore, support is measured with a mean score greater than 3.0 and opposition to an action would be measured as less than 3.0.

Figure 3. Management action matrix.

considered or proven ineffective. Actions supported by visitors (or boaters) but not by managers are worth considering if the manager view shifts (or perhaps the manager views the action as not feasible). Finally, management actions supported by managers but not visitors, if implemented, should be accompanied with an educational strategy including the use of persuasion.

Managers Prediction of Visitors Views

In addition to comparing the two groups' views, managers' predictions of boaters' views towards various potential management actions were also assessed. Managers' predictions of boaters' views are assessed to determine if managers can be a proxy for their visitors. Since boaters were asked to rate the management actions at their favorite water-based state park, the results of the managers' predictions of boaters' views towards the management actions were weighted. Manager data were weighted to reflect the number of respondents who stated the park(s) they manage were their favorite. For example, 30 of the respondents cited Deer Creek as their favorite state park; therefore the Deer Creek manager's response was weighted to reflect that value. In addition, respondents did not mention parks managed by three managers; hence, the responses from these managers were excluded for this analysis. Similar to comparing managers' and boaters' views towards management problems, items which showed a difference equal to or greater than 0.5 (the smallest value which reasonably suggest a meaningful difference) between the groups were noted.

Cluster Analysis of Utah Lakes and Reservoirs

Cluster analysis was used to classify lakes and reservoirs in Utah based on visitation data from the statewide boaters survey. In this analysis, the goal was to identify lakes and reservoirs that have commonalities based solely on visitation and not based on researcher generated factors (based on motives or proximity, for example). The cluster analysis supplements this regional analysis first by identifying displacement possibilities, as lakes and reservoirs in the same cluster are likely to see additional use if

one site in the cluster experiences diminished access due to use limits or reservoir drawdown. Second, certain reservoirs may cluster as these offer similar types of opportunities and advise systematic management of the opportunity. Also, this behavioral approach supplements visitors' responses to questions about their intention to behave (e.g., where they would go if they were not allowed on a water body due to use limits). In addition, the results may provide a check on the regions developed by State Park during the regional meetings; although the regions developed by this cluster analysis assume use in common is a necessary factor in order to define or develop a region.

Cluster analysis is a generic name for a wide variety of mathematical techniques used to identify similarities in objects and to organize them into homogenous sub-groups (Lorr, 1983; Romesburg, 2004). The intent of this analysis was to determine which boating locations interact in a way that the same boaters visit these areas. First, reservoirs that cluster may suggest areas that are likely resource substitutes as the same visitors are already using both areas. Also, the results may suggest what areas are likely to see increased use if access is limited or denied onto another reservoir and perhaps interact as a system, due to low water levels, for example (Shelby et al., 1990). The advantage of this approach is it does not consider visitor intent but rather actual behavior (where the boaters actually go). Although, the disadvantage is the underlying reason a boater went to places in common is not necessarily apparent. Therefore, managerial and social aspects associated with the various clusters are considered.

Respondents were asked as part of a statewide boater survey where and how often did they boat in Utah during the previous 12 months. The number of water bodies visited by the respondents ranged from zero (14 percent) to seven (one respondent). Any lake or

reservoir visited by two or more respondents was turned into a distinct variable in an SPSS file. Although boaters provided the number of times they boated at the particular lake or reservoir, the responses were changed to binary categories (yes/no). If a respondent visited a lake or reservoir at any time during the previous 12 months, the cell was assigned a “1” if they visited or a “0” if they did not.

For this analysis, the variables were cluster analyzed (R-analysis) but not the cases; the variables are the lakes and reservoirs while the cases are the respondents. First, only lakes and reservoirs where two percent or more of the respondents had visited were included in the analysis because the opportunity of error increases if lakes and reservoirs where very few respondents visit are included in the analysis. Also, the analysis was limited to boaters who visited more than one boating location during the 12 months preceding the survey. Additionally, after the first data run, Lake Powell was removed from the analysis because boaters at every single lake or reservoir (less Fish Lake) had also boated at Lake Powell. Therefore, sixteen out of the seventeen most popular boating locations were analyzed. Hierarchical clustering, which allows for binary variables to be analyzed, was used to cluster the variables. The Jaccard index (or coefficient) was used to assess the similarity between objects. The Jaccard statistic was chosen because: (1) it is appropriate to use with binary data; and (2) 0-0 matches are ignored while matches (1-1) and non-matches (0-1) are weighted equally (Romesburg, 2004). This was a practical matter because many of the boating locations were visited by fewer than five percent of the respondents and to allow for clustering nonvisits would mean that most reservoirs that received very little use would cluster. The distance between each object is calculated and presented as a Jaccard coefficient in a 16 x 16 matrix and is included as Appendix D-1.

The Jaccard coefficient may range from “0” to “1” with a one representing perfect similarity and a zero representing complete dissimilarity. The clustering method used was “between group linkages,” also known as UPGMA (un-weighted pair-group method using arithmetic averages); this approach calculates the average distance between all objects in a cluster with all objects in the other clusters. This technique consists of $N-1$ (for this analysis, 15) stages where each object is its own cluster before the first stage. At each stage, one object is either added to an existing cluster or two individual objects are clustered and all objects are in the same cluster after the final stage. A researcher would obviously not choose the final cluster solution, but it does inform the mathematical distance between the two clusters in the two-cluster solution. This technique uses agglomeration, and after two objects are clustered in a stage, the objects will be in the same cluster and will not be separated in subsequent stages.

A dendrogram, a common approach to present hierarchical clustering data, was generated using SPSS to both visually display how the objects cluster and to aid in determining what the appropriate number of clusters is (Appendix D-2). Determining the appropriate number of clusters (i.e., where to cut the tree) is both a quantitative and qualitative exercise (Romesburg, 2004). Mathematically, a researcher could choose a cluster solution where there is a wide range between similarity coefficients. This is represented on the dendrogram as a relatively large horizontal distance or gap between cluster breaks. However, an economizing strategy may be appropriate as well; if the ideal mathematical solution, for example, produces 15 clusters out of 16 objects, this does not necessarily help the researcher. Conversely, the optimal mathematical solution (determined by the greatest difference between the similarity coefficients from one

agglomeration stage to the next) may be two clusters, but this may also not meet the goal of the researcher. The purpose of this exercise is to evaluate the potential interactions between lakes and reservoirs based on common visitation; therefore, many one-object clusters are undesirable. The six-cluster solution was chosen based on these criteria. For this study, a nine-cluster solution is desirable mathematically. However, the ninth cluster that is added separates Fish Lake from Scofield and Strawberry, creating an additional one-object cluster (for a total of five). The eighth cluster separates Rockport from East Canyon, creating two single object clusters. The seventh cluster separates Hyrum from four lakes and reservoirs. Thus, the six-cluster solution has only one object, Echo, in a cluster by itself, and the five-cluster solution did not result in an increase in the number of one-object clusters.

After the clusters were developed, commonalities and differences both within and between clusters were evaluated using two approaches. First, managerial and physical attributes associated with the various water bodies were cross-tabulated with the lakes and reservoirs in the same cluster to determine what, if any, attributes are held in common among the clustered objects. The attributes were obtained from State Parks or online for federally or locally managed water bodies; State Parks planning staff reviewed the matrix for State Park facilities but not for those managed by other agencies. The following managerial and physical attributes were considered: the presence of electrical hook-ups, concession services, marina, a State Park at the water body, blue ribbon fishery, and physical factors including surface area and elevation. Second, boater responses to the statewide survey were also analyzed by cluster including questions about the boater's primary activity, whether boaters support use limits, favorite boating areas

and reasons why, and mean distanced traveled (calculated based on respondents zip code). Any boater who visited one or more of the lakes or reservoirs in a cluster was included in the analysis. The samples are not independent and tests for statistical significance were not conducted because many boaters visited more than one cluster.

Experience Use History

McCool and Cole (2001) note the importance of understanding key experiences when conducting regional analyses. Similarly, a regional approach acknowledges that recreationists' preferences differ, and thus they seek a wide variety of varying experiences; a EUH approach segments recreationists based on behavioral attributes and may elucidate differences, and is one of many factors that may be used to segment users and understand how they may seek different experiences. It is possible these groups may differ on where they visit, their activity participation, or what management problems they perceive and actions they prefer. As such, understanding the variation, if any, between visitors can enlighten management decisions to better provide opportunities and experiences regionally.

In this section, two visitor behavioral attributes are used to segment registered boat owners in Utah into five groups in order evaluate if differences can be elucidated between the groups. EUH is defined as the "amount and extent" of participation in a recreation pursuit and it may be operationalized in different ways (Schreyer, Lime, & Williams, 1984). In essence, EUH should be used to best elucidate differences between groups and to inform the management purpose, if any, associated with the study.

Respondents to the statewide boater survey (the third data collection phase) were segmented based on two behavioral attributes, including the number of outings taken and

the number of different boating locations visited in a year. Consistent with previous studies, a composite variable is developed based on two behavioral attributes. The two attributes (number of outings and number of boating locations), when divided into two categories (low/high) each, create four possible categories. However, about 14% of the respondents did not boat at all and were put into their own category for a total of five categories. Boaters who visited one lake or reservoir were segmented from those who visited more than one; additionally, those who took five or fewer outings during the year were segmented from those who took more. Figure 4 displays group membership and number of respondents with percentage in a 2x2 matrix based on the two behavioral measures; it is worth noting Group #1 is outside the matrix but is still considered in the analysis.

The purpose of this analysis is to determine if a researcher-generated segmentation based on two behavioral attributes shows statistically significant differences on selected visitor attributes and to inform a regional approach to recreation planning and management. The EUH variable developed for this analysis is used as an independent variable to assess if differences between the groups exist. Several variables were considered for comparison: (1) primary activity; (2) boater characteristic (including age, household size, number of years operating a boat, and number of watercraft owned); (3) management problems; (4) management actions; and (5) the proportion who have visited each lake and reservoir cluster (discussed earlier in the chapter).

One-way analysis of variance (ANOVA) for continuous variables, and chi-square analysis for categorical variables, were used to assess if statistically significant differences exist between the five groups. For the continuous dependent variables where

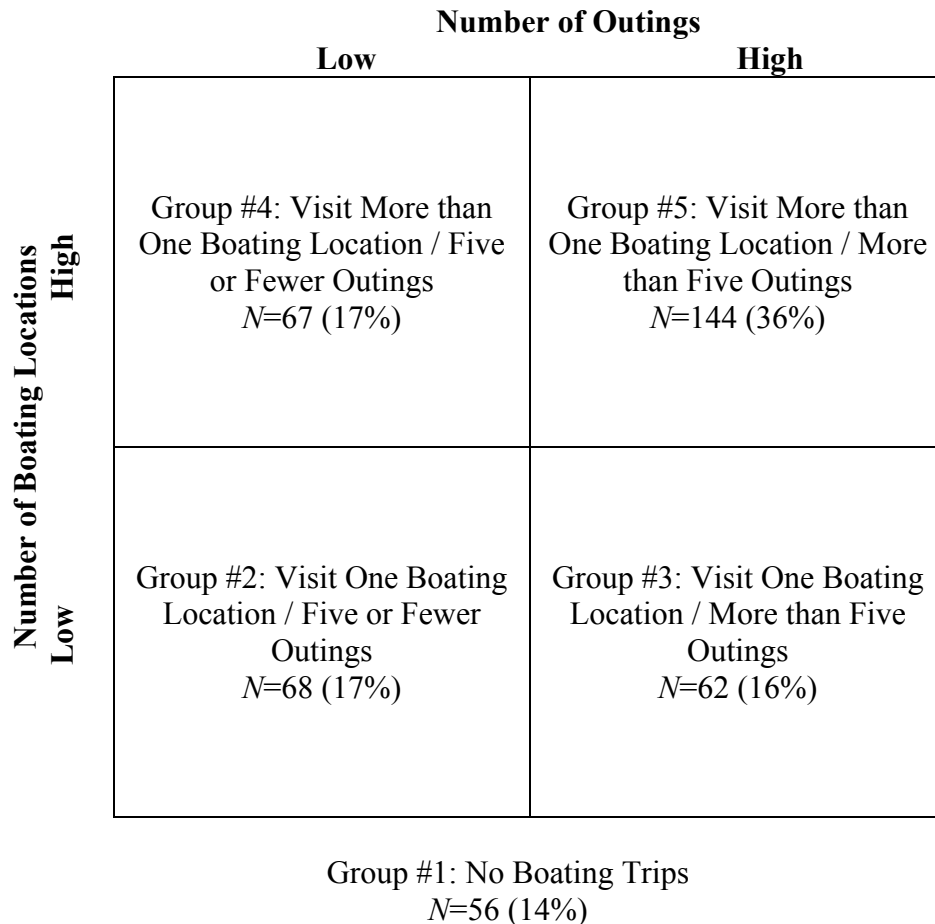


Figure 4. Experience use history categories.

a statistically significant difference was apparent, a post-hoc test (Tamhane’s T2) was completed to determine what groups were different from each other. The Tanhane’s T2 test is based on a *t* test for independent samples.

Data Triangulation for Management Challenges and Recommendations

The final step was triangulating the results of the various data collection phases and analyses. Data triangulation in the social sciences is defined as using multiple

research techniques to evaluate a finding or phenomenon of interest and corroborate evidence (Berg, 2004; Creswell, 2006). There are four general types of data triangulation (Denzin, 1978): (1) data triangulation (multiple data sets); (2) investigator triangulation (using multiple researchers to evaluate data); (3) theory triangulation (apply multiple theoretical approaches); and (4) methodological triangulation (using multiple or mixed methods). In this case, data and methodological triangulation are used to assess what management challenges are pertinent to a regional approach and to inform the management recommendations. In essence, this is a broad descriptive analysis focusing on key issues associated with regional planning and management of Utah lakes and reservoirs. By comparing the results from the various research phases, multiple viewpoints on various issues are considered. For example, if managers are concerned about an issue, it can be examined if boaters are concerned as well. Consistent with a coarse-filter approach, this analysis does not address every issue that emerged in the study; the topics were the most salient to a regional approach.

Ethical Considerations

The funding for this study was provided by Utah State Parks. There was some concern park managers may divulge information that could be detrimental to their job. Therefore, per the Utah State University Institutional Review Board (IRB), all comments made by managers remain confidential consistent with IRB requirements. Park managers (and quotes attributed to specific parks they manage) are not identified. It was apparent managers were more willing to speak knowing they would not be subject to sanction. Managers (or any participant) are not identified in the results of the regional meeting or

on-line survey. Data collected for the statewide boater survey was completed in compliance with the IRB requirements as the respondents' identities are kept confidential; no registered boater names will appear in the dissertation or the associated technical reports.

CHAPTER IV

RESULTS

In this chapter, the results of the four data collection phases and subsequent analyses are shown. First, results of the key-informant interviews are provided, including quotes from the park managers. Next, a summary of the topics and management recommendations discussed at the regional meetings is included. Then, descriptive results from the statewide boater survey are provided. The following section provides manager responses to the on-line survey question related to how many days were the parks they manage closed due to full parking lots. Comparisons between managers and boaters attitudes are shown in the next section, followed by a presentation of managers' predictions of boater attitudes towards management actions. This is followed by the results of both the cluster analysis and EUH study.

Many of the questions on the statewide boater survey replicated questions included on a 1999 boater survey to allow for comparison, and a portion of these questions were not analyzed for this dissertation. However, these results (and summaries of the three other data collection phases) are provided in two technical reports produced for Utah State Parks by the Institute for Outdoor Recreation and Tourism (IORT) (Spain et al., 2007a; Spain, Reiter, Blahna, & Burr, 2007b).

Key-Informant Managerial Interviews

The first data collection phase was conducting in-depth interviews with park managers to identify key issues pertinent to managing recreational water bodies regionally. First, a brief background of the interviewees is provided, followed by a

summary of the six key issues identified in analysis. All of the managers who participated in the key-informant interviews have worked for State Parks in some capacity for at least ten years. Half of the managers have held the position of park manager for more than five years. Also, half of the managers have spent time working for other natural resource agencies at a state or federal level. Seventeen out of the 18 managers interviewed were male. Most of the managers (13 out of 18) were responsible for managing just one water-based state park; four managers were responsible for managing two water-based parks, while one manager was responsible for three. Most managers and their staff have the obligation of periodically patrolling other proximate water bodies managed by federal or local entities such as irrigation districts. At the time of the key informant interview, one manager held the position on an interim basis.

Six key issues were identified from analysis as being important to regional recreation management: (1) interagency interactions; (2) balance and trade-off of tasks and funding and staff constraints; (3) facility capacity is the primary factor limiting use; (4) the growing importance of OHV-management; (5) effects to recreation from irrigation and municipal uses of water; and (6) the importance of temporal scale (Table 6). The table is followed by a discussion, with extensive quotes from the interviews, of each of the issues and its implication to a regional approach for planning and management.

Interagency Interaction and Cooperation

Fifteen out of 18 of the managers discussed interactions with other governmental agencies or private organizations. State park managers operate in a complicated political environment interacting with local, state, and federal entities from the Bureau of

Table 6

*Key Issues Important to a Regional Approach to Recreation Management and Planning
Based on Key-Informant Interviews*

Factor	Summary
Interagency Interaction and Cooperation	State Parks interact and cooperate with agencies at multiple levels of government (federal, state, and local) and private organizations who are involved in (or affect) the management of water-based recreational resources.
Balance and Trade-off of Tasks and Duties / Funding and Staffing Limitations	Managers are challenged by the many duties their job requires and cite the need for additional staff and funding
Facility Capacity is Primary Factor Limiting Use	Facility limitations (e.g., size of parking lot) is the most common factor limiting recreation use at these water-based State Parks. Two parks limit the number of boats on the water for what can best be described as safety reasons.
Importance of OHV/ATV Management	Managers often discussed the growing importance and challenges associated with the increase in off-highway motorized use even though the interviews were focused on water-based recreation.
Effects to Recreation from Irrigation and Municipal Water Use	Other consumptive water uses affect reservoir-based recreation in Utah; these effects are most frequently associated with reservoir drawdown.
Importance of Temporal Scale	Temporal aspects of recreation management appear important to managers. The issue was discussed in spite of the fact that the focus of the study was on spatial scale.

Reclamation to locally operated irrigation districts. Other organizations both constrain and provide opportunities for the provision of outdoor recreation. The primary interaction with counties and local government relates to law enforcement assistance and search and rescue operations. Table 7 provides an outline of the interactions with various levels of government and private entities.

Table 7

Interagency Interactions

Level of Government	Agency / Organization	Interaction
Federal	United States Coast Guard Auxiliary	Involved in interstate lake/reservoir management and also with safety program.
	National Park Service	Cooperation on management at Glen Canyon National Recreation Area.
	Bureau of Reclamation	Operates dams and associated facilities at many water-based State Parks. Provides funding for recreation facility development.
	Bureau of Land Management	Cooperation on the provision of recreation and patrols.
	United States Forest Service	Cooperation on the provision of recreation and patrols. Lead recreation agency at Flaming Gorge and Strawberry Reservoirs
State	Utah Highway Patrol	Provides law enforcement assistance at some parks.
	Division of Wildlife Resources	Cooperation on the enforcement of wildlife related regulations. Some cooperation on enforcement of boating laws on outlying water bodies.
	State Lands	Some state lands are adjacent to reservoirs.
Local (Includes private irrigation companies)	Sheriff / Police	Provides assistance with law enforcement and search and rescue.
	Local Water Users	Recreation is generally a secondary benefit of these reservoirs. Local water users will call on the water with little (or any) regard to recreation use.

Some managers explicitly cited interacting with multiple agencies as their role as a park manager. The following is a partial response from a manager describing his/her role as a park manager:

Co-operative programs with USFS, BLM, Sheriffs Office, and to administer the MOU with Bureau of Reclamation and (local water district) who are the major partners in the operation – (the reservoir is) actually (on) federal property. The (local) water (district) has control over the quality and use.

One park is managed by four agencies representing three levels of government, and interagency cooperation is essentially part of the managerial mandate:

(The) property...is owned by the Bureau of Reclamation, but nobody has any money to manage it correctly...(The reservoir) right now is kind of a four way partnership between State Parks, the Bureau of Reclamation, (local) County, and the (state) Division of Wildlife Resources. We all chip in money, time, technical and professional experience to keep it open.

Law enforcement duties require interagency cooperation; sharing resources is one method of cooperation. One manager, who is responsible for managing two state parks and has law enforcement duties on a large interstate federal reservoir, provided the following response to a question about who has law enforcement duties on the water bodies that they manage:

Primarily we do, but the county does too. We are not proud. If they want to come out and help us out, UHP (Utah Highway Patrol) has actually done some good stuff for us up here...We call on the county a lot. There are issues that we don't handle a lot and that we feel more comfortable putting over to them...We have really good repertoire with our local law enforcement agencies... federal, county, and state. DWR (Division of Wildlife Resources) comes up here and there is a lot of work with fishing regulations...State parks gave the local sheriff...a boat...to go out and patrol...

Interaction with federal natural resource agencies is common. First and foremost, many of the reservoirs represented in the interviews were built and/or managed by the Bureau of Reclamation, an agency within the Department of Interior.

This is a Bureau of Reclamation dam. The property that the State Park is on is leased from the Bureau of Reclamation.

Although they have little influence on day-to-day today operations, the United States Coast Guard Auxiliary is involved in the management of three inter-state water bodies (Lake Powell, Flaming Gorge, and Bear Lake) in Utah. They also track yearly accident and injury statistics nationwide.

We are an inter-state lake; we have to deal with some coast guard enforcement issues as well. Primary jurisdiction then would be very equal with the Coast Guard. however you don't see them here that often.

State Parks cooperates with USFS and BLM when providing recreation opportunities. Some water based state parks in Utah provide developed access to a reservoir while much of the land adjacent to the water body is managed by other agencies, such as the BLM. Interactions with the USFS include cooperation with enforcement at Flaming Gorge, Fish Lake, and Pineview reservoirs, among others. The following two quotes describe cooperation with the BLM:

...we also manage the other beach areas down on the reservoir. BLM owns quite a bit of the property down there...We do a lot of boat patrols...on their property kind of as a favor to them and to maintain order on the lake.

There are five use areas around this reservoir and only one of them is owned by the state. The rest...are owned by BLM. We have a management agreement with BLM...to operate the areas, pay for people to come in and clean, collect fees, answer questions, and whatever is involved with the operation.

Utah State Park managers interact and cooperate with other state agencies from Utah and adjacent states. State Parks have patrol duties on three water bodies that straddle state lines: Bear Lake, Flaming Gorge, and Lake Powell; however, only Bear Lake has a State Park manager. The fact that these lakes and reservoirs are in two states means that the regulations vary from one area of the lake to another. For example, speed

and proximity regulations (the distance that boats moving faster than five MPH must be apart) are different in Utah than in Idaho.

There are also interactions with other divisions within the State Department of Natural Resources including the Divisions of Wildlife Resources, and Forestry, Fire, and State Lands. The interactions with Wildlife Resources relate to fishing and hunting regulations primarily, while some lands adjacent to the water bodies are managed by other state agencies:

We are dealing with the exposed lake bed which is managed by the Division of Forestry, Fire, and State Lands that are considered sovereign lands.

State Park managers both directly and indirectly interact with local water managers and organizations. The water shares in Utah reservoirs are held primarily by irrigational and municipal (includes industrial and household use) interests; the effect of these uses on recreation is addressed later in this chapter. Water users can be governmental (such as a municipal water organization) or could be, for example, a private irrigation company. The main point here is another group (water users) adds to the complicated interactions. The following two quotes emphasize these interactions:

We work with a lot of different agencies and companies, our goals are different...we work with the (local) Irrigation Company (at this park), and over there we work with the (another) Irrigation Company (at the other park)...We do lease ground over there, so that's a little different than what we do here...

(The local) Water Conservancy. They run the tunnels and the dam. They have their purposes. There are areas that are leased for cattle and so that is a different use. The water is managed for drinking water and for irrigation and for recreation.

Balance and Trade-Off of Tasks and Duties/Funding and Staffing Limitations

Managers face a wide array of tasks to balance in light of financial, operational, and staffing limitations. Even though no questions directly asked about balancing duties, 14 out of the 18 managers interviewed brought up the topic at one time or another during the interviews. Additionally, 14 of the managers cited funding and/or staffing limitations as a management constraint. These two topics are linked, in this case, because money can be exchanged for labor. Managers address a wide array of tasks they have to balance in light of financial, operational, and staffing limitations. Balancing “host” duties with being a law enforcement officer further complicates managing within this environment. Managers were asked what the most challenging aspect of law enforcement was, and the most common response (7 out of 16 comments provided) related to balancing host and law enforcement duties.

Managers frequently discussed challenges stemming from balancing the many duties associated with managing a State Park. The job is multifaceted as one manager describes:

I am the park manager...My role is to coordinate all the efforts to run the park in an efficient manner that will either enhance revenue or to utilize the budget... I help not only with doing fee reports but also with collecting the money, hiring (employees), making sure that the budget for both current expenses as well as seasonal time is utilized in an efficient manner...It goes to OHV patrol, to boating patrol, to park patrol, to helping with the Division of Wildlife or other agencies whether it be federal, county, or any other agencies in the area...Preserving what is here making sure that the natural resources are kept intact...Working with local governments is...important with your local state officials, county commissioners, water users...We need to do reports - incident (and) accident reports...We have to make sure that the park is kept clean...

One manager suggested that managing a park is challenging because it is similar to managing the infrastructure in a city:

We have sewer, water, and electricity... We have water that has to be acceptable for drinking. We have water that we use for irrigation. We have the sewer that we have to maintain to make sure that the restrooms are flushing. We have the garbage pickup. We have everything.

The purpose of the interview was to assess managers' view of a variety of water-based recreation issues and problems. However, it is clear that it is difficult to isolate water-based issues from other park problems and duties. This quote describes the wide variety of tasks that a park manager may encounter in one day:

Yesterday was like a slice out of the life of a park ranger. I started the day talking to a camper about fossils and about birds and about plants. We had a great conversation. Then, I met with... (a) trails committee... It is multiple use trails with the major emphasis on OHVs because it is a huge problem... Then, I went to (another park) and somebody had failed to pay a fee so I checked in on that. I actually arrested the guy and took him to jail on a warrant. Then, I came back here and met with campers where we had double booked a couple of sites so we spent some time and made everybody happy and got everybody rearranged in the campground. That was a typical slice out of a whole career. That is what you end up doing. You go from one thing to another. The only thing that I didn't do yesterday was maintenance.

Although the variety of duties may make the position more interesting, it is clear many managers struggle with the task. The following is the answer to a question about what is the most challenging aspect of their position:

I think a variety of the many hats we have to wear is probably the biggest challenge... It's getting to where we have to be certified to spray for weed control and that kind of stuff... Then we have different equipment we have to operate. We have backhoes, ATVs, snowcats, grooming for snowmobiles, OHVs, PWCs, boats... that's... some of the stuff that's hard to keep up with. We have to wear a lot of different hats. Of course we have to negotiate with public entities, and with our legislators, and community leaders, and keep in touch with them. It sometimes gets overwhelming... Sometimes it gets to be pretty difficult when you're asked to do such a variety of different things with such a small, full-time staff.

One manager summed up the issue when asked to describe the most challenging aspect of the position. The response addresses both the wide array of duties and staffing limitations encountered by managers:

Being asked to do many different things, it is kind of like if you try to do everything nothing is up to the standard that you want it to be. If you concentrate on one thing, for example if you concentrate on boating law enforcement, then the things like maintenance and the campgrounds will suffer.

State Park managers in Utah are certified peace officers and have lead jurisdiction at the parks. Further, State Parks has limited presence but still has patrol responsibilities at federally and locally managed water bodies. One manager describes the challenge of having to be a law enforcement officer as just one aspect of the job as opposed to a highway patrol or city officer:

The most challenging aspects would be to enforce the law and also be a host. We're not a city cop... We're dealing with a lot of people that we see all the time...its tougher to do law enforcement because one minute were cleaning their restrooms the next minute were writing them a ticket. It's the toughest part to make that transition...

The following two responses elaborate on balancing law enforcement and hosting duties:

Balancing between being a host to the public and inviting the public to come here and participate in recreation and then to come around and give them a citation or arrest them. That is tough. You have to find that balance. We came into this business to serve the people and to serve the resource.

The thing that I look at as most difficult is hosting and providing law enforcement at the same time. It's a delicate balancing act between the two. Very delicate...To me, that's the hardest part.

A potentially confounding factor to balancing the diverse array of duties is the conflicting priorities and policies from state-level management. Different individuals within the organizations may have varying goals based on their job description or personal philosophy.

...there is a lot of misinformation about what our...division really wants. We get conflicting messages. On one hand, you have (one manager) saying okay this year we are going to enforce these laws. You are going to write a ticket for these violations...but then you have somebody else...saying...we are mainly a host agency, we mostly just want to educate and deal with issues with the least amount of force necessary. I'm fine with whatever they decide to do.

Staffing limitations were often cited as a constraint to management. The following are responses to what is the biggest management challenge at the park(s) they manage:

That definitely would be our limited manpower here... You really only have enough people to be right here at the park stamping out little fires all the time. So really it is personnel...

Probably, the biggest challenge is staff. We are open from six a.m. to ten p.m. With the staff of three full time employees, that is the challenge at both parks. How do you cover, the time with your full time people...How can I spread my staff out and still not exceed forty hours per week per individual.

It is finding and keeping good summertime employees. It is getting harder and harder to find people that are interested in a career and future in outdoor recreation and so our pool of people from the colleges seems to be dwindling...That is probably my biggest point as a manager here is personnel issues.

The broad array of duties has led some managers to suggest increased specialization in some roles. Two tasks that appear amenable to specialization are maintenance and law enforcement. The following two quotes suggest a desire by some managers to increase specialization:

I really think, down the road, we're going to have to move into areas of specialization, because I think the days of being jacks of all trades is kind of wearing thin. It's difficult to do any more and still be proficient.

I think for us here is that we have so many other things that we have to do that we can't focus a hundred percent on the law enforcement. Probably, what would make the biggest difference (is)...if we got a full time maintenance position...

Related to the staffing limits are funding constraints. The following two quotes capture the issue:

We have to manage with the money we get which generally is not enough.

You have budget hearings every year and you plead for more money...and all the things you need. You don't get them.

Facility Capacity is Primary Factor Limiting Use

Overwhelmingly, parks do not have set use limits based on social or ecological conditions, but several parks are limited by facility capacity. Eleven managers cited facility limitations (parking lots and/or campsites) put a limit on use (a few of these sites rarely reach capacity). Five of the managers stated it was not an issue at the parks they manage because their water bodies are large and there is ample parking or access. Two managers stated one of the water bodies they manage had formal use limits; the parks developed the policy due to what the managers described as safety reasons. One park conducted a survey to help determine the parks capacity while the other used ten acres per boat as their standard. Some managers were asked if the parking lot(s) at the park(s) they manage was designed for the appropriate number of boats on the water, and in most cases they were not sure. In some cases, park managers stated increasing the number of parking spaces would be possible with a subsequent increase in funding and/or staffing on-site.

The following response is a representative response to the question if there was a policy that limited use on the reservoir. The response describes a type of facility capacity:

When the campgrounds are full, the campgrounds are full. We aren't turning people away because of policy.

Another response related to facility limitations:

We do have a policy. Our policy is that camping and picnicking and boat parking are limited to the facilities that we have. For example...when the boat marina parking lot is full, then we turn away boaters from coming into the park.

Two of the water bodies have use limits not due to facility limitations, but with safety reasons being the rationale. The following responses were provided by managers from the two parks that have use limits for safety reasons:

We institute the boat capacity because the fact of too many boats creates safety risks.

We did a capacity (study) here on the lake beginning...in 1996...On Saturdays in July, August, or June, it would not be uncommon for us to have a hundred and eighty to two hundred boats on this lake. When it is full, it is six hundred surface acres...What really spurred that is...our accident rate every year was just higher and higher...As a matter of fact, our law enforcement problems reached such a point that the (local) City Police Chief just said that you guys just stay at the lake. If you arrest anyone, we will send a car by and we will take them and book them in. On Saturday, we probably had them... (arrest) at least...six people...somebody would get ticked off at somebody else... (and) we would have a fist fight down on the dock...

One aspect of visitor capacity that is rarely discussed is the managerial aspect.

Managers may have norms for what is an appropriate amount of use. These norms may not be based in science, but as this manager says, "gut feeling." It should be stated that use is limited at this park due to facility considerations.

I have been here...(and)...there were ninety-two boats on it and that is when my gut feeling kicks in. But gut feelings don't count when it comes to laying out capacities...But after so many years you get to know your area and you get a feeling about the tension on the area and if I were to call the beach area they would be parking cars out on the street...You got the stressors with boating involved, you got all of that stuff going at the same time. You just know you got too many boats out on the water.

Importance of OHV and ATV Management

The focus of the interviews was to address water-based recreational and related issues. However, the growing concern for managing off-highway vehicles (OHV) or all-terrain vehicles (ATV) use clearly is important. The topic was brought up by managers when answering several different questions. Four managers cited OHV and/or ATV-use as what attracts visitors to their parks while three managers cited increase in this type of recreational use as changes they have noticed since they have been at the park they manage. Also, three managers cited the ability to use OHVs as a unique aspect to the park they manage. The following quotes emphasize the point:

You have the ATV use which is probably just as popular as the boating. Every year it seems to grow, it's promoted as a prime ATV area.

The park has experienced quite an...influx in OHV (and) ATV (use) at the park.

The following two quotes were from managers when asked if they had noticed if use had changed since they have been a manager:

I don't know if we'll ever swing away from fishing as the main attraction, but we're certainly seeing a lot, especially with the OHV and ATV use. It's beginning to be quite a draw for people.

The biggest thing that has changed are four wheelers and motorcycles and stuff. There is a lot more use by ATV riders...

One manager cited OHV-use as the biggest law enforcement issue:

Our major problem is OHVs. The majority of our accident reports are for off-highway vehicles. We usually do anywhere from seventy five to one hundred right here (in this county).

Effects to Recreation from Irrigation and Municipal Water Uses

Twenty-two of the 24 state parks included in this analysis are reservoirs, while small dams increase the water levels at the two lakes, Bear and Utah Lakes. Managers were asked if other water uses impacted recreation use, and 14 said yes; these impacts were primarily due to reservoir drawdown. The level of the reservoir drops as water is diverted from the reservoir for irrigation or municipal purposes. The reservoirs in Utah were built for irrigation and/or municipal water use as the primary purpose; recreation use can be seen as a secondary benefit of having the reservoirs. Subsequently, primarily in drought years, the water level of many of the reservoirs drops to the point that boating access becomes diminished or even impossible.

In some years, according to managers, the water level remains high throughout the entire boating season whereas, in some instances, boat ramps have been inoperable shortly after the 4th of July. The most common impact relates to reservoir drawdown as the water level decreases in the summer as irrigators call the water. As the water level drops, the boatable area on the reservoir decreases. The area may also become less scenic as mud along the shore is exposed, and features such as boat ramps may become inoperable as the water drops below the bottom of the ramp.

Table 8 highlights impacts to recreation from other uses. The impacts generally affect recreation use negatively. Interestingly, in some cases, reservoir drawdown may be beneficial as beach areas become exposed and usable. In general, the most widely cited impact was due to drawdown; however, a couple of managers cited nutrient loading from upstream due to farming and the operation of a golf course.

Table 8

Impacts to Reservoir-Based Recreation from Municipal and Irrigational Water Uses

Competing Water Use	Affect	Impact to Recreation (+/-)
Downstream Irrigation and Municipal Use	Reservoir Drawdown / Lower Reservoir Level	Operations impacted including making boat ramp unusable (-) Exposed shoreline may be visually unappealing (-) Complete drawdown can decrease or eliminate fishery (-) Exposed shoreline may provide beach access at some reservoirs (+)
Upstream Irrigation	Nutrient loading	Water quality may decrease and algal blooms are possible (-)

+ indicates impact positively affects recreation opportunities or access

- indicates impact negatively affects recreation opportunities or access

The following response reflects issues with reservoir drawdown due to irrigation:

They control the level of the lake. We have absolutely no control over that. If we have a hot dry summer like we have had the last couple of years, they can draw the lake down to where you can't use it or it is where it significantly impacts our use...Last season we were pretty much done by early August. They had drawn it down below our ramps...That is a big impact for us.

Another response related to drawdown:

This is mainly used for agricultural water out of here...Last year for instance we never got full. Last year being a drought, but they needed that water for irrigation and crops. You couldn't launch a boat here after July 10. So the drawdown can adversely affect it during drought years...Agricultural use can really have a big impact on our boating season.

One manager spoke about the purpose of the reservoir and how it impacted recreation use:

The reservoir was built for a purpose, and it was to provide irrigation water. For mitigation for that type of use, they created a recreational area...The fact that we get drawn down and are a high fluctuating type of reservoir. Real great at the

beginning of the year, but things are usually timed pretty effectively to coordinate with our season, but I have no control over that.

At some water bodies, the reservoir drawdown has affected the fishery at some of the water-based state parks:

I do know that a lot of the time the lake will basically dry up...they'll use all the water. They won't leave a lot of water behind and a lot of times they'll just use whatever they can for irrigation and there's no conservation pool to... the fish will just die.

That does affect us... as far as our fishery, because without a conservation pool... we lost our fish last year.

Also, impacts from upstream irrigation practices were noted including nutrient loading from effluent and fertilizer. In fact, one manager stated that a golf course located upstream increased the nutrient load in the reservoir. Another manager discussed impacts from upstream irrigational uses:

Upstream there is a lot of effluent in the water. (The) river runs through a lot of farms bringing a lot of phosphates into the reservoir...agricultural activities play a big part...

In two cases, drawdown positively impacted recreation use; lowering the water level exposed state-owned lands that increased access to the shore for users at one park. In this case, the shoreline of the water body at full pool is adjacent to private land. When the level of the reservoir drops, shoreline access is provided for swimmers and day users as the previously inundated area is publicly owned:

When the lake has receded that has created more beach access. When (the water body) is full there isn't much useable beach...Now that the water is down, there are probably only three or four places that don't have a beach...I have seen a huge increase in day use.

Another manager stated:

If the lake level drops, we have a lot of nice little sandy beaches throughout the lake. You will see that people will tend to spread themselves out more because it isn't an area where they all can concentrate such as the beach.

Some reservoirs appear more resistant to the effects of irrigation and other water uses. One manager provided the following response to what was unique about the park they manage:

Well it kind of showed up a little in the drought period. We were always full to start with; we were never really down. So, people became dependent on the fact that (this reservoir) would have water in it.

Importance of Temporal Scale

All of the managers interviewed discussed temporal aspects of visitor behavior or park management. Since managers were asked questions directly related to seasonality, the fact that all of the managers discussed the topic is not noteworthy in and of itself. However, the changing conditions based on the time of day or season is noteworthy. A regional approach, for the purposes of this dissertation, was conceived spatially and not temporally. A park that may be busy and congested in the summer provides an entirely different experience in other seasons or at different times. Further, a park that is "busy" on a summer afternoon is very different at six in the morning.

First, a daily routine creates some natural temporal zoning between potentially conflicting uses. Anglers may come out early and then leave either due to suboptimal fishing conditions or they begin experiencing conflict with water-skiers or PWC-users. The middle of the day may be dominated by this motorized use and busy beaches. The following quote describes the change in use throughout a day and week:

Summer for fishing – it will start at five in the morning and all through the night. For pleasure boating, skiing, etc. – it is probably going to be 10AM to sundown. It will be really busy at that time on Saturdays, Sundays and Holidays. In the week, it will be busy during the day with a bigger rush from 5pm-10pm with skiers and wakeboarders.

Secondly, seasonality plays a major role affecting conditions at these water-based parks. Managers were asked what time of the year activities take place; the following two quotes highlight how recreation use varies throughout a year:

Primarily from mid-May to the end of September when we have the good weather. We have a few crazies that when the ice is off they put their dry suits on wanting to be the first to waterski. Generally, we have ice fishing in the wintertime. When the ice is off early on, our main use early on is fishing. Then, as the water warms up, we get into the warm water sports. It is usually early to mid May, we are really slowing down by the first of October.

Fishing for example is mainly an early spring, winter, and fall activity. Not a lot of fishing during the summer; there are some that do but the majority of it takes place in the fall, winter, and that time of year. Whereas on the other side of the coin there is not a lot of recreational boating during that time of the year... Anytime from Memorial Day to about Labor Day and then it tapers strongly on both sides of both of those dates.

Finally, long-term temporal aspects are important to consider. Managers were asked if they had noticed any changes at the park over time and the following responses were provided:

...the obvious thing is the decline in sailing activities. (This park) at one time was the Hobie Cat lake in the state... There were many regattas, there would be fifty... on the lake on a Saturday... That has been replaced by wave runners and jet skis.

If you are looking for a trend, you see it from a lake that you used to go fishing. Now, we have water-skiing, then PWCs became huge, and they are building boats for wake boarding. The trend has gone towards increased horsepower...

Summary

Content analysis was used to analyze 18 key-informant interviews of water-based State Park managers in Utah. Six key themes were identified with implications for a regional approach through this analysis: (1) interagency interaction and cooperation; (2) balancing tasks and duties/funding and staffing limitations; (3) facility capacity is the primary factor limiting use; (4) importance of ATV and OHV management; (5) effects to recreation from municipal and irrigational water uses; and (6) the importance of the temporal scale. To some extent, the themes interrelate; for example, ATV and OHV management is one factor that has made balancing tasks and duties more challenging. Also, interagency cooperation may provide an approach to help address staffing and funding limitations. In all, state park managers function within a bureaucracy that has inherent challenges and operate in a constrained external environment. Managers interact and rely on many other government agencies and private organizations and their staff to manage the boating opportunities.

Regional Meetings

The second data collection phase was regional meetings, with the purpose of defining important regional issues and potential management options. Table 9 provides a summary of the topics discussed at the meetings and the regional management considerations provided by the attendees. The results focus on topics that are relevant to a regional approach. The regional management considerations provided by meeting attendees were non-binding. In general, the recommendations varied widely and ranged from site-specific recommendations to programmatic statewide approaches. Although

Table 9

Regional Meetings – Summary of Topics Discussed and Management Considerations

Region	Topic	Regional Management Consideration
Southwest Utah	<ul style="list-style-type: none"> • Longer boating season compared to other regions • Population growth • Limited water bodies for population size • Few opportunities for solitude • Funding and staffing limitation • Management of both boating and OHV 	<ul style="list-style-type: none"> • Consider future population growth in funding and planning • Protect solitude at Gunlock • Consider activity segmentation at Quail Creek and Sand Hollow using indirect management
Northeastern Utah	<ul style="list-style-type: none"> • Funding and staffing limitation (Not enough staff to cover large area, particularly areas outside of State Parks) • Conflict • Manager specialization vs. generalization • Reservoir drawdown • OHV enforcement inadequate • PWC issues and conflict 	<ul style="list-style-type: none"> • Explore new funding sources • Increase collaboration with other resource agencies • Address PWC use issues • Develop a Department of Natural Resource Law Enforcement Officer
Wasatch Front and Back	<ul style="list-style-type: none"> • Population growth • Water is in demand for other uses/ Drought • Dealing with ‘capacity’ on weekends • Yuba and Starvation State Parks have been targeted for additional use • Funding and staffing limitation (finding quality staff) • Generalization vs. specialization (maintenance/law enforcement) • Conflict • Increasing gasoline prices 	<ul style="list-style-type: none"> • Use of webcams that show parking lot and ramp conditions • Consider flexible fee structures/differential pricing/discount coupons • Add launching fee • Require day-use reservations • Promote Yuba and Starvation State Parks • Increase cooperation with other agencies • Consider specialization for some positions or roles • Explore ‘indirect’ management tools such as zoning

Regional Meetings – Summary of Topics Discussed and Management Considerations

Region	Topic	Regional Management Consideration
Northern Utah	<ul style="list-style-type: none"> • Increasing gasoline prices (not affecting those with large boats) • Boaters may be ignorant of laws • Increased Off-Highway Vehicle patrols • Generalization vs. specialization • Staffing/Funding (not enough for boating patrols) • Less non-motorized boating occurring • Crowding (bigger issue at “congestion points” such as boat ramps) • Conflicts (anglers/water-skiers) • Water bodies work as system (Boaters, on weekends, go to Bear Lake and to Hyrum during weekdays) 	<ul style="list-style-type: none"> • Hyrum could tolerate additional use • Increase boater education • Upgrade facilities • Increase staffing and cooperate with other resource agencies • Require boats to be fueled on shore • Consider differential pricing
Central Utah	<ul style="list-style-type: none"> • Irrigational water causing drawdown • Non-motorized vs. motorized use conflict • Providing non-motorized opportunities is difficult due to lack of funding • Boaters without registration appear to use less-patrolled water bodies • Competition w/private providers • Capacity issues 	<ul style="list-style-type: none"> • Work with concessionaires • Collaborate with irrigation agencies on projects of mutual interest
Lake Powell	<ul style="list-style-type: none"> • Varying goals/objectives for Bullfrog/Wahweap • Importance of Tourism (especially to Page, AZ.) • PWCs were not allowed for a short time – this was very contentious • Visitors come from all over the world • Collaboration with the National Park Service (NPS) necessary • Lower reservoir levels have decreased visitation • Opportunities for solitude abound • Law enforcement coverage on large reservoir is difficult 	<ul style="list-style-type: none"> • Expand education programs

the results in the table have been narrowed to the issues pertinent to regional planning and management, there are still some issues or factors that may be difficult for managers to address (e.g., population growth). In reality, some issues, such as population growth, provide the context to management, and managers may be limited in what they can do, while other issues, such as zoning practices or facility development, are more in the control of the management agency.

The issues discussed at the regional meetings were diverse and reflect the differences between the regions. However, several appear to transcend regional boundaries: conflict, OHV-use, effects of reservoir drawdown, and, broadly, staffing and funding issues. The latter three issues were identified as important when analyzing the results of the first data collection phase. Specific to staffing issues, the notion of increasing specialization was often discussed. It is clear meeting participants feel as though they are short-staffed and short on funding; it is perhaps possible they would always feel this way as funding will never be considered adequate. Conflict was not often mentioned during the managerial interviews but was often discussed during the regional meetings. As an observation, two of the regions, the Southwest and the Wasatch Front and Back, appear to have more acute issues compared to other regions. This is likely due to the relatively large population size of these two regions and the resultant demand. Perhaps population growth is a statewide issue that most manifests itself in these two regions. Also, the scarcity of lakes and reservoirs in the Southwest region is likely a factor too. Finally, meeting attendees provided a wide range of potential

management recommendations. The recommendations were assumed to be feasible as attendees are not likely to recommend actions they feel are difficult or impossible to implement.

Statewide Boater Survey

In this section, responses to the third data collection phase, the statewide boater survey, are provided. The statewide boater survey was also used for the following analyses: (1) comparing managers and boaters, (2) evaluating managers' predictions of boaters, (3) the cluster analysis of reservoir use; and (4) boater EUH analysis. First, descriptive statistics are provided for the responses to the statewide boater survey; in a few cases, results of bivariate analyses are also presented when this provides appropriate detail for a regional approach. Descriptive statistics are included for the following items: boater characteristics including demographics, boat ownership information and use history, primary activities, visitation information, and favorite boating area and park. Also, boater responses to questions related to visitor behavior including use limits, displacement, conflict, and PWC-use are displayed. Table 10 presents the results to questions related to the boaters' background and characteristics.

Registered boaters were asked to provide their primary activity while boating in Utah (Table 11). Fishing from the boat (44%) is the most commonly cited primary activity followed by waterskiing, tubing, and knee-boarding (24%). Non-motorized boating activities were cited by very few of the respondents as sailing was mentioned by only two percent, and canoeing and kayaking were cited by less than one percent.

Table 10

Registered Boater Background and Characteristics

Factor	
Mean number of people per household	3.4
Age (mean)	54
Age (median)	53
Income (median range)	\$65,000-\$85,000
Education (% with college degree)	43
Number of boats owned (mean)	1.4
Years operating a boat (mean)	18
Years operating a boat (median)	16
Boat outings in previous year (mean)	9
Boat outings in previous year (median)	6

Boaters were asked about their favorite boating area in Utah, and responses were not limited to just State Parks (Table 12). As a follow-up, respondents were asked why the particular water body was their favorite. Lake Powell was the most commonly cited response with scenic beauty being the main reason. Three factors appear especially important when boaters choose their favorite area including scenic beauty, fishing, and proximity to home. Generally, boaters provided two types of responses why boating areas were provided: (1) a quality factor related to the lake or reservoir (fishing or scenic quality); and (2) proximity to home. Lake Powell and Bear Lake were commonly cited as favorites with scenic beauty being the most cited reason, while Flaming Gorge, Strawberry, and Scofield were noted for their fishing. In contrast, boaters who said

Table 11

Primary Activity at Utah Lakes and Reservoirs^a

Item	<i>n</i>	%
<u>Which one of these is your primary activity while boating</u>		
Fish from a boat	174	44
Waterski, tube, knee-board	94	24
Wakeboard	44	11
Go sightseeing on the lake	33	8
Just drive the boat around for fun	31	8
Swim from a boat	13	3
Sail	7	2
Canoe or kayak	1	< 1

^a*n*=397

Jordanelle, Willard Bay, Pineview, and Utah Lake among others were their favorite cited proximity to home as the primary reason.

In addition to asking boaters about their favorite boating area in Utah, respondents were asked what their favorite water-based State Park was (Table 13). This list does not include lakes or reservoirs managed by a federal agency or managed locally. Bear Lake (21%) was the most frequently cited, followed by Jordanelle (13%) and Willard Bay (11%). Boaters appear to travel further for the large water bodies, including Lake Powell and Flaming Gorge. It is noteworthy that the largest proportion of respondents visited Lake Powell even though it is relatively far from the State's population.

Table 12

Favorite Boating Areas in Utah and Primary Reason^a

Boating Area ^b	<i>n</i>	%	Most Commonly Cited Reason
Lake Powell	112	28	Scenic Beauty
Strawberry	47	12	Fishing
Bear Lake	47	12	Scenic Beauty
Flaming Gorge	34	9	Fishing
Jordanelle	22	6	Proximity to Home
Willard Bay	16	4	Proximity to Home
Pineview	13	3	Proximity to Home
Scofield	13	3	Fishing
Utah Lake	12	3	Proximity to Home
Deer Creek	8	2	Proximity to Home
East Canyon	6	2	Proximity to Home
Yuba	6	2	Proximity to Home, Fishing, Beach Areas
Hyrum	6	2	Proximity to Home

^a *n*=397^b No other lakes or reservoirs were mentioned by more than four respondents.

Table 14 shows the number and percentage of respondents who visited each boating area. Also, the table reports the mean number of trips per person who visited the site and the mean distance traveled; the mean distance traveled accounts for the multiple trips made by respondents. Twelve percent of the respondents did not boat at all in Utah that year even though they still own a boat. The number of trips taken to a lake or reservoir decreases with distance as an analysis showed a negative correlation ($r = -0.58$)

Table 13

Boaters' Favorite Water-Based State Parks^a

Park	<i>n</i>	%
Bear Lake	83	21
Jordanelle	50	13
Willard Bay	44	11
Utah Lake	32	8
Deer Creek	30	8
Scofield	24	6
Yuba	18	5
East Canyon	16	4
Starvation	15	4
Sand Hollow	13	3
Rockport	11	3
Otter Creek	11	3
Hyrum	10	3
Piute	6	2
Great Salt Lake/Antelope Island	6	2
Millsite	5	1
Quail Creek	5	1
Green River	4	1
Gunlock	4	1
Steineker	4	1
Red Fleet	3	1
Huntington	3	1

^a *n*=397

Table 14

Visitation to Utah Lakes and Reservoirs^{a,b}

Lake or Reservoir	<i>n</i>	%	Mean # of Trips per Visitor ^c	Mean Distance Traveled per Trip
Lake Powell	100	25	2.8	266
Strawberry	71	18	3.9	63
Willard Bay	68	17	5.3	24
Jordanelle	61	15	4.8	23
Bear Lake	60	15	6.1	91
Utah Lake	58	15	7.1	22
No Trips in Utah	46	12	-	-
Pineview	46	12	7.4	20
Flaming Gorge	42	11	4.7	142
Scotfield	24	6	5.2	52
Deer Creek	24	6	3.6	44
Rockport	18	5	2.2	41
Sand Hollow	14	4	5.1	52
Hyrum	13	3	3.9	59
East Canyon	12	3	2.2	30
Quail Creek	9	2	9.1	12
Fish Lake	8	2	2.4	161
Echo	8	2	6.4	37
Piute	6	2	3.0	109
Yuba	6	2	2.8	62
Starvation	5	1	4.6	50
Otter Creek	5	1	1.0	101
Mantua	5	1	4.8	15
Current Creek	4	1	5.8	78

^a *n*=397^b Mean distanced traveled was compared with mean number of trips using correlation analysis: $r = -0.58$ ^c Includes only those who visited lake or reservoir.

between mean number of trips and mean distance traveled. It is worth noting that four out of the ten most commonly visited lakes and reservoirs are not managed by State Parks. Statewide, most of the most popular boating locations have one or two of the following characteristics: (1) these are relatively large; and/or (2) these are in or near to the Wasatch Front.

Table 15 shows the response to questions about management problems at Utah Lakes and Reservoirs. In every case, the largest proportion of respondents chose “moderate problem.” Reckless PWC operators were noted by the largest proportion of the respondents (about 80%) as being a moderate or major problem.

There is still strong support for use limits at Utah Lakes and Reservoirs (Table 16). If respondents stated use limits were necessary, they were asked why and where these were needed. The three most commonly cited reasons, accounting for about 90% of responses, were safety ($n=106$), crowding/congestion/too many boats ($n=83$), and use limits are necessary on small water bodies ($n=38$). Pineview Reservoir was cited the most often by 34% of those who stated use limits were needed (it currently does impose a use limit). About one-quarter stated Jordanelle while Deer Creek was mentioned by 18 percent. The most commonly cited areas where use limits were necessary are relatively popular boating areas (based on visitation) in and around the Wasatch Front and Back, along with two popular boating areas near St. George, Sand Hollow and Quail Creek. It should be noted that all eight of these reservoirs do have use limits although six of them (not including Pineview and Quail Creek) are limited by the size of the facilities (including parking lots).

Table 15

Boater Perception of Management Problems

Problem	Not a Problem	Small Problem	Moderate Problem	Major Problem	Mean
	-----%-----				
Reckless personal watercraft operators?	7	14	40	39	3.1
Crowding at launch ramps & parking areas?	15	21	40	24	2.7
Reckless motorboat operators?	13	31	38	18	2.5
Too many boats on the water at one time?	21	25	38	16	2.5
Drug or alcohol abuse by boaters?	20	28	36	15	2.5
Safety problems on the water?	16	28	45	12	2.4
Fluctuating water levels?	30	22	33	15	2.3
Crowding at beaches and facilities?	32	19	39	11	2.3

n=397

Respondents who provided a lake or reservoir where use limits were needed were then asked where they would go instead if they were not able to get onto that lake or reservoir. Table 17 lists what boaters would do if they were not able to get on to the first lake or reservoir they stated needed use limits due to use restrictions. Most respondents (73%) would still go boating while about 16 percent would do something totally different. The table also shows where boaters would go if they were not able to get on a lake or reservoir due to use limits; the five water bodies where use limits are most supported are shown. The results indicate that setting use limits at Utah lakes and reservoirs may just shift use to proximate lakes or reservoirs, many where use limits are already recommended. The problem of boater displacement is an issue if use limits are

Table 16

Use Limits on Utah Lakes and Reservoirs

Item	<i>n</i>	%
<u>Need to Put Limit on Number of Boats at One Time</u> ^a		
Definitely yes	117	30
Probably yes	141	36
Probably no	69	17
Definitely no	49	12
Don't know	21	5
<u>Top Three Reasons Boaters Support Limits</u> ^b		
Safety Reasons	106	41
Crowding/Congestion/Too many boats	83	32
Necessary on small water bodies	38	15
<u>Lakes and Reservoirs Where Boaters Support Limits</u> ^c		
Pineview	88	34
Jordanelle	64	25
Deer Creek	47	18.
Willard Bay	24	9
Quail Creek	15	6
East Canyon	13	5
Hyrum	9	4
Sand Hollow	8	3

^a *n*=397^b A total of 258 responses were provided.^c *n*=258; multiple responses allowed.

set as the majority of boaters' state they would simply go boating elsewhere if they were unable to get onto a lake. To evaluate the presence of visitor conflict, respondents were asked if other users detracted from their enjoyment while boating. Two-thirds (66%) responded "yes" and 20 percent said "possibly" (Table 18). The respondents who stated "yes" or "possibly" were then asked how frequently this occurred, and over half (63 %)

Table 17

Displacement at Utah Lakes and Reservoirs

Item	<i>n</i>	% of Sample
<u>What would boaters do if unable to get onto lake or reservoir due to use limits? ^a</u>		
Go Somewhere Else	154	60
Do Something Totally Different	40	16
Wait for an Opening at Same Site	33	13
Unsure	31	12
<u>Where Boaters Would go if displaced from:</u>	<u>1st Choice</u>	<u>2nd Choice</u>
Pineview	Willard Bay	Jordanelle and East Canyon (Tied)
Jordanelle	Deer Creek	Strawberry
Deer Creek	Jordanelle	Utah Lake
Willard Bay	Pineview	^b
Quail Creek	Sand Hollow	^b

^a *n*=258^b No other lake or reservoir was mentioned by more than one respondent.

said that it occurred “rarely” or “infrequently,” while only 12% said “often” or “very often.” As a follow-up, boaters who stated their enjoyment was or possibly detracted from due to the actions of others were asked what actions or activities led to the conflict. PWC activity (*n*=105) was the was the most commonly cited reason followed by others boating too close (*n*=72). Reckless boating or speeding (*n*=43) and lack of respect or courtesy (*n*=42) followed by drinking (*n*=30) were the next most frequently cited factors.

Although PWC-use is often cited as a cause of conflict, their use on Utah lakes and reservoirs is generally supported. Seventy percent of the non-PWC owners and over 90 percent of PWC owners stated they support their use on Utah lakes and reservoirs

Table 18

Conflict on Utah Lakes and Reservoirs

Item	<i>N</i>	%
<u>Do other users detract from your enjoyment?</u> ^a		
Yes	262	66
Possibly	81	20
No	54	14
<u>If yes or possibly, how often?</u> ^b		
Rarely (on some outings, but not every outing)	149	43
Infrequently (1 per outing)	68	20
Sometimes (2-3 times per outing)	86	25
Often (4-5 times per outing)	28	8
Very Often (more than 5 times per outing)	12	4
<u>Five Most Commonly Cited Reasons for Conflict</u>		
PWC Activity	105	31
Others boating too close	72	21
Reckless Boating/Speeding	43	13
Lack of Respect or Courtesy	42	12
Drinking	30	9

^a *n*=397^b *n*=343*Note.* 343 responses were provided.

(Table 19). The 60 respondents who said they somewhat or strongly disagreed with PWC use on Utah lakes were also asked why they felt that way; safety reasons (*n*=17) and negative impacts to fishing (*n*=12) were cited most often. PWC owners and non-owners disagree on whether PWC should be regulated differently than other boats.

The 239 individuals who stated PWC use should be regulated differently than other boats were also asked how they felt they should be regulated.

Table 19

Personal Watercraft Use on Utah Lakes and Reservoirs

Item	<i>n</i>	%
<u>Support the use of PWC on Utah Lakes and Reservoirs</u> ^a		
<u>(PWC Owners)</u> ^b		
Strongly Agree	31	74
Somewhat Agree	8	19
Neutral	1	2
Somewhat Disagree	1	2
Strongly Disagree	1	2
<u>(Non-PWC Owners)</u> ^c		
Strongly Agree	168	48
Somewhat Agree	77	22
Neutral	50	14
Somewhat Disagree	24	7
Strongly Disagree	34	10
<u>PWC should be regulated differently than other boats</u> ^d		
<u>(PWC Owners)</u> ^e		
Yes	16	38
No	26	62
<u>(Non-PWC Owners)</u> ^f		
Yes	223	65
No	118	35

^a Chi-square analysis was used to compare PWC and non-PWC owners; $X^2 = 12.68$; $df = 4$ ($p = 0.01$);

^b $n=42$;

^c $n=353$; two respondents stated, “don’t know” and were removed from analysis;

^d $X^2 = 11.88$; $df = 1$; ($p < 0.01$);

^e $n=42$;

^f $n=341$; 14 respondents stated, “don’t know” and were removed from analysis.

Common responses included a special license or course should be required ($n=80$), either a minimum age or youth should be required to ride with an adult ($n=34$), PWC users should be limited as to where they can go on the water ($n=34$), and they should have to stay a certain distance away from other boats ($n=23$). Chi-square analysis was used to assess if the differences between PWC and non-PWC owners were significant. In both cases, the differences between PWC owners and non-owners were statistically significant with p-values less than 0.05.

Managerial Online Survey

Managers completed an on-line survey with the primary purpose of comparing their views with the views of the boaters and to assess their ability to predict boaters' attitudes. Most of the managers' responses to the on-line survey are presented in the sections below where managers and boaters are compared and where results of managers' predictions are presented. However, managers were asked on the on-line survey how often they closed their entry gates during the past year because the parking lot was full. Sixteen of the managers provided a response and five of the managers stated they did not close the gates at their park at any time (Table 20). Four managers stated they closed from 1-5 days while three managers each stated they closed the park(s) they manage either 6-10 or 11-15 days. No manager cited 16-20 days, while one manager stated they closed the gate on more than 20 days. According to managers and regional meeting attendees, almost all of the closures are during the summer season on weekends or holidays. As a follow-up, managers were asked where boaters would go if they were not able to boat at the park(s) they manage. Ten managers provided a response; one manager

Table 20

Number of Days a Parking Lot Reached Capacity at One or More Parks Managed by Manager Respondent

Number of days parking lot was full	(n)	%
0	5	31
1-5	4	25
6-10	3	19
11-15	3	19
16-20	0	0
More than 20	1	6

n=16

responded they would come back later and the other nine provided lakes and reservoirs where boaters would go. Eight managers cited lakes and reservoirs in the same region as the park(s) they manage, while one manager cited lakes and reservoirs in an adjacent region. In all, managers provided 25 different lakes or reservoirs, and 23 were in the same region as the managers.

Comparison of Managers and Boaters

In this section, boaters' and managers' views towards eight potential boating problems and 11 potential management actions are compared. The eleven management actions are then arrayed in a 2x2 matrix and classified for managerial purposes.

Boating Problems

All eight boating problems are rated as a small or moderate problem (Table 21) by both managers (means ranged between 2.0 and 3.2) and boaters (between 2.3 and 3.1). Six out of the eight potential boating problems showed very little difference in the mean

Table 21

Boat Owners' and Managers' Attitudes Towards Potential Management Problems^a

	Boaters ^b		Managers ^c	
	Mean	SD	Mean	SD
Reckless personal watercraft operators	3.1	0.9	3.0	0.7
Crowding at launch ramps & parking areas	2.7	1.0	2.9	0.9
Reckless motorboat operators	2.6	0.9	2.5	0.7
Too many boats on the water at one time *	2.5	1.0	2.0	1.0
Drug or alcohol abuse by boaters	2.5	1.0	2.7	0.8
Safety problems on the water	2.4	0.9	2.6	0.6
Fluctuating water levels *	2.3	1.1	3.2	1.0
Crowding at beaches and facilities	2.3	1.0	2.4	0.9

^a Mean is based on a scale where 1 = Not a problem, 2 = Small problem, 3 = Moderate problem, and 4 = Major problem.

^b (n=397);

^c (N=17);

* Mean difference is equal or greater than 0.5.

(less than or equal to 0.2). One action (too many boats on the water at one time) showed a slightly larger difference as boaters perceived it as a greater problem (2.5 compared to 2.0 for managers). However, only one action was perceived substantially different as managers cited fluctuating water levels as a greater problem (3.2 compared to 2.3).

Fluctuating water levels are primarily a result of reservoir dam operations, and managers are more likely clued into these operations; as such, this is not necessarily a surprising finding. Managers are on-site year-round and are in tune with the day-to-day changes caused by reservoir operations. For example, managers and park staff may have to adjust floating docks or clear debris from boat ramps as water levels change. Also, many boaters are not present in the fall or winter when the reservoirs are at their lowest levels; additionally, boaters may simply choose to go to parks where the water level is not as

much of a problem. However, overall, the agreement between the two groups' views of all of the potential problems is more striking than the differences.

Management Actions

Table 22 lists the means of both boater and manager views of various potential management actions. Managers and boaters agree (both groups either support or oppose) on four of the 11 potential management actions; both groups supported two while both opposed two. For three of the actions, boaters were neutral and managers were supportive. Managers and boaters disagreed on the other four management actions: (1) increase fees to improve infrastructure; (2) limit PWC to certain areas on the water; (3) separate motorboats from PWC; and (4) reduce the number of boats allowed on the water on some of the heavier use days. It should be noted that the data were collected to infer a statewide level and the results do not necessarily apply to any one park.

Figure 5 displays how the 11 management actions are viewed by both managers (y-axis) and boaters (x-axis). Actions in Quadrant #1 (upper right) are supported by both groups and those in Quadrant #3 (lower left) are opposed by both. Actions in Quadrant #2 (upper left) are supported by managers and opposed by boaters while the opposite is true for actions in Quadrant #4 (lower right). Managers and boaters are not in lockstep about what management actions are appropriate. Quite importantly, it is apparent that support among managers for various zoning strategies is weak.

Additionally, managers support actions that would expand upon their existing infrastructure (parking lots, boat ramps) and also support increasing fees to support such actions.

Table 22
Boaters' and Managers' Attitudes Towards Potential Management Actions^a

	^b Boater		^c Manager	
	Mean	SD	Mean	SD
Increase number of boater education programs	3.5	1.2	3.7	0.8
Expand parking lot to allow more boats on the water	3.0	1.4	3.7	1.2
Expand the boat ramp to increase the number of boats that could be launched at one time	3.3	1.4	4.0	0.9
Increase fees to improve infrastructure	2.7	1.4	3.2	1.2
Increase the number of law enforcement patrols on water	3.0	1.3	4.2	0.8
Limit PWC to certain areas on the water	3.4	1.5	1.8	1.1
Separate motorboats from PWC	3.1	1.5	1.8	1.0
Prohibit PWC, waterskiing, or similar activity for 2 weekdays during the week	2.1	1.4	1.5	1.1
Add additional or create no-wake zones	3.0	1.4	3.1	1.2
Prohibit PWC, waterskiing, or similar activity in the early morning or late evening	2.2	1.5	2.0	1.4
Reduce the number of boats allowed on the water on some of the heavier use days	3.2	1.5	2.9	1.3

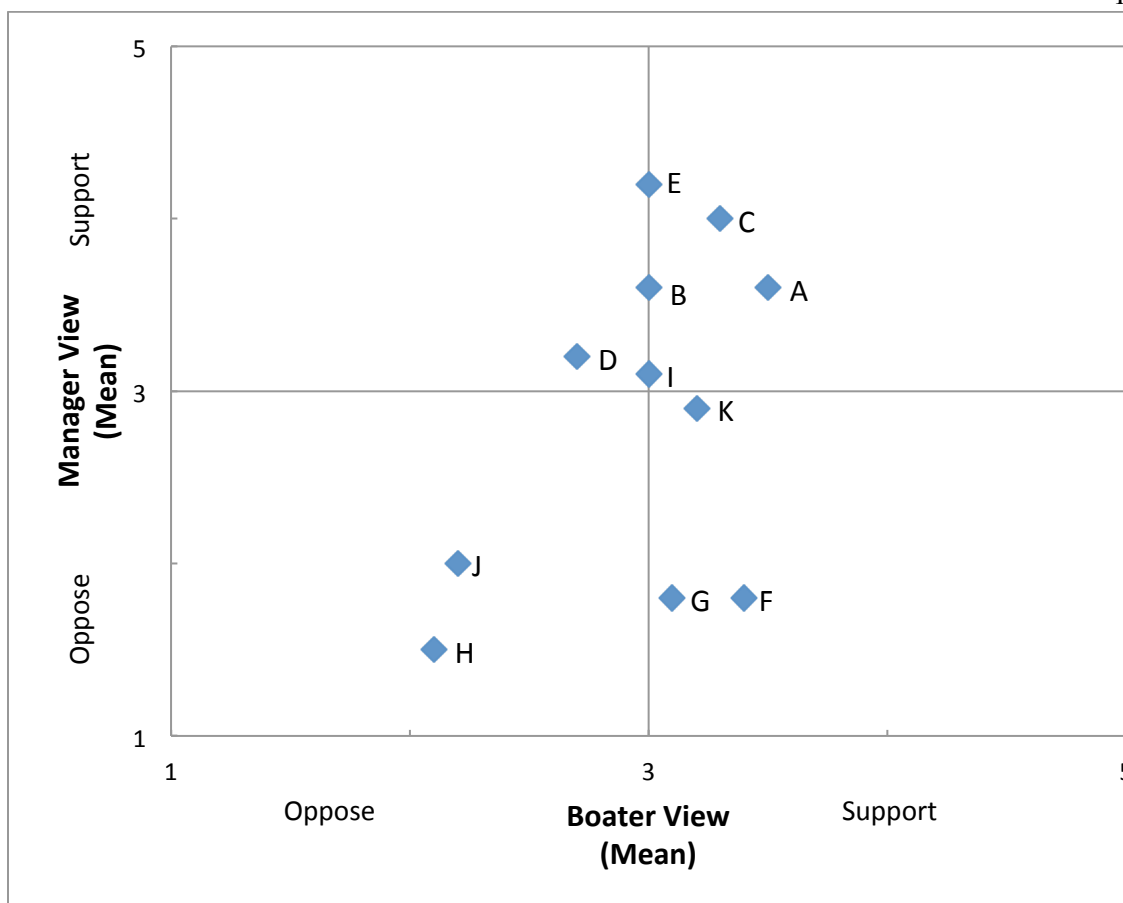
^a Mean is based on a scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree; and 5 = Strongly Agree.

^b ($n=397$);

^c ($N = 17$); weighted results to reflect number of boaters who cited managers' park(s) as favorite; no standard deviation was calculated for weighted sample.

³ ($N = 17$); weighted results to reflect number of boaters who cited managers' park(s) as favorite; no standard deviation was calculated for weighted sample.

Table 23 lists the implications for management actions that fall into each quadrant, along with the actions. Eight out of the eleven actions fall into one of the four



- A. Increase number of boater education programs
- B. Expand parking lot to allow more boats on the water
- C. Expand the boat ramp to increase the number of boats that could be launched at one time
- D. Increase fees to improve infrastructure
- E. Increase the number of law enforcement patrols on water
- F. Limit PWC to certain areas on the water
- G. Separate motor boats from PWC on the water
- H. Prohibit PWC, waterskiing, or similar activity for 2 weekdays during the week
- I. Add additional or create no wake zones
- J. Prohibit PWC, waterskiing, or similar activity in the early morning or late evening
- K. Reduce the number of boats allowed on the water on some of the heavier use days

***Implications for each quadrant discussed in next table.*

*Figure 5. Management action matrix results. ***

Table 23

Management Action by Matrix Quadrant

<p>Quadrant 1: Both groups support. Choose actions in this category first, if they meet desired objective.</p>	<ul style="list-style-type: none"> • Increase number of boater education programs • Expand the boat ramp to increase the number of boats that could be launched at one time
<p>Quadrant 2: Managers support/Boaters oppose. Likely managerially feasible, but would need to be implemented with some type of educational/interpretation program to persuade and/or inform visitors.</p>	<ul style="list-style-type: none"> • Increase fees to improve infrastructure
<p>Quadrant 3: Both groups oppose. Management actions should not be eliminated from consideration, but other actions should be considered first. If a management action in this quadrant is chosen, the managerial feasibility should be considered and educational/interpretation programs will be necessary.</p>	<ul style="list-style-type: none"> • Prohibit PWC, waterskiing, or similar activity for 2 weekdays during the week • Prohibit PWC, waterskiing, or similar activity in the early morning or late evening
<p>Quadrant 4: Boaters support/Managers oppose. Management action may be perceived as not feasible (or difficult to implement) by the manager. But, these are desirable actions otherwise as support by boaters exists.</p>	<ul style="list-style-type: none"> • Limit PWC to certain areas on the water • Separate motorboats from PWC • Reduce the number of boats allowed on the water on some of the heavier use days

Note. Three management actions (1. Increase the number of law enforcement patrols on water; 2. Expand parking lot to allow more boats on the water; and 3. Add additional or create no-wake zones) were supported by managers but were viewed neutrally (mean=3.0) by the boaters and did not fall into any of the quadrants.

quadrants while three of the actions were supported by managers but rated neutrally by boaters. Three management actions are between Quadrant #1 and #2 because the boaters' mean response was neutral; these actions take on aspects of both Quadrant #1 and #2. Visitor and manager attitudes are just one factor to consider when making on-site or regional policy decisions; other realities such as resource conditions, funding constraints, and agency goals must also be considered. These results do not mean to suggest that

certain actions should totally be avoided; it just indicates which management and planning decisions could generate resistance and where an educational campaign may be necessary.

Managers' Predictions of Boaters' Perspective

Table 24 shows the boaters' view and the managers' weighted prediction of the boaters' view. Weighted responses reflect boaters' response to what water-based park is their favorite. Ten boaters cited parks whose park manager was not part of the assessment, including the Great Salt Lake and Green River State Parks, and were subsequently removed for the assessment. No standard deviations are included for these tables because manager results were weighted. Managers were within one-half point (0.5) on the mean prediction of five out of the 11 management actions that were included in the survey. Differences greater than or equal to one-half point suggest managers are closer to another category on the scale and thus considered incorrect in their prediction. Managers overestimated support for three of the management actions (expanding the parking lot, expanding the boat ramp, and increasing law enforcement) and underestimated support for two (limiting PWC to certain areas on the water, and reducing the number of boats allowed on heavier use days). Expanding the parking lot to allow more boats on the water has the largest difference between the means (1.5). Managers have mixed success predicting what actions boaters prefer. Managers were more successful predicting the management actions visitors opposed compared to what they supported or were neutral towards; they correctly predicted the three actions that the boaters opposed but only accurately predicted three of the other eight actions.

Table 24

Boaters' View towards Management Action and Managers' Prediction of Boaters View

	Boater ^a	Manager Prediction ^{b, c}
	Mean	(Weighted) Mean
Increase number of boater education programs	3.5	3.3
Expand parking lot to allow more boats on the water *	3.0	4.5
Expand the boat ramp to increase the number of boats that could be launched at one time *	3.4	4.7
Increase fees to improve infrastructure	2.7	2.5
Increase the number of law enforcement patrols on water *	3.0	3.6
Limit PWC to certain areas on the water *	3.4	2.6
Separate motorboats from PWC *	3.1	2.6
Prohibit PWC, waterskiing, or similar activity for 2 weekdays during the week	2.1	2.1
Add additional or create no-wake zones	3.0	3.0
Prohibit PWC, waterskiing, or similar activity in the early morning or late evening	2.2	2.0
Reduce the number of boats allowed on the water on some of the heavier use days *	3.2	2.5

^a (n=387); ^b (n=17); ^c Weighted results to reflect number of boaters who cited managers' park(s) as favorite.

¹ Mean is based on a scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree; and 5 = Strongly Agree.

* Mean difference equal to or greater than 0.5.

Cluster Analysis

Cluster analysis was used to identify if there are lakes and reservoirs which interact and operate as a system (i.e., these have the same boaters) based on common visitation. The six-cluster solution was chosen, and their cluster groups are shown in Table 25.

Table 25

Lake and Reservoir Clusters

	Lakes / Reservoirs				
Cluster # 1	Bear Lake	Flaming Gorge	Pineview	Willard	Hyrum
Cluster # 2	Fish Lake	Strawberry	Scofield		
Cluster # 3	Jordanelle	Utah Lake	Deer Creek		
Cluster # 4	Rockport	East Canyon			
Cluster # 5	Sand Hollow	Quail Creek			
Cluster # 6	Echo				

Table 26 presents the physical and managerial characteristics that lakes and reservoirs in the same cluster have in common and responses to survey questions by boaters who had visited one or more water bodies in the particular cluster. The second column, physical/managerial attributes, lists attributes that all of the water bodies in the cluster have; the one exception is Cluster #1 where four out of the five water bodies have marinas. It is important to note that this analysis does not imply causality; the factors associated with the various lakes and reservoirs may simply be coincidental. Two factors appear to be important when clustering the boating locations: proximity and fishing. For four of the clusters (#1, #3, #4, #5), the proximity of the boating locations to each other appears to be important, although Flaming Gorge is a bit of an outlier in Cluster #1. For Cluster #2, quality fishing (and likely higher elevation) appears to be an important factor. If boating access changes, due to low water for example, it is possible that lakes and

Table 26

Physical, Managerial, and Social Attributes by Lake and Reservoir Clusters

	Physical/Managerial Attributes	Primary Activity	Visited Cluster		Support Use Limits ^b		Water Body is Favorite ^c		Top reason boating area(s) are favorite.	Mean Distance Traveled /Trip ^d
			n	(%)	n	(%)	n	(%)		
Cluster # 1	4 out of 5 have marina(s)	Waterski ^a (42%)	157	40	111	74	116	29	Proximity to Home	61
Cluster # 2	Above 7500 msl	Fish From Boat (75%)	84	21	53	66	62	16	Fishing	64
Cluster # 3	Concessions/Electrical Hookups/State Parks	Waterski ^a (61%)	111	28	78	75	42	11	Proximity to Home	25
Cluster # 4	Concessions, State Parks, 5500-6000 msl, surface area < 700 acres	Fish From Boat (54%)	28	7	20	74	9	2	Proximity to Home and Less Crowded (3 responses each)	31
Cluster # 5	Blue Ribbon Fishery/State Park/3300 msl	Waterski ^a (47%)	19	5	11	71	4	1	Fishing	35
Cluster # 6	Recreational facilities are privately managed	Waterski ^a (88%)	8	2	5	63	3	1	No reason cited more than one time	37

^a Includes tubing, knee boarding and wakeboarding

^b Does not include “Don’t know responses”

^c If one of the lakes or reservoirs in the cluster was cited as favorite water body.

^d Accounts for multiple trips made by respondents.

reservoirs in the same cluster will have increased visitation. Managers, as noted above, believe if boaters were not able to access the parks they manage, they would choose to go to proximate parks. However, managers of federal water bodies did not complete this survey, so perhaps it may be different for larger federal water bodies.

Cluster #1: The largest cluster includes five water bodies (Bear Lake, Flaming Gorge, Pineview, Willard Bay, and Hyrum) and also has the largest proportion of the survey respondents (40 percent) visiting one or more of the lakes and reservoirs. None of the physical or managerial characteristics considered were found to be in common among the five, although four out of the five have marina(s). Hyrum, which has no marina, also has the weakest mathematical association with the others. Regardless, the proximity of Hyrum to Bear Lake, Pineview, and Willard Bay likely explain the cluster. Four out of the five (less Flaming Gorge) are in the Northern Utah region as defined early in the planning process by State Parks staff. The average distance traveled (61 miles) to one of the reservoirs in the cluster is relatively far; the range is perhaps more noteworthy. The average trip to Willard Bay and Pineview is less than 25 miles while the average length of trip to Flaming Gorge is about 140 miles.

Cluster #2: The three water bodies (Strawberry, Scofield, and Fish Lake) in this cluster are all 7500 feet above mean sea level (msl) and have the highest proportion of survey respondents who cite fishing from a boat as their primary activity. In fact, the three highest elevation water bodies of the sixteen considered in this analysis are in this cluster. Given the high elevation and the associated colder water, this makes the reservoirs less appealing for water contact activities including waterskiing and PWC-use. Additionally, two (Strawberry and Scofield) out of the three are blue ribbon fisheries; the

third, Fish Lake, is a noted fishery in spite of not being a blue ribbon fishery. These water bodies clustered likely because they are all popular fisheries as 75% of the respondents who boated at one or more of the water bodies in the cluster cited fishing from a boat as their primary activity. This cluster showed the largest average distance traveled per trip; this may partly be due to the relatively remote locations but also indicates boaters may be willing to drive further to these sites.

Cluster #3: The three water bodies (Utah Lake, Deer Creek, and Jordanelle) in this cluster all have concessions, electrical hook-ups for RVs, and they are State Parks (although Utah Lake also has access areas not managed by State Parks). The majority (61%) of the survey respondents cited waterskiing (or similar activity) as their primary activity. This cluster also has the lowest average miles driven per trip of the six clusters; the three reservoirs are very close to Utah's population center along the Wasatch Front. Fifty-eight percent of the respondents who called one of these reservoirs their favorite stated it was due to the proximity to their home. It appears this cluster may be due to the relative proximity of the three reservoirs to each other.

Cluster #4: This cluster, which contains two water bodies (East Canyon and Rockport), are both State Parks, have concession services, are relatively similar in elevation, and are both relatively small (less than 700 acres). Fishing from the boat was cited as the primary activity. The average distance traveled was 31 miles per trip. Both reservoirs are relatively easy to access from Interstates 80 and 84. Perhaps the most interesting aspect of this cluster is that Echo is not included; Echo is on the road that connects East Canyon and Rockport and has some similar attributes.

Cluster #5: Both of the reservoirs (Sand Hollow and Quail Creek) in this cluster are State Parks, blue ribbon fisheries, and at the same elevation. It should also be noted these two reservoirs are less than 10 miles apart and both in Washington County and are the only two reservoirs considered in the cluster analysis that are a part of the State Park defined Southwest Region.

Cluster #6: Echo Reservoir is in a cluster by itself and is a Bureau of Reclamation facility, but a private company manages the recreation facilities. It is not necessarily unusual for a private company to be involved as most (if not all) of the marinas in the state are managed privately by concessionaires. It is, however, unusual for the entire facility (parking lots, campgrounds, etc.) to be managed privately. One park manger suggested that some boaters might avoid Echo Reservoir because it is known for lax enforcement and people go there to “party.” The results of this analysis support Echo boaters being unique in their site selection.

Experience Use History

Table 27 displays the most commonly cited primary boating activity by EUH category arrayed from lowest EUH to highest. No chi-square tests were completed for primary activity because there were too many cells with not enough respondents. In each case, fishing is the primary activity for the groups that went on five or fewer outings in one year.

Table 28 shows the mean response groups with higher EUH tend to be younger and have more people living in their household. Two (age and household size) out of the four continuous variables showed statistically significant differences bases on ANOVA.

Table 27

Primary Boating Activity by Experience Use History Category

	Most Frequently Cited Primary Activity	%
Group #1: No Boating Trips	Fishing	57
Group #2: Visit One Boating Location/Five or Fewer Outings	Fishing	51
Group #3: Visit One Boating Location/More than Five Outings	Water-ski ^a	40
Group #4: Visit More than One Boating Location/Five or Fewer Outings	Fishing	40
Group #5: Visit More than One Boating Location/More than Five Outings	Water-ski ^a	47

^a Includes tubing, knee boarding and wakeboarding

The post-hoc analysis (Tamhane T2) showed that Groups #1 and #2 differed from Group #5 in both cases, while Group #1 differed from Group #4 when comparing household size. Years operating a boat and number of watercraft owned did not show a statistically significant difference. Statistically significant differences were apparent between the five EUH categories developed for this analysis. In general, the study supports the notion suggested by Schreyer et al. (1984) that EUH categories can be useful in segmenting visitors in order to better understand their attitudes or behavior.

Table 29 shows the percent by group with chi-square statistics of those who own PWC, believe that PWC should be regulated differently than other boats, experience conflict while at a Utah lake or reservoir, and support use limits. No statistically

Table 28

Boater Characteristics by Experience Use History Category

Item	Group	Group	Group	Group	Group	(ANOVA) F	p-value
	#1	#2	#3	#4	#5		
	-----Mean-----						
Age ^a	59.4 ^b	56.5 ^c	54.1	54.5	49.7 ^{b, c}	6.842 *	0.00
Household Size ^a	2.6 ^{b, c}	3.1 ^d	3.3	3.4 ^b	3.9 ^{c, d}	6.290 *	0.00
Years Operating a Boat ^a	21.1	21.8	23.0	20.8	19.7	0.668	0.61
Number of Watercraft Owned ^a	1.3	1.3	1.6	1.4	1.4	1.473	0.21

^a df = 4

^{b, c, d} Number in common and in the same row indicates statistically significant differences between groups confirmed by Tamhane T2 post-hoc test ($p \leq 0.05$)

significant differences ($p \leq 0.05$) were found between the five EUH groups. Although the result was not statistically significant at a $p \leq 0.05$ level, it is worth noting that none of the respondents who did not boat during the 12 months previous to the survey own a PWC.

Only one out of the eight potential management problems (Table 30) showed a statistically significant difference. The one problem, safety problem on the water, is perceived as a major problem by a larger proportion of the Group #1 respondents whereas Groups #3, #4, and #5 tend towards the intermediate rankings (moderate and small problem). Three out of the 11 management actions were shown to have statistically significant differences (Table 31). The table displays the percent that somewhat or

Table 29

PWC-Use, Experiences with Conflict, and Support for Use Limits by Experience Use History Category

Item	Group #1	Group #2	Group #3	Group #4	Group #5		
	-----Percent-----					χ^b	p-value
Own PWC (yes) ^a	0	13	11	13	12	7.973	0.09
Should Regulate PWC Differently (yes) ^a	60	52	63	63	67	4.353	0.36
Experience conflict (yes or possibly) ^a	88	81	85	87	89	2.624	0.62
Support Use Limits (yes) ^a	60	64	63	73	75	6.412	0.17

^a df = 4

Table 30

Percentage Who Believe Safety Problems on the Water are a Problem by EUH Category

Item	Group #1	Group #2	Group #3	Group #4	Group #5
	-----Percent-----				
Major Problem	18	7	8	7	8
Moderate Problem	45	35	40	45	42
Small Problem	13	29	39	36	33
Not a Problem	25	28	13	12	17

$\chi^2 = 21.878$; df = 12; p = 0.04

Note. Only one of the eight management problems showed a statistically significant difference between the five groups.

Table 31

Boater Responses to Potential Management Actions by EUH Category

Item	Group	Group	Group	Group	Group	χ^2	p-value
	#1	#2	#3	#4	#5		
	Percent who Strongly Agree and Somewhat Agree						
Prohibit PWC, waterskiing, or similar activity for 2 weekdays during the week ^a	25	23	18	25	20	27.290	0.04
Add additional or create no-wake zones ^a	59	50	35	30	37	28.488	0.03
Prohibit PWC, waterskiing, or similar activity in the early morning or late evening ^a	30	31	26	22	17	29.693	0.03

Note. Three of the 11 management actions showed a statistically significant difference between the five groups. Although the results show only those who strongly or somewhat support the management action, the chi-square analysis.

^adf = 16

strongly support the three actions; however, all five categories were considered for the chi-square analysis. It appears that individuals with a lower EUH categorization may be more likely to support restrictive management actions.

As a final step, site selection (by cluster) was evaluated by EUH category with the goal of determining if EUH category influences site selection. Group #1 is not shown because no respondent from this group visited any lake or reservoir in Utah.

Respondents provided the number of visits they made to the lakes and reservoirs, and this was totaled by cluster and by EUH category (Table 32). Therefore, the proportion of visits made to each cluster could be evaluated rather than just the percentage of those who visited. Chi-square analysis was used to assess the difference in reservoir cluster

Table 32

Total Visits to Cluster by EUH Category with Chi-Square Analysis^a

	Group #2	Group #3	Group #4	Group #5	Total
	Number of Visits ^b				
	(Percent of Trips by Group)				
Cluster #1: Bear Lake, Pineview, Flaming Gorge, Willard Bay and Hyrum	155 (60%)	268 (46%)	77 (35%)	807 (47%)	1307 (47%)
Cluster #2: Strawberry, Scofield and Fish Lake	82 (32%)	70 (12%)	44 (20%)	223 (13%)	419 (15%)
Cluster #3: Jordanelle, Deer Creek and Utah Lake	18 (7%)	132 (23%)	77 (35%)	565 (33%)	792 (29%)
Cluster #4: Rockport and East Canyon	2 (1%)	26 (4%)	12 (5%)	52 (3%)	92 (3%)
Cluster #5: Quail Creek and Sand Hollow	1 (< 0.5%)	87 (14%)	13 (6%)	53 (3%)	154 (6%)
Total Trips by Group	258	583	223	1700	-

^a $\chi^2 = 273.1$; $df = 12$; $p = 0.000$

^b The number of visits is defined as any visit to a lake or reservoir in a cluster.

Note. Group #1 was not included in the analysis because respondents from this group did not visit and lakes or reservoirs; Cluster #6 (Echo Reservoir) was removed from the analysis because few respondents visited the cluster.

Summary of EUH Results by Category

Group #1: No Boating Trips - This group is, generally, older and has a smaller household size than groups with higher EUH (Groups #4 and #5). Fifty-seven percent (the highest proportion of any group) cite fishing as their primary boating activity and none of the respondents own PWC. Members of this group are more concerned with

safety problems on the water. They strongly support additional no-wake zones, perhaps to improve their fishing experience.

Group #2: Visit One Boating Location/Five or Fewer Outings - This group is older and has a smaller household size than Group #5 and tends to support additional no-wake zones. Over 90 percent of the trips to the lakes and reservoirs considered in the cluster analysis, by this group, are to lakes and reservoirs in Clusters #1 and #2. Group #3: Visit One Boating Location/More than Five Outings - The most noteworthy aspect of this group is the relatively large proportion of the visits to Cluster #5 (Quail Creek and Sand Hollow). This is perhaps not surprising for two reasons: (1) Sand Hollow and Quail Creek are relatively far from the other lakes and reservoirs considered in the analysis, and individuals who live close to these two reservoirs may see little reason to drive elsewhere; (2) making five or more trips in a year is easier to do because of the relatively long boating season in Washington County.

Group #4: Visit More than One Boating Location/Five or Fewer Outings - The household size for this group is larger than both Groups #1 and #2. Respondents from this group tend to take a larger proportion of their trips to Clusters #2 and #3 and a smaller proportion to Cluster #1 compared to the respondents at large. It is not necessarily clear from the data why this may be the case. Given this group visits multiple sites but makes very few total trips (less than 5), they may seek out different types of experiences for their different trips, and therefore they visit multiple clusters and tend not to concentrate their use in one cluster type.

Group #5: Visit More than One Boating Location/More than Five Outings - This group is younger and has a larger household size than Groups #1 and #2. Nearly one-half

(47%) cite waterskiing or similar activity as their primary boating activity, and they tend not to support various spatial or temporal zoning methods. Their visitation to the various clusters does not vary substantially from the respondents as a whole.

CHAPTER V

DISCUSSION AND CONCLUSION

For this study, principles from the study of spatial scale regionalism are applied to better understand regional recreation planning and management at Utah lakes and reservoirs. Also, consistent with taking a whole-system view, both the managing agency and visitors were included in the data collection phases. Manager input was incorporated because they provide insight into ecological, economic, and social factors. This dissertation explored three questions: (1) what factors are important to a regional approach to recreation planning and management; (2) how future regional analyses should be conducted; and (3) if the framework provided by McCool and Cole (2001) as to how a regional analysis should be conducted is adequate. It is worth noting that studying the regional level is rarely done, and ironically for some aspects of management and visitor behavior, it is the most important level. First, eleven factors were identified through the four data collection phases and addressed in detail in the next section. Second, leading into the discussion of how future regional analysis could be conducted, a discussion of the three key-concepts (scale, regionalism, and a whole-systems approach), integral to this dissertation, is provided. Then, the framework provided by McCool and Cole is critiqued and expanded upon to describe how future regional analyses could be conducted. Each of the four steps of the recommended framework is described, and data collection considerations are also discussed. Then, a brief discussion of the importance of incorporating goals and objectives to a regional approach is discussed.

In this chapter, recommendations for implementing a regional approach have been addressed in a broad and conceptual manner. However, specific recommendations for implementing a regional approach to planning and managing Utah's lakes and reservoirs are included in Appendix E. These recommendations were included in an Institute for Outdoor Recreation and Tourism (IORT) report (Spain et al., 2007b) and incorporated into State Parks strategic plan (Utah Division of Parks and Recreation, Department of Natural Resources, 2010). The management recommendations include factors related to visitor behavior, management, and planning and coordination.

Triangulation of Results in Relation to Key Factors Important to a Regional Approach to Recreation Planning and Management

The results of the four data collection phases, in summary, highlight factors important to a regional approach. In all, these suggest the implementation of a regional approach is more complicated than simply providing recreational opportunities and experiences. Eleven topics are identified, discussed, and segmented into three categories: managerial constraints, visitor behavior and perceptions, and factors important to a regional context. In short, considering larger spatial scales and recreation resource management increases an agency's options to address various challenges. Table 33 highlights the phase(s) the topics were discussed or explored.

Managerial Constraints

Balance and trade-off of tasks and duties/funding and staffing limitations.

State Park managers are challenged by their increasingly complex roles and duties, while staffing and funding limitations exasperated the situation. These constraints have been

Table 33

Factors Affecting a Regional Approach to Recreation Planning and Management

	Managerial Key Informant Interviews	Regional Meetings	Statewide Telephone Survey	On-line Managerial Survey
Managerial Constraints				
Balance and Trade-off of Tasks and Duties/ Funding and Staffing Limitations	x	x		
Importance of OHV/ATV Management	x	x		
Effects to Recreation from Irrigation and Municipal Water Uses	x	x	x	x
Visitor Behavior and Perceptions				
Conflict	x	x	x	
Displacement	x	x	x	x
PWC-Use	x	x	x	x
Crowding	x		x	x
Regional Context				
Use Limitations	x	x	x	x
Interagency Cooperation	x	x		
Importance of Temporal Scale	x			
Recreation Succession	x			

within other natural resource and public recreation agencies as well (Cervený & Ryan, 2008; Crompton, 1999). Balancing “host” duties with being a law enforcement officer further complicates managing within this context. Park managers are challenged by their role as peace officer, as they were often trained and more prepared for the hosting role.

From a regional perspective, job sharing could free up on-site staff to conduct patrols, for example, as staff with specialized skills could be shared regionally. Increased specialization and/or providing some assistance with specific duties could free up on-site staff for other duties. Three types of tasks appear to provide opportunities for increased specialization: administrative, maintenance, and law enforcement. Federal land management agencies have implemented similar cost-cutting strategies. Additionally, the National Park Service relies on specialized law enforcement officers, leaving the provision of recreation opportunities to other staff. Another approach includes increasing inter- and intra-agency collaborative efforts.

Importance of OHV and ATV management. Managers and park staff discussed OHV-related management issues in spite of the fact the interviews were focused on water-based issues; the issue was especially pronounced in central Utah where there are several popular OHV trails. State Parks has, at least, partial responsibility for patrolling OHV areas – even when these areas are on federal lands. Increased OHV use is especially pertinent as park managers reported spending more time than in the past patrolling and managing OHV use. Management of OHV appears to be requiring more resources than in the past and this has, in turn, decreased time spent on the boating program.

Motorized recreation was cited most often by USFS recreation managers as the most significant management issue they have faced during their career (Cervený & Ryan, 2008); in fact, “unmanaged recreation” often attributed to motorized use was cited by the Chief of the USFS as one of the four great threats to national forest health (Bosworth,

2003). Overall, water-based regional planning and management efforts cannot take place in complete isolation from these land-based issues.

Effects to recreation from irrigation and municipal water uses. Other water uses do affect recreation use and access at Utah lakes and reservoirs as water levels often drop substantially by mid-summer, especially during droughts. Reservoir drawdown appears to have the most substantial effect on recreation access. This potential for conflict between recreation use and other competing water uses is consistent with what Kakoyannis and Stankey (2002, 2008) have suggested. State Parks does not control the water levels because when irrigators call on the water, it is delivered without (or with little) regard to recreation use (in some cases, there is a conservation pool maintained for fisheries). Thus, there is little State Parks can do to “fix” the problem of drawdown. Extending boat ramps may increase access and operational flexibility but does not address diminished surface area or exposure of mud that may decrease aesthetic quality.

Understanding the effects of reservoir drawdown is important to a regional approach, as many reservoirs in Utah have been low enough during drought years that operations such as marinas or boat ramps become inoperable. This may, in turn, impact other reservoirs as visitors redistribute themselves. Education can play a key role in improving visitor satisfaction by increasing information related to water levels. If boaters are aware of water levels, they can better select an appropriate setting for their experience. Also, reservoirs that are less affected by drawdown could be targeted for increased use during dry years. A recreational drought plan could be developed that identifies which water bodies could be maintained at higher water levels later into the season. Additionally, cooperative agreements could be developed with local water users

to keep certain reservoir boat ramps functional later in the summer. State Parks could work with irrigation districts that manage multiple reservoirs within a watershed to keep one reservoir close to full while drawing down the others, if possible. In central Utah, State Parks has worked with local irrigation districts to remove silt from the reservoirs to increase the storage capacity, and this has been beneficial to both parties.

Visitor Behavior and Perceptions

Conflict. Conflict is an issue at Utah lakes and reservoirs as about two-thirds of the boaters stated other visitors detracted from their enjoyment and, consistent with previous surveys, PWC activity was the most frequently mentioned contributing factor (Reiter, Blahna, & Smith, 2001). Managers do not favor zoning strategies to separate potentially conflicting user groups, either temporally or spatially. This may be a discouraging finding as zoning strategies are an oft-cited tool used to manage conflict. The opposition to zoning by managers may not actually reflect their attitude towards the practice but rather the feasibility of the action. During regional meetings, the feasibility of spatially zoning was cited overwhelmingly as being too difficult and resource-intensive to enforce. Regardless, consistent with the management action matrix, if the managers' view shifts, these zoning actions would be acceptable. From a regional perspective, zoning between water bodies may be a more successful conflict management tool than zoning within a water body. For example, one lake or reservoir may cater to motorized craft while another nearby may cater to anglers.

PWC use. PWC use in Utah continues to be an issue as these watercraft are owned by less than 10 percent of the boat owner population but are disproportionately

represented in conflicts. Many boaters experience conflict with PWC users but overwhelmingly support their right to access Utah lakes and reservoirs. They do, however, support regulating PWC differently than other boats. To some extent, this is already the case as age restrictions are enforced on PWC and younger PWC-operators must pass a safety course.

Special consideration for managing PWC and the associated conflict regionally appears necessary, and concentrating their use at fewer water bodies is desirable. Providing PWC facilities or commercial activities (e.g., rentals) at selected areas while focusing PWC management strategies at these sites should be considered. For example, providing PWC “play areas” at some high-use reservoirs or in coves is appropriate to direct PWC use as much as possible. As an example, Jordanelle Reservoir has a PWC-only boat ramp, and the users are informally separated spatially within the reservoir to some extent. Additionally, it is appropriate to discourage or even restrict their use at lakes notable for fishing or non-motorized use if conflicts prove hard to manage.

Displacement. Visitor displacement is a concern at Utah lakes and reservoirs, and the results support the notion that management actions have regional implications. Park managers who had closed their park entrance, at some point, during the previous year were asked to provide the location where boaters would go, and managers provided 25 (mostly) proximate boating locations. The key point to a regional approach relates to displaced boaters changing conditions at proximate lakes and reservoirs. About 60 percent of the boaters interviewed stated they would go to another boating area if they were not able to boat on their first choice reservoir. This is confirmed by past intercept surveys at eight northern Utah lakes and reservoirs (Reiter et al., 2000, 2002). The

results support the notion that “small decisions” (e.g., decisions being made at one lake or reservoir without considering the regional context) may have unintended consequences at larger scales (Kahn, 1966; Odum, 1982). A management action such as setting a use limit should only be made after effects to displaced users are considered. As such, it is apparent that site-specific management may indeed be both detrimental to regional recreational opportunities, but also inadequate to address some on-site issues.

Crowding. Crowding is a subjective judgment of encountering too many people, in this case, while boating. Certainly, boaters at Utah water bodies experience crowding as more than half (54%) of the registered boaters stated too many boats on the water was a moderate or major problem, while a greater percentage (65%) stated crowding at launch ramps and parking areas was a moderate or major problem. Additionally, crowding was the second most frequently mentioned reason why use limits are necessary at Utah lakes and reservoirs among boaters. Five managers, during interviews, stated crowding or a lack of solitude was a reason visitors may avoid the water-based parks they manage.

However, interpreting responses related to perceptions of crowding and its implication for a regional approach is challenging; if setting a capacity is determined to be an appropriate action to manage crowding, the implications for displaced boaters should be considered (see previous section). Educational strategies such as informing boaters before they arrive about conditions, as visitors’ expectations influence perceived crowding (Graefe, Vaske, & Kuss, 1984). Another approach to address crowding is to provide and maintain a range of opportunities, including areas where encounters are few regionally (or at least statewide). The literature suggests that the motives users seek varies considerably (Borrie, McCool, & Stankey, 1998; Driver, Nash, & Haas, 1987;

Knopf & Lime, 1984; Stewart & Cole 2003); many of these motives are not dependent on encountering few other visitors, such as social interaction and meeting new people. Beyond managing expectations (to the best extent possible) and providing some semblance of solitude at some boating areas, decreasing crowding perceptions substantially at many boating areas is likely not feasible, and the costs of trying to do so are not desirable (e.g., displacing visitors).

Regional Context

Use limitations. Park managers cited facility limitations (most commonly parking lot size) as the most common factor limiting use at water-based State Parks. In fact, one manager stated on the on-line survey that the park they managed was closed more than 20 times in a year, while six more managers stated it had happened more than five times. It is interesting to note some traditional rationales for limiting use such as perceived crowding or biophysical concerns were never mentioned. On the statewide boater survey, about half of the respondents agree with reducing the number of boats allowed on the water on heavy use days, and just over half cite too many boats on the water as a moderate or major problem. Although there is support among boaters for use limits, implementing them without considering the regional context may have unintended consequences.

The implications of use limits to a regional approach have been previously noted (Blahna & Reiter, 2001; Borrie et al., 1998; McCool & Cole, 2001; Schreyer, 1985). In short, visitors who are displaced by use limits may simply move to a proximate reservoir and thus change conditions at those locations. Considering a larger spatial scale would

suggest that perhaps a use limit should only be set where it is consistent with pre-determined management goals or objectives. Further, if use limits are most often determined by facility capacity at Utah water bodies, this suggests that use could actually be increased at some sites by expanding the facilities and increasing staff. Use limits may be appropriate at outlying water bodies where there is a minimal management or organizational capacity to address this use.

Interagency cooperation. State Park managers interact with many other governmental agencies given the amount of federal land in Utah and the overlapping jurisdictions with county and local agencies. In fact, four out of eight most popular boating locations are not directly managed by State Parks, although the agency has law enforcement patrol responsibilities at these locations. Also, the vast majority of State Parks are operating on lakes and reservoirs managed by federal entities including the Bureau of Reclamation or local water districts. Interagency cooperation is both a necessary aspect to a regional approach and a major challenge. The jurisdictional authority at State Parks is limited in some cases as they may have a very small tract of land along the shore (for campsites, boat ramps, etc.), while the rest of the shoreline may be federal land, and a local irrigation district controls the water level. As such, agencies leading a regional planning and managing effort need to involve other relevant agencies. Encouraging agencies that have acrimonious relationships (or varying goals) to collaborate and cooperate is a major challenge (Daniels, 1999; Goodsell, 2003). Providing for recreation is a primary goal (if not the top priority) for State Parks, a major goal for NPS, one of many goals for BLM and USFS, and an afterthought for the BOR, while local water districts may have no ability or desire to manage recreation.

Possibilities for cooperation include sharing law enforcement duties, allocating funding for development and, perhaps most importantly, collaborating on long-range planning efforts.

Cortner and Moots (1999) have suggested the need to coordinate varying needs, perhaps indicating the need for a lead agency to coordinate a regional effort. In Utah, State Parks is at an advantage by operating the “Boating Program” statewide, and the agency does have a presence on non-State managed facilities. However, this does not necessarily mean other agencies will be on board or supportive of the decisions made by State Parks. Regardless, if interagency cooperation is important to managing just one park, it is even more important at broader regional or statewide scales because of cross-jurisdictional responsibilities.

Importance of temporal scale. This study was designed to consider the implication of spatial scale to recreation planning and management; however, temporal aspects such as seasonality and changes throughout a day (and a week) are important as well. Perhaps it is not surprising that temporal scale is important to recreation management given its importance in ecology (Peterson & Parker, 1998). Social conditions are very different in November than in June, as they are at 7 a.m. compared to 3 p.m. A reservoir that receives a lot of use from water-skiers and PWC may seem like an inappropriate place to fish; but, this may not necessarily be the case early in the morning. The implication is a mapping approach that zones areas with no regard to temporal changes may not be adequate to in order to capture the full range of opportunities. From a regional perspective, managers and planners need to decide if an opportunity is not provided during the summer due to excessive motorized use, does

providing the opportunity during the off-season compensate? This may be an especially important practice in resource-constrained areas (regions with few water bodies).

Recreation succession. Recreation succession is a predictable sustained change in character that a recreation site or area may undergo over time (Schreyer, 1979); the change is unplanned and, most often, favors increased development and level of use. This is not to suggest providing developed recreational opportunities is “bad”; however, the unplanned loss of other opportunities may be an issue. Schreyer and Knopf (1984) suggest recreationists with few behavioral options are subject to unmanaged change or succession; non-motorized use falls into this category in Utah, and actions should be taken to prevent the currently appropriate areas from changing. Given the potential for conflict between non-motorized and motorized use (Adelman, Heberlein, & Bonnicksen, 1982; Jackson & Wong, 1982; Lucas, 1964; Shelby, 1980), there is reason to believe this is an issue.

State Parks should do what is possible to protect the non-motorized boating opportunities by preventing recreation succession at the areas. Given the level of motorized use at Utah lakes and reservoirs, the tendency towards recreation succession may be expected. A major source of funding at Utah water-based parks comes from fuel taxes – these taxes may only be used for motorized facilities and not non-motorized facilities. Therefore, if a manager would like to expand facilities, there may be little or no funding for non-motorized facilities, for example. Recreation succession was not directly measured in this study as it would not be possible without conducting a

longitudinal study. However, discussions with park staff and results of the EUH analysis may provide some evidence for recreation succession.

Although non-motorized boaters were not surveyed, there is evidence fewer are using State Parks lakes and reservoirs. During key-informant interviews and regional meetings, park managers and staff mentioned a noticeable decrease in non-motorized use over time. It is possible non-motorized boaters are visiting non-State Park water bodies or they simply have stopped boating because of undesirable conditions. In addition to the possibility of non-motorized boating opportunities diminishing at State Parks, the results of the EUH suggest that fishing opportunities may be at risk of recreation succession as well. First, none of respondents in Group #1 (the group with the lowest EUH and did not boat at all during the past year) owned a PWC; additionally, the highest percentage (57%) of any group cited fishing as their primary activity. Furthermore, this group most strongly supports the creation and/or expansion of no-wake zones, indicating their fishing experiences may have been affected by motorized use in the past. This group is also the oldest on average, so perhaps life stage may play a factor too. In fact, the three oldest EUH groups most frequently cited fishing as their primary activity while the two youngest groups cited waterskiing or similar activity most frequently. It is unclear if the results suggest that people are likely to change from waterskiing to fishing as they get older or if this reflects a generational change, and a higher proportion of younger boaters will continue to waterski rather than fish in the future. These results are not conclusive about the presence of recreation succession, just suggestive. Longitudinal studies would be necessary to completely measure and capture this. Regardless, the topic justifies

further research and attention; one challenging factor, not addressed in this study, is identifying and surveying individuals who have stopped boating completely.

Schreyer (1979) has suggested the result of recreation succession is managing agencies are unwittingly favoring one group over another. It is also worth considering the possibility that State Parks has unintentionally shifted resources away from non-motorized opportunities. A regional approach could diminish the possibility of succession by identifying experiences susceptible to unmanaged change. This is accomplished by providing a range of experiences and taking management actions to maintain and protect them (especially the experiences susceptible to subtle changes). More so, developing management objectives for each site that takes into account the potential effects of recreation succession is necessary.

Discussion of Key Concepts

In this section, three concepts (scale, regionalism, and a whole-systems approach) key to understanding a regional approach are discussed. The whole-systems approach addresses the key aspects of including both managers and boaters in the analysis and how they are similar and different. The discussion of the three topics leads into the next section, which addresses how future regional analyses could be conducted.

Scale and Regionalism

Ecology has benefited from collecting data at multiple scales as studies of the same phenomena may clarify differing underlying factors based on the scale of analysis (Peterson & Parker, 1998; Vogt et al., 2007). Certainly, the results of this study bear this

out as the site-level data (from the key-informant interviews) were detailed but were short on context from outside the park. The statewide survey revealed interactions between sites (e.g., cluster analysis) and the potential effects of displacement, but drawing specific conclusions about individual sites was difficult. Overall, collecting data at different scales is a trade-off between depth of analysis and understanding (smaller spatial scale) versus broad contextual understanding (larger spatial scales). To some extent, the benefits of collecting data at multiple scales and acquiring multiple perspectives are similar to the advantages of conducting mixed-method research approaches (Clark et al., 2008). In the future, it would be interesting to interview managers at multiple levels (site, multi-site, and state) to determine if staff in the various positions and spatial scales view problems and issues differently. For example, perhaps state level managers (such as the Director and Deputy Directors) may be more concerned with political issues and how the agency is perceived in a political context, while park managers are more concerned with staffing.

The notion of regionalism from urban planning literature suggests unique governance (or management) structures are often necessary to address regional issues such as air quality or traffic (Beatley & Manning, 1998; Calthorpe & Fulton, 2001; Daniels, 1999). Two approaches were used in this study to develop and define regions. The first approach, based on professional opinion, was completed in collaboration with State Parks staff (Table 4). The second approach was empirically based using cluster analysis (Table 25) and grouped lakes and reservoirs based on common visitation (the same visitors tended to visit lakes and reservoirs in the cluster). In general, the primary factor determining the regions is the same for both methods: proximity. However,

differences between the two approaches are apparent, and each has its strengths and weaknesses.

The professional opinion-based approach divided the state into six regions (Lake Powell was its own region). Park staff were asked to consider how the water bodies might relate as a system using the following criteria: logical day trips, logical boating substitutes, and boating areas that provided for a range of opportunities. While this approach was efficient (the exercise took only a few hours in total), it pre-determined the spatial scale that problems and issues would be addressed. For this approach, an intermediate planning level between the State and the lake or reservoir level was developed to create a management structure (albeit an informal one) to provide for multiple recreational experiences with addressing regional challenges. This approach allowed for the inclusion of reservoirs and lakes where data were not available for the cluster analysis. Another advantage is the ability to capture more factors than the cluster analysis (the cluster analysis relied on visitor behavior alone). The meetings provided an efficient way to collect information in a short period of time, but it was clear managers were having difficulty assessing what the issues were at a regional level. Many managers knew very little about use at other parks within their region. Another disadvantage of this approach is that it relied, in part, on the park staff's prediction of the visitors' behavior which this study has shown to be incomplete or even wrong. Addressing management problems and issues became a more important focus as the planning process progressed. The notion of scale matching is important in these cases; scale mismatching occurs in ecology when ecological boundaries do not coincide with the management boundaries

(Hobbs, 1998). By choosing the regional boundaries before all of the data collection phases had been completed, the scale of regional issues was defined a priori.

The empirically-based cluster analysis approach resulted in six clusters or “regions” based on common visitation. An obvious shortcoming of this approach is that lakes and reservoirs that were visited by very few respondents could not be included in the analysis. An advantage of this approach is it provides insight into how boaters interact with these lakes and reservoirs as a system. One cluster (#2: Fish Lake, Strawberry, and Scofield) was interesting because it showed that proximity might not be the only way to develop regions; rather, the commonality among these reservoirs was cold-water fishing opportunities. Alternatively, management structures for managing cold-water fishing opportunities (among other opportunities) could be considered, as opposed to just spatially defined regions. It opens the question if a management structure should be based on key experiences rather than (or as well as) regions. Additionally, given the apparent willingness of boaters to travel further to these sites, it may provide insight that these experiences need to be protected. Overall, a shortcoming is these experience-based regions do not incorporate many factors to develop cogent regions. For example, the clusters do not take into account the broad question if these regions support a *range* of recreational experiences; the clusters were based only on one variable. The results only show that boaters tend to go to these places, and it is not conclusive in every case why, although proximity appears to be an important factor.

Ideally, the two approaches used in this study should be coupled while developing regions. The cluster analysis approach is empirical but incomplete, and the professional approach incorporates more factors subject to the, at times, flawed predictions of boater

behavior of the managers. Empirical results would be available to managers, planners, and decision makers when regions were being defined. It is appealing to define regional boundaries in a hierarchal manner as was done by park staff. However, the results suggest interactions are not always influenced by proximity. In all, further research into how regions could or should be developed is justified. Although, it is apparent that combining empirical and professional opinion-based approaches would be beneficial.

Future regional meetings would benefit from the incorporation of empirical data. This, in turn, could be presented to managers and planners in a region to help guide appropriate management actions (if any). Empirical information could also be helpful to identify the scale of a “problem” and perhaps develop regions. In this study, boaters were asked where they would go if they were not able to get on the first choice lake or reservoir; many respondents would just go to a nearby water body and still boat. This approach identified the scale of the problem associated with setting use limits. Also, managers of high elevation cold-water reservoirs (as these reservoirs were clustered) would meet to address their common management problems. In addition, numerous management issues and problems were discussed at the regional meetings, but it was difficult to determine the most important. In retrospect, it would have been beneficial to have attendees prioritize the challenges at the end of the meeting, for example, using the Delphi method or nominal group process.

Another potential approach to developing regions is using existing management regions (e.g., Utah State Parks regions, BLM field offices). The advantage is that a governance or management structure exists at that level, but the disadvantage is these

regions are likely to not reflect the scale of the problems or issues of concern.

Essentially, an agency has two options to address regional issues and problems: (1) use the existing scale or management structure (e.g., county or state); or (2) develop a new governance structure based on the scale of the problem. Overall, empirical approaches may be necessary to help determine the scale of a problem. For example, empirical approaches, where possible, could be used to determine at what scale a problem occurs, and managers within the area would work together to implement appropriate management policies and actions. Consequently, this indicates the need to develop research techniques to gauge the scale at which problems occur. The development of regions should be linked with the issues of concern while pre-determining the regions may beg a mismatch between region and problem or issue. Future efforts should attempt to ascertain the scale of various problems and at what level these are best addressed.

Managers and Boaters (Whole-Systems Approach)

Both managers and boaters were included in this study to incorporate a whole-system view of recreation use at Utah lakes and reservoirs. In both the key-informant interviews and regional meetings, managers and their staff discussed factors related to social, ecological, and managerial issues, and it is apparent all three factors are important to a regional approach. Also, the system includes both elements of recreational use and demand (boaters) and those most responsible for supply (managers, their staff, and the managing agency). Similarities and differences between managers and boaters are apparent. First, these two groups view six out of the eight potential management problems at roughly the same magnitude. One key difference is managers viewed

fluctuating water levels as a much larger problem compared to boaters, perhaps indicating differences in the amount of information the two groups have. Managers are on-site throughout the year, and they are aware of reservoir drawdown even if it occurs outside of the busy summer boating season. When it comes to the appropriateness of management actions, differences between the two groups become apparent. Boaters are more supportive of spatial zoning actions and efforts to limit use than are the managers, although both groups oppose temporal zoning efforts. In short, they generally agree on the magnitude of boating problems, but they are not in lockstep about what management actions are appropriate. When evaluating managers' predictions of boaters' preferences, managers underestimated boaters' support for actions limiting PWC access and reducing the number of boats on high use days while they substantially overestimated support from boaters for increasing development (expanding boat ramps and parking areas). As such, it is clear that obtaining data from both groups suggests different information will be obtained and, more importantly, managers are not necessarily good proxies for boaters' views.

Managers and boaters have differing community orientations in spite of interacting with the same resource; this is consistent with Manning and Frayser's (1989) findings in Vermont when comparing "elites" (managers and decision makers) with the public. Managers view the resource much more broadly and are also subject to inherent limitations, both internal, such as funding and staffing shortfalls or managing OHV-use, and external to the organization, such as the effects of other water uses and subsequent impacts to recreation access due to reservoir drawdown. Really, it is not expected the boaters would be aware of all of the challenges faced by managers (and their staff),

because boaters are probably focused on their own experience. Managers may be more concerned with feasibility and practicality, while boaters may be more concerned with how the action may limit their access or experience. For example, boaters may perceive spatial separation as desirable while managers do not see the action as feasible. Managers noted funding and staffing limitations as key issues with the implementation of such a strategy; managers may view enforcement of these zoning areas as requiring additional staff they feel they do not have. Although manager versus visitor conflict was not explored in this study, the environment for this type of conflict exists. Implementing a regional approach to management may require actions to be employed that may be unpopular locally. A manager may think boaters are being unreasonable if they complain, when in reality boaters may not be aware of the reasons why certain management actions are chosen; therefore, managers should provide a clear rationale of why certain actions are taken.

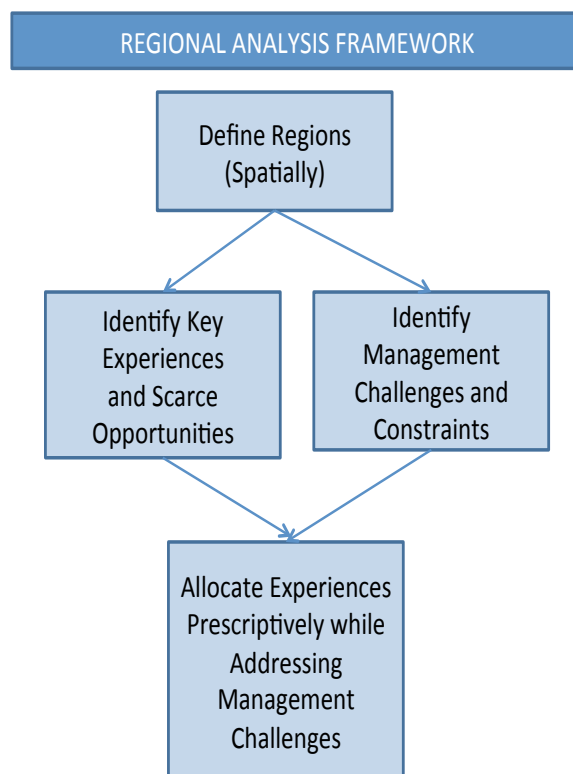
In all, regional analyses are more likely to be successful when both the managing agency and visitors are included. Incorporating park managers' perspectives enlightens researchers about factors such as budgeting, feasibility of actions, park operations, natural resource issues, and historical context. Managers were able to describe certain activities that no longer occur at the parks they manage or describe the emergence of PWC over the past 15 years. Managers provide unique insight to recreation areas as they spend so much time in the setting. Also, given the likelihood that managers are more likely to hear from only those who oppose certain on-site management actions (Manning, 2011) and that managers are not necessarily good proxies for the visitors' view, the use of social research is necessary to capture the visitors' attitudes and behavior. Overall, the results

support the use of a whole systems approach because the two groups appear to have differing community orientations.

Framework for Future Regional Analyses

A major purpose of this dissertation was to assess if McCool and Cole's model to conduct a regional approach is adequate and to recommend how future regional analyses should be conducted. The model provided by McCool and Cole (2001) to conduct regional analyses – (1) define region; (2) define desired range of experiences and scarce opportunities; and (3) allocate experiences in a prescriptive manner – is incomplete. A regional analysis should also assess potential management challenges and the organizational capacity of the agencies involved to address such challenges. For example, an organization may not incentivize thinking or acting regionally, or, as is the case in Utah, the lead organization (State Parks) is subject to the water resources being managed by agencies not under their control.

Figure 6 provides a conceptual framework on how a regional analysis could be organized and conceptualized building off the model proposed by McCool and Cole (2001). Broadly, this model includes an identification of management challenges and constraints along with identifying key experiences and scarce opportunities. As such, the model incorporates problem-solving into the allocation of recreation opportunities. In this section, each step of the framework is described, evaluated, and data collection considerations are addressed.



Expanded from McCool and Cole (2001)

Figure 6. Regional analysis framework

Define Regions

First, it is necessary to define the regions under study. How a region is defined should reflect the purpose of the analysis and the key problems or issues to be addressed. For example, a state park agency may want to maintain a wide array of opportunities within a reasonable day trip of their constituents. Regions could be very large and focus on a specific type of experience, such as planning for the management of multi-day river trips in the Western United States. Conversely, a city park agency may seek diversity within the city parks it manages and may focus on a neighborhood. Another approach to identifying regions is to evaluate where and at what scale key issues or problems occur;

proximate reservoirs where visitor capacity is a concern or a watershed where reservoirs tend to be drawn down are examples. At the very least, managers and agencies within the same region must be willing to both think regionally and collaborate. Multi-state efforts may require some type of federal coordination or at least a significant amount of cooperation between states.

Defining regions is best done combining empirical data with knowledge of the area under interest (including key issues and problems). Ideally, data would be collected (or available) regarding origin of visitors and distance traveled to the recreation areas under study. Also, information about regional recreation opportunities should be ascertained, with the scale of analysis being river reaches, hiking and mountain bike trails, OVH trails, lakes, with many other possibilities. In this study, cluster analysis was used to identify lakes and reservoirs with common visitation, and cold-water fisheries were clustered. These lakes and reservoirs within the same cluster are likely to see additional use if access is denied or diminished at one of the water bodies. This approach captures the scale of the potential impact attributed to a closure. Regional boundaries do not need to be hard and fast, and researchers and planners should not hesitate in putting recreation areas in two regions - if this indeed makes the most sense. Overall, a region can be defined based on the scale of the problem of interest, but a management structure (informal or not) at the necessary scale needs to exist or be developed. As such, research approaches to better understand the scale at which problems occur are necessary.

Identify Key Experiences, Scarce Opportunities

Next, identifying “key experiences” is subject to the context of the study. Consistent with the notion of conducting coarse-grained analyses, researchers and planners need not focus on every possible scenario, activity, or experience. For example, Blahna and Reiter (2001) focused on whitewater boating opportunities in Utah, and this topic is more specific than lake or reservoir boating (as considered in this study). The authors used social-psychological attributes (solitude, social interaction, and thrill-seeking), and in one case an activity (fishing), to identify key experiences associated with the various river reaches and thus inform management. Use limits would only be considered on river reaches where solitude was a goal. As for this study, on-site data was not collected, and a typology of experiences was not created. However, considering activity-based segmentation may be appropriate in this case when the type of activity use is broad. Examples of the types of experiences to be provided include: (1) general motor boating activities (including waterskiing, wakeboarding, and knee boarding); (2) fishing from the boat; (3) PWC-use; and (4) non-motorized boating.

EUH provides another potential approach to identifying and defining key experiences. EUH influences primary activity and what lake and reservoir clusters were visited. For example, the Quail Creek and Sand Hollow cluster draws a disproportionately high amount of their use from visitors who only use one site but visit many times. Additionally, preferences for management actions showed statistically significant differences, as those with low EUH tend to be more supportive of zoning actions. The statewide survey was used to evaluate the EUH data; unfortunately, the data

was collected at too coarse of a scale to accurately identify what EUH types are visiting each site. However, the results do indicate that EUH may inform a regional approach to management.

Identifying scarce opportunities is similar to a process in conservation planning known as *gap analysis*, where threatened elements of an ecosystem are identified and a protection plan is developed (Jennings, 2000). Three characteristics in conservation biology are used to determine prioritization of protection: distinctiveness, endangerment, and utility. For example, sailing in Utah (Bear Lake and Great Salt Lake) may be representative of this. If conditions were to change dramatically at either or both of the locations, sailors would have few other options. It should be a priority to protect the remaining sailing locations in Utah. It may be difficult to identify scarce opportunities by simply considering existing conditions, because in some cases these visitors may have already been displaced. Regardless, scarce opportunities can be described using social-psychological attributes such as solitude or a resource-specific activity such as flat-water kayaking. An opportunity may be scarce locally, regionally, or statewide.

Collecting on-site data through user surveys (if possible) is beneficial for this step as both behavioral and social-psychological information could be ascertained. A telephone survey of a targeted user group (assuming a list of respondents exists as was the case for this study) or random sample of a population at large, if warranted, would be beneficial to identify regional and unmet demand. The survey would identify gaps in available opportunities in order to prioritize management actions to protect scarce opportunities. In this study, a few managers suggested there had been a decline over time in non-motorized boating at the parks they manage, although it is not clear if this is due to

recreation succession or simply diminished demand. But it does suggest managers provide valuable background information, and that qualitative approaches may be useful when conducting a regional approach.

Identify Management Challenges and Constraints

Parallel to identifying key experiences and scarce opportunities, identifying management challenges and constraints are the key addition to McCool and Cole's framework. This includes evaluating the lead agency's (and potentially cooperating agencies and organizations) organizational capacity to implement a regional approach to management. Two factors are important here: (1) identify management challenges important at scales larger than a specific area or site; and (2) evaluate the agency's capacity to implement a regional approach. This is key as a regional approach should not be limited to simply allocating recreational experiences and opportunities. Management challenges may be related to visitor behavior or perceptions (e.g., conflict, displacement), managerial limitations (funding, staffing, uncooperative partner agencies), or other natural resource issues (drought, competing water uses, water quality issues). Even so, local political issues (not considered in detail in this study) may, in many instances, also be a constraint, such as a desire for a particular lake or reservoir to be open for a specific type of use. In all, it is important for the lead agency to adequately assess what issues can and should be addressed regionally. Although not necessarily empirical, the agency should assess what it realistically can and cannot do.

In this phase, the importance of the whole-system approach (including managers and visitors) is apparent. In this study, challenges were identified in multiple data

collection phases, and regional meetings were used to identify them at a regional level. In coordination with the survey data collected for the previously discussed step, visitor perceptions of the problem of interest and information about displacement (a key regional issue) could be ascertained. Also, visitor attitudes towards various management actions could be measured to assess the possible effectiveness of the actions and the possibility for “push-back” from recreational users. The managing agency should assess what managerial factors could be addressed with a regional management approach, as well as what factors may be constraints or barriers. For example, if a regional plan was being developed to manage OHV-opportunities in Utah and the BLM does not want to cooperate, this would be a major problem for implementing a regional approach.

Allocate Experiences Prescriptively While Addressing Management Challenges

The final step is integrative and the key point here is that experiences are allocated prescriptively. This means the managers and administrators responsible for providing recreational opportunities make a reasoned decision where an identified key experience and scarce opportunities (if possible) ought to be provided within a region. This decision is made in conjunction with addressing the various management challenges. The allocation of recreational experiences is made, ideally, in a way in which each region would have one or more dedicated areas or days/times where each key experience would be offered. If resources are scarce, a time (e.g., early in the morning for fishing) should be identified when the experience or an area within one lake or reservoir could be provided. It should be noted some regions cannot provide all of the opportunities for practical reasons; for example, a region may be especially arid for a cold-water fishery or

there just is no place to provide for sailing. At this point, it is important that scarce opportunities are provided where biophysical and managerial conditions are favorable; for example, if solitude is determined necessary, management actions should be enacted to protect such an opportunity. The recreational experiences should be provided in a way that potential management problems and constraints are considered and then addressed, where possible. In the simplest sense, this would mean potentially conflicting experiences would be managed through spatial and temporal zoning strategies, allowing for different uses in different areas or at different times or days. If sensitive resources necessitate protection or may be damaged by motorized use, perhaps this area could be targeted for partial closure or allowed for non-motorized use.

It was not within the scope of this study to collect or analyze the ecological effects of motorized recreation use or its implication for a regional approach, but is clear integrating ecological concerns and data is possible when allocating for experiences. For example, lakes and reservoirs (or even areas within a lake or reservoir) susceptible to ecological impacts due to boating could be targeted for limited boating activity or be designated as non-motorized or wakeless speed. In turn, lakes or reservoirs where boating is not expected to negatively affect ecological resources would be appropriate to target for additional motorized use.

Developing Goals and Objectives

Related to conducting regional analyses and integral to a regional approach is setting statewide, regional, and on-site management goals and objectives. Goals and objectives should be developed consistent with providing scarce opportunities, key

experiences, and addressing management challenges. Also, manager's struggle with balancing various duties, so providing clear priorities and objectives for each park based on a regional approach is beneficial. Ideally, goals and objectives would be developed at a state and regional level and then applied at a site-by-site level. Setting goals and objectives is key to tying the desire to meet regional demand while guiding how individual areas should be managed. For example, a lake or reservoir targeted to provide for non-motorized boating and fishing may have a goal to discourage motorized uses such as waterskiing. Setting site-by-site objectives helps reduce the possibility of recreation succession and homogenization, both subject to incremental "small decision effects." By setting objectives, lakes and reservoirs are managed to provide for a diverse array of opportunities and not tend towards providing the same opportunities at each and every location. Without setting these objectives, the past has shown there may be tendencies for non-motorized uses to be replaced by motorized use and "small decisions" (such as expanding a boat ramp) may exasperate the situation, although determining the exact location as to where key experiences can and should be provided may be challenging. As such, future research into how on-site management goals and objectives can and should be applied is justified.

After on-site management goals and objectives have been developed, managers should use all means necessary to meet the goals and objectives that have been developed. By setting the goals and objectives, managers and planners are able to monitor effects of management actions and track changes over time. Managers and/or boaters oppose many of the potential management actions; however, unpopular management actions should not be eliminated from consideration because multiple

strategies (zoning included) are necessary to maximize the diversity of settings and experiences provided. This is because protecting scarce opportunities and preventing recreation succession may require aggressive management. First, interpretation and educational resources can be developed that make boaters aware of these opportunities. Second, indirect management actions can be used to both encourage and discourage various types of use at certain sites; for example, provide PWC-only ramps where their use is most appropriate. Third, direct actions should be considered, in spite of opposition from many managers, where these may enhance existing conditions. In all, developing on-site management goals and objectives may be challenging but is necessary. Once the goals and objectives have been developed, managing agencies should not be reticent to apply various management actions (popular or not) to meet the goals and objectives.

Summary and Conclusion

The purpose of this dissertation is to apply principles from the study of spatial scale and regionalism to better understand regional recreation planning and management. As such, the following questions are addressed and discussed in this section: (1) what factors are important to a regional approach to recreation planning and management; (2) how future regional analyses should be conducted; and (3) if the framework provided by McCool and Cole (2001) as to how a regional analysis should be conducted is adequate.

First, eleven factors (Table 33) were identified and discussed early in this chapter as being important to understanding a regional approach. These factors reflect the whole-systems approach, as managerial constraints along with visitor behavior and regional context are included. The results suggest implementing a regional approach requires a

paradigmatic change within an organization that must view problems and solutions more holistically. It also becomes apparent that regional recreation planning cannot be completed in a vacuum, as consideration of other natural resource issues is notable. The importance of water resource management issues to lake- and reservoir-based recreation management is critical. Also, other recreation uses (such as OHV-use) are important because additional resources are now necessary to manage their use and effects.

The results support the notion that managerial factors and visitor behavior are inter-related. An approach that simply focused on visitor perceptions and behavior would likely be incomplete. For example, protecting some recreational experiences may involve limiting use at various parks; however, park managers are often pressured to find ways to increase their revenue and allowing additional use is the most obvious (and likely easiest) way to do so. Therefore, the agency responsible for management needs to address this; one approach is to calculate revenues at a statewide or regional level.

Although this study was limited to lake and reservoir boating, a future challenge to both researchers and managers will be managing regionally and not limiting the analysis to a single activity or activity type, rather managing for multiple activity types.

The second and third questions are addressed in tandem. The model proposed by McCool and Cole (2001) is incomplete and future analyses need to be broader and incorporate management challenges and constraints. Addressing various challenges in concert with identifying key experiences is necessary. It is clear that certain issues (such as conflict) are better addressed at a regional scale compared to a site-level scale.

Therefore, while managers and planners decide where key experiences ought to be

provided, doing so without considering the implications for other management issues is, at best, incomplete.

Specific management recommendations provided to State Parks are available in Appendix E. Overall, management actions focusing solely on visitor behavior are not adequate. The necessity to shift staffing resources, for example, along with continuing to collect supporting data, is necessary. In all, cooperation, such as continuing to conduct regional meetings, is a very important aspect to conducting a regional approach to planning and management.

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APPENDICES

APPENDIX A

KEY INFORMANT INTERVIEW INSTRUMENT

Recreational Water Use on Utah's Lakes and Reservoirs -- Interview Questions for the Key Informants

Introduction: We would like to thank you for your time and willingness to participate in this interview. The purpose of the study is to provide a regional and statewide overview of the issues, problems, and management challenges facing water-based recreation areas in Utah. Your comments and suggestions will be a valuable resource and will help to maintain quality boating opportunities and services.

Recordings of the interviews will be transcribed, but we will protect any information you share with us that you would like to keep confidential. You are free to discontinue or not to answer questions from the survey at anytime. In addition, you are free to turn off the recorder at anytime. Before we begin, do you have any questions about the interview process?

Section 1: Background Information...The first few questions provides us with general information about your professional experience.

1. How many years have you been employed by State Parks? How long have you been at this position?
2. What jobs or position have you held during your time with State Parks?
(Please specify job title)

3. Have you worked for another natural resource agency prior to working for State Parks? Yes No

If yes, which ones? What were/was your position(s)?

Section 2: Management Policies...The next few questions are general and their purpose is to get your ideas about Utah Parks and Recreation's policies.

1. What is the primary mission or purpose of Utah Parks and Recreation? How about for (INSERT NAME OF LAKE/RESERVOIR)?
2. How does this particular park contribute to the mission?
3. What is your role within Utah Parks and Recreation?
4. Are there specific recreation management objectives for the lake? (If yes, ask

what they are and get copy.) Are they appropriate and useful? If no to any of these: How would you describe what the management objectives are/or should be? Do management objectives vary for different portions of the water body?

Section 3: Visitor Behavior... These next questions address visitor behavior while at (INSERT NAME OF LAKE/RESERVOIR).

- 1 How large is the staff at this site?
- 2 What water-based activities do visitors participate in at (INSERT NAME OF LAKE/RESERVOIR)?

Motorboating	Sailing	Waterskiing	Canoeing/kayaking
Oar Boating	Fishing	Swimming	Trolling
Snorkeling	Scuba Diving	Wake Boarding	Knee Boarding
Sightseeing on Lake/Reservoir	Personal Watercraft Use		

Others: _____

- 3 What times of the year do these activities occur? What times of the day do they occur?
- 4 Where on (INSERT NAME OF LAKE/RESERVOIR) do (ACTIVITIES MENTIONED ABOVE) occur on the water? Why?
- 5 Are there certain portions of the water that are more appropriate for activities that require solitude? How about for larger groups and socializing? Do you notice any activities that are more common for those that seek solitude? How about socializing?
- 6 Are there sections of (INSERT NAME OF LAKE/RESERVOIR) that certain activities are not permitted?
- 7 Are there any activities or watercraft that are not allowed at this (INSERT NAME OF LAKE/RESERVOIR)?
- 8 Is there an activity that you believe this water body is especially well suited? Why? What other activities are related to this one?
- 9 Is there an activity that occurs at (INSERT NAME OF LAKE / RESERVOIR) that you believe is not appropriate? (If yes, what is it?)
- 10 Where do most of your visitors live?

- 11 What attracts visitors to (INSERT NAME OF LAKE/RESERVOIR)?
- 12 Do you know what other attractions that your users visit in this region?
- 13 Have you seen the types of recreation use change over time? Do you predict any changes in the future? If yes, how so?
- 14 Is there any factor(s) that you believe keep people from visiting (INSERT NAME OF LAKE / RESERVOIR)?

Section 4: Management Challenges...The next set of questions concerns the challenges you face as a park manager.

- 1 What are the most challenging aspects of managing (INSERT NAME OF LAKE/RESERVOIR)?
 - a. Where is this problem occurring? (Ask if it is not obvious.)
 - b. How are you currently addressing this challenge?
 - c. What additional steps could be taken to meet this challenge?
 - d. Are there barriers preventing management action to address this challenge?
- 2 Are there any major natural resource issues at (INSERT NAME OF LAKE/RESERVOIR)? If yes, do you believe that recreation use may be a factor? Why?

Section 5: Recreational Use Issues...The next set of questions relate to visitor and recreation management at (INSERT NAME OF LAKE/RESERVOIR).

Is there any official policy that limits recreation use at this (INSERT NAME OF LAKE / RESERVOIR)? (PROBE: Is there an actual number? What do you do when this occurs? Where do people go under these circumstances? What about lakes/reservoirs managed by other agencies or locally?)

- 1 Do any other water uses (agriculture, hydropower, etc.) adversely impact recreation use at (INSERT NAME OF LAKE / RESERVOIR)?
- 2 Are there any characteristics about (INSERT NAME OF LAKE / RESERVOIR) that make it unique?
- 3 How are other reservoirs/lakes in the state or region different or similar to your lake/reservoir?

Section 6: Accident and Incident History...The next set of questions concerns law and policy enforcement. We would like to know what law and policy enforcement challenges and issues you face as a park manager. We would also like to hear your suggestions about improving current law enforcement conditions.

If available: Request a 10 year history of accident, incident reports, citations, and verbal warnings. Or obtain as much information as possible if a 10-year history does not exist.

1. Who has jurisdiction within the State Park? Co other agencies patrol the water?
(PROBE: What is the interaction with other agencies?)
2. What are the most common infractions?
For each, probe for reasons/causes. Why are visitors doing that?) (Has this been changing? How? Why?)
3. What are the most challenging aspects of law and policy enforcement?
 - a. How are you currently addressing these challenges?
 - b. What additional steps could be taken to meet these challenges?
4. How do you feel about boater safety education?
 - a. Should boaters be required to take boater safety courses?
If yes, Why? How could those courses be delivered?

Thank you for your time and participation in this survey.

In (month) we will present the findings from the manager surveys at regional meetings throughout the state. At that time, we will ask for additional ideas about how the state office can help meet park and regional management needs. We will also use the results to help design a statewide telephone survey of boaters.

APPENDIX B

STATEWIDE TELEPHONE SURVEY INSTRUMENT

2006 Recreational Water Use Capacity on Utah's Lakes and Reservoirs Telephone Survey

Hello. May I speak to (Name of Registered Boat Owner). I am calling from Discovery Research on behalf of Utah State University and Utah State Parks. We are doing a statewide telephone survey of registered boat owners to collect information about recreational water use in Utah. This information will help park managers maintain quality recreational experiences and services, protect the lakes, and identify areas of concern.

This telephone survey is completely voluntary. You are free to discontinue or to not answer questions from the survey at anytime. To assure confidentiality, your personal information will not be included in the final report. The survey should take about 15 minutes. Is it OK if we do the survey now?

1. How many boats do you currently own? Please include any motorized boats, sailboats, or personal watercraft such as jet skis, wave runners, seadoos, etc.

None [**Thank the respondent and end the interview – This is not a completed interview**]

One [**GO TO 1a.**]

_____ [**NUMBER OF BOATS**GO TO 1b.]

- 1a. [**IF ONE BOAT**] What type of boat is that, a/an . . .

Open motorboat, Personal watercraft (like a jet ski or wave runner),

Sail (only) boat, Cabin motorboat, Auxiliary sail boat, Other: _____

- 1b. [**IF MORE THAN ONE BOAT**] How many are . . .

_____ Open motorboats _____ Personal watercraft _____ Sail (only) boats _____ Canoes

_____ Cabin motorboats _____ Auxiliary sail boats _____ Rowboats

Other: _____

2. How many years have you operated a boat, including personal watercraft? _____

The following Questions are about your Boating Preferences.

3. In the past 12 months, approximately how many outings did you take using your boat(s) in Utah? _____ [**PROBE: What is your best guess?**] [**IF NONE, GO TO Q6**]

[**AN OUTING IS DEFINED AS ANY TRIP TO A WATER BODY WITH A BOAT**]

4. In the past 12 months, how many days did you typically stay on a boat outing, including travel time to and from the boating location? _____
5. On which Utah lakes or reservoirs have you gone boating in the last 12 months?
PROBE: ANY OTHERS?
[LIST AREAS] _____ How many times did you boat at . . . ?

If Lake Powell, Utah Lake, or Flaming Gorge is mentioned, ask specifically where. For example, for Lake Powell – it could be Wahwep/Page area OR Bullfrog area.

6. Which Utah boating area would you say is your favorite?

6a. What is the MOST important reason _____ is your favorite boating area?

6b. Are there any other reasons?

7. Which Utah boating area would you say is your LEAST favorite?

7a. What is the MOST important reason _____ is your least favorite area?

8. The next set of questions deals with where you would like to see your boat registration funds spent. Do you believe it is very important, moderately important, slightly important, or not important that your boat registration funds are spent on . . .
(REPEAT SCALE AS NEEDED)

	VERY IMPORTANT	MODERATELY IMPORTANT	SLIGHTLY IMPORTANT	NOT IMPORTANT

<i>printed facility guides?</i>				
<i>pump-out facilities?</i>				
<i>safety patrols?</i>				
<i>boating education programs?</i>				
<i>picnic areas and campsites?</i>				
<i>parking?</i>				
<i>launching facilities?</i>				
<i>non-motorized boating facilities</i>				
<i>restrooms?</i>				
<i>law enforcement?</i>				

9. I am going to read you a list of activities. For each, please tell me if you participate in that activity when you go boating, and, if so, do you do it rarely, sometimes, often, or always. Do you . . .

[IF YES: How often would you say . . .]

ACTIVITY	NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS
waterski, tube, or knee board?					
wakeboarding?					
swim from a boat?					
sail?					
go sightseeing on the lake?					
canoe or kayak?					
fish from a boat?					
just drive the boat around for fun?					

- 9a. [IF MORE THAN ONE] Which of these is your *primary* activity when you go boating? [REPEAT LIST IF NECESSARY]

10. Now I would like you to think about boating safety for a moment. What is the *primary* source where you obtained your boating safety knowledge?

10a. Where did you *most recently* see or hear boating safety information?

11. Have you ever completed a boating education course? YES NO DO NOT KNOW
12. Do you strongly agree, somewhat agree, are neutral, somewhat disagree, or strongly disagree with the statement? “Boating education courses are important.”
- STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL DO NOT KNOW
SOMEWHAT DISAGREE
STRONGLY DISAGREE
13. Do you strongly agree, somewhat agree, are neutral, somewhat disagree, or strongly disagree with the statement? “Boating education courses should be mandatory for all boat operators.”
- STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL DO NOT KNOW
SOMEWHAT DISAGREE
STRONGLY DISAGREE
14. How about the statement? “All boat operators should be licensed to operate a boat.”
This means that operator privileges could be revoked for certain boating violations.
- STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL DO NOT KNOW
SOMEWHAT DISAGREE
STRONGLY DISAGREE
15. How about the statement? “ I support the use of personal watercraft on Utah lakes.”
- STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL DO NOT KNOW
SOMEWHAT DISAGREE
STRONGLY DISAGREE
- 15a. **[IF DISAGREE]** And why is that?
-

[**PROBE:** Are there any other reasons you DO NOT SUPPORT the use of personal watercraft on Utah lakes?]

16. Do you believe personal watercraft should be regulated differently than other boats?
YES NO DO NOT KNOW

- 16a. [IF YES] How should personal watercraft be regulated differently than other boats?

[**PROBE:** anything else?]

17. In GENERAL, do you feel that the actions of some lake users detract from your enjoyment while you are boating in Utah?

YES POSSIBLY NO [GO TO Q#18]

- 17a. How often is your boating enjoyment reduced by the actions of others when you go boating on Utah lakes? Would you say . . .
rarely (by that I mean on *some outings but not on every outing*),
infrequently (maybe once per outing)
sometimes (about 2 or 3 times per outing),
often (about 4 or 5 times per outing), or
very often (more than 5 times per outing).

- 17b. Which types of activities, actions, or lake users detract from your enjoyment?

[**PROBE:** Do any other actions detract from your enjoyment?]

18. In general, do you think there is a need to put a limit on the number of boats that can use a lake at one time? Would you say . . .
definitely yes,
probably yes,
probably no, or
definitely no.
DO NOT KNOW

- 18a. [IF YES] Why do you feel use limits are needed?

[**PROBE :** Any other reasons? UNTIL NO MORE ARE GIVEN]

[IF NO LAKES LISTED - GO TO Q 19]

[REPEAT FOLLOWING QUESTION SERIES FOR UP TO TWO LAKES – CHOOSE THE FIRST TWO LAKES ON THE LIST]

NOTE: IF A LAKE OR RESERVOIR THAT IS NOT LISTED BELOW IS INDICATED BY THE RESPONDENT, PLEASE ASK ABOUT THAT LAKE OR RESERVOIR AS LAKE #2

**PINEVIEW JORDANELLE DEER CREEK WILLARD BAY EAST CANYON
QUAIL CREEK**

18c. Why do you think use limits are needed on _____ [LAKE 1, Q19b]?

18d. If you were not able to get on [LAKE 1] as a result of restrictions on the number of boats that are allowed on the lake, do you think you would wait there for an opening, try boating somewhere else, or do something totally different?

- WAIT FOR AN OPENING AT SAME LAKE
- TRY BOATING SOMEWHERE ELSE -- Where do you think you would go? _____
- DO SOMETHING TOTALLY DIFFERENT
- UNSURE

19. Next I would like to read you a list of *potential* problems or concerns that may occur at various lakes. For each, please tell me if you think it is a problem on the Utah lakes you are familiar with, and if so, is it a small, moderate, or major problem.

[IF YES: Is it a small, moderate or major problem?]

PROBLEM	NOT PROBLEM	SMALL PROBLEM	MODERATE PROBLEM	MAJOR PROBLEM
Is drug or alcohol abuse by boaters a problem?				
<i>How about...reckless motorboat operators?</i>				
<i>How about...reckless personal watercraft operators?</i>				
<i>How about...too many boats on the water at one time?</i>				
<i>How about...crowding at launch ramps & parking areas?</i>				
<i>How about...crowding at beaches and facilities?</i>				
<i>How about...fluctuating water levels?</i>				
<i>How about...safety problems on the water?</i>				

20. For the following questions, please tell me if you would strongly agree, agree, disagree or strongly disagree with the following action at your favorite water-based State Park in Utah:

Note: If the respondent mentioned Lake Powell or Flaming Gorge as their favorite (SEE QUESTION #6) – tell them that we want to hear about their favorite state park. If they say that they do not have a favorite state park – have them discuss a park they use frequently or live near (find out which one they are talking about).

20a. Increase the number of boater education programs

- STRONGLY AGREE
- SOMEWHAT AGREE
- NEUTRAL
- SOMEWHAT DISAGREE
- STRONGLY DISAGREE

20b. Expand the parking lot to allow more boats on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

20c. Expand the boat ramp to increase the number of boats that could be launched at one time

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

20d. Increase fees to improve infrastructure (such as boat ramps, restrooms, picnic areas)

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

20e. Increase the number of law enforcement patrols on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

20f. Decrease the number of law enforcement patrols on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

20g. Limit Personal Water Craft to certain areas on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

20h. Separate motor boats from PWC on the water

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

20i. Prohibit PWC, waterskiing or similar activity on the water for 2 weekdays during the week

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

20j. Add additional or create no-wake zones

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

20k. Prohibit PWC, waterskiing or similar activity in the early morning or late evening

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

20l. Reduce the number of boats allowed on the water on some of the heavier use days

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

Finally, I have just a few personal questions that are for statistical purposes only. **As with all the questions on the survey, these questions are *completely* confidential.**

21. What was your age on your last birthday? _____

22. What is your zip code? _____

23. Including yourself, how many people in your household operate boats? _____
24. How many people are there living or staying in your household, including yourself?
- 24a. Of these x people, how many are 17 or younger?
25. What was your *total* combined household income from all wage earners during the past 12 months? Please include money from all sources, not just wages and salaries, before taxes and other deductions. Was it . . .
- Less than \$25,000,
between \$25,000 and \$45,000,
between \$45,000 and \$65,000,
between \$65,000 and \$85,000.
between \$85,000 and \$105,000,
between \$105,000 and \$125,000,
between \$125,000 and \$150,000,
between \$150,000 and \$200,000,
or
more than \$200,000
26. What is the highest year or grade of school you have completed?
- Junior high or less
Some high school
High school grad or GED
Some college or vocational school
Technical or vocational school grad. or Associates degree
College graduate (4 years, Bachelors degree)
Some graduate courses
Graduate/Professional degree

Thank you for your time and participation in this survey. This information will assist Utah State Parks in making your water recreation experience more enjoyable for you.

APPENDIX C
ONLINE MANAGERIAL SURVEY INSTRUMENT

On-line Managerial Survey

This survey was administered on-line.

1. What State Parks(s) do you manage?

2. Do you believe it is very important, moderately important, slightly important, or not important that boater registration funds are spent on . . .

	VERY IMPORTANT	MODERATELY IMPORTANT	SLIGHTLY IMPORTANT	NOT IMPORTANT
<i>printed facility guides?</i>				
<i>pump-out facilities?</i>				
<i>safety patrols?</i>				
<i>boating education programs?</i>				
<i>picnic areas and campsites?</i>				
<i>parking?</i>				
<i>launching facilities?</i>				
<i>non-motorized boating facilities</i>				
<i>restrooms?</i>				
<i>law enforcement?</i>				

3. Please read the list of potential problems or concerns that may occur at various lakes or reservoirs. For each, please state if you think it is a problem on the Utah lake(s) or reservoir(s) that you manage, and if so, is it a small, moderate, or major problem.

PROBLEM	NOT PROBLEM	SMALL PROBLEM	MODERATE PROBLEM	MAJOR PROBLEM
Is drug or alcohol abuse by boaters a problem?				
reckless motorboat operators?				
reckless personal watercraft operators?				
too many boats on the water at one time?				
crowding at launch ramps & parking areas?				
crowding at beaches and facilities?				
fluctuating water levels?				
safety problems on the water?				

Note: The following set of potential management actions were listed twice following the two questions listed below. First, managers were asked about their preference towards management actions and then asked to predict their visitors view.

4. For the following questions, please tell me if you would strongly agree, agree, disagree or strongly disagree with the following action at the lake(s) or reservoir(s) that you manage:

5. For the following questions, please rate how you believe boaters at the lake(s) or reservoir(s) that you manage would agree or disagree with the following management actions:

4a/5a. Increase the number of boater education programs

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

4b/5b. Expand the parking lot to allow more boats on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

4c/5c. Expand the boat ramp to increase the number of boats that could be launched at one time

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

4d/5d. Increase fees to improve infrastructure (such as boat ramps, restrooms, picnic areas)

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

4e/5e. Increase the number of law enforcement patrols on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

4f/5f. Decrease the number of law enforcement patrols on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

4g/5g. Limit Personal Water Craft to certain areas on the water

STRONGLY AGREE
SOMEWHAT AGREE
NEUTRAL
SOMEWHAT DISAGREE
STRONGLY DISAGREE

4h/5h. Separate motor boats from PWC on the water

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

4i/5i. Prohibit PWC, waterskiing or similar activity on the water for 2 weekdays during the week

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

4j/5j. Add additional or create no-wake zones

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

4k/5k. Prohibit PWC, waterskiing or similar activity in the early morning or late evening

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

4l/5l. Reduce the number of boats allowed on the water on some of the heavier use days

STRONGLY AGREE
 SOMEWHAT AGREE
 NEUTRAL
 SOMEWHAT DISAGREE
 STRONGLY DISAGREE

6. About how many times per year do you have to close your park because the parking lot is full or the lake or reservoir is at capacity?

SKIP THIS QUESTION IF YOU ANSWERED "0" TO THE PREVIOUS QUESTION

7. What two or three lakes or reservoirs do you believe that your users would go to if they were unable to get onto the lake(s) or reservoir(s) that you manage?

APPENDIX D

CLUSTER ANALYSIS: PROXIMITY MATRIX AND DENDROGRAM

APPENDIX D-1

Proximity Matrix Showing Distance (Measured With Jaccard Statistic) Between Lakes and Reservoirs Based on Common Visitation

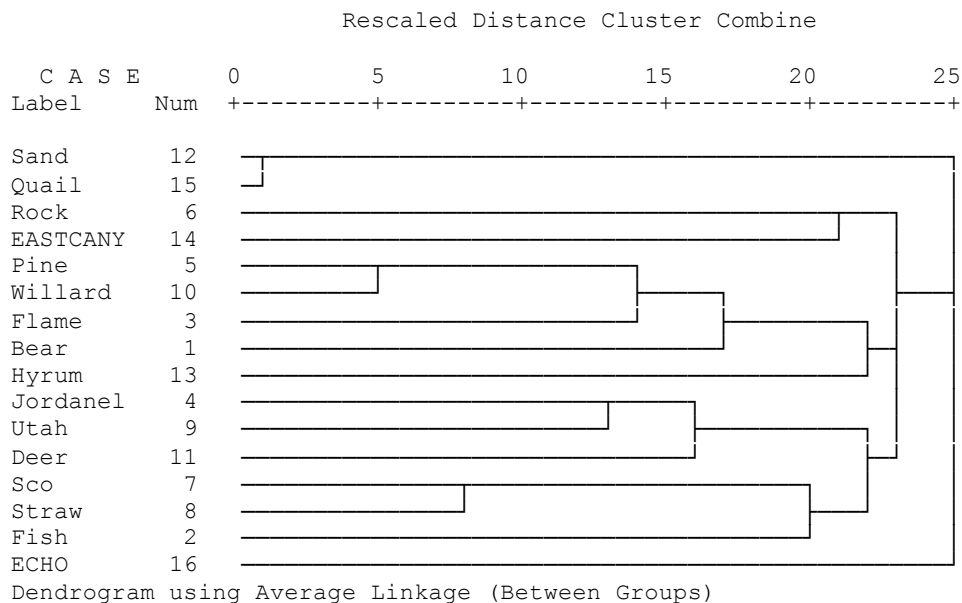
Proximity Matrix

Case	Matrix File Input															
	Bear	Fish	Flame	Jordanelle	Pine	Rock	Sco	Straw	Utah	Willard	Deer	Sand	Hyrum	EASTCANYON	Quail	ECHO
Bear	1.000	.044	.069	.092	.135	.054	.017	.066	.069	.161	.016	.020	.082	.019	.021	.067
Fish	.044	1.000	.081	.000	.000	.000	.100	.071	.018	.016	.000	.000	.067	.000	.000	.000
Flame	.069	.081	1.000	.060	.149	.061	.020	.125	.089	.205	.018	.000	.045	.000	.000	.000
Jordanelle	.092	.000	.060	1.000	.056	.094	.014	.125	.182	.087	.136	.016	.016	.032	.000	.035
Pine	.135	.000	.149	.056	1.000	.035	.017	.054	.057	.295	.016	.000	.039	.060	.000	.000
Rock	.054	.000	.061	.094	.035	1.000	.000	.108	.030	.070	.000	.000	.000	.077	.000	.045
Sco	.017	.100	.020	.014	.017	.000	1.000	.263	.062	.041	.054	.000	.037	.077	.000	.000
Straw	.066	.071	.125	.125	.054	.108	.263	1.000	.152	.118	.027	.016	.031	.082	.000	.000
Utah	.069	.018	.089	.182	.057	.030	.062	.152	1.000	.048	.141	.017	.000	.016	.000	.018
Willard	.161	.016	.205	.087	.295	.070	.041	.118	.048	1.000	.000	.015	.061	.029	.000	.000
Deer	.016	.000	.018	.136	.016	.000	.054	.027	.141	.000	1.000	.033	.000	.031	.037	.037
Sand	.020	.000	.000	.016	.000	.000	.000	.016	.017	.015	.033	1.000	.000	.000	.364	.000
Hyrum	.082	.067	.045	.016	.039	.000	.037	.031	.000	.061	.000	.000	1.000	.000	.000	.000
EASTCANYON	.019	.000	.000	.032	.060	.077	.077	.082	.016	.029	.031	.000	.000	1.000	.000	.000
Quail	.021	.000	.000	.000	.000	.000	.000	.000	.000	.000	.037	.364	.000	.000	1.000	.000
ECHO	.067	.000	.000	.035	.000	.045	.000	.000	.018	.000	.037	.000	.000	.000	.000	1.000

APPENDIX D-2

Dendrogram Displaying Clusters of Lakes and Reservoirs Based on Common Visitation

Dendrogram using Average Linkage (Between Groups)



Produced with SPSS

APPENDIX E
STATEWIDE MANAGEMENT RECOMMENDATIONS

Statewide and regional management recommendations were provided to guide an implementation of a regional approach at Utah State Parks. The majority of the recommendations provided were incorporated into State Parks' Boating Programs Strategic Plan (Utah Department of Natural Resources, Division of Parks and Recreation, 2010). Statewide recommendations were divided into three categories: (1) Visitor Behavior; (2) Managerial; and (3) Planning and Coordination.

Table E1

Statewide Management Recommendations

Factor	Recommendations
Visitor Behavior	<ul style="list-style-type: none"> Clearly identify the visitor boating experiences to be offered at each lake and reservoir. Protect current unique opportunities for solitude and fishing. Increase management consideration of non-motorized users. Separate conflicting uses using indirect management strategies first (where possible). Setting use limits should be the management action of last resort after others have failed and only after impacts to potentially displaced users has been considered.
Managerial	<ul style="list-style-type: none"> Additional staffing may be necessary at parks with increased use. Develop guidelines for expanding park revenues, and allocation of park revenue should not be based on use level alone. Continue and expand boater education programs. Develop plan for patrolling outlying lakes and reservoirs. Consider increased specialization and job sharing for some staff roles. Continue and expand interagency cooperation. Consider the role of OHV management when planning for water-based recreation.
Planning and Coordination	<ul style="list-style-type: none"> Develop a drought plan to address effects of reservoir drawdown. Conduct periodic regional meetings. Conduct intercept surveys focusing on different regions each year. Continue longitudinal survey of registered boaters.

Visitor Behavior

Clearly identify the visitor boating experiences to be offered at each lake and reservoir – Objectives would be determined at a regional level; however, some water bodies or experiences may be determined as being important statewide, and thus the objectives could be set at a state level. Determining the specific lakes or reservoirs where the various experiences could be provided for each region as a part of this study. Some regions cannot provide all of the opportunities for practical reasons; for example, the Southwest region is especially arid, and there just is no place to provide for sailing. Further, some lakes or reservoirs may offer and provide more than one experience if the water body is large or if the uses are not expected to be in conflict.

Protect current unique opportunities for solitude and fishing– Use appropriate management actions to preserve solitude and quality fishing at Utah water bodies to prevent recreation succession. In areas where fishing or solitude is available, appropriate actions may include setting up wakeless speed zones, promoting nearby sites for motorized use, and perhaps even removing facilities that encourage motorized use.

Increase management consideration of non-motorized users – Non-motorized boating opportunities are scarce at Utah lakes and reservoirs. These opportunities do not necessarily need to be provided at state managed facilities, but continued consideration for their provision is important. Many non-State Park facilities are appropriate for non-motorized boating use; it is desirable that limited motorized boating occur at these locations.

Separate conflicting uses using indirect management strategies first

(where possible) – Indirect management strategies include education or non-regulatory encouragement, such as developing a boat ramp solely for a specific craft, whereas direct management strategies include area closures, and use limits. Conflicting uses (e.g., PWC and many groups, anglers, and motorized users) should be segmented using indirect methods, where possible. Managers and boaters both seem averse to segmenting (or separating) uses on a particular lake. It may not be necessary to ban certain activities at parks, but creating facilities that attract different types of visitors at different lakes or sites is an alternative strategy. For example, a PWC-only ramp could be built at one site while creating a large slow wakeless area at another for anglers. Removing facilities can serve the same purpose, but this will be initially controversial for visitors who have become accustomed to these facilities. Direct management actions should be considered if the indirect strategies are not effective.

Setting use limits should be the management action of last resort after others have failed and only after impacts to potentially displaced users has been considered—Setting a use limit should only occur after other management strategies, including expanded education, increased enforcement, and zoning, have not met desired management goals. If a use limitation is set, it is likely that the “problem” will be displaced to the closest park or water body. Further, boaters may be displaced to lakes and reservoirs, such as those managed by local irrigation districts, where there are limited facilities and resources to address potential use issues and fewer law enforcement patrols.

Managerial

Additional staffing may be necessary at parks with increased use – If management objectives or actions lead to increased use at a particular lake or reservoir, an increase in staff should be commensurate to address related use issues, including frequency of patrols. Job sharing between parks could be used to shift staff from relatively low use parks to higher use parks on weekends, for example.

Develop guidelines for expanding park revenues, and allocation of park revenue should not be based on use level alone. – Expand the use of fees for specialized uses and access (e.g., launching fees at high-use parks) and develop guidelines for sharing fees across parks statewide and within the region. Also consider Memoranda of Understanding (MOUs) with other agencies, collaborative agreements, and research grants to help increase funding for facilities and staffing. If a water body is targeted for low use consistent with objectives (such as providing for solitude), financial support for managing that water body effectively and efficiently should still be provided. Parks with higher use would ideally subsidize parks with less use.

Continue and expand boater education programs – Educational programs are supported by both boaters and managers; expanding educational programs with an emphasis on regional opportunities is suggested. One potential specific educational tool is to provide a map that highlights specialized opportunities at Utah water bodies (e.g., PWC ramp at Jordanelle). Since indirect management actions are desirable, encouraging users to visit appropriate sites is important. Related to this is the need for improving information dissemination, especially through the internet, for issues such as lake levels

and alternative opportunities. Webcams can provide information about conditions at heavily used parks or water bodies; the webcams would focus on the parking lot and conditions at the boat ramps. Many users currently call the park to assess conditions. Providing webcams would allow users to access real-time information while decreasing the impact on staff. Webcams could be best utilized at parks having parking lots that tend to fill and at parks that may serve as substitutes.

Develop plan for patrolling outlying lakes and reservoirs – Park managers and other staff at the regional meetings mentioned the propensity of users to bring unregistered boats to less frequently patrolled sites. If enforcing registration violations is a priority, it is suggested increasing patrols at these areas be considered. Collaborating with other agencies, in particular the Division of Wildlife Resources, who do patrol outlying water bodies may provide one method of patrolling these lakes and reservoirs.

Consider increased specialization and job sharing for some staff roles – The challenge of balancing many tasks could be addressed by increasing specialization in some roles. Applying a regional perspective by sharing specialized staff between parks in close proximity to one another could be useful. One example of increased specialization is a Department of Natural Resources position to address the wide array of natural resource related law enforcement issues in the area, not just specific to State Parks. These officers could support state lands on oil and gas exploration issues and DWR on fishing and hunting issues as well and focus on issues that are important seasonally (e.g., boating in summer, hunting in fall). Maintenance and administrative tasks may also lend themselves to specialization at proximate parks.

Continue and expand interagency cooperation – When considering larger spatial scales in management as the boating program does, areas not currently under State Park jurisdiction must be considered. It is important to collaborate with other governmental agencies on many tasks including planning, management, facility development, and enforcement.

Consider the role of OHV management when planning for water-based recreation – OHV management is a major issue for State Parks staff. Where possible, water-based and OHV recreation planning should be integrated. If planning is not integrated, consideration for OHV management should be made. Given the dispersed character of the OHV recreation and the need for infrastructure, inter-jurisdictional trails, dispersed management, maintenance, and enforcement, the provision of OHV activities and management in a geographic context requires regional coordination, perhaps even more so than water based recreation. OHV management appears to be especially dependent on inter- and intra-agency, including funding, trail and facilities provision, enforcement, and management.

Planning and Coordination

Develop a drought plan to address effects of reservoir drawdown – The plan would account for which water bodies are less affected by drought or which reservoirs could be kept at usable or even desirable levels while other lakes and reservoirs in a region may be drawn down. Also, potential changes in the climate leading to increased periods of drawdown magnify the importance of these plans. Perhaps drought planning could take advantage of watershed forecast models; critical values (such as the bottom of

a boat ramp) could be incorporated into models, and maintaining these levels at one or two reservoirs could be modeled to evaluate if this is possible while still maintaining water deliveries to agricultural and other water users.

Conduct periodic regional meetings – The regional meeting presents an excellent opportunity for staff to discuss problems and management options regionally. These meetings would monitor/evaluate existing provision of recreation opportunities, identify new problems/issues (if any) and optional collaboration opportunities, and consider appropriate management strategies.

Conduct intercept surveys focusing on different regions each year – Data collected from these surveys provide key information about experiential opportunities, social-psychological dimensions, and management preferences for parks. These preferences do not necessarily dictate policy and management strategies but can help identify conflicts' sources, missing or unique recreational experiences, and estimates of acceptability and educational needs related to alternative management strategies. These surveys can also assess if managerial objectives are being met at different units.

Continue longitudinal survey of registered boaters – The registered boat owner survey completed for this study partially replicated surveys completed in 1994 and 1999. Of concern, the proportion of the population who only use cell phones is likely to continue to increase, and the subsequent potential for increasing non-coverage error presents challenges for future researchers attempting to obtain scientifically valid samples. Given the list of registered boaters includes only the boaters address and phone numbers have to be searched on-line, it is worth considering conducting the next statewide survey as a mail survey. Data should be collected via telephone if it is still feasible to obtain a

reasonable response rate; otherwise, a multi-wave mail back survey could be conducted (Dillman, 2007). This will provide the Division of Parks and Recreation with longitudinal data and allows potential changes and trends to be tracked over time. The statewide survey provides insight into the management issues associated with Utah water bodies with both occasional and frequent users being interviewed. Further, boaters who did not visit State Parks, but register their boats in Utah, can be reached by this approach.

CURRICULUM VITA

William Spain, Ph.D.**Boulder Creek, CA 95006****E-Mail: bilspain@yahoo.com****Education**

Ph.D. **Human Dimensions of Ecosystem Science and Management**, Utah State University
(2012)

M.S. **Recreation Administration**, San Francisco State University (2000)

B.S. **Physical Science (Earth Science Option)**, California State University, Chico (1995)

B.A. **History**, California State University, Chico (1995)

Areas of Expertise

Recreation Resource Management

- Water-based Recreation
- Recreation Planning
- Visitor Behavior

Human Dimensions of Natural Resource Management

- Natural Resources Policy, Planning, and Management

Water Policy and Issues in the Western United States

FERC Relicensing

Work Experience

• **Project Scientist**, Cardno/ENTRIX, Sacramento CA 2008-Present

Worked on a variety of environmental projects, including FERC relicensing and CEQA/NEPA, throughout California with an emphasis on water-based issues. Designed field surveys, led data collection efforts and managed field crew, maintained databases, analyzed results and wrote reports for these projects. Worked with a broad array of stakeholders when completing and conducting the appropriate studies, including representatives of local, state, and federal agencies, utilities, recreationists (including boaters and beach users), and local residents.

As a part of FERC relicensing and compliance, assessed the effects of reservoir operations and proposed changes and its implications for recreation access, estimated existing and future recreation use, and determined appropriate management objectives. The projects under study

were throughout the Sierra Nevada range including along the west slope (Feather River, the American River, Stanislaus, Upper San Joaquin River Basin, Tule River, and the Kern River) along with projects along the eastern slope above Mono Lake and within the Owens River watershed.

Designed analyses to evaluate effects of changes to river regime based on proposed dam removal on Klamath River to whitewater rafting resources and other river-based recreational activities. Project models included changes to water supply as expected due to potential climate change. Worked in collaboration with multiple federal agencies developing research strategies, including Reclamation, Bureau of Land Management (BLM,) USFS and National Park Service (NPS).

Developed a long-term plan to determine appropriate level of commercial services at New Melones Lake, a Reclamation-managed reservoir located in the Sierra Nevada foothills, based on biophysical, social, and managerial factors.

As a part of CEQA/NEPA, projected effects of various proposed projects on recreational and wilderness resources, including introduction of Piute Cutthroat Trout. Also evaluated the effects of proposed in-water gates to manage water deliveries and protect smelt on the Sacramento-San Joaquin Delta.

- **Instructor and Graduate Researcher**, Institute of Outdoor Recreation and Tourism Utah State University, Logan UT 2004-2008

Worked on several natural resource-based recreation studies throughout Utah including the Grand Staircase of the Escalante National Monument Front Canyon Management Plan and Study, and a survey measuring Utah residents' attitudes towards State Parks. Developed a statewide plan for managing recreational water bodies throughout Utah regionally by applying a multiple methods (both qualitative and quantitative) multi-scale research approach.

- **Outdoor Recreation Planner**, EDAW, Inc., Seattle WA 2002-2004

Worked on several FERC hydroelectric relicensing and compliance projects throughout California and the Pacific Northwest including projects along the Feather and Klamath Rivers. The primary focus of the work was assessing project and proposed effects to recreational resources. Made presentations to collaborative workgroup that included local residents, representatives of local city and county governments, business and environmental interests, and representatives of state and federal resource agencies. Other project experience included working on a Visual Resource Assessment for Puget Sound Energy (PSE) in the vicinity of Mount Baker in Washington State.

- **Outdoor Recreation Assistant / Park Services Attendant**, East Bay Regional Park District, Oakland, CA 1998-2001

Administered outdoor recreation programs for a public agency serving a diverse constituency in the San Francisco Bay Area. Developed and managed contracts with local outfitters who provided programs offered to the public. Drafted evaluation reports using statistical procedures that determined the effectiveness of the agency's outdoor programs. Also assisted with planning and implementation of district wide events including fishing derbies, family camping events, drama camp and events for seniors.

- **Graduate Assistant**, San Francisco State University, San Francisco, CA 1998-1999

Developed quarterly and yearly reports for the California Department of Water Resources that evaluated the effectiveness of their visitor centers' education program. These centers were located in Northern and Southern California and informed visitors about the California State Water Project and water conservation issues. Coordinated and facilitated staff training for several San Francisco Bay Area municipal and private recreation organizations. The staff training component utilized low ropes course activities and challenges.

- **Tour Leader**, TrekAmerica, Gardena, CA 1996-1997

Led international groups on multi-week outdoor adventure tours throughout the United States, with an emphasis on National Parks. Required extensive planning, driving, natural interpretation, along with the ability to work independently and to understand group dynamics.

- **Hydrologic Technician**, Mendocino National Forest, Covelo, CA 1995

Involved in the prevention and control of erosion due to roads, forest management and recreation use. Conducted a habitat survey for the Northern Spotted Owl. Participated in Steelhead counts on a protected reach of the Middle Fork of the Eel River. Assisted in the operation of a USFS nursery that supplied conifers, as well as native plants and grasses for National Parks and Forests throughout California.

FERC Project Experience

Have worked on water-based projects throughout the Western U.S. with extensive experience with FERC relicensing and compliance.

- Big Creek Projects (Upper San Joaquin River Basin), CA Southern California Edison (SCE)
- SCE Eastern Projects (Tule River, Klamath River, Lee Vining Creek, Mill Creek, Bishop Creek), CA SCE
- Stanislaus - Spring Gap (Pinecrest Lake), CA Pacific Gas and Electric (PG&E)
- Middle Fork of the American River, CA Placer County Water Agency

- Oroville Facilities (Feather River), CA CA Department of Water Resources (DWR)
- Klamath Project, CA/OR PacifiCorp
- Upper North Fork of the Feather River, CA PG&E
- Baker River Project, WA Puget Sound Energy

Other Project Experience

- Grand Staircase of the Escalante Front Country Management Plan and Study, UT BLM
- Recreational Water Use Issues and Regional Planning on Utah Lakes and Reservoirs Utah State Parks
- Commercial Services Plan, New Melones Lake, Stanislaus River, CA Bureau of Reclamation
- Piute Cutthroat Trout Restoration Project, Silver King Creek, Alpine County, CA Fish and Wildlife Service / CA Fish and Game
- Klamath River Proposed Dam Removal EIR/EIS Bureau of Reclamation
- Water System Improvement Program San Francisco PUC
- Evaluation of California Department of Water Resources Education Program (Survey of Visitor Center Guests) DWR

Teaching Experience (Utah State University)

Instructor of Record: 2004-2006

ENVS 4500 Wildland Recreation Behavior

An upper division undergraduate course concentrating on the social science, ecological, and management aspects of natural-resource based recreation.

Classes assisted or team taught:

ENVS 6800 Environment and Society Department Seminar 2006

ENVS 6500 Behavioral Aspects of Wildland Recreation (Graduate Level) 2006-2007

Professional Competencies

- Skilled in both quantitative and qualitative data collection techniques
- Experienced with SPSS along with data management and analysis
- Survey design
- Experience working with multidisciplinary teams