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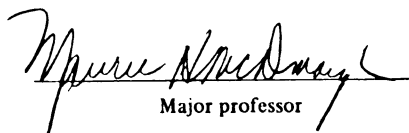
EVALUATION OF MANAGERS' AND VISITORS'  
PERCEPTIONS OF WILDERNESS CONDITIONS  
AT THE NORDHOUSE DUNES WILDERNESS AREA

presented by

Amy Lynn Wiita

has been accepted towards fulfillment  
of the requirements for

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Major professor

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**EVALUATION OF MANAGERS' AND VISITORS' PERCEPTIONS OF  
WILDERNESS CONDITIONS AT THE NORDHOUSE DUNES WILDERNESS AREA**

**By**

**Amy Lynn Wiita**

**A THESIS**

**Submitted to  
Michigan State University  
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## **ABSTRACT**

### **EVALUATION OF MANAGERS' AND VISITORS' PERCEPTIONS OF WILDERNESS CONDITIONS AT THE NORDHOUSE DUNES WILDERNESS AREA**

By

Amy Lynn Wiita

This study addressed the need for an understanding of the characteristics and perceptions of visitors, and managers' perceptions of the Nordhouse Dunes Wilderness Area. On-site exit interviews were conducted from May 1993 to March 1994. Five hundred six individuals comprising 285 groups were interviewed; 166 people refused to participate in the study. Information was collected on visitation to the wilderness area, visitor characteristics, visitor travel patterns, what "wilderness" means to visitors, visitors' perceptions of current wilderness conditions, visitors' preferences for ideal wilderness conditions, and acceptable levels of encounters in the wilderness area. Managers' perceptions of wilderness conditions were obtained from documented statements from Forest Service personnel and project meeting notes. Managers' and visitors' perceptions differed for a variety of wilderness conditions. Recommendations for additional research on wilderness perceptions, inclusion of public participation in the management process, and a re-evaluation of the 1964 Wilderness Act are presented.

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**This thesis is dedicated to my late father Adelbert E. Gieche who graduated as a forester from Michigan State University in 1952. I hope to be able to meet the challenges and help realize his visions.**

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## **SECTION 1**

### **INTRODUCTION**

The National Wilderness Preservation System stretches across the nation encompassing approximately 91 million acres. It is by means of the 1964 Wilderness Act that these lands are defined as wilderness. But, does everyone define wilderness in the same manner as the Wilderness Act? Does simply designating an area as wilderness determine that this area will be perceived the same way by all? Merigliano (1990) points out that mere designation of an area as Wilderness does not ensure that desired environmental and experiential conditions will be achieved. Therefore, who is to say that with designation all will perceive a wilderness in the same way. The Wilderness Areas of the United States are a valuable natural resource capable of providing many pleasures and benefits to all. Managing these lands has been the responsibility of natural resource agencies and their staff. It is vital to the preservation of these lands that the perceptions of both managers and visitors alike be investigated to formulate efficient and effective management frameworks for each Wilderness Area.

Managers' and users' perceptions often vary (Hendee and Harris, 1970, Downing and Clark, 1978). How then can managers effectively manage wilderness areas for the public if they do not have a thorough understanding of their clients perceptions? The

answer to this question is that managers must obtain a thorough understanding of their clients. Managers must reevaluate their role in resource management and begin to investigate what their clientele desires. Managers' roles are changing and becoming one of a facilitator rather than an autonomous decision maker (Tipple and Wellman, 1989).

The public is increasingly becoming more interested in taking an active role in the management of natural resources and therefore, bringing to the forefront of natural resource management the concept of public participation. Management frameworks for the natural resources such as the Recreation Opportunity Spectrum and Carrying Capacity have not employed user or public participation with a bottom-up framework to ensure appropriate wilderness conditions for both the user and the ecological environment of the wilderness area. In an effort to seek public input the Limits of Acceptable Change (LAC) management framework was developed (Stankey et al. 1985). It is still however, most often implemented as a manager driven process that employs public participation at selective stages. In contrast, a bottom up oriented participation process where visitors would be included in the planning, decision making, and implementation processes as equal partners with resource managers would facilitate resource management at all levels. To effectively manage Wilderness for its users, managers must seek a better understanding of their clients and use the knowledge clients possess to enhance their management practices. The key to wilderness management is a cooperative learning relationship between managers and their clientele.

The purpose of this study was to examine the differences between managers' (USDA Forest Service personnel) and users' perceptions of wilderness conditions in the

Nordhouse Dunes Wilderness Area. The study also described the existing users, their travel patterns, preferences, and perceptions to provide managers with a better understanding of their clientele. This thesis reports the formal findings of this study and examines the importance of public participation in the framework for managing wilderness as a resource.

## **SECTION 2**

### **LITERATURE REVIEW**

#### **2.1 Defining Wilderness**

##### **2.1.1 The Wilderness Act of 1964**

On September 3, 1964 Congress passed Public Law 88-577, an act, which was to "establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes" (PL 88-577 Wilderness Act, 1964). The basis for the establishment of such a system was the belief that with increased population in the United States all lands would become developed and modified from their original uninhabited state. Therefore, to preserve some lands in their wilderness state, the Wilderness Act was developed.

With the 1964 Wilderness Act came the first legal definition of the term wilderness. The Wilderness Act defines wilderness in the following manner:

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

This definition set the groundwork for how managers of wilderness areas would come to perceive wilderness.

### **2.1.2 The Eastern Wilderness Act of 1975**

The 1964 Wilderness Act designated lands as Wilderness only in the Western United States. Therefore, to encompass lands in the Eastern United States, on January 3, 1975 the Eastern Wilderness Act was developed to "further the purposes of the Wilderness Act [1964] by designating certain acquired lands for inclusion in the National wilderness Preservation System, to provide for study of certain additional lands for such inclusion, and for other purposes" (Eastern Wilderness Act, 1975). The Act designated specific lands as wilderness in the Eastern United States and also designated areas as Wilderness Study Areas which were areas to be reviewed within ten years for their suitability for wilderness designation. The Eastern Wilderness Act put the concept of wilderness into legal terms in the Eastern United States. No longer would legally designated wilderness be a concept to be attributed solely to the Western United States.

### **2.1.3 Michigan Wilderness Act of 1987**

January 6, 1987 the Michigan Wilderness Act was enacted to "designate certain public lands in the State of Michigan as wilderness and for other purposes" (Michigan Wilderness Act, 1987). It was in this wilderness act that the Nordhouse Dunes Wilderness Area was legally designated as wilderness. Although the size of the Nordhouse Dunes Wilderness Area is small in comparison to other wilderness areas (3,450 acres) the act stated that it was not intended that buffer zones be created around

designated wilderness in the state of Michigan. Therefore, nonwilderness activities which could be seen or heard from within a wilderness area were to be permissible up to the boundaries of the wilderness. This permits the use of motor craft on the area of Lake Michigan that borders the wilderness as well as nonwilderness activities in the developed Lake Michigan Recreation Area and Ludington State Park which also border the wilderness.

#### **2.1.4 The Recreation Opportunity Spectrum**

How does recreation fit into the framework of multiple-use land management as it is specified in the 1964 Wilderness Act? The recreation opportunity spectrum (ROS) was developed to address this issue. The ROS framework as outlined in Driver et al. (1987) "involves specifying recreational goals in terms of broad classes of recreation opportunity, identifying specific indicators of these opportunities that permit their operational definition and defining specific standards for each indicator that make distinctions among the opportunities possible." Driver et al. (1987) continue by indicating that ROS is then made operational by means of fourteen assumptions. The assumptions outline what recreation is, the three components of recreation (behavior, setting and experience), the three types of settings (physical, social and managerial) and how these components interact and pertain to ROS. The basic concept of ROS is that people participate in preferred recreation activities, within preferred environmental settings, in order to attain satisfactory experiences (Driver 1976; Brown et. al. 1979). The recreation opportunity spectrum can facilitate the land use planning process and serve as a tool in land use management.

The United States Forest Service (U.S.F.S.) has operationalized the ROS framework by dividing the spectrum of opportunities into six broad classes. The classes consist of primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban (Buist and Hoots 1982). The U.S.F.S. then identifies settings based on five indicating criteria (remoteness, size, evidence of humans, user density and amount and noticeability of managerial regimentation or control). These characteristics of the setting are used to indicate the kinds of experiences the recreationist is most likely to obtain [from that setting](Buist and Hoots 1982). In this way the U.S.F.S. can use ROS to label given areas according to managers' perceptions of what a given setting has to offer a recreationist. What is lacking in this planning strategy is the answer to whether or not the recreation opportunity spectrum, as it is applied by the U.S.F.S. and other land management institutions, is classifying lands in the same way as a recreationist on these lands would. ROS classifies wilderness as primitive to semi-primitive.

It is not known to what degree recreational experiences are influenced by settings, behaviors and activities. The recreation opportunity spectrum's integration of recreation activities, settings, and experiences is based on planners' and managers' perceptions of these unknown relationships. Virden and Knopf (1989) recognized in a study of recreationists in southwestern Colorado that some desired experiences are more activity-dependent, while others are more setting dependent. They also recognized that desired experiences for a given activity might be independent of environmental setting, while for other activities those same desired experiences might be setting dependent. Without knowing the manner in which activity, experience and setting interact as perceived by

recreationists, who is to say that managers and planners are correctly correlating these assumed components of recreation with land classifications? This indicates the need for systematic feedback from recreationists to better understand their desires and preferences (Heywood et al. 1991). Simply categorizing an area as having the resources to provide particular recreational experiences as managers perceive it may not mean that recreationists will perceive the area as providing the same opportunities. "Wilderness" for one person may mean an area of a minimum of a million acres where he or she will not encounter another recreationist for days, if ever. For another person "wilderness" may constitute an area less than 4,000 acres with periodic encounters with other users. Further research is need to ascertain the appropriateness of the assumptions on which ROS is based (Driver et al. 1987).

## **2.2 Wilderness Use**

### **2.2.1 Visitors**

In an attempt to manage wilderness for wilderness users an understanding of these users is essential. "Information on visitors can help wilderness policy makers, managers, and researchers understand the distribution of wilderness benefits among various clientele groups, the behavior of users, and the causes and potential solutions to visitor caused social and ecological impacts in wilderness (Watson et al. 1989)." Roggenbuck and Watson (1989) indicate that assessing visitation to wilderness areas requires an understanding of three components of wilderness use: the total amount of use, characteristics of that use and characteristics of the wilderness user. The authors summarized overall use conditions for the National Wilderness Preservation system and



reported on the aforementioned components of wilderness use. Traditional characteristics of users and their use such as age, gender, residency, length of stay, and activities as well as others were addressed as information useful to the management of wilderness.

Who is to decide what are the appropriate characteristics that should be examined when attempting to identify wilderness visitors and the characteristics of their use?

Young (1983) indicates that variables may vary for identifying who will use a wilderness versus how much a person will use a wilderness area. Young (1983) also found that nondemographic variables were more important indicators than certain traditional demographic variables. Amount of use may be better analyzed through the use of constraining parameters such as number of children and amount of vacation. Young stated that "it seems that users have a relatively high set of wilderness values, and the amount of use they make of the wilderness is not determined by their degree of wilderness commitment, approval, or knowledge, but by how much time they have available and how easy it is to make a wilderness trip."

Public and user involvement is critical when gathering information on wilderness users and potential wilderness users. The relationships which can be developed between managers and their clientele, who receive personal benefits from resource management, will increasingly become a factor in the success of the managing agency (Roggenbuck and Watson, 1989). There is a need for baseline data on wilderness conditions and use for most U.S.F.S. managed wilderness areas (Watson et al. 1992). Therefore, who better to ask than the users themselves about how, when and where they recreate?

### **2.2.2 Crowding**

Crowding in wilderness areas is often a concern of wilderness managers. The concept of carrying capacity in recreation settings was developed to address this issue. However, it may not always be the level of encounters that is of issue to wilderness users but, rather, the type of encounters. Gramann and Burdge (1984) in their study of recreationist in central Illinois, indicated that use levels should be assessed in terms of both "physical tolerance" and "behavioral tolerance." Physical tolerance is tolerance based on the proximity of users to one another due to use levels. Behavioral tolerance is based on the tolerance for types of behaviors exhibited by other users. A few incompatible encounters may influence perceptions as much if not more than a larger number of compatible encounters. Gramann and Burdge (1984) continue that "simply limiting use, therefore, will not necessarily reduce the proportion of visitors feeling crowded, although it may produce a decline in the frequency of crowding reports, since the number of potential reporters will be less."

Displacement of users from a given area is also not necessarily inevitable with increased levels of use. Kuentzal and Heberlein (1992) determined that for users of the Apostle Islands in northern Wisconsin intrasite displacement was an effective coping strategy for visitors as use levels increased. Williams et al. (1991) indicated that further research is needed that addresses the socialization process for encounter norms. The lack of knowledge regarding what constitutes crowding for a wilderness user and how coping strategies are employed in given situations by these users supports the need for user participation in the research and management processes for wilderness areas. Simply

limiting use is no longer a suitable solution to the crowding phenomenon. Perhaps with a cooperative effort between managers, researchers and users, greater insight may be obtained concerning crowding in wilderness areas.

## **2.3 Wilderness Perceptions**

### **2.3.1 Perceptions**

Perception as related to landscape, is identified as involving the reception and processing of information gleaned from the landscape (Zube, 1975). Zube continues to state that the landscape acts as the stimulation and as the information for an organism. But, perception is also influenced by individuality. Perception is influenced by and individuals' experiences, values, beliefs, attitudes, social and economic well-being, and by ones' expectations for the future (Zube, 1975). Therefore, wilderness may be perceived in as many different ways as there are different people with different experiences and values.

Kaplan and Kaplan (1982) outline the multitude of factors which are involved when the human mind perceives the environment. Perception of the environment is based on experience, familiarity and space to name but a few factors. The mind, when perceiving its environment, summarizes attributes with which it is familiar to identify that current environment. According to Kaplan and Kaplan (1982) when representing the environment which one is perceiving, four aspects influencing perception are involved: simplicity, essence, discreteness, and unity. Using these concepts one arrives at a mental picture or feeling which describes an environment. This representation is then used to form a cognitive map which associates time and space with a given environment.

Therefore, an individual can begin to predict what attributes are associated with given environments and act or react with some cognition. A person would most likely expect different attributes from a parking lot than he or she would from park once he or she had experienced these two environments. Cognition is formulated based on both similarity (unity) and dissimilarity (discreteness).

What does perception mean for the concept of wilderness? Individuals can perceive their environment in many different ways as perceptions are based on various experiences, levels of familiarity, and spatial settings. This supports that not only will two different users of the same wilderness area have differing perceptions of that environment but managers will also have differing perceptions. In fact, the same visitor to a wilderness area at a different point in time may often have a differing perception than that of a previous visit. Managers of a wilderness have a different association, familiarity level and intention for a given wilderness environment than do the users of the same wilderness. Even if a manager was to recreate in the wilderness he or she manages, perceptions of the wilderness conditions would vary from those of users. Essentially, the cognitive maps of managers differ from those of users. Leff (1978) proposes that an individual can control to some degree the quality of an experience by consciously controlling how he or she processes information and limiting what we choose to concern ourselves with in the environment. Williams (1986) states that "the more researchers understand the interrelations between the way people perceive and process information from the environment and the nature of human experience, the more freedom participants and managers will have to provide opportunities for the kinds of experiences most highly

valued." This further supports the importance of cooperative relationships between managers and their clientele so as to facilitate wilderness management.

### **2.3.2 Managers' Versus Users' Perceptions**

Downing and Clark (1978) state that it is management concerns with impacts that have frequently led to constraints on users. But what if these concerns are based on misperceptions of user impacts and behaviors? Downing and Clark's study of visitors to three forest areas in the Pacific Northwest and managers in the U.S.F.S., Bureau of Land Management, Oregon Department of Forestry, and the Washington Department of Natural Resources found that managers and recreationists do not always share the same perceptions. Managers tended to rate recreation impacts as more serious than did users. Perceptions of managers and visitors varied concerning issues of vandalism and theft, fire, logging traffic accidents, recreationist conflicts, and impacts of human waste. Overall "in dispersed recreation areas many impacts which distress managers are not regarded as serious by recreationists" (Downing and Clark, 1978).

When looking at foresters' perception of wilderness user attitudes and preferences Hendee and Harris (1970) noted that foresters correctly perceived users' reactions to two-thirds of various wilderness management policies and behavior norms. Managers did however have a variety of misperceptions concerning users' attitudes and perceptions. Managers mistakenly perceived users as being in favor of recreational development in wilderness settings, having primarily purist philosophies, and being clearly opinionated in their wilderness views. Managers' perceptions of users are biased due to their role in wilderness management. Hendee and Harris (1970) indicate that "a continuing challenge

to wilderness and other resource managers is to learn more about their clientele: who they are, where they come from, and how they feel about management policies.”

A study identifying managers' perceptions of recreational horse use by Shew et al. (1986) looked solely at managers' perceptions. Users' perceptions of recreational horse use were not identified and it is therefore not known if and how the perceptions may have varied. The need for managers to seek an understanding of their clientele was briefly addressed but the study showed no attempt at user involvement. This top down management approach where recommendations are made solely on the basis of managers' perceptions is nonparticipatory and ultimately impedes the management process. The support of users in the predecision and decision making processes facilitates the implementation of forest management and is vital to the success of the natural resource.

A study by Absher and McAvoy (1986) found that managers and commercial users were in agreement with their support for maintaining wilderness values along the Upper Mississippi River. Rosenthal and Driver (1983) indicated that they found that managers' perceptions of skiers preferences were representative of skiers stated preferences. Discrepancies did however exist. Managers underestimated the importance of three out of five experiences most highly valued by the users. Rosenthal and Driver (1983) state that "managers need a good, not perfect, understanding of the types of experiences that ski-tourers prefer." Who is to define what reasonable is however? It should not be assumed that managers inherently do not know what their clientele desire but, one should not assume that managers' perceptions are correct simply because they

hold the title of manager. With public involvement managers are more likely to begin to obtain a "reasonable" understanding of users.

How does the changing of a land use designation effect users' perceptions of the area? Fedler and Kuss (1986) studied the effect of changing the management designation from backcountry to wilderness for an area. It was found that designation did impact users' perceptions of the area. This supports others such as Anderson and Brown (1984) who have suggested that changes in the management direction of an area from backcountry to wilderness could result in the displacement of some traditional visitors. Designation, whether it be ROS, LAC, or other, is yet another way in which managers' and wilderness users' perceptions of a given area can be influenced.

## **2.4 Wilderness Management**

How is it that one is to manage a natural resource? Robert Behn (1988) gives animated insight on the process of managing. According to Behn, managers should manage by groping along and wandering around in an effort to get to that management goal they feel they should be attaining. "An excellent manager has a very good sense of his objectives but lacks a precise idea about how to realize them." Groping is not to imply random managing with no purpose. Groping has purpose but allows for the flexibility necessary to manage effectively and efficiently.

Wandering around is also a key to good management. Behn (1988) states that "Managers need to get information more personally and directly from the people affected by their decisions." Wandering around supports the need for input from the public in the

management process. Who are the clients and what do they want? These are the questions managers should be asking.

Charles Linblom (1959) argues against the rational-comprehensive method of managing which is too logical to be feasible. Managers can over plan and limit the management process to the point that it is ineffective. Incrementalism does not allow for change. It builds on past experiences and makes only minor changes. There is no original thought processes involved in incrementalism. The process does not employ the notions of risk or change. Cates (1979) indicates that incrementalism is best suited to a stable environment. Cates addressed natural resource management as a non-stable environment best suited to addressing ever changing issues. She suggests creativity as a management technique for the natural resource arena. Creativity employs asking questions and welcoming new input from the public, clients, other managers--whomever or whatever it takes. Creativity also employs the risk of failure. Failure can be recognized as a new challenge rather than as a fear that stifles innovation (Cates, 1979).

#### **2.4.1 A Changing Paradigm**

Bonnicksen (1991) identifies managers of natural resources as mediators between society and the physical environment from which resources are derived. As a mediator a manager needs a framework for organizing the relationships among resource managers, the society they serve, and the resources upon which they depend. Bonnicksen presents the biosocial model as this framework. This model assumes a process of mutual adjustment exists between a society and its physical environment and represents



functional relationships. With this model managers can assess the changes in the relationships that result from management practices.

Society and its views of the natural resources and the role management should play in their management is changing. McCool (1989) points out that wilderness, as a land designation, is a cultural institution. As such, its meaning - and management - reflects the social and cultural norms dominant at any given point in time. McCool also states that "as our culture evolves, we can expect a parallel evolution in definitions of wilderness." Managers therefore, must keep abreast of changing cultural values and expectations. McCool presents various obstacles to managing wilderness amidst cultural change. A recurring theme is that of a lack of knowledge about natural resource processes and clients. "We know far too little about the people who use wilderness and how they use it. Certainly, our ability to manage wilderness is influenced by our knowledge of what people seek from it" (McCool, 1989).

Public involvement in the management process is again analyzed by Shindler et al. (1993). Shindler's study surveyed people to assess public preferences for federal forest policy and opinions regarding public involvement in decision making. The vast majority of the people surveyed supported increased public participation. When asked to whom the managers should listen, participants responded with "local affected communities." "The message [from the public] here for forest resource agencies is they must adjust management strategies more quickly to adequately reflect public preferences and attitudes" (Shindler et al. 1993).

Contrary to the public involvement frame of mind supported by Shindler et al. (1993) is the survey of National Park Service managers by Marion et al. (1993). In this study managers were surveyed to determine the prominent management problems for the National Park System. The problems identified were based on management's perceptions and public or user involvement was not involved. The study presented a comprehensive account of managers' perceptions of backcountry problems in the National Park System. It was recognized that more formal research and monitoring of backcountry conditions would help validate the observational data of the study. Clark (1986) addresses the need for information concerning wilderness user characteristics for effective resource management. This baseline information permits managers to recognize changing conditions in the wilderness and with its users. Clark points out the need to study people who do not participate in wilderness recreation as well off-season recreationists. Clark indicates the "great need" for studies regarding wilderness and nonwilderness users on a regional, national and international basis.

#### **2.4.2 Monitoring Conditions**

Monitoring is a critical aspect of managing wilderness areas. It is vital that wilderness conditions and users are monitored on a periodic basis to identify changes in the wilderness environment. Monitoring provides managers and publics with relatively up-to-date accounts of the complex interactions that take place in a wilderness area. A 1991 report from the task force on monitoring for wilderness conditions indicates the critical need for monitoring in wilderness areas given that wilderness is often in unique

and fragile environments. Monitoring allows managers to identify whether management goals are being achieved and if changes in management strategy are needed.

The importance of monitoring wilderness conditions as well as the wilderness recreation experience is addressed by Merigliano (1990) in two papers presented at the conference on Monitoring America's Enduring Wilderness Resource. Simply designating a location as Wilderness does not guarantee that the desired (by management) ecological and social conditions will be realized. Monitoring identifies how conditions are changing and informs management of new challenges. Merigliano supports the use of indicators which are defined as "specific elements of the wilderness setting which change in response to human activities." Indicators are used in such wilderness planning frameworks as the Limits of Acceptable Change and Visitor Impact Management. Indicators do not, however, identify if the changes occurring are acceptable nor the causes of the changes. Chilman et al. (1989) note the importance of monitoring both the physical and social aspects of the wilderness environment. In the effort to monitor these conditions Chilman et al. (1989) identifies the importance of public input and the necessary cooperative learning relationships that need to be fostered between managers and their clientele.

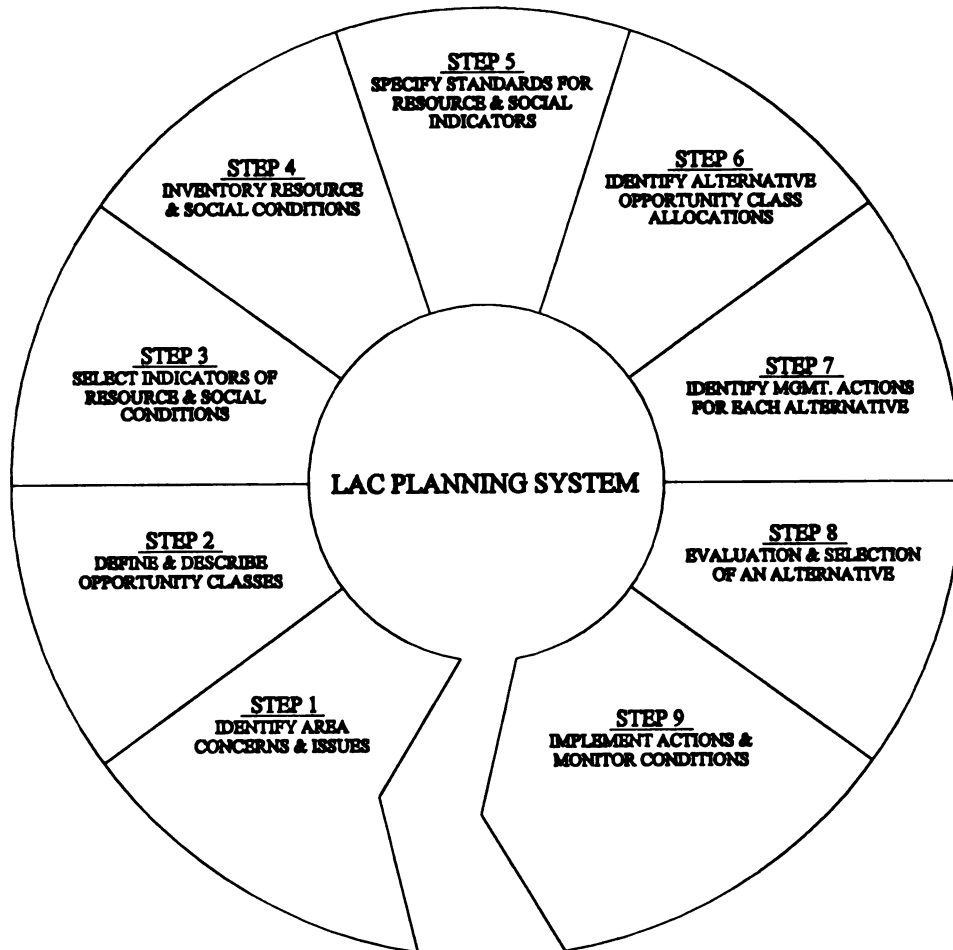
### **2.4.3 Limits of Acceptable Change**

The Limits of Acceptable Change (LAC) process is a planning framework for natural resource managers which aids in establishing acceptable resource and social conditions in recreation environments. Stankey et al. (1985) outline the process in detail identifying the focus of LAC and the nine steps which it entails. The process consists of

identifying issues and concerns, defining opportunity classes (based on ROS), selecting indicators of resource and social conditions, inventorying current conditions, specifying standards for resource and social conditions, identifying alternative ROS classes, identifying management activities for each alternative, evaluating and selecting an alternative, and implementing actions and monitoring conditions (Figure 1) (Stankey et al. 1985).

The LAC process "requires deciding what kind of wilderness conditions are acceptable, then prescribing actions to protect or achieve those conditions" (Stankey et al. 1985). The question then becomes who decides what conditions are acceptable and how to achieve those conditions? As McCool (1986) stated, LAC and public involvement go hand in hand. Public involvement in LAC results in greater acceptance of the process and establishes ownership in the process for both managers and the public. Public involvement can be employed at various levels of the LAC process.

Defining standards for wilderness conditions is an important and basic aspect of the LAC process. Shelby et al. (1992) outline the importance of standards as establishing a foundation from which resource managers can work. Standards provide a reference point from which change in the wilderness environment can be monitored. Standards help to define the acceptable range for wilderness conditions and are a basis for judgement of wilderness conditions. Shelby et al. (1992) cautions that the employment of standards can lead to rigid forms of management and can be treated as regulations instead of guidelines.



**Figure 1: The Limits of Acceptable Change (LAC) Planning System**

Standards are quantitative or highly specific measures assigned to indicators (Stankey et al. 1985). To clarify, an indicator of solitude might be “other parties camped within sight or sound at night” and the standard for this indicated condition may then be “no other parties camped within sight or sound” (Stankey et al. 1985). Standards provide a means by which one is able to measure resource conditions. Public involvement in the process of establishing standards makes the process interactive between managers and their clientele and benefits both parties by facilitating the management process.

Whittaker (1992) indicates the importance of attempting to determine which impacts matter more in the wilderness environment and the importance for developing standards for these impacts. Which impacts matter more to whom? Whittaker states that what is at issue is whether managers' perceptions of what is important is the same as users' perceptions. In his study it was determined that there are a variety of factors which have varying degrees of potential to detract from a visitor's wilderness experience. Results support those of crowding studies in that it may not always be the number of encounters that are critical but rather the types of encounters (i.e., rude behavior). It is important to not limit the range of indicators to choose from as well as the sources of input for evaluating indicators. Excluding user input from the process may eliminate valuable information otherwise unavailable to resource managers.

Mitchell (1992) identifies the importance of determining standards on a case by case level rather than attempting to determine uniform standards across wilderness areas in general. Only with tailoring to the needs of specific areas can standards have appropriate meaning. Mitchell believes that the Wilderness Act legislation is an adequate

unifying component of the wilderness system and management should be on an individual wilderness basis. Standards should not be employed to provide uniformity but as guidelines to provide desired (by both managers and users) wilderness conditions. This is not to say managers from one area can not learn from others. Mitchell believes that "management objectives and standards should be developed by federal managers interactively with their constituents, following research on sociological and natural indicators and values."

Roggenbuck et al. (1993) states that "human use of wilderness is not only acceptable, it is a part of the wilderness mandate. [But] with human use comes unavoidable impacts." The LAC process focuses on system outputs to attempt to manage these impacts on wilderness from humans. It is once again illustrated in Roggenbuck et al. (1993) that the views of the users are critical as wilderness is largely a cultural resource. In the change toward defining acceptable conditions in the wilderness environment and incorporating public opinion and knowledge, processes such as the limits of acceptable change are constantly evolving and new processes are being developed. As part of this evolving paradigm, Chilman et al. (1989) present refinements on the LAC process and Hof et al. describe the Visitor Experience and Resource Protection (VERP) process for addressing visitor carrying capacity in the national park system.

The concept of wilderness has evolved from a legislative mandate which first encompassed the western United States and then the eastern United States to a mind set for a management framework. It is now recognized that this management framework

does not only involve the natural resources and their managers, but also those people who use the natural resources. The role of managers is changing to that of a facilitator and the role of the public to that of an active participant (Tipple and Wellman 1989). Managers must begin to seek an accurate understanding of their clientele. Public participation can provide vital knowledge of wilderness conditions otherwise unavailable to managers. It was with this intention of grasping a better understanding of their clientele that managers of the Nordhouse Dunes Wilderness Area embarked on a study of the users of the wilderness area using the LAC process.



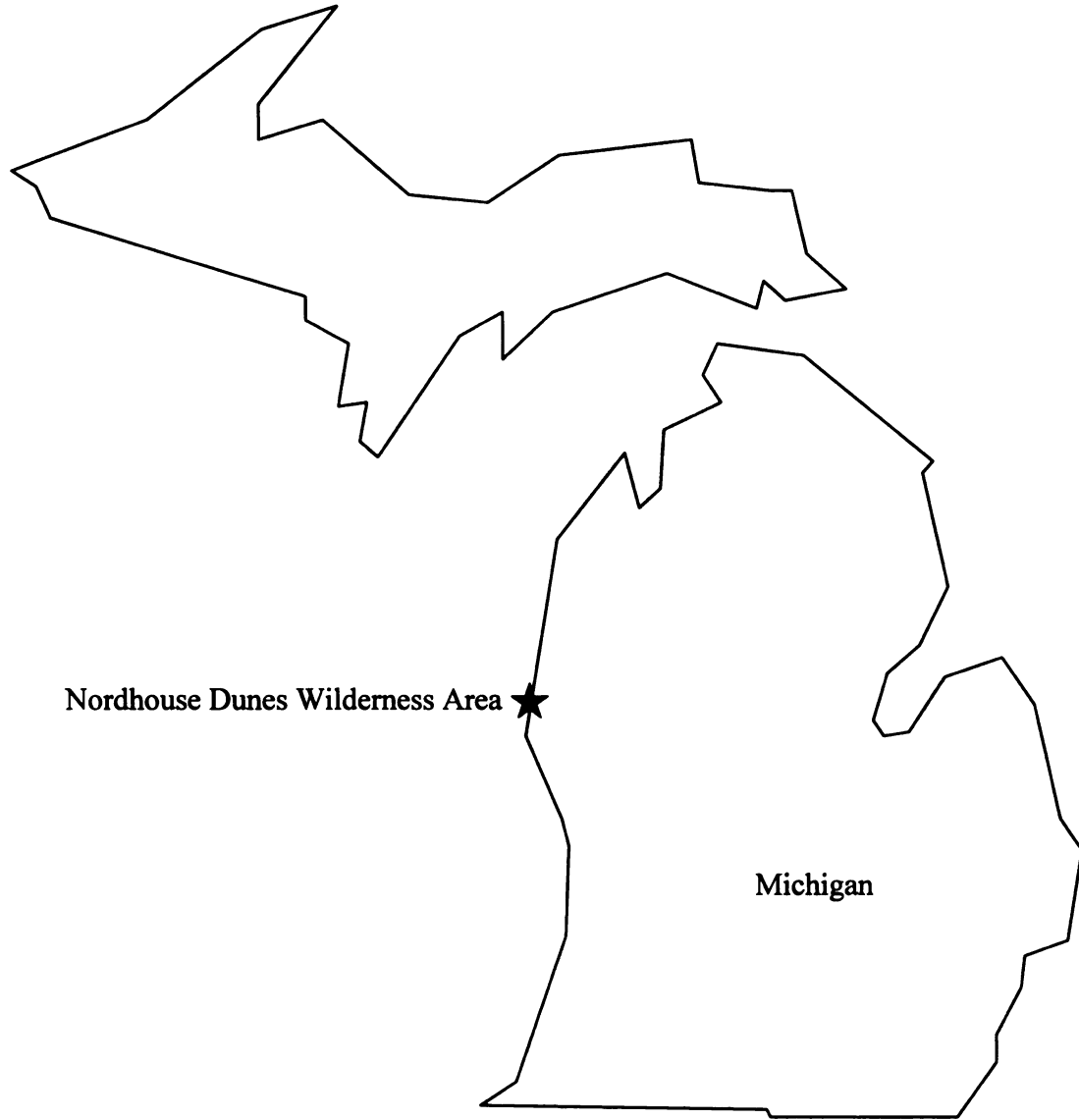
## **SECTION 3**

### **PROBLEM STATEMENT**

#### **3.1 The Issue at Nordhouse Dunes**

Nordhouse Dunes Wilderness Area is a small Eastern United States wilderness. It is the only designated wilderness area in the lower peninsula of Michigan (Figure 2). This wilderness area, designated as such in 1987 due primarily to its dunal ecology, consists of only 3,450 acres. The active sand dunes support unique ecosystems within the wilderness area and several endangered plants and animals. The western border of the wilderness area consists of 7,300 feet of undeveloped Lake Michigan shoreline. The Nordhouse semiprimitive motorized area borders the wilderness area to the east and the Lake Michigan Recreation Area is located on the northern border of the wilderness. Both of these areas are managed by the U.S. Forest Service. The Ludington State Park borders the wilderness area to the south and is managed by the Michigan Department of Natural Resources.

Prominent management challenges for the wilderness were to identify where main entry points into the wilderness were located and determining if the developed recreation areas, which differ in purpose from the wilderness, were affecting wilderness use. Also, prior to its wilderness designation, there were traditional/historical uses of the area such as off-road vehicles and snowmobiling. Concern was expressed by the Forest Service



**Figure 2: Study Area, Nordhouse Dunes Wilderness Area**

that these uses, which were incompatible with a wilderness designation, were continuing to occur in the area.

To cope with these management challenges, the U.S.F.S. on the Manistee National Forest is developing a Limits of Acceptable Change (LAC) management plan. This study addressed the need for a social and psychological understanding of users for the LAC process. User concerns regarding social impacts are critical to establishing the social and resource condition standards that are the basis of the LAC approach (Williams et al. 1992). However, in 1989 when the Wilderness Implementation Schedule (WIS) was developed for the area, users were not involved. Information about previous users has been unavailable except in anecdotal form and there is no permit system from which to gather user information. Seismic counters have been used along the trails to estimate user numbers and access points but their accuracy is unknown. The seismic counters have not been adequately calibrated to account for influences from rain, animals and vandalism.

Essentially, little to no visitor information for establishing a limits of acceptable change approach has been available. The purpose of this study was to estimate visitation to the wilderness area and describe its users and their perceptions of and preferences for the wilderness area. The study was also to identify the differences between managers' and users' perceptions as they related to wilderness conditions. The importance of user involvement in the management process was outlined and addressed as a vital component to the management of the wilderness area. This study has provided this information to

facilitate the LAC management plan for the Nordhouse Dunes Wilderness Area and provide managers with a better understanding of their clientele.

### **3.2 Study Objectives**

The specific objectives this study addressed are as follows:

1. Estimate visitation and show how these estimates can be used to calibrate and modify the existing use estimation system (seismic counters).
2. Describe existing users: degree of return visitation, place of residence, reason for visiting Nordhouse Dunes, activities at the Dunes, size of party and length of stay.
3. Describe travel patterns within the wilderness area.
4. Identify what "wilderness" means to users.
5. Describe user needs for management activities (as opposed to user preferences).
6. Identify level of acceptable encounters with other users in terms of numbers, location and type.
7. Examine the differences between manager and user perceptions of wilderness conditions.

## **SECTION 4**

### **METHODS**

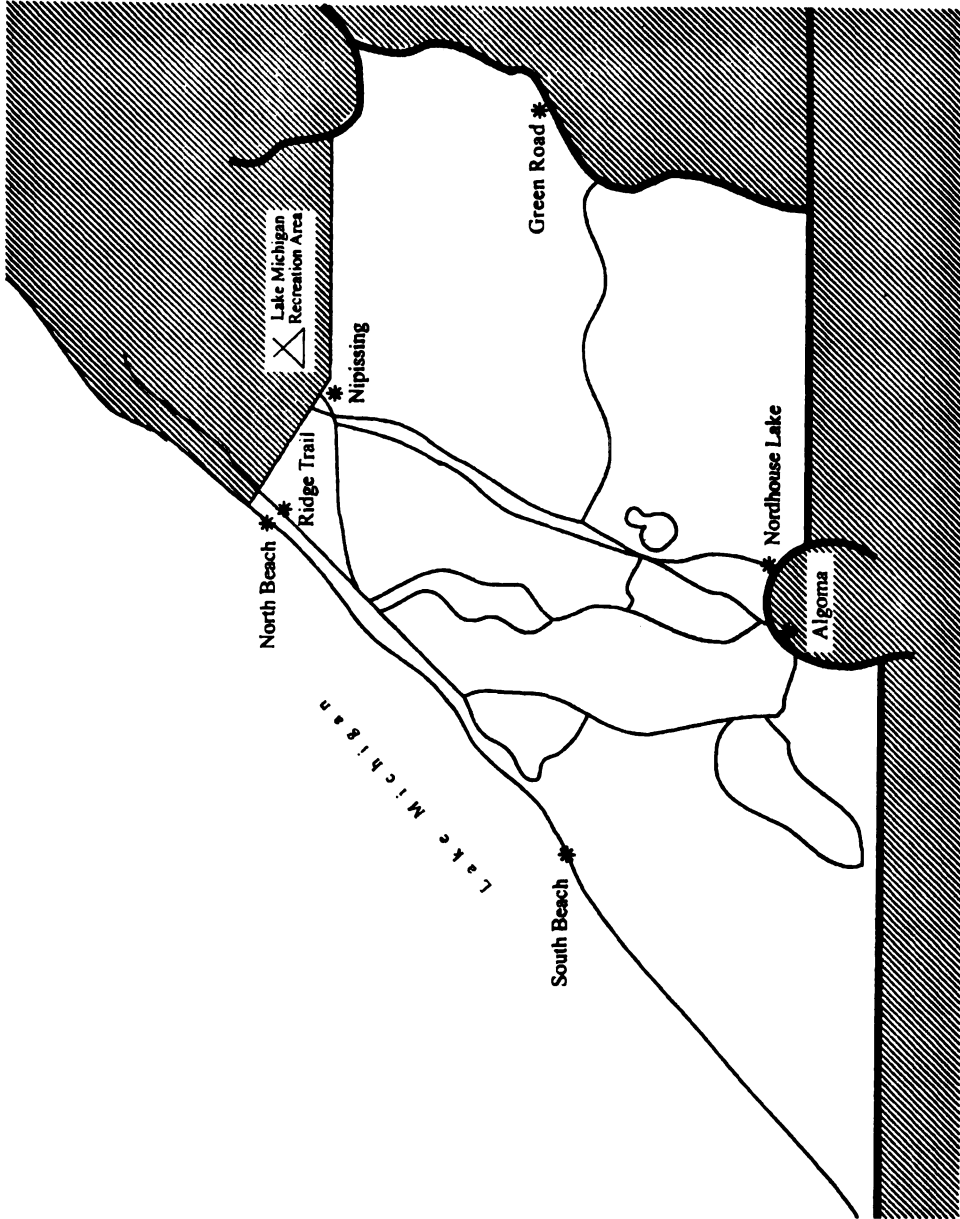
#### **4.1 Sampling**

A combination of stratified and random sampling procedures (Perales et al. 1992) were employed in this study. Sampling was conducted from May 1993 to March 1994. Sample size was based on Forest Service estimates of 15,000 to 20,000 visitors per year with an average party size of three. The total number of parties per year was estimated to be 5,000 to 7,000. A sample size of 10% was used to set a goal of collecting 500 to 700 surveys over the life of the project. The sampling methodology was structured to obtain a representative sample of wilderness users across all times of day, days of the week, entry points and times of the year. Table 1 contains the sampling schedule for the summer sampling season and is an example of the overall sampling schedule. Seven main entry points into the wilderness were identified and sampled (Figure 3): the parking circle at the end of Nurnberg Road, south end of the Lake Michigan shoreline, north end of the Lake Michigan shoreline, northern wilderness boundary on Nipissing Trail, northern wilderness boundary on ridge trail, along Green road, and the Nordhouse Lake trail head. Depending on the amount of daylight during a season, time blocks of two, three or four hours each were selected randomly during a given day. Across seasons, the blocks of

**Table 1: Sampling Schedule for Summer**

	10:00 AM TO 1:00 PM					1:00 PM TO 4:00 PM					4:00 PM TO 7:00 PM					7:00 PM TO 9:00 PM								
	AL	NL	NB	RT	SB	NG	AL	NL	NB	RT	SB	NG	AL	NL	NB	RT	SB	NG	AL	NL	NB	RT	SB	NG
FRIDAY	6/18	✓			✓	✓	✓	✓					✓											
	7/2	✓	✓		✓	✓	✓						✓						✓		✓			✓
	7/23													✓						✓				✓
	8/13													✓						✓				✓
	9/3							✓					✓		✓								✓	
SATURDAY	6/19	✓	✓				✓													✓		✓		✓
	7/3																							✓
	7/24	✓		✓									✓							✓				✓
	8/14								✓					✓										
	9/4	✓						✓																
SUNDAY	6/20	✓		✓		✓							✓								✓			✓
	7/4						✓			✓		✓							✓		✓			✓
	7/25						✓												✓					✓
	8/15	✓		✓					✓					✓										
	9/5																							
MONDAY	6/21	✓																		✓				✓
	7/5							✓				✓								✓				✓
	7/26	✓		✓					✓												✓			
	8/16			✓										✓										
	9/6													✓										
TUESDAY	6/22	✓		✓																				
	7/6																							✓
	7/27								✓													✓		
	8/17			✓																				
	9/7																			✓				
WEDNESDAY	6/23																							
	7/7	✓		✓					✓															
	7/28		✓																					
	8/18																			✓				✓
	9/8													✓						✓				
THURSDAY	6/24																							
	7/8	✓	✓						✓															
	7/29			✓																✓				✓
	8/19																			✓				✓
	9/9																							

Survey Sites: AL=Algoma, NL=Nordhouse Lake, NB=North Beach, RT=Ridge Trail, SB=South Beach, NG=Nipissing.



**Figure 3: Survey Site Locations**

time ranged from 8:00 a.m. to 9:00 p.m.. Generally, there were four time blocks of equal length per day. Sampling was from 10:00 a.m. to 9:00 p.m. during the summer and fall until daylight was limited and sampling ended at 7:00 pm. Sampling in the winter was from 11:00 a.m. to 5:00 p.m.. On the opening day of firearm deer season sampling began at 8:00 a.m.. This sampling scheme attempted to contact day users leaving during the mid-afternoon and early evening, and overnight users exiting during midmorning.

Sampling for the time periods was stratified and systematic with a random start. The first level of stratification consisted of "seasons." Within seasons, there were five strata: three traditional seasons (summer, fall, winter) plus major summer holidays and firearm deer hunting season. Holidays and the 18-day firearm deer season were separated because of the atypically high use that occurs during these periods. It was desired to know how much use occurred during these periods, but it was not desired to use only holiday and deer season averages to estimate use for a given season. For example, combining deer season visitation averages with nonhunting week averages would upwardly bias the fall visitation estimate. For the same reason, merging holiday averages with other summer averages would paint a false picture of typical summer visitation patterns. The spring season (March 13 to May 16) was not sampled due to time and budget constraints and presumed low visitation rates. Fall sampling results were applied to the spring season according to standardized procedures (Perales et al. 1992) to estimate study results across the entire year. The five periods sampled were:

1. "Summer"--May 17, 1993 to September 19, 1993 (18 weeks), excluding holiday weeks.



2. "Fall"--September 20, 1993 to November 28, 1993 (10 weeks), excluding firearm deer season.
3. "Winter"--November 29, 1993 to March 13, 1994 (15 weeks).
4. Holiday--Memorial Day (5/28 to 5/31), Fourth of July (7/2 to 7/5), Labor Day (9/3 to 9/6).
5. Firearm Deer Season--11/13 to 11/30.

Within seasons, the strata were months, weeks, days of the week and time of day (daylight hours only). For a given month, a week was selected such that, after Memorial Day weekend, there was approximately a two-week period between each week sampled. For example, counting holiday weeks, there were five of each of the seven days of a week within the summer sampling season (five Fridays, five Mondays, etc.). For each day of the week, a date and time block were randomly chosen as a beginning point. Thus, one of the five Fridays, for example, was randomly chosen and within that Friday one of four, 3-hour time blocks was randomly selected. To continue the example, after one of the five Fridays and time block for that Friday were randomly selected, time blocks were systematically selected during the remaining four Fridays such that all possible time blocks during Fridays in the summer were sampled 2-3 times each. Due to visitation generally being greater on weekends more time blocks for sampling were selected for weekend days than weekdays (during nonholiday weeks only; during holiday weeks, an equal number of time blocks was sampled each of the seven days). During summer, 13 sampling blocks were chosen for each Saturday, Sunday and Monday across the weeks selected, 10 time blocks for Fridays, and 8 blocks for the remaining days.

Finally, for a given sampling day (e.g., Fridays), as many as four interviewers were systematically assigned to entry point locations such that each of the seven entry points was sampled several times during each season. Algoma, North Beach and Nipissing were sampled more frequently than the other three access locations because these were the most heavily used. Across the entire summer season, with four interviewers per time block, there were a total of 262 time block/access site combinations sampled (Saturdays, Sundays and Mondays, 42 times; Fridays, 40 times; Tuesdays, Wednesdays, Thursdays, 32 times). Algoma, North Beach and Nipissing were sampled 56 times; Ridge Trail, 33; Nordhouse Lake, 32; South Beach, 29.

The same procedure was followed for the remaining seasons with some exceptions. Because of lower visitation and a reduction in the number of available interviewers, sampling frequency decreased during the fall and winter sampling periods. Also, during winter, time block sampling was restricted primarily to weekend days. With the exception of winter, all possible time blocks during daylight hours were selected to assure representativeness across days of the week and entry points. The result was a sampling design which was representative of all possible daylight time periods and access points from May to March.

Length of stay bias, pertaining to campers and extended stay day users, was minimized in this study due to the exit survey structure of the sampling. The fact that users were sampled only when they were exiting the wilderness for the day prevented longer stays in the wilderness from increasing users' chances of being included in the sample (i.e., a person can only exit once whether it is at the end of one day or five days).

Those users not exiting for the day (i.e., exiting but returning later) were recorded appropriately and were only included in the sample when they were exiting for the day. The sampling design also minimized length of stay bias through the random sampling of all possible day light hours. Therefore, anyone, regardless of how long they stayed in the wilderness, had an equal probability of being sampled when exiting. One exception to this may have been during weekends that were over sampled. On these weekends certain types of weekend use may have been overestimated.

#### **4.2 Data Collection**

Interviews were conducted on site to reduce costs, increase response rates, and counteract recall bias. Each person in a party over the age of 15 exiting the wilderness for the day was interviewed to gather the information outlined in the study objectives. Interviewing only those groups that were exiting for the day minimized double-counting that would occur if both entering and exiting parties were interviewed. The first week of the study was dedicated to pretesting the instruments and data collection strategy. Changes were made by refining instrument questions, modifying survey time periods and locations, and expanding the data collected for use estimation.

#### **4.3 Survey Instrument**

Data collection instruments used in other Eastern wilderness areas were provided by Dr. Alan Watson (Wilderness Management Unit, Forest Sciences Lab, Missoula, Montana). Most questions for the instrument in this study were taken directly from these instruments to enable the direct comparison of these results to those of other wilderness studies. The questions were compiled, as appropriate, to address the objectives of this

study. The instrument contained ten sections comprised of questions focusing on data collection, visitor group information, visitation to wilderness areas, wilderness activities, visitor perceptions, level of acceptable encounters, crowding norms, visitor demographics, and additional visitor comments (Appendix A).

## **SECTION 5**

### **DATA ANALYSIS**

The data collected from the on site surveys were entered into the Statistical Package for the Social Sciences (SPSS). The information collected for the project objectives was analyzed using SPSS procedures, content analysis and visual interpretation.

#### **5.1 Annual Visitation (Objective 1)**

The LAC process is manager-driven in that it is initiated as a result of management's perception of, most often, a visitor-related challenge in a given area. If this is to be the driving force behind the implementation of the LAC process it is vital that existing use levels be estimated to ascertain the reality of use in an area. Visitation estimates can then function as a baseline from which to apply user information gathered in the LAC process. This baseline estimate of visitation can then give context to both users' and managers' perceptions of use in the wilderness and be used as a means of comparison to facilitate concrete management decisions.

Visitation for the Nordhouse Dunes wilderness area was analyzed by comparing the number of people entering the wilderness to the number of users exiting the wilderness for the day. Visitation analysis utilized the following data: the number of people exiting for a period of time but returning to the wilderness, users who already did the survey, users who refused to participate in the study, users interviewed, users who

were not contacted, and the number of cars parked on Green Road and at the Algoma survey site. Visitation data was compiled on a spreadsheet in Quattro Pro for Windows 1.0. These data were converted to recreation-visits and annual visitation was estimated for the wilderness area. Seasonal visitation data was then derived from the annual visitation estimate.

For example, to estimate total annual visitation, assume that for the fall season there were a total of eight Monday 10 to 12 a.m. time blocks and three were sampled (i.e., interviewed visitors at three randomly chosen survey locations during the fall on Mondays from 10 to 12 a.m.). During these three sampling periods, 15 persons were exiting the Wilderness Area the day they were sampled. Thus, the average number of persons visiting Nordhouse in the fall on Mondays from 10 to 12 a.m. was 5 (15 persons/3 sampling periods). It was assumed that the rate of visitation would be similar for the time periods not sampled. Therefore, a total of 40 persons (5 persons/sampling block \* 8 sampling periods) visited Nordhouse on Mondays from 10 to 12 a.m. for the entire fall season. In this example, the sample visitation figure is 15 recreation-visits and the total fall visitation (for Mondays, 10 to 12 a.m.) is 40 recreation-visits. A recreation-visit is a complete visit by one individual to a designated area for recreation purposes. These computations were then applied across all sampling periods across all seasons and summed to estimate total annual visitation.

**Equation 1: Sample Visitation**

$$V_s = \sum_{p=1}^m \left( \frac{C_p}{N_p} \times P_T \right)$$

where,

$V_s$  = total visitation in one of the six seasons (in recreation-visits)

$C_p$  = number of visitors counted in a given sampling period (p)

$N_p$  = number of times a given sampling period (p) was sampled

$P_T$  = number of total sampling periods possible in a given season

$m$  = total sampling periods in a given season

**Equation 2: Population Visitation**

$$V_T = \sum_{s=1}^6 V_s$$

where,

$V_T$  = total annual visitation (in recreation-visits)

$V_s$  = total visitation in one of the six seasons

**5.2 User Characteristics (Objective 2)**

The description of the existing users was obtained through the analysis of questions 12, 17, 19-37, 94, 95 and 114 (Appendix A). Question twelve was analyzed to determine the degree of return visitation among the users. The zip codes reported by users in question 114 were used to determine the users' place of residence. Frequencies

were used to obtain the percentage of users from any given zip code and these percentages were reported according to general geographic locations within Michigan, the Chicago area, and on an out-of-state basis. Zip codes indicating cities within a 60-mile radius of the wilderness area were identified using a map. Percentages for these zip codes were then aggregated to produce the percentage of users who were from within a 60-mile radius of the wilderness area. Users' responses to question 17 were analyzed by means of content analysis to determine users' reasons for visiting the wilderness area. Responses were then tallied and put in rank order. Questions 19-37 were used to identify the activities in which visitors participated while at Nordhouse Dunes. Frequencies for each question were produced and the activities were ranked according to total participation. The size of the parties visiting the wilderness area was determined using question six. The mean party size was calculated in SPSS as were the frequencies for question six. Visitors were asked if they stayed overnight in the wilderness and if so, how many nights in questions 94 and 95. These questions were used to determine the users' length of stay in the wilderness area. Day users were determined from those visitors that answered "no" to question 94 and the length of stay for overnight users was determined from responses to question 95.

### **5.3 Travel Patterns (Objective 3)**

Travel patterns of the wilderness users were analyzed using visual interpretation, Excel spreadsheet applications and computer mapping using Freehand 5.0. Each group interviewed highlighted on a map the trails they traveled and this information was categorized, using visual interpretation, into four categories. The categories consisted of



day use on trails, overnight use on trails, day use on and off trails, and overnight use on and off trails. The trails were then labeled and a grid system developed to enable travel patterns and camping locations to be recorded in spreadsheet form in Excel. Travel patterns were identified as linear (i.e., a person travels in and out along the same trail or trails and as a result uses the trail(s) twice), loop (i.e., travel pattern is a loop and a person uses the trail once because person does not backtrack along the same trail) and combination travel patterns that combined both linear and loop travel. This organized information was then used to produce a master map with the aggregated travel and camping patterns of the users. The master map identified the location specific frequencies of hiking use on and off trails and camping throughout the wilderness area. The master map was developed by means of computer mapping using Freehand 5.0. Travel and camping patterns were then identified in terms of location and frequency of use.

#### **5.4 Wilderness Meanings (Objective 4)**

What the term "wilderness" means to users was analyzed using questions 10 and 11 and the 1964 Wilderness Act criteria for defining wilderness. Question ten (users' definition of "wilderness") was analyzed using content analysis and the frequencies of users' responses were compared to the criteria for the definition of wilderness in the 1964 Wilderness Act. Question eleven (if Nordhouse met users' definition of wilderness) was also used in the analysis of users' definition of wilderness to put users' responses to question ten in context of the Nordhouse Dunes Wilderness Area.

### **5.5 Users' Perceptions of Current Wilderness Conditions and Preferences for Ideal Conditions (Objective 5).**

Users' perceptions and preferences for management activities were analyzed using the agree, neutral and disagree responses from questions 42 through 86. Users' perceptions of current wilderness conditions were analyzed based on questions 42 through 62 and their preferences were analyzed based on questions 63 through 86. Responses for these questions were recoded so that "strongly agree" and "agree" were aggregated as were "strongly disagree" and "disagree."

The subgroups of hunters (n=96) and nonhunters (n=410) and horseback riders (n=65) and nonhorseback riders (n=441) were analyzed to determine if statistical differences existed in the subgroups' responses to selected questions. The parametric *t* test and nonparametric Mann-Whitney *U* test were employed for this analysis.

Hunters were determined as those people surveyed from September 7, 1993 to December 1, 1993 who indicated hunting as a primary or secondary activity while in the wilderness area. The remainder of people surveyed were considered nonhunters. Horseback riders were those people surveyed who indicated horseback riding as an activity while in the wilderness area. The remainder of people surveyed were considered nonhorseback riders.

### **5.6 Encounter Tolerance (Objective 6)**

The level of acceptable encounters with other users in terms of numbers, location, and type was examined using questions 42-93 (users' perceptions and preferences) and 96 through 110 (encounter and crowding perceptions). Frequencies and cross tabulations

were used to analyze the responses to these questions. Responses to questions 42 through 86 were recoded such that strongly agree and agree were aggregated as were strongly disagree and disagree. Frequencies were employed in the analysis for questions 87-110. Question 105 (places user felt were crowded) was analyzed using content analysis. Responses to question 105 were tallied and percentages calculated. The responses of "far fewer" and "fewer," as well as "more" and "far more," for questions 87-93 and 96-97, were aggregated into the categories of "fewer" and "more." Cross tabulation was primarily employed in the analysis of selected questions from 42-86 concerning what Nordhouse Dunes Wilderness is and what it should be. The analysis for encounter information was based on the nine response categories produced from the cross tabulation of any two questions. These categories consisted of the correlated responses of agree, neutral and disagree for each of the two questions in the cross tabulation. Table 2 is an example of the cross tabulating of question 63 (Nordhouse should be a place to be alone) with question 42 (Nordhouse is a place to be alone).

**Table 2. Example of an SPSS Cross Tabulation of Survey Questions 63 and 42.**

		<b>Q42</b>			
		AGREE	NEUTRAL	DISAGREE	totals
		(%)	(%)	(%)	(%)
<b>Q63</b>	AGREE	83.0	6.2	1.7	91.0
	(%)	n=387	n=29	n=8	n=424
	NEUTRAL	3.4	3.2	0.4	7.1
	(%)	n=16	n=15	n=2	n=33
	DISAGREE	0.7	0.7	0.7	1.9
	(%)	n=3	n=3	n=3	n=9
	totals	87.1	10.1	2.8	100.0
	(%)	n=406	n=47	n=13	n=466

This cross tabulation shows that 83% of the visitors agreed that Nordhouse should be a place to be alone and it is a place to be alone, indicating that their perception of the ideal wilderness conditions is the same as what they experienced. It also shows that 2% of the visitors agree that Nordhouse should be a place to be alone but disagree that it is, indicating eight out of 424 people felt that their needs were not being met by the current conditions. Types of encounters focused on hunters, horseback riders, skiers, and campers as user types.

### **5.7 Location Specific Encounter Information (Objective 6)**

Encounter information regarding location was analyzed from the cross tabulation of questions 42-93 and 96-110 by the location of where each survey was conducted. Once

again, the responses of "far fewer" and "fewer," as well as "more" and "far more," for questions 87-93 and 96-97 were aggregated into the categories of "fewer" and "more."

Users' responses to encounter information were then associated with appropriate locations in the wilderness under the assumption that surveys from a specific site are most closely applicable to that area of the wilderness.

## **SECTION 6**

### **RESULTS AND DISCUSSION**

#### **6.1 General Overview**

During the sampling period of this study (May 17, 1993 - March 13, 1994) 506 people comprising 285 groups were interviewed and one hundred sixty-six people refused to participate in the study. Refusals were primarily due to inclement weather conditions and an abundance of biting insects, both greatly impeding the surveying process. Despite refusals the response rate was 75%. Users consider Nordhouse Dunes Wilderness Area to be an area where the forces of nature predominate and a place where they can be alone. Fall season attracts the greatest number of visitors to the area, whereas winter boasts the least amount of use. Visitors do not feel that the area is overused or crowded currently and most visitors reported seeing less or about the number of people they expected to see. The three main reasons users reported for visiting the wilderness area were the Lake Michigan shoreline, opportunities to walk and hike in the area, and to enjoy nature. Hunting, enjoying the peace and quiet, lack of people, the scenery, and just being able to get away from everything and relax were also popular reasons. Most people visiting the area were satisfied with their experience and felt that Nordhouse was what they consider to be a wilderness.

When visiting the wilderness area one would encounter users mostly between the ages of 21 and 50. Children and people over the age of 70 are not prevalent. Most users

are encountered hiking along the trail leading to the beach from the trail head at the end of Nurnberg Road (i.e., Algoma) and to a lesser degree at the north end of the beach. The majority of the visitors using the area visit for the day and are repeat visitors. Campers are the minority of the users. Most of the people who camp in the area are between the ages of 21 and 30 and day users are between 31 and 50. Visitors do not feel there are too many people on the beach even though 52% of the visitors use the beach to swim, 41% use it for sunbathing, 19% for nude sunbathing and 1% just like to be on the beach. The majority of visitors were not concerned with nude sunbathing in the area. Visitors mostly spend their time in the wilderness area viewing scenery, hiking on and off the trails and camping. Visitors also hunt, engage in photography, collect berries, nuts and the like, cross country ski, fish, boat, ride horses and participate in other minor activities. Visitors use the wilderness area as a place to test their skills but, indicated they would like some areas of greater challenge.

Approximately two-thirds (68%) of the visitors are male and one third (32%) are female. Women who use the area are primarily between the ages of 21 and 50 and men between the ages of 31 and 50. Roughly twice as many men use the area for camping and day use as do women. The majority of the visitors to the area come from within the state of Michigan. Most visitors are from the Muskegon and Grand Rapids area or from within 60 miles of the wilderness area. Visitors came from the Detroit and, to a lesser extent, the Chicago area as well. The wilderness area had visitors from various locations outside the state of Michigan. Wilderness users are from various locations in Michigan and from as far away as Europe.

The responses of day, overnight, first time and repeat visitors indicated that results from these subgroups directly supported the findings for the wilderness users as a whole. The majority of these subgroups indicated that Nordhouse was not overcrowded. However, approximately twice as many campers versus day users and repeat versus first time visitors (10% vs. 5% and 8% vs. 3% respectively) indicated that they felt the area was overcrowded. All of these subgroups indicated that they primarily did not change the route or length of their stay due to overcrowding. Day, overnight, first time and repeat visitors all encountered mostly what they expected or fewer for various conditions in the wilderness. All of these groups also gave Nordhouse primarily a very good or good grade, supporting the findings for users collectively. Subgroup responses to use levels also supported overall findings. These subgroups primarily felt that there were not too many users of any kind in the wilderness. Hunting, did however, have the greatest amount of opposition from these subgroups. Campers, day users, repeat and first time visitors all primarily view scenery in the wilderness and felt the area was a place to test their skills as well as be alone. Users in all of these subgroups primarily felt that controls on use levels should only be implemented when overuse occurs. Also, responses from the subgroups of horseback riders and nonriders did not vary significantly concerning horse use in the wilderness area.

The analysis of hunter and nonhunter subgroups indicated that responses from hunters differed significantly from nonhunters regarding whether the wilderness is a place with too many people, if there should be fewer hunters, if hunting should not be allowed, wilderness quality, and visitor satisfaction with their wilderness trip. A greater



percentage of hunters than nonhunters felt that there were too many people in the wilderness, disagreed that there should be fewer hunters, disagreed that hunting should not be allowed, felt that the quality of the wilderness was improving and were dissatisfied with their wilderness trip.

## **6.2 Objective 1. Estimate visitation and show how these estimates can be used to calibrate and modify the existing use estimation system (seismic counters).<sup>1</sup>**

### **6.2.1 Annual Visitation**

This section presents visitation results for the Nordhouse Dunes Wilderness Area across all sampling periods from May 1993 to March 1994. To make the yearly estimate complete, fall visitation estimates (minus firearm deer season figures) were applied to the "spring" season (April-May, 1994). Results based upon observations made during the sampling periods only are referred to as average visitation figures. As previously explained (equations 1 and 2 in the methods section), annual visitation was estimated by multiplying average visitation per sampling period by the total number of possible sampling periods in a season and then summing across all seasons.

During the 12-month period, May 1993 to May 1994, it was estimated that there were 3,575 recreation visits<sup>2</sup> to the Nordhouse Dunes Wilderness Area. Campers accounted for 32% or 1,144 recreation visits.

Three factors make the initial estimate of 3,575 recreation visits an underestimate, but only the third factor may be significant in this study. First, sampling was only conducted during daylight hours. Second, the survey instructions were to interview only

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<sup>1</sup>

Objective 1 was written in a cooperative effort by Dr. Dennis B. Propst and myself (Amy L. Wiita) as part of the final project report to the U.S.F.S..

<sup>2</sup>

A recreation visit is a visit by one person to a designated area for recreation purposes. For day users, a recreation visit is a single day or portion of a day in the designated area. For campers, a recreation visit may include one or more nights (e.g., 2 persons for 3 nights = 2 recreation visits).

those 16 years of age or older. Thus, persons younger than 16 were not counted if they were part of a group that was interviewed. Most importantly, Forest Service staff indicated that the year the study took place was unusually wet and prone to larger amounts of biting insects than normal, thus deflating our estimate of use. In terms of rain and insects, what is not known is how atypical the sampling year was compared to other years.

In past years, the Nordhouse Dunes management staff has estimated visitation using an entirely different procedure than the one followed in this study. Nordhouse Dunes Wilderness managers have 11 pressure sensitive counters buried under 9 trails leading into the wilderness. Using these counters, the Forest Service estimated visitation at Nordhouse Dunes for the entire year to be approximately 15-20,000 persons. This figure is not directly comparable to our estimate of 3,575 visits. The 15-20,000 figure represents "clicks" on the trail counters and thus is inflated by double-counting (e.g., same person crossing the same or different trail counters several times during a day). The pressure counters also do not distinguish between humans and animals (e.g., deer, dogs) that may register "clicks." Large raindrops are a third means of artificially increasing the number of clicks on the counters. Because of these sources of error, the 15-20,000 person estimate overestimates total visitation. Offsetting this upward bias, there are other visitor entry points (e.g., along Green Road and the Lake Michigan shoreline) where there are no trail counters. It was found in this study that 24%, 7%, and 4% of the visitors sampled exited the wilderness area from North Beach, Green Road and South Beach, respectively.

Therefore, use estimates based solely on trail counters do not account for visitation in these areas.

Taking all these factors into account, the study annual visitation estimate is still significantly lower than the U.S.D.A. Forest Service estimate. This difference is due to measurement error in the trail counters, different measurement units (trail counter clicks versus recreation visits), and weather. It is not unusual for use estimates based on the exit interview and sampling procedure employed in this study to be half as much as the estimate derived by other means (Perales 1995). Therefore, the typical annual visitation at Nordhouse Dunes, as measured by trail counters and manager judgment alone, is likely to be within the 7,000-10,000 visitor (not recreation visits) range *when weather and insects are favorable*.

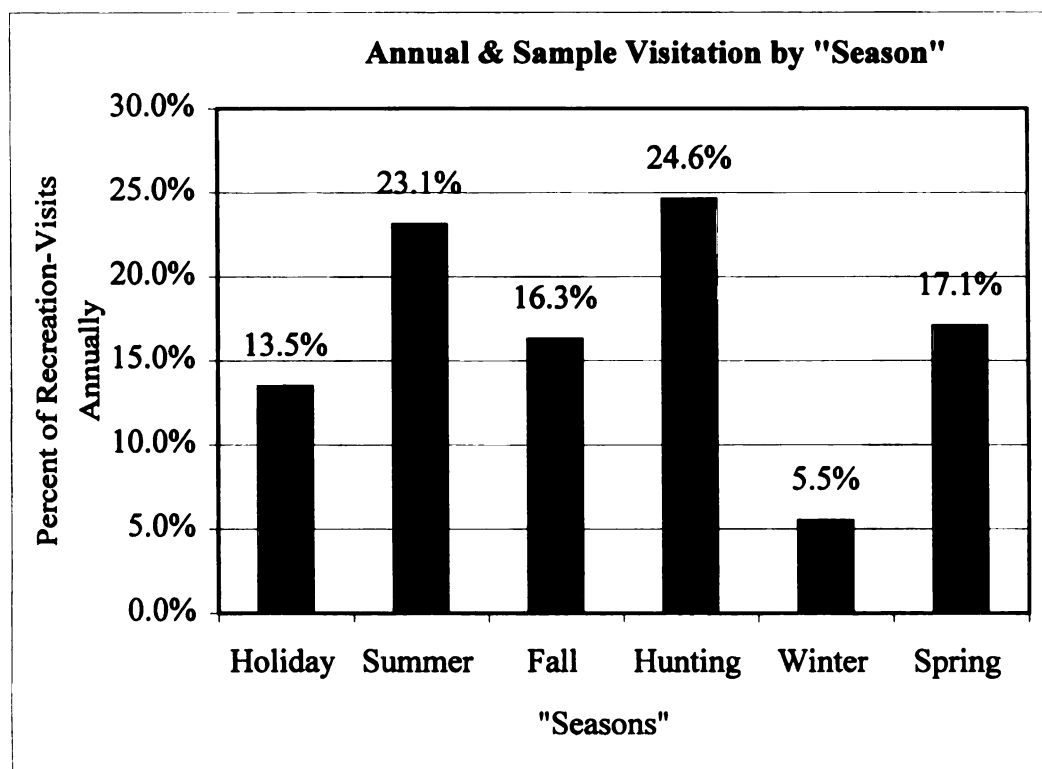
#### **6.2.2 Total Visitation by Season**

The expected highest use period, summer (6/1/93 to 9/6/93), excluding holidays, received 33% of the total annual visitation (Table 3 and Figure 4). The 18-day firearm deer hunting season received the second highest proportion of annual usage (25%). If the Memorial Day, Fourth of July and Labor Day weekends are added to the summer season and firearm deer season is included in fall use, fall (41%) has a slight edge on summer visitation (41%), followed by spring (16%) and winter (2%) (Table 4 and Figure 5). Nonetheless, it is during the deer hunting season that the greatest proportion of total visitation occurs (25% of the total use in 18 days).

Holidays account for 8% of total visitation to Nordhouse (Table 3). Summing the holiday visitation, which occurs in 12 days, and the deer season visitation, which occurs

**Table 3: Annual & Sample Visitation by Season, 1993-1994, Holidays & Hunting Season Separated**

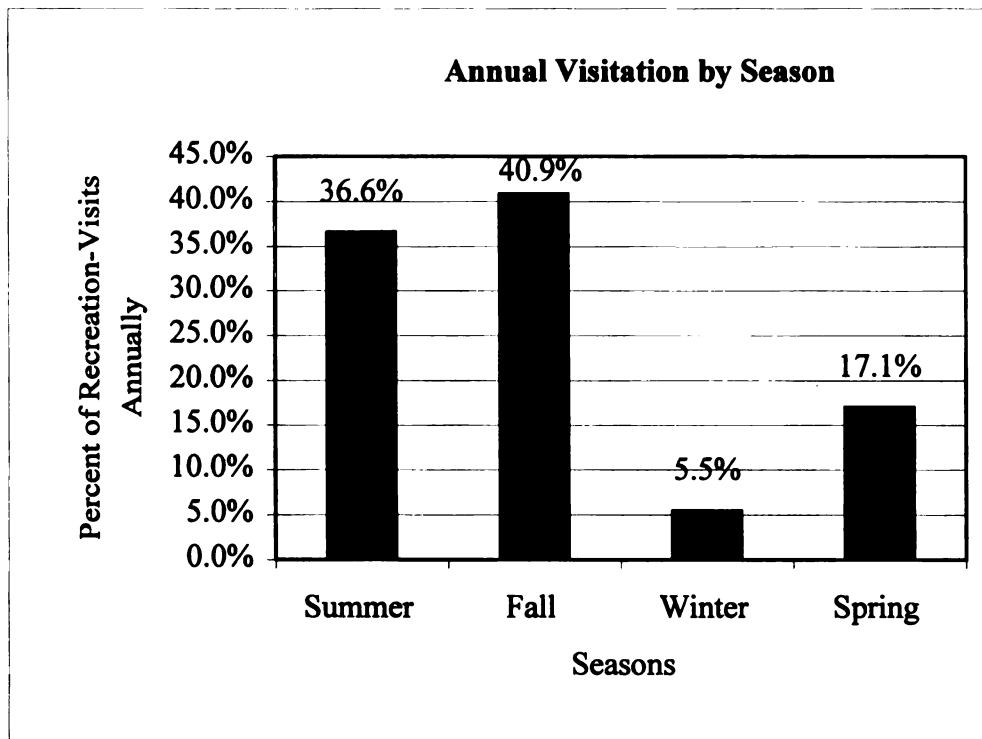
Season	Visits	Percent	Visits	Percent
Holiday	555	13.5%	273	21.6%
Summer	951	23.1%	281	22.2%
Fall	670	16.3%	157	12.4%
Hunting	1013	24.6%	356	28.2%
Winter	226	5.5%	37	2.9%
Spring	702	17.1%	160	12.7%
ANNUAL	4118	100.0%	1263	100.0%



**Figure 4: Nordhouse Annual Visitation: "Six Seasons", 1993-1994**

**Table 4: Annual & Sample Visitation by Season, 1993-1994, Holidays & Hunting Season Merged into Four seasons**

Annual Visitation			Sample Counts	
Season	Recreation Visits	Percent	Recreation Visits	Percent
Summer	1506	36.6%	554	43.9%
Fall	1683	40.9%	513	40.6%
Winter	226	5.5%	37	2.9%
Spring	702	17.1%	160	12.7%
ANNUAL	4118	100.0%	1263	100.0%



**Figure 5: Nordhouse Annual Visitation: Four Seasons, 1993-1994**

in 18 days, results in about a third of total visitation to Nordhouse occurring in 8% of the 365 days in a year. In fact, 9% of total visitation in 1993 occurred on one day, the opening day of firearm deer season (Table 5). Seasonal visitation information illustrates the uneven distribution of use in the wilderness area over the course of a year. Use is concentrated on summer holidays and during firearm deer hunting season which are a small proportion of the total year.

### **6.2.3 Total Visitation by Day of Week**

Across the entire year, Sundays received the highest proportion of visitation (31%) at Nordhouse Dunes (Table 6 and Figure 6). Saturdays followed by Mondays received 22% and 19% of the total visitation, respectively. The relatively high proportion of visitation occurring on Sundays and Mondays may partially be attributed to having several holidays, Memorial Day (Sunday and Monday), Fourth of July (Sunday only) and Labor Day (Sunday only) occur on these days. Also, the opening day of deer season fell on a Monday during which almost half of all hunting season visitation occurred. As expected, Tuesdays, Wednesdays, and Thursdays received the least amount of use (8%, 5% and 5% respectively). Use in the wilderness area across the days of the week is unevenly distributed as was use across seasons. More than 72% of the use in the wilderness area is concentrated on Saturdays, Sundays and Mondays. Eighteen percent of the total use in the wilderness area occurred on the weekdays of Tuesday, Wednesday and Thursday. For a compilation of visitation by season and day see Table 5. Appendix B contains the raw data upon which seasonal and daily visitation estimates were based.

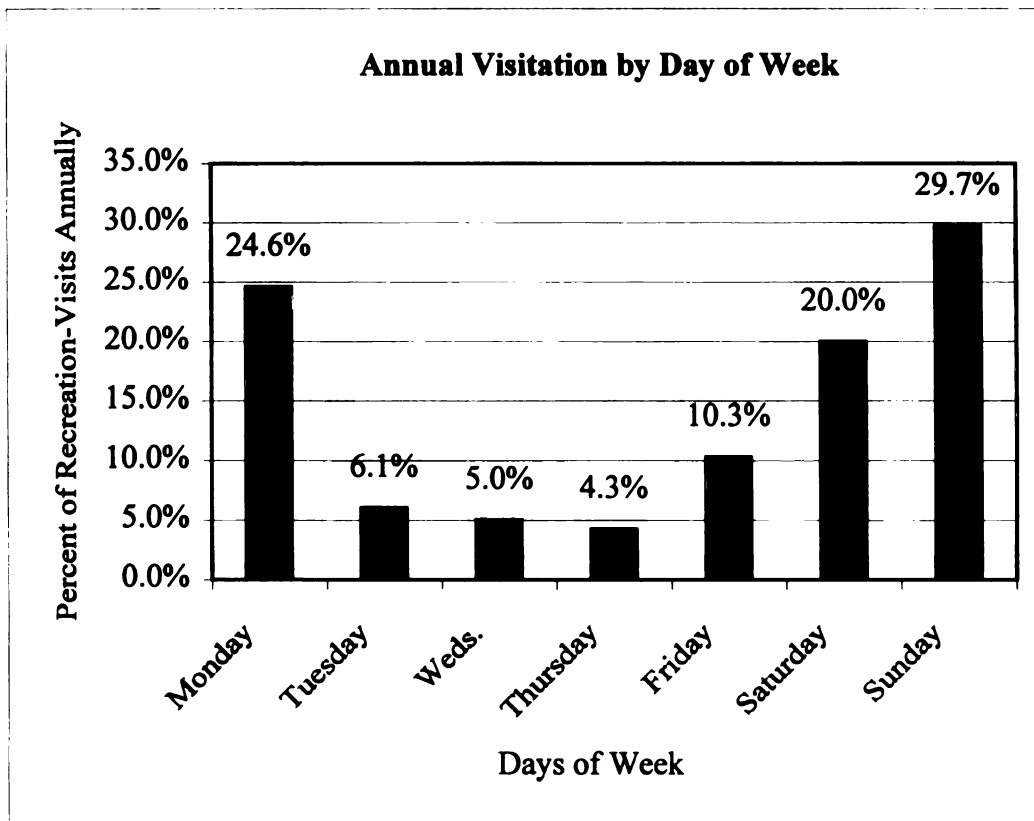
**Table 5: Visitation by Season and Day, 1993-1994**

Day	Holidays	Summer	Fall	ALL SEASON TOTAL				
Day	Hunting	Winter	Spring					
Monday	457.76	11.1%	88.80	2.2%	89.46	2.2%	1013.49	24.6%
Tuesday	121.73	3.0%	0.00	0.0%	26.40	0.6%	249.18	6.1%
Wednesday	99.55	2.4%	0.00	0.0%	0.00	0.0%	207.48	5.0%
Thursday	12.00	0.3%	0.00	0.0%	34.35	0.8%	175.95	4.3%
Friday	53.76	1.3%	41.03	1.0%	92.58	2.2%	424.70	10.3%
Saturday	124.47	3.0%	29.70	0.7%	184.24	4.5%	822.86	20.0%
Sunday	144.04	3.5%	66.61	1.6%	275.45	6.7%	1224.33	29.7%
TOTAL	1013.31	24.6%	226.14	5.5%	702.49	17.1%	4118.01	100.0%



**Table 6: Annual & Sample Visitation by Day of the Week, 1993-1994**

Day	Annual Visitation		Sample Counts	
	Recreation		Recreation	
	Visits	Percent	Visits	Percent
Monday	1013	24.6%	286	22.7%
Tuesday	249	6.1%	74	5.9%
Weds.	207	5.0%	88	7.0%
Thursday	176	4.3%	65	5.2%
Friday	425	10.3%	126	10.0%
Saturday	823	20.0%	238	18.9%
Sunday	1224	29.7%	385	30.5%
	4118	100.0%	1263	100.0%

**Figure 6: Nordhouse Annual Visitation by Day of Week, 1993-1994**

**6.3 Objective 2. Description of existing users: Degree of return visitation, place of residence, reason for visiting Nordhouse Dunes, activities at the Dunes, size of party, and length of stay.**

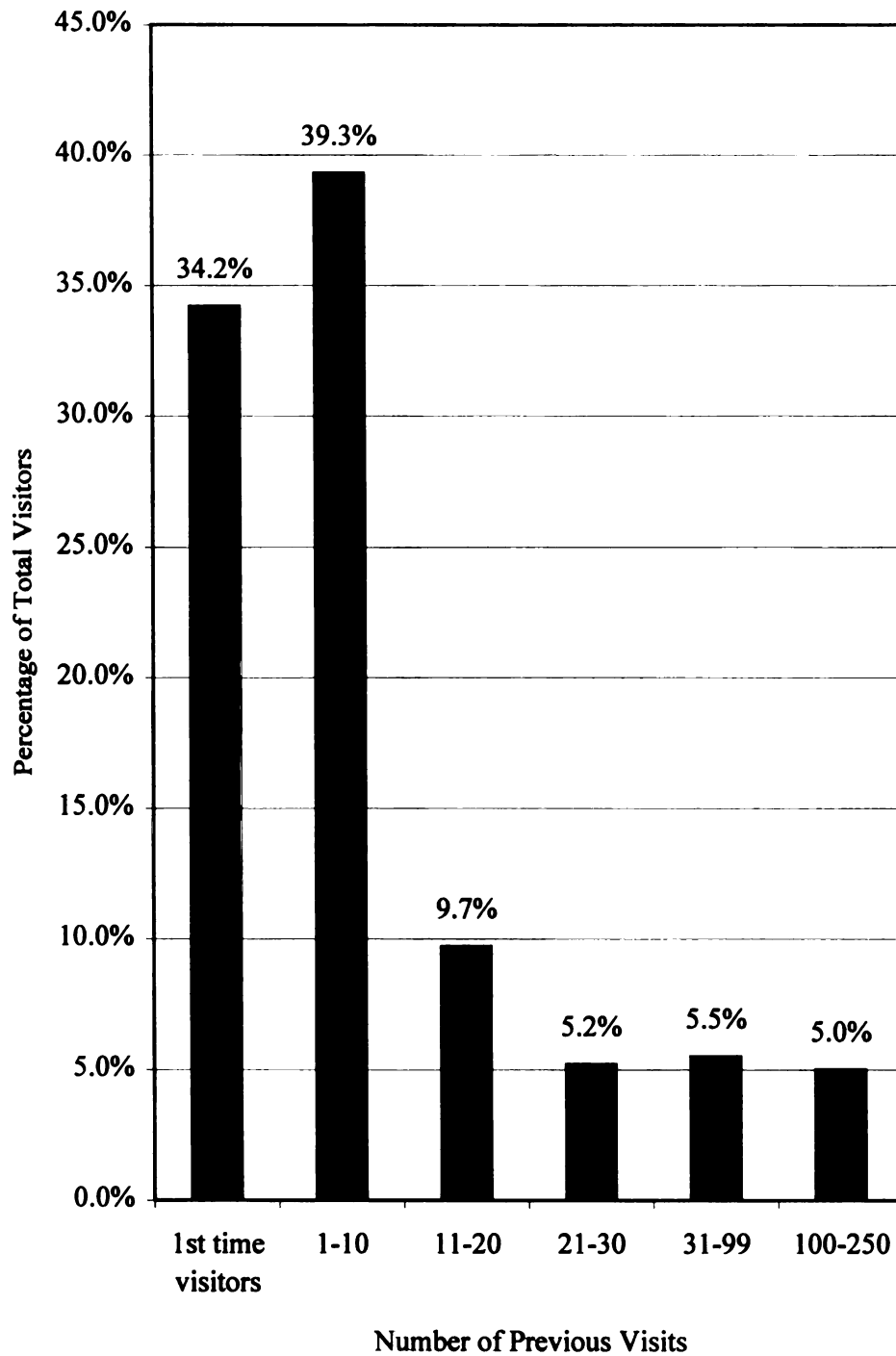
**6.3.1 Degree of Return Visitation and Residency**

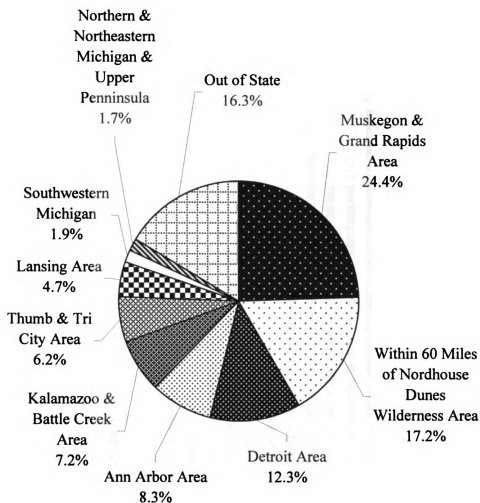
Users of the wilderness area were predominately repeat visitors (66%) (Q12). Visitation ranged from 1 to 250 times a year per visitor (Figure 7). First time visitors constituted 34% of the wilderness area users. The largest group of visitors were from the local (60 mile radius), Muskegon and Grand Rapids areas (40%) (Figure 8). Out of state visitors comprised 15% of the sample population. These findings support the continuing need for the involvement of local residents in the management process of the wilderness area.

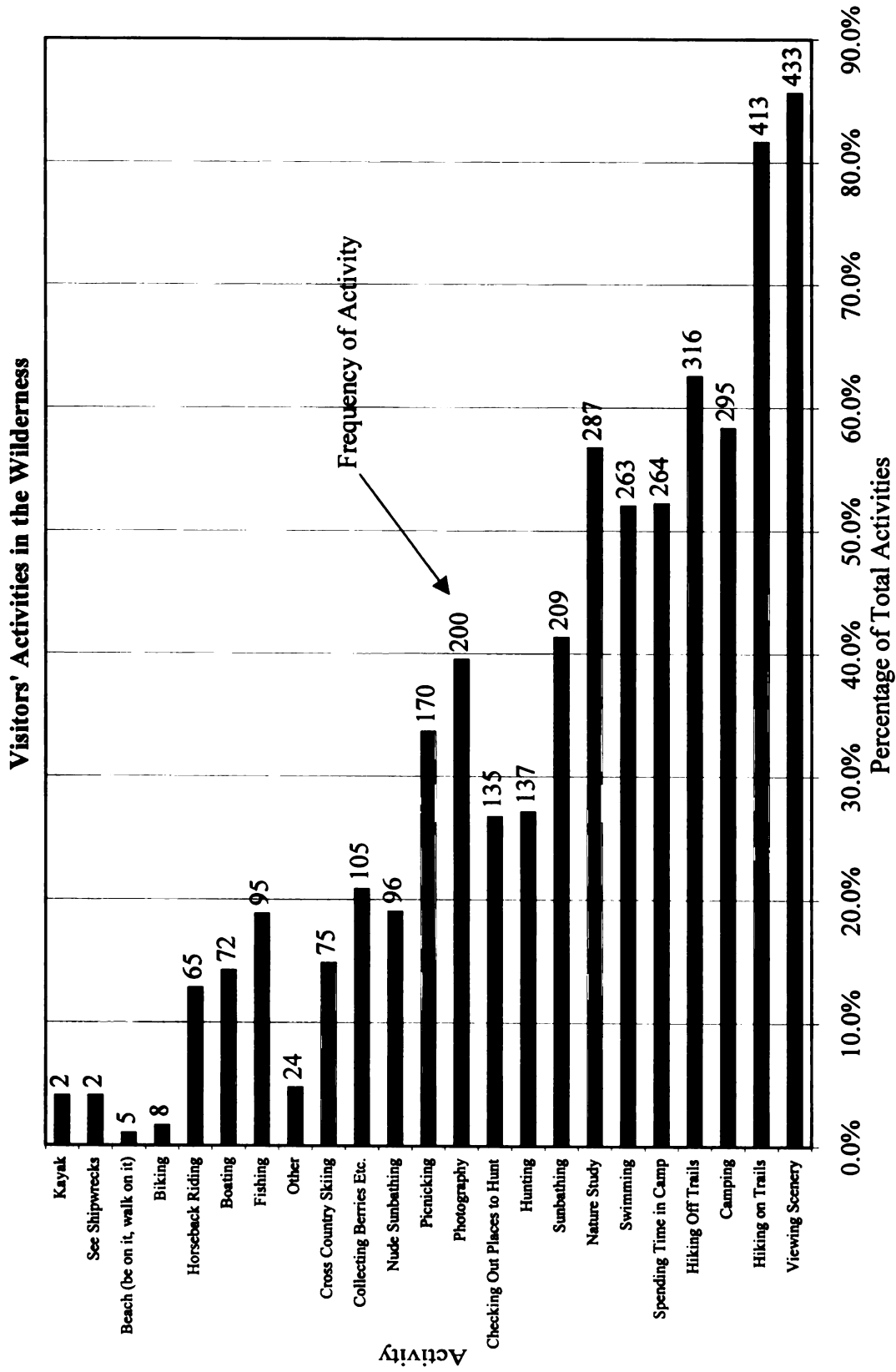
**6.3.2 Activities and Reasons for Visiting**

Visiting Lake Michigan followed by hiking and walking and enjoying nature were ranked highest as reasons listed by visitors for visiting the wilderness area (Q17). Hunting and solitude or just getting away from it all were also included in the top 10 reasons.

The primary activities of visitors (Q19-Q41) were consistent with their reasons for visiting the wilderness. In analyzing total overall participation, 86% of the visitors viewed scenery, 82% hiked on trails, and 63% hiked off trails (Figure 9 and Appendix C). Camping was ranked fourth with 58% of the visitors noting it as an activity. Swimming was ranked seventh, sunbathing ninth and nude sunbathing fifteenth with 52%, 41%, and

**Repeat Visitation****Figure 7: First Time and Repeat Visitation**

**Residency of Nordhouse Visitors****Figure 8: Residency of Wilderness Visitors**



**Figure 9: Visitors' Activities in the Wilderness**

19% visitor participation respectively. Analyzing activities as major or minor activities, as identified by visitors, showed that the majority of those people listing nude sunbathing as an activity did not list it as a major activity. Six percent of the visitors participated in it as a major activity. Users visited Nordhouse Dunes to enjoy the area by simply viewing it and by walking through it. Lake Michigan attracts people for more than just swimming. This was indicated by Lake Michigan being ranked number one as a reason for visiting the dunes but swimming being ranked seventh overall in activities. Users may have been visiting the lake during the summer months and simply appreciating its aesthetic value and never going swimming. Results concerning swimming however, may have been skewed because swimming is limited primarily to three months of the year. This may have had an adverse impact on the rank position of swimming since the top six categories were not seasonal activities and therefore had a greater likelihood for participation by the users over the entire survey period.

Caution should be taken when interpreting visitors' activities (Q19-Q41) in the wilderness area. Through the cross referencing of questions seven and thirty-four it was identified that although 65 visitors indicated that they participated in horseback riding as an activity in the wilderness only five visitors stated that they traveled by horseback in the wilderness. If a visitor were to have participated in horseback riding as an activity he or she would have had to have also traveled by horseback in the wilderness. This indicates that users may have identified experiences from past trips to the wilderness area or experiences outside the wilderness area when responding to questions concerning activities in the wilderness.

### **6.3.3 Party Size and Length of Stay**

Users visited the wilderness area in groups with an average size of 2.5 people per group (Q6) (Table 7). Group size ranged from one person to fourteen people. However, groups with over seven people comprised only 2% of the users. Day use constituted 68% of the visitors (Q94). Overnight visitors (32%) camped in the wilderness from one to five nights. The majority of campers (82%) stayed overnight in the wilderness for 1 to 2 nights (Q95) (Table 7). This reflects the small size of the wilderness area and the ease of accessibility that facilitates short stays. Nordhouse provides a conducive environment both for people who merely want to take a walk in the woods in an afternoon or those who wish to camp overnight for several days.

**Table 7: Visitor Group Size and Length of Stay**

Group Size (people)	Frequency	%
1	73	25.7
2	125	44
3	33	11.6
4	25	8.8
5	11	3.9
6	7	2.5
7	5	1.8
8	1	0.4
9	1	0.4
10	1	0.4
13	1	0.4
14	1	0.4
Mean Group Size: 3		
Number of Nights	Frequency	%
0 (Day Users)	366	72.3
1	51	10.1
2	64	12.6
3	17	3.4
4	4	0.8
5	4	0.8



### **6.4 Objective 3. Describe travel patterns within the wilderness area.**

All use pertaining to travel in the wilderness is presented on a group basis (n=285).<sup>3</sup> This is because one person from each group interviewed recorded the travel for the entire group (i.e., travel is a group variable).

#### **6.4.1 On-trail Use**

Users' on-trail travel was most heavily concentrated along trail segments A1 through A4 which lead from the parking area at the end of Nurnberg Road to the beach (Figure 10). Trail use diminished with increasing distance from the parking area. Trail segment A1 was used 190 times where as segment A4 was traveled only 124 times. Segment A1 of this trail that leads from the parking area to the first loop is the most heavily used trail segment in the wilderness area (n=190). Most groups using the trail leading to the beach traveled along the west fork, segment A4, (n=123) rather than the east fork, segment E1 (n=55). Trail segment A5 had a noticeably low number of uses (n=41) given that it connects the trail with the greatest number of uses (A1-A4) to the beach. Given that 46% of the use along trail segments A1-A4 occurred during the summer it is unlikely that a large number of groups simply stopped at the dunes overlooking the beach and did not use trail segment A5 to arrive at the beach. This improbable data was most likely due to inaccuracies on the part of the groups when

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<sup>3</sup>

A use for a trail, trail segment or quadrant of the wilderness area is the number of uses by groups that visited the area. For example, the 190 uses on trail segment A1 represents 190 uses by groups that traveled this segment. Therefore, if there were 2 people per each of these groups the trail segment would have been used by 380 individuals in our sample.

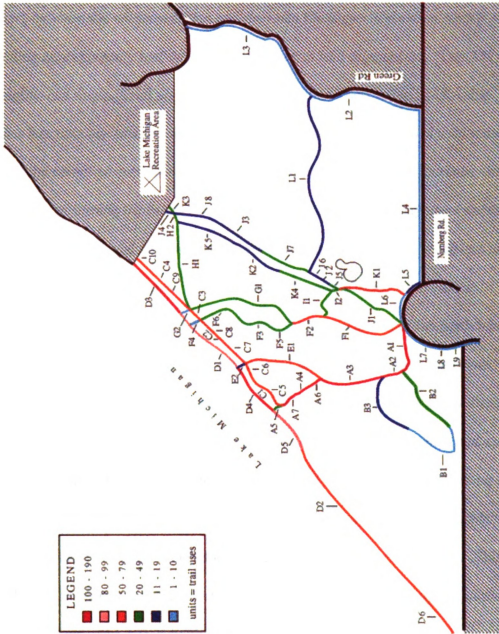


Figure 10: Trail Use

identifying their route of travel. The heavy off-trail and camping use in this area also support that users may have misrepresented the use of trail segment A5.

The trail second most frequented was D1, the shoreline starting at the common boundary between the wilderness area and the Lake Michigan Recreation Area (LMRA) and ending approximately half way down the beach at trail segment A5. Trail D1 was used eighty-one times. Trail segment D3, the shoreline closest to the LMRA that stretches less than one quarter of the way down the beach, however, was used more often than was the complete north beach trail. Trail segment D3 was used 125 times. From information concerning the use of trail segment D3, it appears that day users parked or camped at the LMRA and ventured from the recreation area down the beach and into the periphery of the wilderness area. This peripheral use of the beach from visitors comprised approximately 35% of the use for the northern segment of the north beach trail (segment D3). Trail segments D4 and D5, located in the midsection of the beach, were used 100 and seventy-four times respectively. The southern portion of the wilderness shoreline, segment D2, which starts where segment A5 intersects the beach and ends at the southern boundary of the wilderness, was used sixty-four times. Travel along the shoreline was most concentrated at the northern boundary next to the LMRA and decreases the closer one approaches the southern boundary of the wilderness. This is given that the users reported their routes of travel correctly and the midpoint of the shoreline (i.e., segment A5), actually did have a low number of uses.

The trails that received the next greatest amount of use were as follows: the ridge trail consisting of segments C1 through C10 with 56, 52, 70, 55, 64, 62, 59, 56, 62 and 63

uses respectively, the trail leading to Nordhouse Lake (K1) with fifty-five uses and the section of the middle trail comprised of segments F1 and F2 with fifty-two and fifty-nine uses, respectively. The next lowest category of trail usage diminishes to use ranging from thirty to forty-one uses per trail. These trails are mostly connecting trails between larger trails except trail J1 that leads to Nordhouse Lake. The trail segments comprising this group are A5, F3, G1, H1, H2, I1, I2 and J1 with uses of 41, 35, 30, 31, 32, 30, 37 and 39 respectively.

All other trails or trail segments in the wilderness area were reported as having lesser amounts of travel. Travel for these trails ranged from three (L7) to twenty-four (K4) uses. Trail B1 had the least amount of travel of the designated wilderness trails with six uses. It should be noted that "trails" and "trail segments" L2, L3, L4, L5, L6, L7, L8 and L9 are located on the borders of the wilderness area and are not designated trails within the wilderness area. Use reported on these "trails" may or may not have been on the perimeter of the wilderness area. It cannot be discerned if travel occurred on the periphery of the wilderness or just outside its borders.

#### **6.4.2 Off-trail Use**

The entire wilderness area was used for the off-trail hiking activities of the users (Figure 11). Off-trail hiking was concentrated in the western section of wilderness that spans an area from slightly north to slightly south of Nordhouse Lake (and includes the area surrounding the lake) and is located between Nordhouse Lake and the Lake Michigan shoreline. Travel in the western section ranged from seventeen to thirty-seven groups per quadrant (i.e., high off-trail use) and constituted 30% of the off-trail use in the

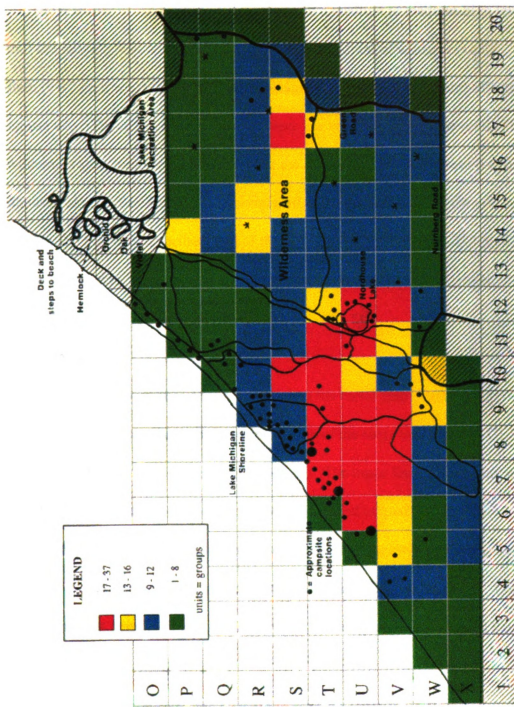


Figure 11: Off-Trail Hiking Use



wilderness area. The heaviest off-trail use was located in quadrants T7 and T8 with thirty-three and thirty-seven reported groups using each area respectively.

The majority of the wilderness area received a medium to medium-high level of off-trail use ranging from nine to sixteen groups per quadrant of wilderness area. Medium (9-12 groups/quadrant) and medium-high (13-16 groups/quadrant) off-trail hiking use was 51% of the off-trail use. Medium use was primarily in the eastern half of the wilderness stretching from the northern to the southern boundaries located east of Nordhouse Lake. Off-trail hiking use diminished along the perimeter of the wilderness area and in and around the northern end of the Lake Michigan shoreline. Off-trail hiking use in these quadrants was considered low and ranged from one to eight groups per quadrant. Low use was 19% of off-trail use.

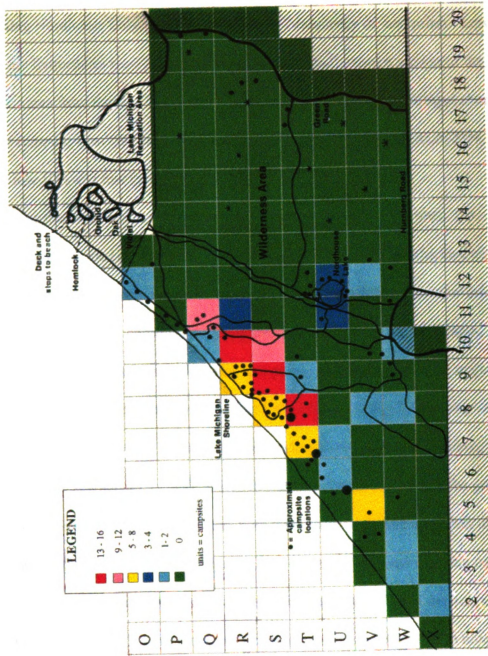
#### **6.4.3 Camping Use**

The camping locations of users recorded on the travel maps indicated that camping use was concentrated mostly on either side of the ridge trail (i.e., C1-C10) and just past the south end of the ridge trail (Figure 12). The range for high camping use was from 14 to 16 campsites, medium-high use was comprised of quadrants with 10 campsites, medium use ranged from 6 to 8 campsites, medium low use encompassed quadrants with 4 campsites and low use constituted 2 campsites per quadrant.<sup>4</sup> Quadrant S9 had the greatest number of campsites with sixteen and quadrants R10 and T8 just to

---

<sup>4</sup>

A campsite was a location indicated by a group as having been used for camping for a recreation-visit. If two different groups indicated the same location for camping at different times this was considered two campsites.



**Figure 12: Camping Use**



ATC

OPAC

DIAMOND

BOND

USA

1957

25% CO

the north and south of S9 also showed high levels of camping with fourteen campsites recorded for each quadrant. Medium levels of campsites were located along the Lake Michigan shoreline just west of the high use areas (quadrants R9, S8, and T7). The area surrounding Nordhouse Lake showed a medium-low frequency of campsites. Low levels of campsite frequencies were dispersed throughout the southwestern section of the wilderness area from north of the end of Nurnberg Road to the Lake Michigan shoreline. High use camping was 35% of the camping use, medium-high 16%, medium 21%, medium-low 10% and low camping use 19%.

Campsites were not evenly dispersed throughout the wilderness area. No campsites were recorded on the wilderness' eastern half (i.e., wilderness located east of Nordhouse Lake and between the north and south boundaries of the wilderness area). Campsites were distinctly concentrated along the shoreline area of the wilderness.

The travel patterns in the wilderness area paint a clear picture that the majority of the users were arriving at the midsection of the Lake Michigan shoreline by way of the beach from the north (i.e., trail D1) and the trail leading from the end of Nurnberg Road to the beach (i.e., segments A1 - A5). Given that trails D1 and A1 - A5 had the greatest levels of use, it is not surprising that where both these trails lead, the midsection of the beach, is where the greatest concentration of both off-trail hiking and camping use was located. Located in this concentrated area of the wilderness was 30% of the heavier off-trail hiking use as well as 35% of the heavier camping use. It is interesting to note that although the western half (i.e., wilderness west of Nordhouse Lake) was used more than the eastern half (i.e., wilderness east of Nordhouse Lake), no section of the wilderness

was omitted from off-trail hiking use. However, camping was concentrated along the beach and was nonexistent in the eastern half of the wilderness. Nordhouse Dunes Wilderness Area is used in its entirety with hiking and camping use heavier nearer the shoreline.

#### **6.4.4 Visitors' Awareness of Wilderness Boundaries**

An important finding of this study was that a minimum of 9% of wilderness visitors were not aware of the wilderness boundaries and therefore did not know what did and did not constitute the Nordhouse Dunes Wilderness Area. Comments were noted from visitors who referred to the Lake Michigan Recreation Area (LMRA) and/or Green Road that were inapplicable to the visitors' current visit to the wilderness area. The survey was to only address conditions in the wilderness area, not conditions in the surrounding areas. These users were mistakenly considering the LMRA and Green Road as part of the wilderness area and, therefore, applicable to the survey.

Conflicting responses within a group of users were also used to identify visitors confused about what area constituted the wilderness. Most inconsistencies were found in day users who incorrectly thought they had stayed overnight in the wilderness and day users who addressed the LMRA and Green Road as part of the wilderness area. Surveyors also encountered wilderness users, especially users exiting from the north and south beach ends of the beach, that stated as they were exiting the wilderness area, that they had not even been in the wilderness.

A minimum of 9% of wilderness users was found to be confused as to whether they had hiked and/or camped in or outside the boundaries of the wilderness area.

Results for the percentage of people interviewed who were confused is stated as a minimum because only those surveys with notable incongruencies could be recorded, with confidence, as people who were confused. Therefore, if anything, 9% would be an underestimate of the amount of visitors confused as to the location of the wilderness boundaries.

Adding to the complexity of the confusion of visitors is that only 38% realize that the U.S.F.S. manages the area. Other users, 16%, believe the managers to be the Department of Natural Resources, 13% believe it is other government agencies or nonexistent government agencies, 8% listed multiple agencies, 5% listed other state agencies, 4% had no idea and 4% listed other responses such as "the local people." Users may not be as aware of the wilderness boundaries as managers would hope or assume them to be.

## **6.5 Objective 4. Identify what "wilderness" means to users.**

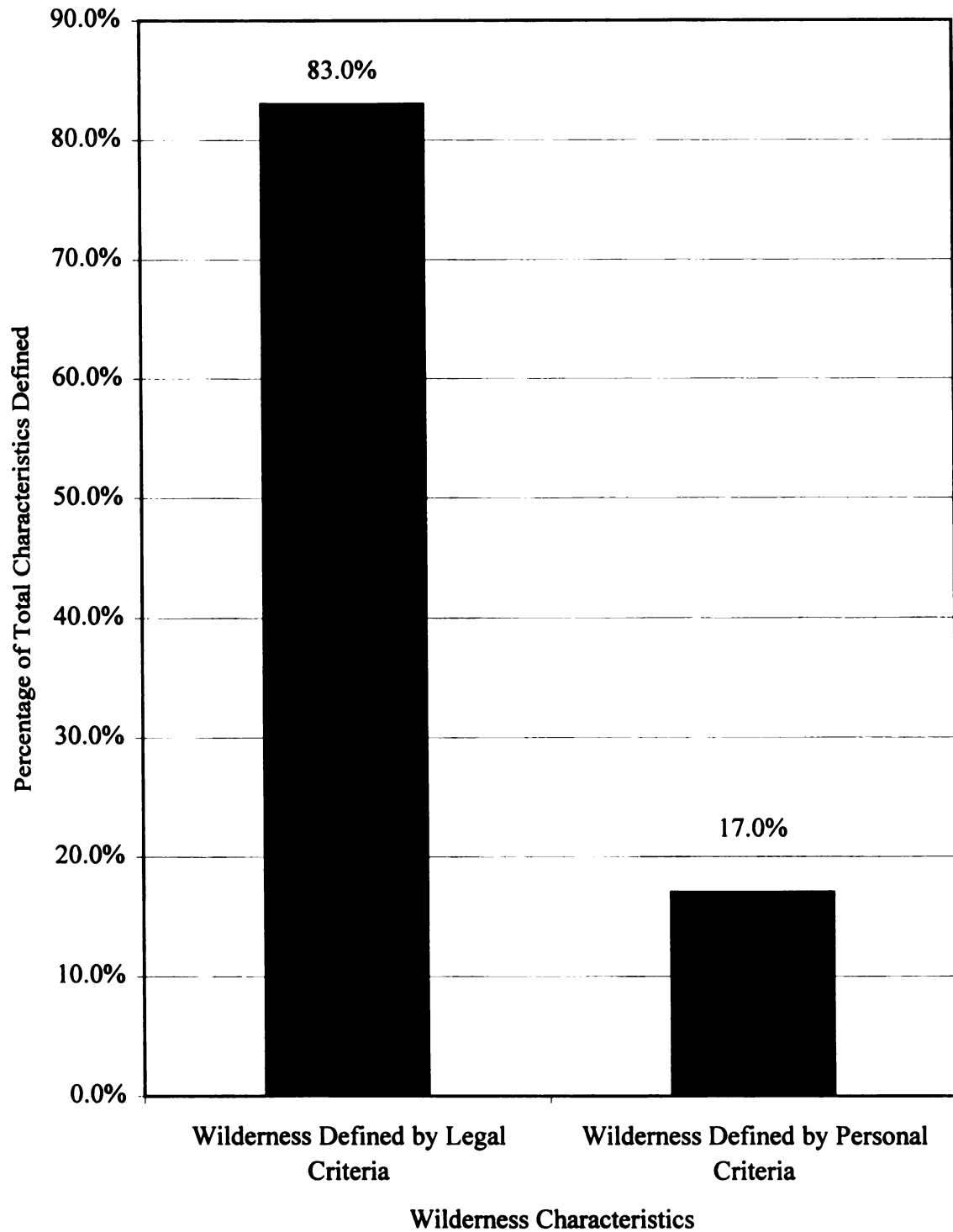
Users' definitions of wilderness (Q10) were divided into their component parts and the parts were categorized into seven categories (Appendix D.). The six categories that follow are based on the definition of wilderness in the 1964 Wilderness Act: large size (extent, expanse, vastness), minimum evidence of human influence, forces of nature predominate, opportunities for solitude (no or few people, privacy), primitive and/or unconfined recreation (hiking, walking, camping) and ecological and geological or other features of scientific, educational and scenic or historic value. The seventh category consists of personal meanings that are not directly stated in the official definition of wilderness. These meanings emerged through content analysis of users' responses to open-ended question ten and are termed "personal meanings."

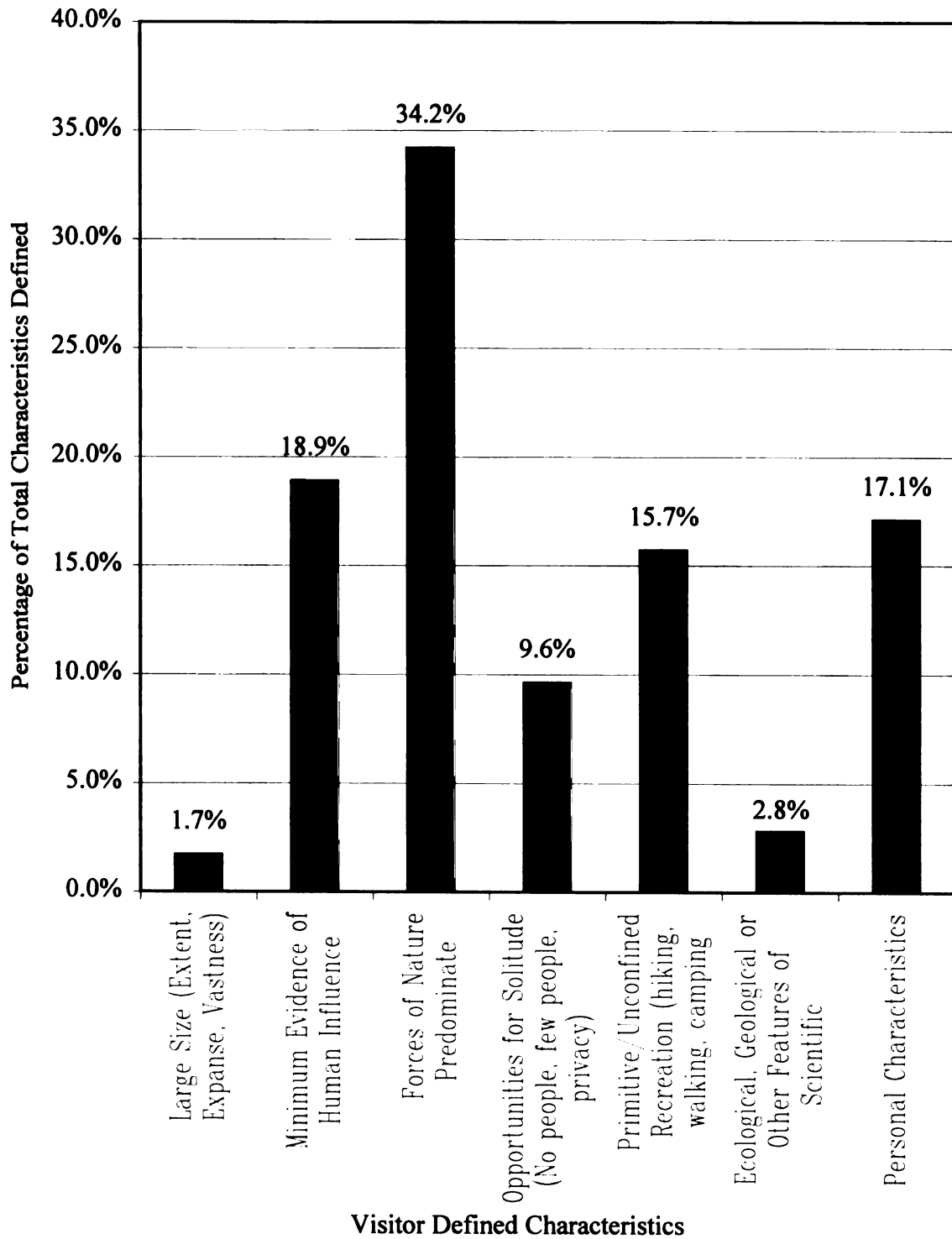
### **6.5.1 Legal Definitions**

Visitor definitions matched the 1964 Wilderness Act legal definitions closely (Table 8 and Figure 13). These characteristics comprised 83% of the characteristics listed by users. Visitors' definitions of wilderness coincided most closely with the 1964 Wilderness Act clauses regarding the predominance of the forces of nature (34%), minimum evidence of human influence (19%) and opportunities for primitive recreation (16%). Large size and ecological, geological or other features were rarely mentioned by visitors (Figure 14). Also important is that "minimum evidence of human influence" and "primitive recreation opportunities" held a wide range of meanings to visitors. Responses ranged from "no fast food" to "pristine, natural, unimproved serenity" for "minimum

**Table 8: Visitor Defined Wilderness Characteristics**

<b>Characteristics</b>	<b>Percentage</b>
<b><u>Legal Characteristics (SUBTOTALS)</u></b>	
Large Size (Extent, Expanse, Vastness)	1.7%
Minimum Evidence of Human Influence	18.9%
Forces of Nature Predominate	34.2%
Opportunities for Solitude (No people, few people, privacy)	9.6%
Primitive/Unconfined Recreation (hiking, walking, camping)	15.7%
Ecological, Geological or Other Features of Scientific Value	2.8%
<b>Personal Characteristics:</b>	17.1%
<b>Total</b>	<b>100.0%</b>
<b>Total Legal Characteristics</b>	<b>83.0%</b>
<b>Total Personal Characteristics</b>	<b>17.0%</b>
<b>Total</b>	<b>100.0%</b>

**Visitors' Definition of Wilderness****Figure 13: Legal and Personal Visitor Defined Wilderness Characteristics**

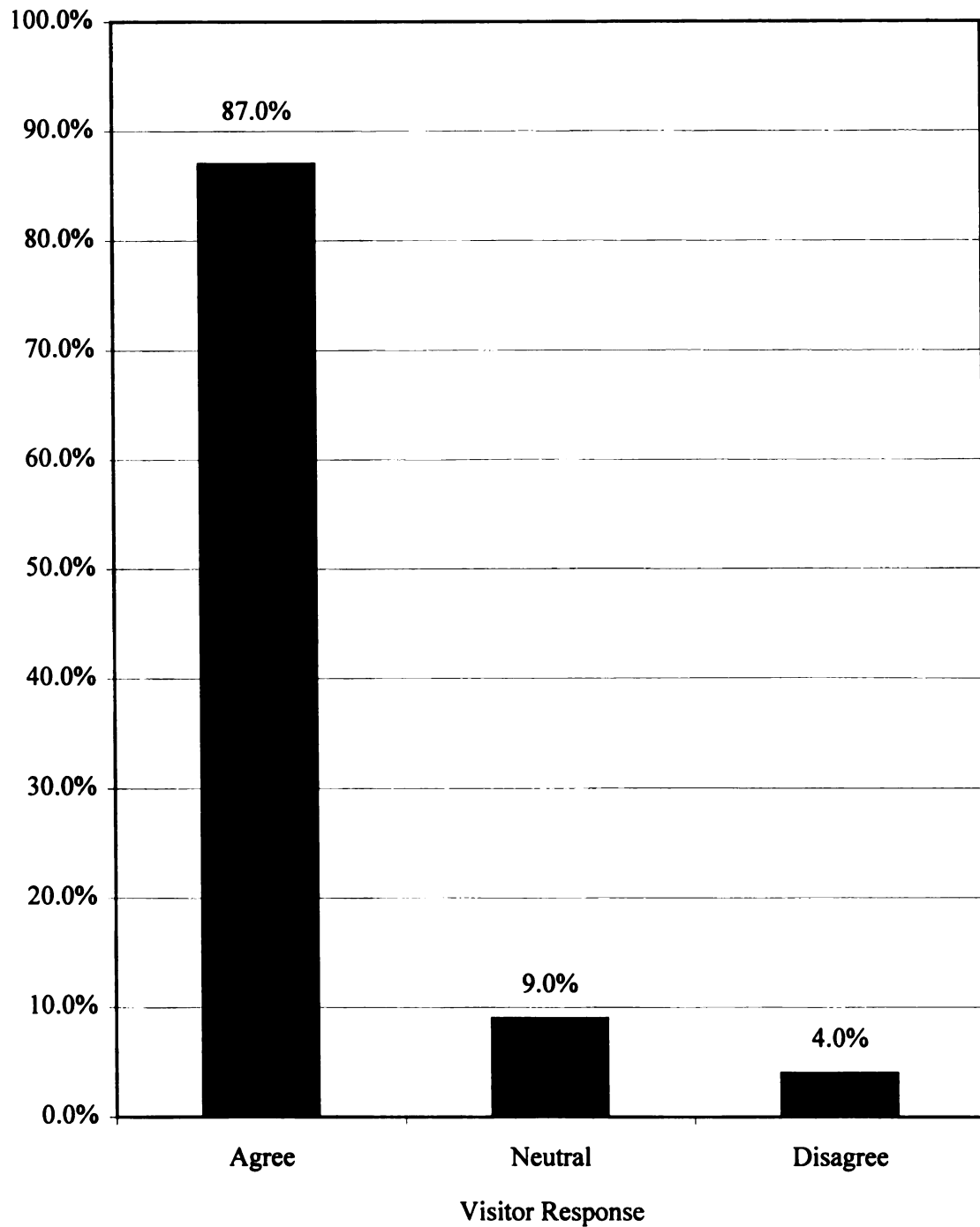
**Wilderness Characteristics****Figure 14: Visitor Defined Wilderness Characteristics**



evidence of human influence" and from "unrationed and unmarked campsites" to "lots of well-marked trails and rustic accommodations" for "primitive recreation opportunities." The existence of this range of meanings is an indicator that "wilderness purist" values regarding what constitutes human influence or primitive recreation do not necessarily prevail.

### **6.5.2 Personal Definitions**

The personal meanings listed by users as characteristics of wilderness comprised 17% of the characteristics listed. Personal meanings included "being able to see the stars at night," "[wilderness] is off the beaten path" and phrases such as "freedom," "spirituality," "tranquility" and "oneness [with nature]." Although visitors reported a great variety of wilderness definitions, 86% agreed that Nordhouse Dunes Wilderness met their definition of wilderness (Q11) and 5% reported it did not meet their definition (9% were neutral) (Figure 15).

**"Nordhouse Meets My Personal Definition of Wilderness"****Figure 15: Nordhouse Dunes Meets Visitors' Definition of "Wilderness"**

## **6.6 Objective 5. Describe user needs for management activities (as opposed to user preferences).**

Users' needs for management activities were not determined in this study. Rather, users' perceptions of the current wilderness conditions as well as their preferences for ideal wilderness conditions were determined. This section presents the results of how wilderness users perceive the current wilderness conditions and what they perceive ideal conditions to be for the wilderness area (Table 9). Users' perceptions of current wilderness conditions are based on the analysis of questions 42-62 and users' preferences for ideal conditions are based on questions 63-86. Further interpretation of Table 9 is provided in the ensuing Figures 15 through 25 and accompanying text.

### **6.6.1 Users' Perceptions of Current Wilderness Conditions**

#### **6.6.1.1 Management Controls**

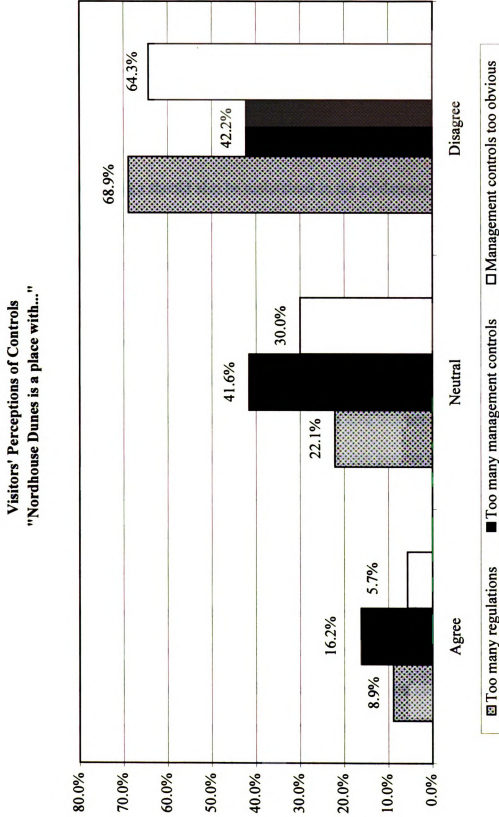
Users perceived the wilderness area as a place with the appropriate level of management activities (Figure 16). The majority of the users indicated that the area did not have too many regulations (69%) nor were the management controls too obvious (64%). Sixteen percent of the users felt that there were many management controls and 42% felt there were not many (42% were neutral). Data concerning the level of controls in the wilderness indicates that, from a user perspective, management regulations and controls are at the appropriate levels at this time and should continue to be implemented at the current levels. An increase in management controls may displace some users as a greater percentage of users indicated a neutrality or concordance than disagreement that there are already many regulations governing the area at this time.

**Table 9: Visitors Responses to How They Perceive Current Conditions and Preferences for Ideal Conditions**

Question #	Question	Responses		
		Agree (%)	Neutral (%)	Disagree(%)
Perceptions of Current Conditions: Nordhouse is a place...				
42	To be alone	87.4	9.9	2.7
43	With too many people	10.3	25.9	63.9
44	With too many regulations	8.9	22.1	68.9
45	With some areas for hikers only	67.4	18.2	14.4
46	With many natural openings	84.5	13.0	2.5
47	With many natural forested areas	92.5	6.0	1.5
48	To test my skills	45.6	40.1	14.3
49	With too few people	7.1	20.5	72.4
50	With many management controls	16.2	41.6	42.2
51	With too many backpackers	4.6	28.3	67.1
52	With too many day hikers	7.4	27.2	65.3
53	With too many people on the beach	7.1	30.1	62.8
54	With too many roads	10.0	25.2	64.8
55	With too many motorized vehicles	10.4	24.3	65.3
56	With too many horses	10.0	27.1	62.9
57	With too many hunters	20.1	32.2	47.6
58	With too many facilities	3.7	32.3	64.1
59	That is easy to access	71.0	20.5	8.6
60	Where mgmt. controls are too obvious	5.7	30.0	64.3
61	With too many maintained trails	4.9	27.9	67.2
62	With too many cross-country skiers	1.3	47.8	50.9

Table 9: Continued

Question #	Question	Responses		
		Agree (%)	Neutral (%)	Disagree(%)
Preferences for Conditions: Nordhouse Dunes should be a place...				
63	To be alone	90.4	7.3	2.3
64	With too many people	51.7	37.4	10.9
65	With many regulations	26.4	32.3	41.3
66	With some areas for hikers only	69.7	13.0	17.3
67	With many natural openings	81.7	16.0	2.3
68	With many natural forested areas	91.6	7.4	1.1
69	To test my skills	65.0	29.6	5.4
70	With more people	4.1	23.3	72.6
71	With fewer management controls	15.2	48.5	36.3
72	With fewer backpackers	13.3	36.9	49.8
73	With fewer day hikers	15.9	37.1	47.0
74	With fewer people on the beach	21.7	44.9	33.3
75	With fewer roads	36.4	39.0	24.6
76	With fewer motorized vehicles	55.7	30.7	13.6
77	With no motorized vehicles	58.9	23.4	17.6
78	With less horse travel	24.7	51.2	24.1
79	With no horses allowed	21.9	41.7	36.3
80	With fewer hunters	46.7	27.3	26.0
81	Where hunting is not allowed	45.5	21.0	33.5
82	With less facilities	25.5	49.5	25.1
83	That is not easy to access	35.1	32.5	32.5
84	Where mgmt. controls are not obvious	52.7	33.3	14.1
85	With fewer maintained trails	19.8	36.1	44.1
86	With fewer cross-country skiers	9.0	53.1	37.9



**Figure 16: Visitors' Perceptions of Management Controls**

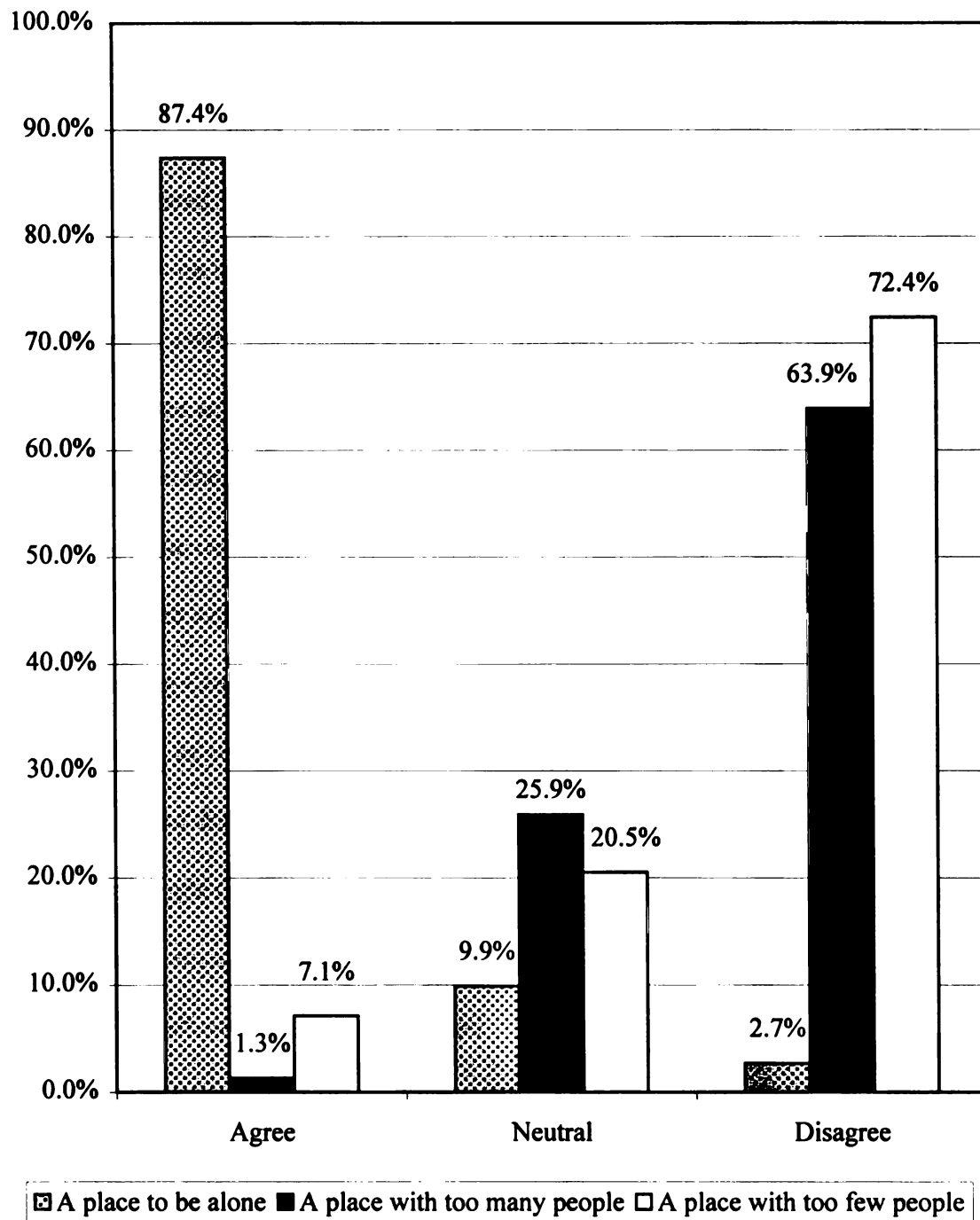
### **6.6.1.2 General Wilderness Conditions**

Eighty-five percent of the users perceived Nordhouse as a place with many natural openings and 93% of the users felt it had many forested areas. The majority of visitors (67%) indicated that it is a place with some areas where only hikers can go, 14% indicated that it was not and 18% were neutral. Based on users' perceptions, places where only hikers can go should also be maintained in the wilderness. User responses to whether Nordhouse was perceived as a place where they could test their skills were primarily divided between those users that agreed and those that were neutral. Forty-six percent of the users felt that the wilderness was a place to test their skills whereas 14% did not (40% were neutral). Users did not feel that there were too many facilities (64%), maintained trails (67%), roads (65%), or motorized vehicles (65%) in the wilderness area. An overabundance of these conditions in the wilderness area was not a concern of the users and they do not need to be reduced. Also, seventy-one percent of the users perceived the area as easy to access, 9% of the users disagreed that the area was easy to access and 21% were neutral.

### **6.6.1.3 Use Levels**

Users' responses to use levels indicated that there is no need at this time to decrease the amount of use in the wilderness area. Users supported this by indicating that there are not too many backpackers or dayhikers and that there are not too many people in general that use the area. The majority of users (64%) felt that the wilderness did not have too many people (Figure 17). Also, 72% of the users felt that there was no need for more people in the area. This is consistent with users' responses to questions concerning

**Visitors' Perceptions of Use Levels**  
**"Nordhouse Dunes is a place..."**



**Figure 17: Visitors' Perceptions of General Use Levels**



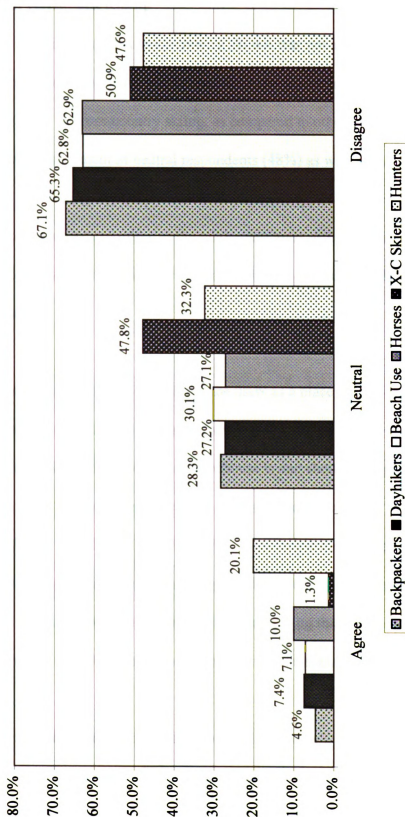
encounters in the wilderness. Eighty-three percent of the users reported that they did not feel the area was overcrowded and 90% reported they did not feel there were too few people nor that there should be more.

Sixty-seven percent of the users did not feel there were too many backpackers and 65% did not feel that there were too many dayhikers. Users' perceptions of current conditions indicated, as did users' responses to encounter information, that there are not too many people on the beach. The majority of the users (63%) agreed that there are not too many beach users; 7% felt that there were too many and 30% were neutral (Figure 18). Management activities should, therefore, focus on maintaining the current use levels and conditions in the wilderness. Visitors' support for current use levels ranged from a low of 48% of the users indicating that there were not too many hunters to a high of 67% that felt that there were not too many backpackers using the area.

#### **6.6.1.4 Hunting Conditions**

Hunting, as compared to other types of uses, had the greatest percentage of people (20%) that agreed that there were too many in the area. This finding occurred even though most people (90%) were interviewed in nonhunting seasons. Although hunting had the greatest amount of opposition from users, 48% of the users agreed that there were not too many hunters and 32% were neutral. Current hunting levels are being tolerated, but not to the extent of other types of uses. Analysis of the encounter information (objective 6) however, identified a polarity in the users concerning the number of hunters in the area. This encounter information indicates that users are concerned with the issue of hunting and that they may be supportive of change.

**Visitors' Perceptions of Types of Use  
Nordhouse Dunes is a place with too many...**



**Figure 18: Visitors' Perceptions of Specific Types of Use Levels**

#### **6.6.1.5 Ski Use and Horseback Riding**

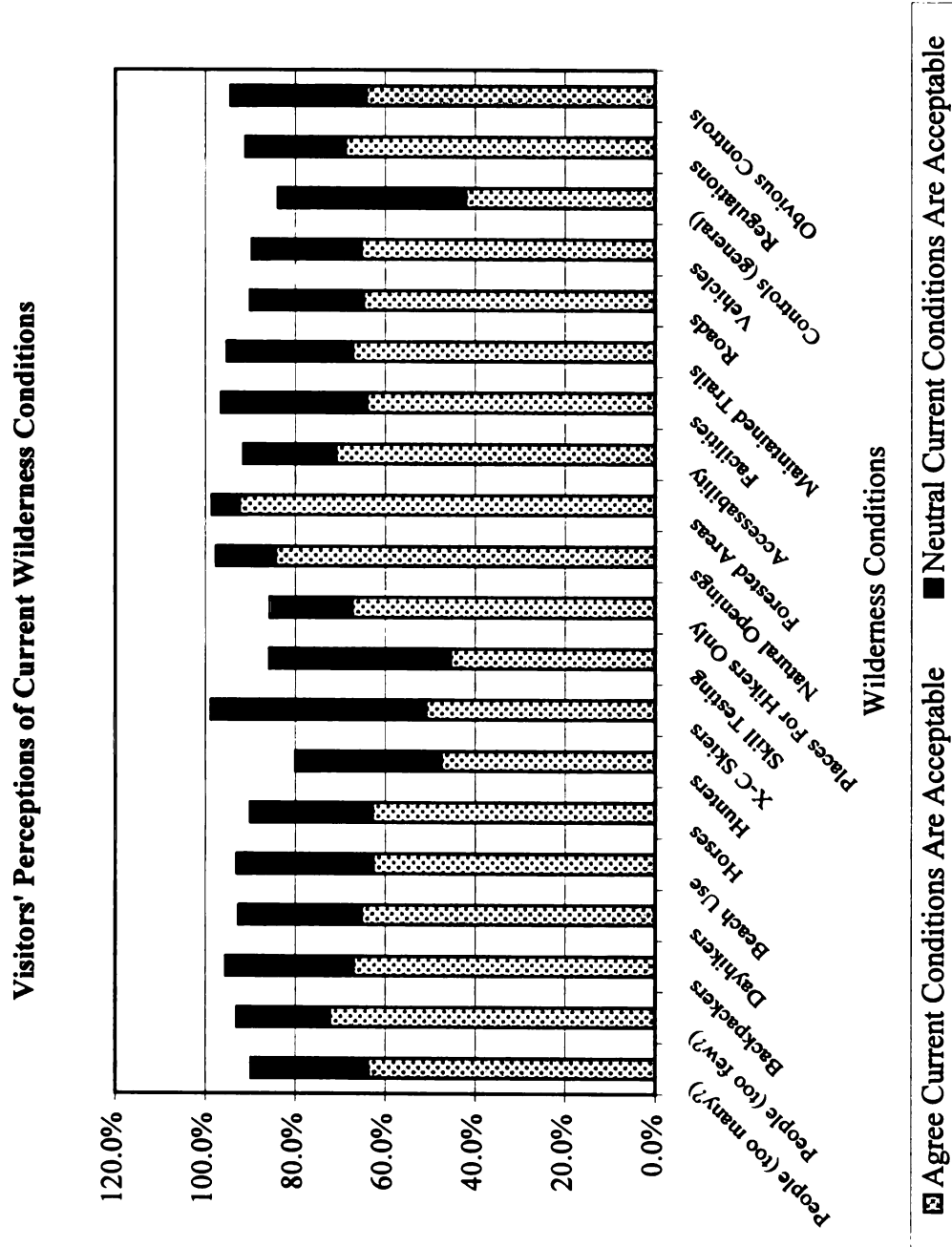
Users' responses indicated that cross-country ski use was not a problem in the wilderness area. The majority of the users (51%) felt that there were not too many cross-country skiers. The issue of cross-country skiing, as compared to other types of use addressed, had the greatest percent of neutral respondents (48%) as well as the least amount of visitors (1%) feeling that there was too much of this type of use. Horse use is also not currently too abundant according to the wilderness users as 63% indicated that it is not a place with too many horses and only 10% agreed there are too many horses at this time (27% were neutral).

#### **6.6.1.6 Solitude**

The wilderness area at this time is serving the users as a place to be alone as indicated by 87% of the users. This is consistent with the 83% of the users who reported in the encounter information (objective 6) that Nordhouse is and should be a place to be alone. The fact that users are able to experience their desired solitude further supports that there is no need for a reduction of use at this time. Nordhouse Dunes is perceived as a wilderness by its users and as a place to find the peaceful, serene type of experience for which they are looking. Users repeatedly stated this by indicating that the wilderness is a place to be alone, that it meets their definition of the term wilderness and through a 95% approval rate.

#### **6.6.1.7 Summary of Visitor Perceptions of Current Conditions**

Figures 18 and 19 summarize users' perceptions of the current wilderness conditions. Of the 20 wilderness conditions for which visitors were asked to state their



**Figure 19: Visitors' Perceptions of Currently Acceptable Wilderness Conditions**

preferences, there were three for which less than 50 percent of the sample found conditions to be acceptable: the number of hunters, opportunities for skill testing and level of management controls (Figure 19). More than 10 percent of visitors surveyed deemed the number of hunters and management controls to be in need of reduction (Figure 20).

### **6.6.2 Visitors' Preferences for Ideal Conditions**

Visitors' preferences for wilderness conditions coincide closely with their perceptions of current conditions and give insight on what users' ideal conditions might be in the wilderness. Users' preferences for what they felt Nordhouse Dunes Wilderness Area should be depicted it as a place with many forested areas and natural openings. It is also a place where visitors can be alone and experience no increase in the number of other users.

#### **6.6.2.1 Management Controls**

In achieving a preferred wilderness environment, users (41%) did not feel that many visitor regulations should be employed and that controls should not be obvious (53%) (Figure 21). Twenty-six percent of the visitors agreed that the wilderness should be a place with many visitor regulations and 32% were neutral. Fourteen percent of the visitors disagreed that management controls should not be obvious and 33% were neutral. There was a greater preference for fewer (36%) rather than more (15%) management controls but most of the users (49%) were neutral to this issue. Users would also prefer that management controls do not become obvious and that a great deal of visitor regulations not be implemented.

Visitors' Perceptions of Current Wilderness Conditions

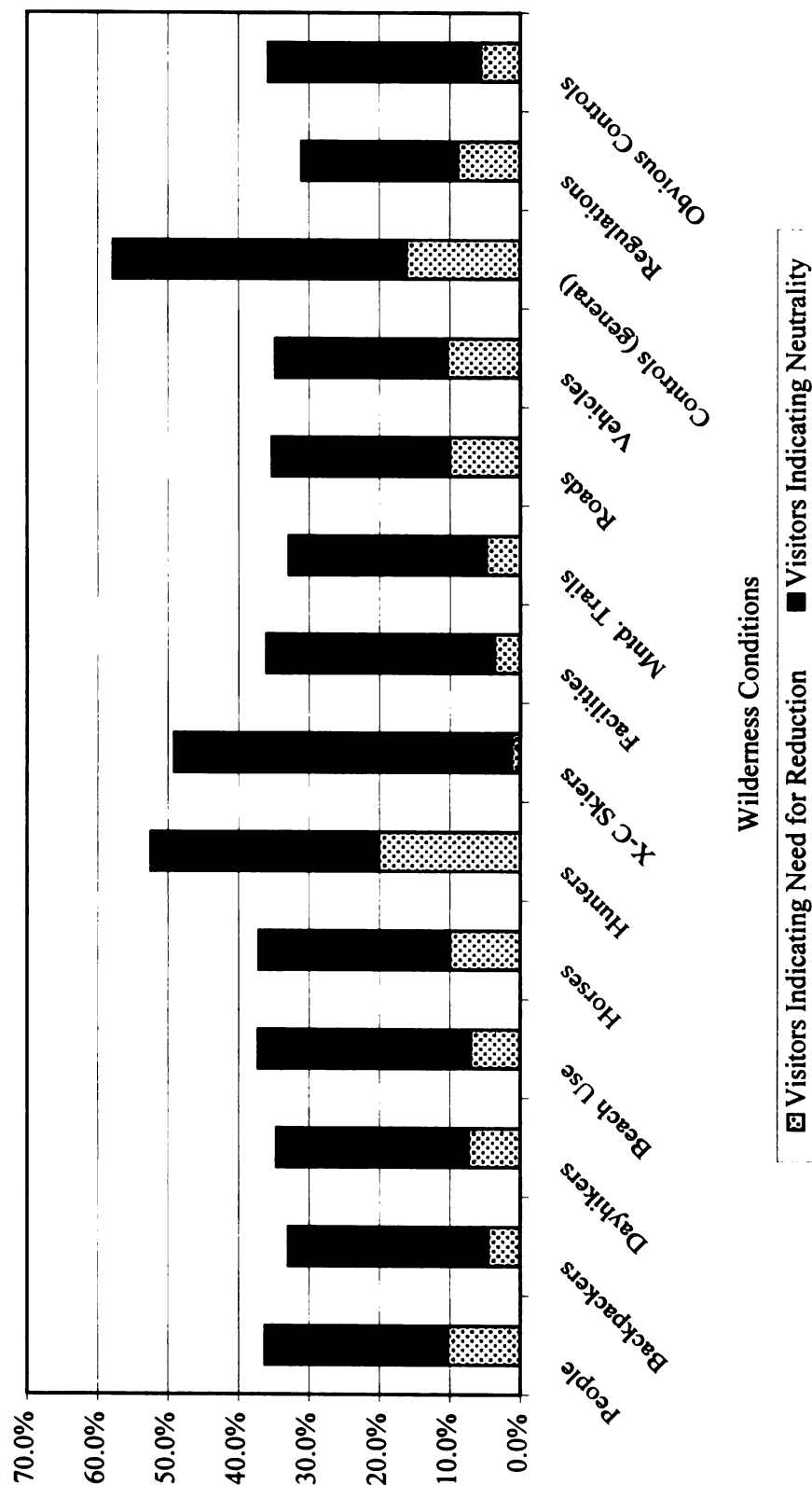


Figure 20: Visitors' Perceptions of Needed Reductions in Use Levels

Visitors' Preferences for Management Controls in the Wilderness  
 "Nordhouse Dunes should be a place with..."

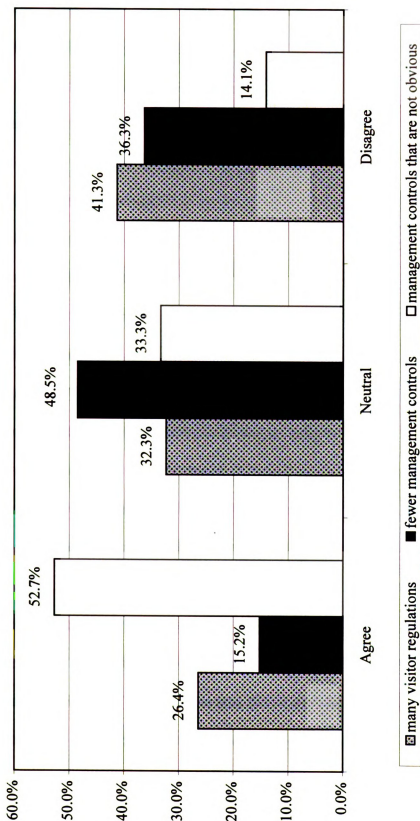


Figure 21: Visitors' Preferences for Management Controls

### **6.6.2.2 Wilderness Conditions**

Eighty-two and ninety-two percent of the users, respectively, indicated preference for Nordhouse Dunes to be a place with many natural openings and forested areas (16% and 7% respectively were neutral and 2% and 1% respectively disagreed). A large majority (90%) indicated that the wilderness should be a place to be alone. Most users (65%) felt that Nordhouse Dunes should be a place to test their skills and should contain areas where only hikers can go (70%).

The level of facilities in the wilderness was acceptable to most users as 50% were neutral to whether there should be fewer facilities in the area, and almost equal percentages indicated that there should be fewer (26%) as indicated there should not be fewer (25%) facilities. There is virtually a 50%/50% split between those users who agreed that there should be fewer facilities and those that disagreed.

Thirty-six percent of the users felt that there should be fewer roads in the wilderness area and 25% felt there should not be fewer roads (39% were neutral). Given that there are not any roads within the wilderness boundaries, users are likely referring to the roads surrounding or near the wilderness. Users also preferred that the area have fewer motorized vehicles (56%) or no motorized vehicles (59%). These findings support the wilderness regulation against the use of motorized vehicles in the wilderness area. Users predominantly disagreed (44%) that the area should have fewer maintained trails while 20% agreed there should be fewer and 36% of the users were neutral.

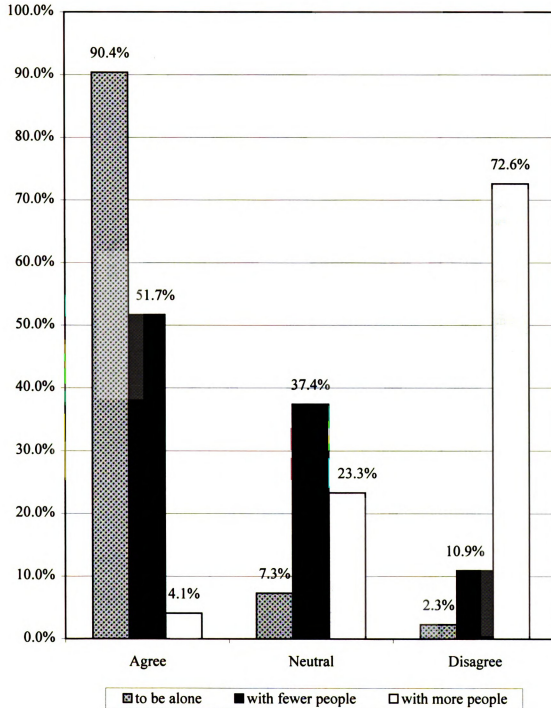


### 6.6.2.3 Use Levels

Users' preferences concerning whether there should be more people using the wilderness area coincided closely with their perceptions of this condition. Seventy-three percent of the users indicated a preference for no increase in the number of users (Figure 22). The preferences of users, did however, vary slightly from their perceptions concerning an abundance of people in the wilderness area. Whereas users' perceptions indicated that current conditions were acceptable (64% of the users concurring), users (52%) indicated a preference for fewer people in the area. Findings for users' preferences concerning use levels was consistent with findings for encounter information (objective 6) where 52% of users also favored a reduction in use. The relatively high percentage of both users that preferred less use and those that stated that the current use conditions were acceptable, supports the "fewer is preferable" attitude of users identified in responses to encounter information (objective 6). In combination, these findings indicate that although they were accepting of current use levels, visitors would ideally prefer the wilderness area to have fewer users. These findings exemplify the need for the continuous monitoring of visitor use levels and preferences. Monitoring will ensure appropriate management based on the continually changing environment of the wilderness area and its users and determine if and when controls on use should be implemented.

Users did not indicate any other types of use that they would prefer to be decreased in the wilderness area (Figure 23). Fifty percent of the users disagreed and thirteen percent agreed that there should be fewer backpackers (37% neutral).

**Visitors' Preferences for Wilderness Use Levels**  
**Nordhouse Dunes should be a place...**



**Figure 22: Visitors' Preferences for General Use Levels**

Visitors' Preferences for Specific Types of Use Levels  
 "Nordhouse Dunes should be a place with fewer..."

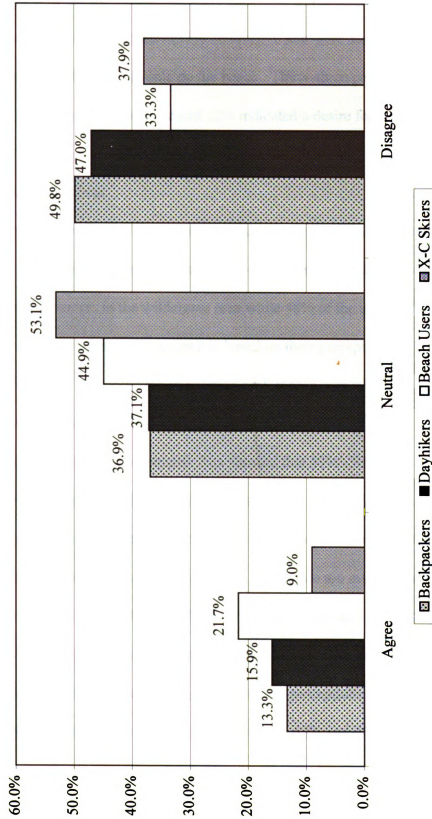


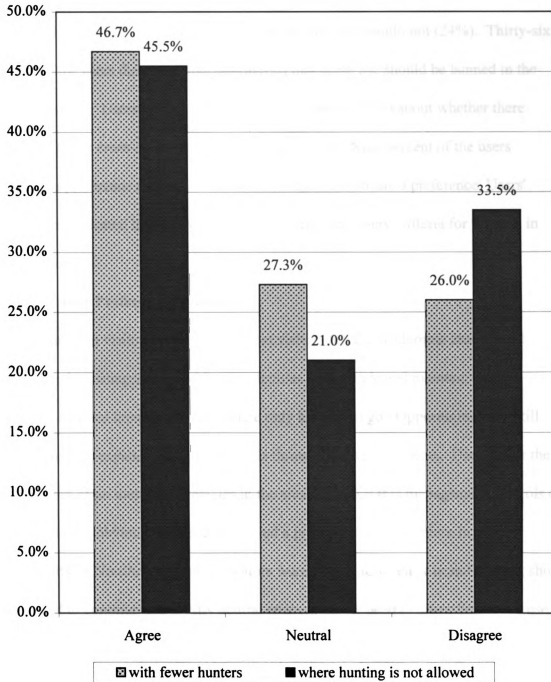
Figure 23: Visitors' Preferences for Specific Types of Use Levels

Forty-seven percent of the users disagreed there should be fewer dayhikers whereas 16% agreed there should be fewer dayhikers (37% neutral). Users were mostly neutral (45%) to whether there should be fewer people on the beach. Thirty-three percent of the users showed no preference for less beach use and 22% indicated a desire for fewer beach users.

#### **6.6.2.4 Hunting Conditions**

Users' preferences for the level of hunters directly opposed their perceptions of the current hunting conditions in the wilderness. Forty-seven percent of the users showed a preference for fewer hunters in the wilderness area while 48% of the users also indicated that current hunting conditions were acceptable based on their perceptions of the current conditions (Figure 24). This polarization of users' preferences versus users' perceptions concerning hunting use was supported by findings for the accepted level of encounters in the wilderness (objective 6). The encounter data showed that 49% -50% of the users favored and 48% - 49% opposed hunting and 18% indicated that the fewer the number of hunters there were in the wilderness the more preferable the conditions. In addition, forty-six percent of the users not only indicated that there were too many hunters, but that they would prefer hunting banned all together. This further emphasizes users' concerns for hunting and their preference for a reduction in hunting use. The fact that virtually equal percentages of users favored hunting based on their perceptions of the current conditions as wished it banned based on their preferences, 48% and 46% respectively, is an indicator that hunting is a prominent management issue for Nordhouse Dunes.

**Visitors' Preferences for Hunting Use Levels in the Wilderenss**  
**"Nordhouse should be a place..."**



**Figure 24: Visitors' Preferences for Hunting Use Levels**

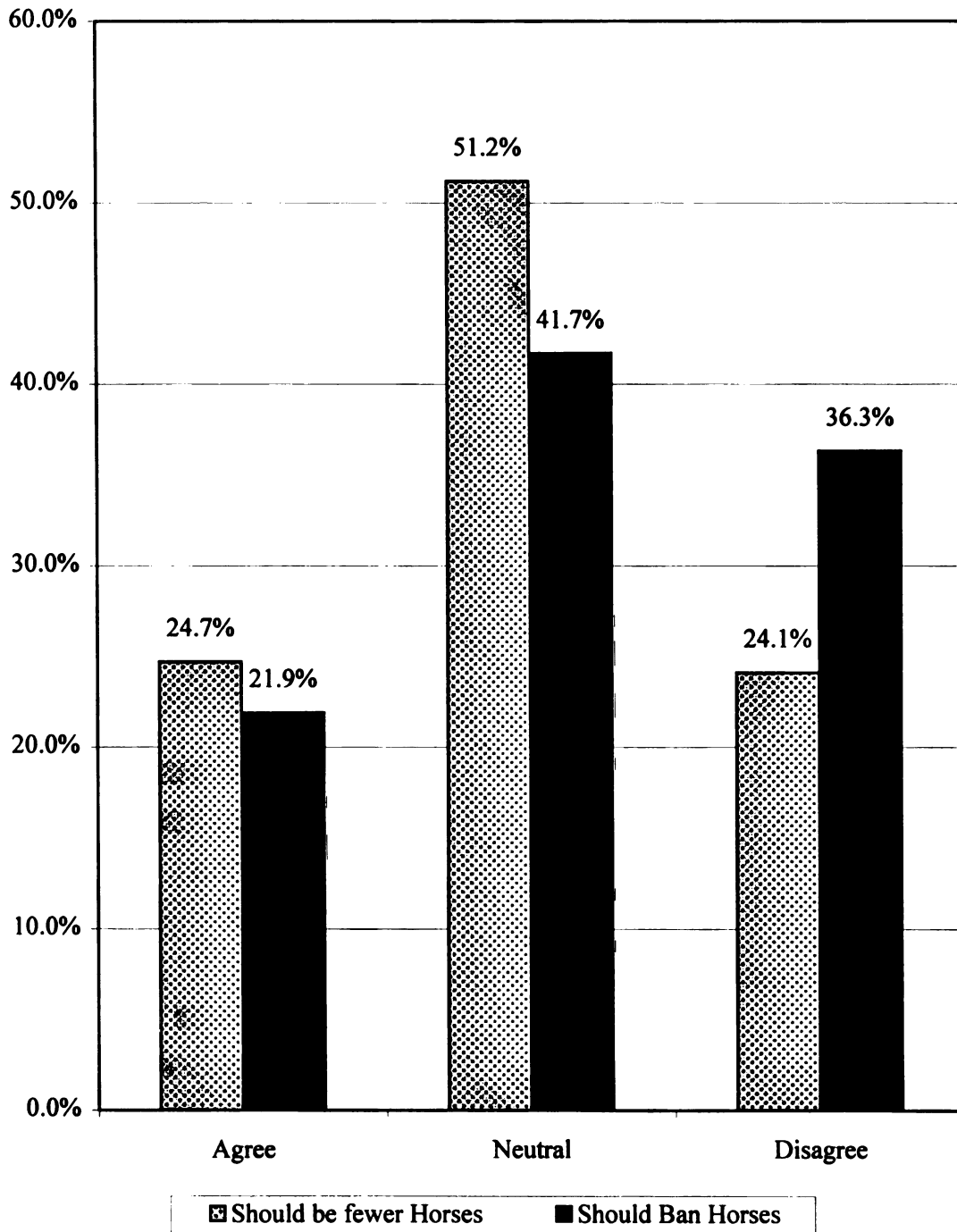
#### **6.6.2.5 Ski Use and Horseback Riding**

Users were mostly neutral as to whether there should be less horse use (51%) or no horses allowed in the wilderness (42%) (Figure 25). Users were split between those that would prefer less horse use (25%) and those that who would not (24%). Thirty-six percent of the users disagreed and 22% agreed that horse use should be banned in the wilderness area. Users were also predominantly neutral (53%) about whether there should be fewer cross-country skiers in the wilderness. Nine percent of the users indicated a preference for less ski use and 38% did not indicate a preference. Users' preferences indicated that the wilderness area is meeting users' criteria for the area in most aspects.

#### **6.6.2.6 Visitor Preference Summary**

Based on visitors' preferences, most visitors felt the wilderness area should continue to be managed to provide opportunities for solitude and maintain natural openings, forested areas and places where only hikers can go. Opportunities for skill testing could be expanded at various levels throughout the wilderness. Users favor the enforcement of no motorized vehicles in the area but prefer that management controls do not become too obvious. Users also showed a preference for a decrease in the accessibility of Nordhouse Dunes. Visitors were split as to whether or not hunting should be allowed to continue and mostly neutral concerning the need to lower horseback use.

Figure 26 summarizes users' preferences for conditions in the wilderness area.

**Visitors' Preferences for Horse Use Levels in the Wilderness****Figure 25: Visitors' Preferences for Horse Use Levels**

Summary of Visitors' Preferences for Wilderness Conditions  
 "Nordhouse Dunes should be a place..."

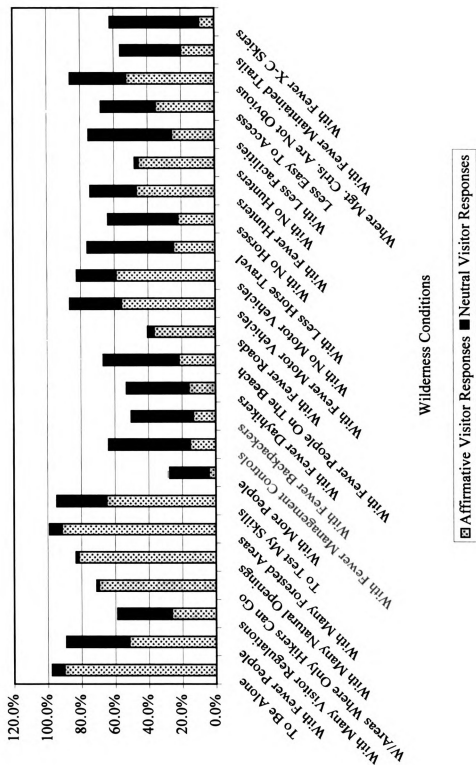


Figure 26: Summary of Visitors' Preferences for Wilderness Conditions



### **6.6.3 Summary of Hunters' Perceptions and Preferences for Selected Issues**

Nineteen percent of the visitors to the wilderness area were hunters (n=96) and 81% were nonhunters (n=410). Statistical differences were determined to exist between responses from hunters versus nonhunters for the following wilderness conditions: if there are too many people (Q43), if there should be fewer hunters (Q80), if hunting should be banned (Q81), the quality of the wilderness (Q109), and wilderness satisfaction (Q110) (Table 10).

#### **6.6.3.1 Group Size**

The range of group size (Q6) was larger (1-14 people/group) for nonhunters than for hunters (1-6 people/group). Hunting or nonhunting did not statistically influence visitors' group size. This lack of significance was however, borderline with a significance value (P) of 0.0510 as determined by the Mann-Whitney *U* test.

#### **6.6.3.2 General Use Levels**

A statistically greater percentage of hunters than nonhunters agreed that there were too many people in the wilderness (Table 10). Differences in sample means as to whether there should be fewer people (Q64), however, were not statistically significant ( $P = 0.900$  using the *t* test). Furthermore, neither group contends that Nordhouse is crowded.

#### **6.6.3.3 Hunting Use Levels**

A higher percentage of hunters than nonhunters felt that there were too many hunters in the wilderness, but this difference was not statistically significant (Table 10).

**Table 10. Hunter and Nonhunters Responses for Selected Wilderness Conditions.**

Issue	n	Agree (%)	Neutral (%)	Disagree (%)	Significance (%)
Too many people	H=96 NH=410	H=15.7 NH=9.0	H=32.6 NH=24.3	H=51.7 NH=66.8	P=0.012 *
Should be fewer people	H=96 NH=410	H=48.9 NH=52.4	H=42.2 NH=36.2	H=8.9 NH=11.4	P=0.900
Too many hunters	H=96 NH=410	H=14.1 NH=21.5	H=32.6 NH=32.2	H=53.3 NH=46.3	P=0.111
Should be fewer hunters	H=96 NH=410	H=14.6 NH=54.3	H=21.3 NH=28.7	H=64.0 NH=17.0	P=0.000 *
Hunting should be banned	H=96 NH=410	H=6.8 NH=54.5	H=8.0 NH=24.1	H=85.2 NH=21.4	P=0.000 *
Nordhouse is crowded	H=96 NH=410	H=7.7 NH=6.2	H=15.4 NH=8.8	H=76.9 NH=85.0	P=0.173

H = Hunter    NH = Nonhunter    \* = significant

Using the *t* test with a resultant P value of 0.000 a strong significant difference was determined between hunter and nonhunter responses for whether there should be fewer hunters in the wilderness. Hunters primarily disagreed (64%) that there should be fewer hunters in the wilderness area whereas, nonhunters primarily agreed (54%) that there should be fewer hunters in the wilderness area.

Hunter and nonhunter responses also differed significantly for whether the wilderness should be a place where hunting is not allowed. Using the *t* test, the P was determined to be 0.000. Hunters primarily disagreed that hunting should be banned and nonhunters primarily agreed that it should be. Eighty-five percent of the hunters disagreed, 7% agreed and 8% were neutral. Whereas, 55% of the nonhunters agreed, 22% disagreed and 24% were neutral that hunting should be banned.

Based on results using the *t* test, hunters view issues concerning hunting significantly differently than do nonhunters. Hunters indicated less opposition to current hunting conditions in the wilderness than did nonhunters.

#### **6.6.3.4 Wilderness Quality and Satisfaction**

Subgroup responses differed significantly for wilderness quality and satisfaction (Tables 11 and 12). Significance values of 0.000 and 0.006 were determined for the difference in means for wilderness quality and satisfaction respectively using the *t* test. Approximately two-and-a-half times as many hunters as nonhunters reported that Nordhouse was improving in terms of quality (Q109). However, over half of both groups agreed that the quality of the area had not changed as to previous trips.

The perceived improvement in quality expressed by hunters as compared to nonhunters was not necessarily correlated with hunter satisfaction with the current trip (Q110). Both groups gave their trips to Nordhouse high ratings. However, a statistically greater percentage of nonhunters than hunters rated their trip as “very good” and “good” combined.

**Table 11. Hunter and Nonhunters Responses for Wilderness Quality.**

Issue	n	Getting Better (%)	Has not Changed (%)	Getting Worse (%)	Have not Visited (%)	Other (%)	Significance (%)
Quality of trip	H=96 NH=410	H=31.9 NH=12.9	H=52.7 NH=52.6	H=4.4 NH=7.4	H=8.8 NH=24.5	H=2.2 NH=2.6	P=0.000 *

H = Hunter    NH = Nonhunter    \* = significant

**Table 12. Hunter and Nonhunters Responses for Satisfaction With Wilderness trip.**

Issue	n	Very Good (%)	Good (%)	Fair (%)	Poor (%)	Very Poor (%)	Significance (%)
Wilderness trip was...	H=96 NH=410	H=49.5 NH=63.2	H=38.7 NH=33.2	H=10.8 NH=3.1	H=1.1 NH=0.5	H=0.0 NH=0.0	P=0.006 *

H = Hunter    NH = Nonhunter    \* = significant

#### **6.6.4 Summary of Horseback Riders' Perceptions and Preferences for Selected Issues**

The two subgroups of horseback riders and nonriders were analyzed to determine if statistically significant differences existed in group means for group size (Q6) and responses to horse use in the wilderness area (Q56, Q78, and Q79). Only five people indicated horseback riding as an activity in the wilderness and stated that they traveled by horseback in the wilderness. This sample size was too small to be able to determine differences reliably. Therefore, the sixty-five people who simply indicated horseback riding as an activity were used in this analysis. Horseback riders (n=65) constituted 13% of the sample population and nonriders (n=441) were 87% of the sample population.

##### **6.6.4.1 Group Size**

Group size ranged from 1 to 9 people per group of horseback riders and from 1 to 14 people for nonriders. No significant difference was determined between these subgroups regarding group size.

##### **6.6.4.2 Horse Use Levels**

There were no significant differences determined between the subgroup responses regarding horse use in the wilderness area (Table 13). Most of both groups felt that there were not too many horses in Nordhouse; most of both groups disagreed or were neutral that horse use should be banned. While there was much neutrality on the issue, a statistically greater proportion of nonriders felt that there should be fewer horses in the wilderness area. It should be noted however, that the sample size for nonriders was almost seven times that of riders.

Given that only five people actually traveled in the wilderness by horseback, as compared to the 65 who checked horseback riding as an activity, riders are a small percentage of the wilderness users. Results from this subgroup analysis should be considered with caution given that 60 of the 65 people used in the analysis may not have actually used horses on the wilderness visit for which they were interviewed.

**Table 13. Horseback Rider and Nonrider Responses for Horse Use Levels.**

Issue	n	Agree (%)	Neutral (%)	Disagree (%)	Significance (%)
Too many horses	R=65	R=9.4	R=29.7	R=60.9	P=0.866
	NR=441	NR=10.1	NR=26.7	NR=63.2	
Should have fewer horses	R=65	R=19.7	R=42.6	R=37.7	P=0.025 *
	NR=441	NR=25.5	NR=52.5	NR=22.1	
Horses should be banned	R=65	R=19.7	R=36.1	R=44.3	P=0.256
	NR=441	NR=22.3	NR=42.6	NR=35.1	

R = Horseback Rider

NR = Nonrider

\* = Significant

## **6.7 Objective 6. Identify level of acceptable encounters with other users in terms of numbers, location and type.**

Under objective 5, analysis and results were provided separately for (a) visitor perceptions of current conditions and (b) preferences for ideal conditions. In this section, the analysis of perceptions and preferences is conducted simultaneously by cross tabulating corresponding survey items (e.g., cross tabulation of responses to “Nordhouse is a place to be alone” with “Nordhouse should be a place to be alone”). Examinations between the current and the ideal conditions provides a basis for making management recommendations. Table 14 presents all the data pertaining to the cross tabulations of questions 42-86. Tables 15-18 aggregate the Table 14 data and present them in a form that is readily interpreted in terms of management recommendations. The final section of objective 6 examines the Table 14 data in terms of various locations within the Nordhouse Dunes Wilderness Area.

### **6.7.1 Crowding**

Crowding was not a concern of most Nordhouse Wilderness users as 83% indicated that they did not feel Nordhouse was overcrowded, 7% felt that overcrowding was a problem and 10% were uncertain (Figure 27). Six percent of the users listed specific areas in the wilderness they felt were overcrowded. The areas most frequently noted as being crowded were the beach and on or near the trails. These concerns however, are only shared by a small percentage of the total users. Those users concerned with beach crowding constituted 2% of the total sample and those concerned with trail crowding only 1%.

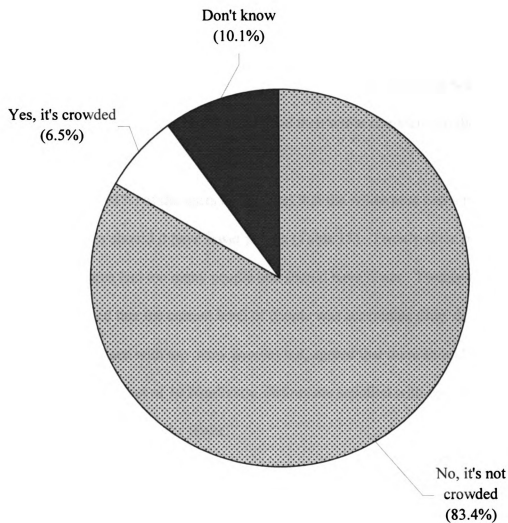
**Table 14: Cross Tabulation of User Perceptions of Current Conditions and Preferences for Ideal Conditions**

Question #	Survey Items	Percent Agree/Neutral/Disagree									
		A/A (%)	A/N (%)	A/D (%)	N/A (%)	N/N (%)	N/D (%)	D/A (%)	D/N (%)	D/D (%)	Total (%)
Nordhouse is a place.../Nordhouse should be a place...											
42/63	To be alone/ To be alone	83.0	6.2	1.7	3.4	3.2	0.4	0.7	0.7	0.7	100
43/64	W/too many people/ W/fewer people	8.5	13.0	29.1	1.1	11.7	25.3	0.7	1.6	9.0	100
44/65	W/too many regulations/ W/fewer regulations	1.6	4.2	20.5	2.7	10.0	20.5	4.2	7.8	28.5	100
45/66	W/some areas for hikers only/ W/some areas for hikers only	54.8	10.0	10.3	5.4	4.0	2.9	6.3	4.3	6.0	104
46/67	W/many natural openings/ W/many natural openings	74.4	5.8	1.3	8.4	6.4	1.3	1.3	1.0	0.0	99.9
47/68	W/many natural forested areas/ W/many natural forested areas	87.6	2.6	1.3	4.6	3.0	0.0	1.0	0.2	0.0	100.3
48/69	To test my skills/ To test my skills	41.0	18.7	5.1	3.1	20.7	5.8	1.0	1.3	3.6	100.3
49/70	W/too few people/ W/more people	0.7	1.3	2.0	1.8	9.9	11.5	4.0	9.9	58.9	100
50/71	W/many mgnt. controls/ W/fewer mgnt. controls	5.0	3.4	5.4	5.2	26.4	17.8	5.6	11.9	19.4	100.1
51/72	W/too many backpackers/ W/fewer backpackers	3.5	2.2	7.1	0.4	19.0	17.3	0.7	6.6	43.1	99.9
52/73	W/too many day hikers/ W/fewer day hikers	5.8	2.7	6.5	1.1	19.4	16.5	0.7	5.4	42.0	100.1
53/74	W/too many people on the beach/ W/fewer people on the beach	5.3	6.5	9.4	1.3	20.9	22.3	0.0	3.1	31.2	100
54/75	W/too many roads/ W/fewer roads	8.2	7.3	20.0	1.1	15.5	22.6	0.4	2.4	22.4	99.9
55/76	W/too many motorized vehicles/ W/fewer motorized vehicles	9.9	11.9	32.8	0.4	11.7	19.1	0.2	1.0	13.0	100
55/77	W/too many motorized vehicles/ W/no motorized vehicles	7.8	13.0	37.6	1.6	8.7	13.6	1.0	2.2	14.5	100
56/78	W/too many horses/ W/fewer horses	8.6	4.4	11.1	1.3	20.6	29.6	0.0	2.2	22.1	99.9
56/79	W/too many horses/ W/no horses allowed	7.3	4.2	9.8	2.2	16.5	23.2	0.4	6.7	29.6	99.9
57/80	W/too many hunters/ W/fewer hunters	16.3	12.2	17.8	1.8	15.4	10.2	2.0	5.1	19.2	100
57/81	W/too many hunters/ W/no hunting allowed	15.0	13.7	17.3	2.5	10.1	9.0	2.5	8.5	21.5	100.1
58/82	W/too many facilities/ W/fewer facilities	2.7	7.0	15.1	1.1	21.7	27.5	0.0	3.8	21.0	99.9
59/83	That is easy to access/ That is not easy to access	20.8	8.9	4.2	21.1	9.1	2.9	29.3	2.4	1.3	100
60/84	Where mgnt. cntrls. are too obv./ Where mgnt. cntrls. are not obv.	3.3	13.9	35.0	1.5	13.1	19.0	0.4	3.5	10.2	99.9
61/85	W/too many maintained trails W/fewer maintained trails	4.0	5.3	9.8	0.4	13.3	22.4	0.4	8.9	35.5	100
62/86	W/too many cross-country skiers/ W/fewer cross-country skiers	0.7	3.7	4.2	0.2	34.9	17.9	0.2	10.2	27.9	99.9

A=Agree, N=Neutral, D=Disagree



**Crowding in the Wilderness Area**  
**"Is Nordhouse Dunes crowded?"**



**Figure 27: Crowding in the Wilderness Area**

Perceived overcrowding did not change the routes or length of stay of users in the wilderness. Four percent of those who felt the area was overcrowded changed the route of their trip and 2% changed the length of their stay. This is a clear indicator that those who are using the area are satisfied with the use levels at this time.

Visitors were found to be inconsistent and contradictory concerning crowding and overuse in the wilderness area. Visitors responded to crowding questions both indicating that the wilderness was and was not overused and then wrote comments to the contrary.

### **6.7.2 Use Levels**

Nearly half (48%) of the users did not feel that the wilderness was a place with too many people nor should it have fewer people (Table 15). Twenty-three percent of the users felt that the area had too many people and should have fewer. Twenty-nine percent of the users indicated that the current level of people was acceptable (they disagreed that the wilderness is a place with too many people) but, agreed that there should be fewer people. Thus, nearly 3 out of 10 Nordhouse visitors are satisfied with the current number of people, but would ideally like fewer.

As already stated, 48% of the visitors sampled found current use levels acceptable and 29% found current use levels acceptable but ideally preferred fewer people. Summing these two percentages yields 77% who tolerate the current number of people. This percentage compares favorably to the 83% reporting that the area was not overcrowded. However, if those visitors indicating that they would ideally prefer less people are considered to want a reduction in use levels and are summed with those users

Table 15: Acceptability of Use Levels

Is" and "Should be" Survey Items	% Response to "Is" & "Should be" Item				Mgt. Priority
	No/No	No/Yes	Yes/No	Yes/Yes	
Number of People: (Q43xQ64) Q43: Is Northhouse Dunes a place with too many people? Q64: Should Northhouse Dunes be a place with fewer people?	48%	29%	1%	23%	MED
Number of People: (Q49xQ70) Q49: Is Northhouse Dunes a place with too few people? Q70: Should Northhouse Dunes be place with more people?	90%	0%	4%	6%	LOW
Number of Backpackers: (Q51xQ72) Q51: Is Northhouse Dunes a place with too many backpackers? Q72: Should Northhouse Dunes be a place with fewer backpackers?	86%	7%	1%	6%	LOW
Number of Day Hikers: (Q52xQ73) Q52: Is Northhouse Dunes a place with too many day hikers? Q73: Should Northhouse Dunes be a place with fewer day hikers?	83%	7%	1%	10%	LOW
Number of Beach Users: (Q53xQ74) Q53: Is Northhouse Dunes a place with too many people on the beach? Q74: Should Northhouse Dunes be a place with fewer people on the beach?	78%	9%	0%	13%	LOW

## NOTES ON COLUMN HEADINGS

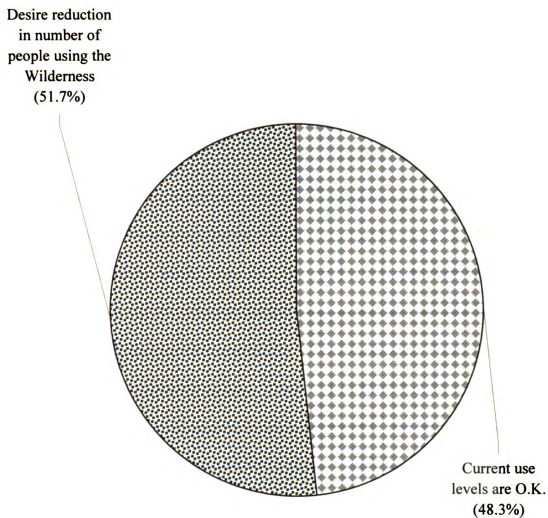
1. NONO: % visitors responding "No" to both items in a pair; Interpretation: the current conditions are favorable (e.g., 86% said Northhouse does not have too many backpackers AND should not have fewer).
2. NO/YES: % visitors responding "No" to first item and "Yes" to second item in a pair; Interpretation: the current condition is favorable but ideally should be less.
3. YES/NO: % visitors responding "Yes" to first item and "No" to second item in a pair; Interpretation: shows ambivalence (visitors do not like current condition, but they do not want it changed).
4. YES/YES: % visitors responding "Yes" to both items in a pair; Interpretation: current conditions unfavorable and visitors want a change.
5. MGT. PRIORITY: "LOW"=No/No percentage is high relative to all others; "MED"=No/No percentage is less than 60%; "HIGH"=Yes/Yes percentage is high relative to all others.

indicating a dissatisfaction with current use levels while desiring fewer people the result is 52% of the users desiring a reduction in use levels. The percentage of visitors in favor of a reduction in the number of users then exceeds the 48% that were in favor of the current conditions but contrasts the 83% reporting that the area was not overcrowded. These percentages may indicate a polarization or simply inconsistency in users' opinions concerning the issue of the number of people using the wilderness (Figure 28). Given the division among users concerning the level of people in the wilderness area, users' perceptions of the use levels and the actual use levels at Nordhouse Dunes must be monitored to support and validate management decisions.

Ninety percent of the visitors also indicated that there were not too few nor should there be more people using the wilderness area (Table 15). Six percent of the users desired more use and 4% indicated that although they felt that the area should not have more people they did feel it had too few. These data support maintenance of current use levels.

Further encounter and crowding data even more strongly support that the area as a whole is not perceived by visitors to be overused. Eighty-six percent of the users felt that Nordhouse was not a place with too many backpackers and did not need fewer (Table 15). The proportion of users who felt the same way concerning dayhikers was 83% (Table 15).

A “medium” management priority rating was assigned to the first condition in Table 15 (the number of people using Nordhouse) because fewer than 60 % indicated that they did *not* feel that Nordhouse was a place with too many people and that should it have

**Visitor Polarization Regarding General Use Levels****Figure 28: Visitor Polarization Concerning General Use Levels**

fewer. However, as the rest of data in Table 15 indicates, it is not the number of backpackers, day hikers or beach users that are making the visitors less than enthusiastic with the number of people in general.

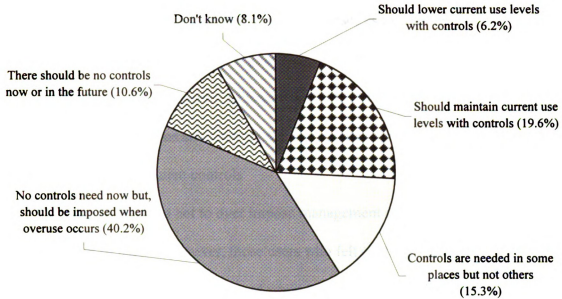
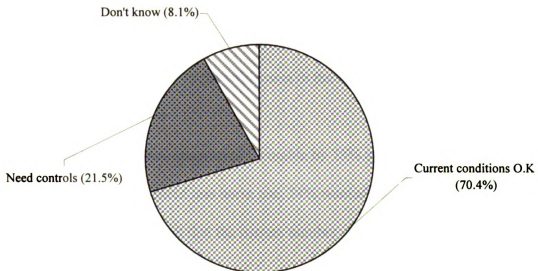
Users' responses for the desired maximum number of people per group using the wilderness area ranged from one to thirty-five. The average maximum number of people per group desired by users was nine. These responses were bimodal at six and ten with both values having frequencies of sixty-one users (25% each).

### **6.7.3 Beach Use Levels**

Opinions regarding beach use showed that 78% of the users favored the current wilderness conditions with users feeling that there were not too many and should not be fewer people that use the beach (Table 15). Thirteen percent of the users desired less people on the beach and 9% indicated that the fewer people there were the more preferable the wilderness conditions would be. Users' responses to beach use levels again indicate overuse is not currently an issue. Caution should be taken when interpreting beach use because users indicating the beach as an overused area may likely be referring to the Lake Michigan Recreation Area beach and be a part of the population confused regarding the wilderness boundaries.

### **6.7.4 Level of Controls**

The greatest proportion of wilderness users (40%) felt that management controls on use should be imposed only when overuse occurs (Q101 and Figure 29). Twenty percent desired that current use levels be maintained. Fifteen percent of the users felt that

**Data Based on Encounter Levels****"Do You feel that controls are needed on the number of people using Nordhouse Dunes?"****Aggregated Responses****Figure 29: Should Controls on Use Levels be Imposed?**

controls were needed only in some places and 6% felt that use need to be lowered now. Controls are not desired at any time by 11% of the users.

Table 16 contains cross tabulated visitor responses as to whether the wilderness is/should be a place with (a) too many regulations, (b) controls that are too obvious, and (c) management controls in general. At least two-thirds of the visitors feel that the current number of regulations and controls are appropriate, and they would not prefer to see more (or less) management controls.

Care should be taken not to over impose management controls that could result in the displacement of users. However, those users who felt controls should be implemented at this time may be displaced while managing for the desires of the majority if areas of lower encounter rates are not provided for these users. With an increase in the levels and types of use in the wilderness there will be a greater potential for the displacement of current users. Therefore, the overall change in use numbers and the concentration of use in primary use areas such as along the trail from the Algoma survey site to the beach and the northern portion of the beach (i.e., trail D1) should be monitored to maintain an understanding of use in the wilderness in the future.

#### **6.7.5 Horse and Ski Use Levels**

The level of horse use was considered favorable by 75% of the users (Table 17). Fourteen percent of the users desired less horse use, 24% wanted horses banned from the wilderness area. Eleven percent felt that the current number of horses was acceptable but would ideally like fewer.



Table 16: Acceptability of Management Activities

Is" and "Should be" Survey Items	% Response to "Is" & "Should be" Item					Mgt. Priority
	No/No	No/Yes	Yes/No	Yes/Yes		
Number of Regulations: (Q44xQ65) Q44: Is Northhouse Dunes a place with too many regulations? Q65: Should Northhouse Dunes be a place with many visitor regulations?	67%	21%	4%	8%		LOW/MED
Number of Management Controls: (Q50xQ71) Q50: Is Northhouse Dunes a place with many management controls? Q71: Should Northhouse Dunes be place with fewer management controls?	86%	5%	0%	9%		LOW
Number of Obvious Controls: (Q60xQ84) Q51: Is Northhouse Dunes a place where management controls are too obvious? Q72: Should Northhouse Dunes be a place where management controls are not obvious?	67%	14%	0%	19%		LOW/MED

## NOTES ON COLUMN HEADINGS

1. NO/NO: % visitors responding "No" to both items in a pair, Interpretation: the current conditions are favorable (e.g., 86% said Northhouse does not have too many management controls AND should not have fewer).
2. NO/YES: % visitors responding "No" to first item and "Yes" to second item in a pair, Interpretation: the current condition is favorable but ideally should be less.
3. YES/NO: % visitors responding "Yes" to first item and "No" to second item in a pair, Interpretation: shows ambivalence (visitors do not like current condition, but they do not want it changed).
4. YES/YES: % visitors responding "Yes" to both items in a pair, Interpretation: current conditions unfavorable and visitors want a change.
5. MGT. PRIORITY: "LOW"=No/No percentage is high relative to all others; "MED"=No/No percentage is less than 60%; "HIGH"=Yes/Yes percentage is high relative to all others.

**Table 17: Acceptability of Horseback Use and Cross-Country Skiing**

Is" and "Should be" Survey Items	% Response to "Is" & "Should be" Item				Mgt. Priority
	No/No	No/Yes	Yes/No	Yes/Yes	
Number of Horses: (Q56xQ78)	75%	11%	0%	14%	LOW
Q56: Is Nordhouse Dunes a place with too many horses?					
Q78: Should Nordhouse Dunes be a place with less horse travel?					
Number of Horses (ban): (Q56xQ79)	76%	0%	0%	24%	LOW
Q56: Is Nordhouse Dunes a place with many horses?					
Q79: Should Nordhouse Dunes be place with no horses allowed?					
Number of Cross-Country Skiers: (Q62xQ86)	91%	4%	0%	5%	LOW
Q62: Is Nordhouse Dunes a place with too many cross-country skiers?					
Q86: Should Nordhouse Dunes be a place with fewer cross-country skiers?					

**NOTES ON COLUMN HEADINGS**

1. NO/NO: % visitors responding "No" to both items in a pair; Interpretation: the current conditions are favorable (e.g., 86% said Nordhouse does not have too many people AND should not have fewer).
2. NO/YES: % visitors responding "No" to first item and "Yes" to second item in a pair; Interpretation: the current condition is favorable but ideally should be less.
3. YES/NO: % visitors responding "Yes" to first item and "No" to second item in a pair; Interpretation: shows ambivalence (visitors do not like current condition, but they do not want it changed).
4. YES/YES: % visitors responding "Yes" to both items in a pair; Interpretation: current conditions unfavorable and visitors want a change.
5. MGT. PRIORITY: "LOW"=No /No percentage is high relative to all others; "MED"=No/No percentage is less than 60%;  
HIGH"=Yes/Yes percentage is high relative to all others.

Thirteen percent of the users indicated that they engaged in horseback riding as an activity in the wilderness area, but, as previously noted, there is some doubt as to whether or not all reported horseback riding actually occurred within the wilderness boundaries. The average maximum number of horses per group desired by users was four.

Cross country skiing was also not perceived to be a problem in the wilderness area. The majority of users (91%) indicated that they did not feel that there were too many skiers and that there should not be fewer (Table 17). Five percent of the users felt contrary to this and 4% indicated that fewer skiers were preferable.

#### **6.7.6 Hunting Use levels**

Users were more divided in their responses to the appropriateness of hunting as compared to other types of use (Table 18). Approximately half of the visitors felt that the current number of hunters was acceptable and did not want to ban hunting. Three out of ten visitors felt there were too many hunters and wanted a reduction in hunting use or a ban on hunting. This encounter information indicates that users are concerned with hunting and thus received a “medium” management priority rating.

Eighteen percent of the users also indicated that the level of hunters was tolerable but, they felt that the wilderness should have fewer hunters. Seventeen percent of the users felt that the level of hunters was acceptable but, hunting should be banned all together. If these users are aggregated with those that were clearly opposed to the level of hunters (i.e., 30% and 31%), opposition rises to 48%. Users' opinions concerning hunting can then be viewed as polarized with 49% to 50% favoring and 48% to 49% wanting a reduction or a complete ban of hunting, respectively (Figure 30).

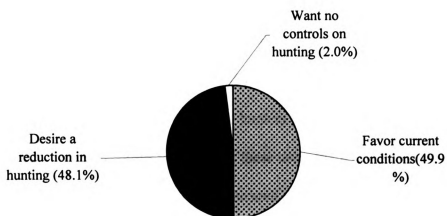
**Table 18: Acceptability of Hunting**

Is" and "Should be" Survey Items	% Response to "Is" & "Should be" Item				Mgt. Priority
	No/No	No/Yes	Yes/No	Yes/Yes	
Number of Hunters: (Q57xQ80)	50%	18%	2%	30%	MED
Q57: Is Nordhouse Dunes a place with too many hunters?					
Q80: Should Nordhouse Dunes be a place with fewer hunters?					
Number of Hunters (ban): (Q57xQ81)	49%	17%	2%	31%	MED
Q57: Is Nordhouse Dunes a place with too many hunters?					
Q81: Should Nordhouse Dunes be place where hunting is not allowed?					

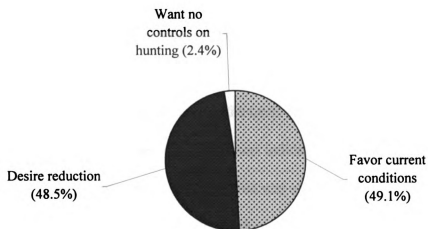
**NOTES ON COLUMN HEADINGS**

1. NO/NO: % visitors responding "No" to both items in a pair; Interpretation: the current conditions are favorable (e.g., 86% said Nordhouse does not have too many hunters AND should not have fewer).
2. NO/YES: % visitors responding "No" to first item and "Yes" to second item in a pair; Interpretation: the current condition is favorable but ideally should be less.
3. YES/NO: % visitors responding "Yes" to first item and "No" to second item in a pair; Interpretation: shows ambivalence (visitors do not like current condition, but they do not want it changed).
4. YES/YES: % visitors responding "Yes" to both items in a pair; Interpretation: current conditions unfavorable and visitors want a change.
5. MGT. PRIORITY: "LOW"=No /No percentage is high relative to all others; "MED"=No/No percentage is less than 60%;  
HIGH"=Yes/Yes percentage is high relative to all others.

**Visitors' Polarization Regarding Hunting Use Levels "Are there too many hunters and should there be fewer?"**



**Should hunting be banned at Nordhouse Dunes?**



**Figure 30: Visitor Polarization Concerning Hunting Use Levels**

A small percentage of users (2%) disagreed that there should be fewer hunters but also agreed that the area had too many hunters. These responses indicate that these users likely did not desire a restriction on the number of hunters in the wilderness even though the level of hunters exceeded what they felt was appropriate. These users were opposed to controls on the level of hunters despite the conditions in the wilderness.

A small percentage of users (3%) also indicated that although they agreed that Nordhouse was a place with too many hunters they disagreed that hunting should be banned. These responses indicate that these users felt a lesser restriction or no restriction on hunting would be appropriate for the area.

The even split in users' opinions over the issue of hunting indicates that hunting must be targeted as a focus in the management of the wilderness area. Diverging user perceptions concerning hunting must be monitored and identified to enable user based management of the area.

#### **6.7.7 Solitude and Wilderness Quality**

Nordhouse is providing users with the solitude that they desire in their wilderness experience. Ninety-eight percent of the users felt that Nordhouse was and should be a place to be alone; two percent of the users indicated the opposite sentiment.

The quality of the wilderness area was also meeting the needs of the users. The majority of the visitors (70%) felt that the quality of the wilderness was getting better or about the same in comparison to previous trips. Twenty-one percent of the visitors had not visited the area and, therefore, had no means of comparison for question 109. Two and a half times as many people felt that the quality of the wilderness area was

improving (17%) as felt it was getting worse (7%). There was also a 95% approval rate (i.e., rated it as very good or good) for the wilderness in general by the visitors. These, along with previous findings, clearly indicate that Nordhouse supports users' wide range of needs and preferences for the wilderness.

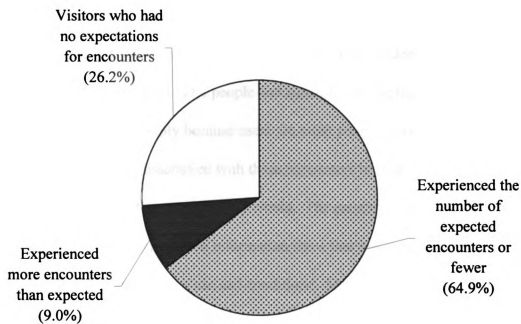
#### **6.7.8 Camping**

Campers encountered about as many people camped within sight or sound of their camp site as they expected (Appendix E). Furthermore, campers primarily encountered fewer people walking through their campsite than they expected (Appendix E). Campers indicated that they would tolerate camping within sight or sound of 0-5 other groups. Fifty-one percent of the campers stated that they would tolerate zero groups, 18% one other group, 23% two groups, 8% three groups and 1% said they would tolerate five groups camped within sight or sound of their campsite. These camping encounter results support that even the heavy use camping areas of the wilderness (quadrants S9, R10 and T8) may not be perceived as overcrowded by the wilderness users.

#### **6.7.9 Users' Expectations for Wilderness Conditions**

Users were asked about their expectations for the following conditions in the wilderness area: the number of people, pets, nude sunbathers, large groups, groups that were too close, groups that were too noisy, and indecent behaviors present in the wilderness. Across all of these items 65% of the users encountered either what they expected or less, 9% encountered more, and 26% had no expectations for these conditions (Figure 31). The conditions for which the greatest amount of users felt they saw more than what they expected to see were the number of people (17%) and the number of pets

**Data Based on Encounter Levels**  
**Visitors' Actual Levels of Encounters in the Wilderness**  
**Versus**  
**Visitors' Expected Level of Encounters**



Aggregated Data for Questions 87-93

**Figure 31: Visitors' Expectations for Wilderness Conditions**



(15%). The condition for which the greatest amount of users felt they saw fewer than what they expected to see was the number of nude sunbathers (32%). Although these conditions had the greatest amount of actual encounters in comparison to expected encounters this may not be significant enough to mandate a change in management.

Caution should be taken when interpreting peoples' expectations. Traditionally, management interpretations have been that it is best when users encounter fewer users than expected and worse when they encounter more than expected. However, as users indicated in this study this traditional interpretation may not always be correct. A user of Nordhouse Dunes indicated that she became lost while in the wilderness area and would have liked to have encountered more people and signage than she had. Therefore, fewer may not always be best. Simply because users see more people, pets, or whatever, may not signify that they were dissatisfied with these encounters but may only indicate that they saw more than what they thought they would. The general indications from the crowding, encounter and expectation information show that management should be aimed at maintaining the current level of use and conditions. Most users of the area indicated that crowding and overuse are not current problems in the Nordhouse Dunes Wilderness Area and that, with the possible exception of hunting, conflicts between types of users are minimal.

#### **6.7.10 Location Specific Encounter Information**

Encounter information in this section is presented in terms of the seven survey sites depicted in Figure 3. The location specific encounter information gives an insight on users' responses to the acceptable level of encounters at each survey location. The

following are the percentages of individuals surveyed at the seven survey sites in the wilderness area: Algoma 49%, Nordhouse Lake 8%, North Beach 24%, Ridge Trail 3%, South Beach 4%, Nipissing 5% and Green Road 7%. Encounter information based on location is presented as the percentage of individuals surveyed at a given site that responded in a particular manner to a survey question.

Encounter information by location may not be representative of the total population of Nordhouse visitors. The sampling strategy was designed to be representative of visitors across all locations not within each location. Also, the small sample size at certain survey sites for specific questions makes the information obtained less generalizable to the population using the wilderness. For example, Ridge Trail and Nipissing for questions 96, 97, and 99 have sample sizes of only one or two people. It would not be appropriate to generalize these findings to the population as a whole using the Ridge Trail and Nipissing areas.

#### **6.7.11 Wilderness Satisfaction**

Location specific encounter information supports the general encounter information previously reported. Groups indicated satisfaction with the wilderness area at all survey sites and did not indicate any drastic deviations from previous encounter information (Appendix E). The majority of groups at all survey sites indicated that Nordhouse met their personal definition of wilderness and that they were satisfied with their trip to the wilderness area. Users gave their trip to the wilderness area primarily very good and good ratings at all survey sites. The majority of people at all sites also indicated that the wilderness area was getting better or about the same as compared to

previous trips. The majority of the users at all sites indicated that crowding was not a problem in the wilderness area.

#### **6.7.12 Users' Expectations for Wilderness Conditions**

Visitors' expectations showed that users at all survey sites predominantly encountered what they expected to encounter of various conditions in the wilderness (Appendix E). Users at all survey sites predominantly had no expectations for the number of nude sunbathers they expected to see. Users at all sites also indicated that they mostly had no expectation, encountered what they expected or encountered fewer than expected immodest, indecent or lewd behaviors. Users at all sites encountered primarily what they expected, fewer than they expected or they had no expectations for the number of large groups, number of groups too close, number of groups that were too noisy and the number of pets they expected to see.

#### **6.7.13 Camping**

Campers at all survey sites mostly encountered as many groups as they expected or fewer camped within sight or sound of their campsite (Appendix E). Visitors at all sites also encountered as many groups walking through their campsite as they expected or fewer. Campers at all survey sites except Ridge Trail indicated that they could find their desired type of campsite mostly all the time in the wilderness area. Also, the majority of campers at all survey sites except Ridge Trail did not change the route of their trip or the length of their stay due to not being able to find their desired type of campsite.

#### **6.7.14 Use Levels**

Encounter information by location concerning the number of people, backpackers, dayhikers, hunters, beach users, horseback riders, and cross-country skiers (Appendix E) directly supports the general encounter information discussed earlier. It also supports user perception and preference findings discussed earlier. The majority of individuals at all survey sites indicated that there are not currently too many people in the wilderness area. However, the majority of users also stated at every site except Nipissing that there should be fewer people.

Users at all sites indicated that there were too many hunters in the wilderness area. Green Road however, was the only site where the majority of users disagreed that there should be fewer hunters. Nordhouse Lake and Green Road were the only sites where a majority, 54% and 97% respectively, of the users disagreed that hunting should be banned in the wilderness area. The majority of the users at Algoma, North Beach, Ridge Trail, and South Beach agreed that hunting should be banned; the majority of the users at Nipissing were neutral to the issue of restrictions on hunting.

The majority of the users at all sites disagreed or were neutral that there were too many and should be fewer backpackers, dayhikers, cross-country skiers, or beach users in the wilderness area. These responses contrast users' previously stated preference for fewer people in general at all survey sites. The majority of the groups at all sites also indicated that there were currently not too many horses in the wilderness area.

Location encounter information revealed few deviations from the total sample results. Concerns were most prominent for the level of people in general and hunters for

each of the seven sample sites just as they were for the wilderness as a whole. Despite this, most of the people at all sites agreed that Nordhouse was and should be a place to be alone. The most prominent difference identified was the lack of opposition toward hunting on Green Road. Green Road was only surveyed during the fall season which may have biased the results. Overall, users again indicated their support for the current wilderness conditions throughout the location specific encounter information.

#### **6.7.15 Summary of Objective 6 Findings**

The number of hunters and people in general that use the wilderness area are the most prominent and complex issues for Nordhouse Dunes. The complexity of these issues is most apparent when data for the level of acceptable encounters, users' perceptions and users' preferences are looked at collectively as was done in this section. Users' responses concerning hunting and the number of people in the wilderness area oscillated between indicating that current conditions are acceptable to a desire for a ban on hunting. Users' responses were indicative of the need for a management strategy that monitors for changes in users' perceptions and manages for the current use levels in Nordhouse Dunes.

##### **6.7.15.1 Use Levels of People**

Encounter information (objective 6) indicated that users' opinions the level of people are not always clear. Forty-eight percent of the users were in favor of current conditions and 52% were in favor of fewer people in the area. Nearly 3 out of 10 Nordhouse visitors were satisfied with the current number of people, but ideally preferred fewer. Thus, a medium priority rating was assigned to the overall use level situation at

Nordhouse Dunes (Table 15). However, the rest of the data in Table 15 indicates that it is not the number of backpackers, day hikers or beach users that is making half of the visitors concerned about the number of people in general. Consistent with research pertaining to carrying capacity, it is the location of use (e.g., near campsites) and the type of use considered appropriate (e.g., day hiking over hunting) that are of more concern than overall use levels.

Users' perceptions (i.e., objective 5) of whether there were too few people in the wilderness area indicated that current conditions are acceptable. Seventy-two percent of the users indicated that there are not too few people and 7% said that there were too few (21% were neutral). Users' preferences (i.e., objective 5) were consistent with both the encounter data and users' perception data. Seventy-three percent of the users were in favor of no more people whereas 4% favored more people (23% were neutral).

Encounter, users' perception, and users' preference data support the finding that most of the users do not want an increase in the number of people in the wilderness area. Users' responses across encounter, perceptions of current conditions and preference data flow from being polarized to accepting current conditions to a possible preference for fewer people in the wilderness area.

#### **6.7.15.2 Hunting Use Levels**

Encounter data (i.e., objective 6) revealed that users' opinions were polarized concerning hunting use in the wilderness. Fifty percent of the users reported that they favored current hunting use levels while 48% favored a reduction in the amount of hunters that use the wilderness area (2% were neutral). Users' perceptions of current

wilderness conditions (i.e., objective 5) indicated that the current level of hunters was acceptable. Forty-eight percent of the users did not feel there were too many hunters and 20% indicated that there were too many (32% were neutral). Users' preferences (i.e., objective 5) however, showed that users would prefer fewer hunters. Forty-seven percent of the users stated that there should be fewer hunters and 26% indicated the contrary (27% were neutral).

Encounter data, again, showed users' opinions as polarized regarding the banning of hunting in the wilderness area (49% opposed to and 49% favoring a ban, 2% were neutral). Users' preferences indicated that 46% of the users would prefer a ban on hunting and 34% did not agree that hunting should be banned (21% were neutral).

Users have indicated through their varying responses that the level of people in general, and hunters specifically, must be monitored in the wilderness area. Users' opinions also, should continue to be monitored to identify changes in their polarization concerning these issues and their preference for less use. Encounter data, as well as data from users identified as feeling that fewer people and hunters were preferable, indicated that current conditions are acceptable but there is room for some reduction. Users' perceptions of current wilderness conditions however, clearly indicated that management of the area should maintain the current use conditions. The “ideal” state may not be possible. Certain data --the “YES/NO” column-- in tables 15 through 18 indicate how ambivalent humans often are (i.e., do not like the current conditions but also do not want them to change). These contradictory user responses emphasize the need for management to concentrate on the maintenance of current use levels and the monitoring of changes.

## **6.8 Objective 7. Examine the differences between manager and user perceptions of wilderness conditions.**

### **6.8.1 Manager Perceptions**

Managers perceive Nordhouse Dunes Wilderness Area to be overused and overcrowded, especially along the Lake Michigan shoreline. Manager's views are that "It's [Nordhouse] just overused. People are loving it to death" and that "They [visitors] don't find the solitude they're looking for, especially along Lake Michigan" (Ingells, 1991). Management feels that most use in the wilderness area is concentrated along Lake Michigan and the foredunes. These areas are only approximately 1,000 of the 3,500 acres in the designated wilderness. Use has been estimated at approximately 15,000 - 20,000 visitors and this does not include the significant number of users the Forest Service believes enter the wilderness by watercraft.

Management has been concerned with the perceived continued illegal use of motorized vehicles such as watercraft, and especially, snowmobiles. There is also concern that there is the presence of indiscrete nude sunbathers and nude windsurfers who create discomfort for others, especially families with children, using the wilderness area. Encounters by trail hikers and campers have also been estimated by managers to be high. Managers describe the diversity of the types of users in the area to be high and include day users, boaters of all types, nude sunbathers, horse riders, motorized vehicle users, large groups, and others whose presence and/or activity might conflict with other users. Management suggests, based on their use estimates that "there could be a new class called



'Urban' Wilderness for the Nordhouse Dunes from mid-June through Labor Day" (Ingells, 1991).

Managers perceived use levels to be higher than what they considered conducive to the Nordhouse Dunes wilderness environment. Specific types of uses such as beach use, nude sunbathing, and horse use were also considered to be exceeding appropriate levels. A closure to horse use in the wilderness area was being considered due to the perceived inappropriate levels. Hunting use levels however, were not a concern of managers. Managers did not consider Nordhouse to be a place to be alone and therefore, felt that users were not able to find solitude in the wilderness area.

#### **6.8.2 User Perceptions**

Users of the Nordhouse Dunes Wilderness Area did not perceive an overabundance of people using the area. When questioned about use levels of specific types of users, users consistently indicated that there were not too many of any type of user in the wilderness area. General use levels and specific types of uses were not issues for the users. Hunting use however, did have the greatest amount of opposition from users. Users showed a polarization over whether hunting should be decreased or eliminated in the wilderness area.

The majority of users noted that Nordhouse Dunes was a place to be alone indicating they were able to find solitude in the wilderness area. Users were generally satisfied with the wilderness area and felt that it met their definition of wilderness.

From this data the differences between manager and user perceptions is apparent. Managers did not have an accurate perception of wilderness users' perceptions of the

wilderness area. It was based on this incorrect perception of users that managers were implementing wilderness policy such as a closure to horse use.

## **SECTION 7**

### **CONCLUSIONS**

#### **7.1 Summary of Findings**

##### **7.1.1 Use Levels Concerning Hunting and People in General Across Encounter, Users' Perceptions and Preferences Data**

The number of hunters and people in general that use the wilderness area are the most prominent and complex issues for Nordhouse Dunes. The complexity of these issues is most apparent when data for the level of acceptable encounters, users' perceptions and users' preferences are looked at collectively. Users' responses concerning hunting and the number of people in the wilderness area wavered between indicating that current conditions are acceptable and indicating that users desire a reduction in these conditions. Users' responses were indicative of the need for a management strategy that monitors for changes in users' perceptions and manages based on visitors' needs and perceptions.

##### **7.1.2 Use Levels of People**

Encounter information (objective 6) indicated that users' opinions are polarized concerning the level of people using the wilderness. Forty-eight percent of the users were in favor of current conditions and 52% were in favor of fewer people in the area. Users' perceptions of current conditions (objective 5) however, indicated that users were accepting of the current level of people using the wilderness area. Sixty-four percent of

the users favored current conditions and 10% favored fewer people (26% were neutral). Users' preferences (objective 5), nonetheless, indicated that users desired less people with 52% in favor of less people and 11% were in favor of the current conditions (37% were neutral). Users' responses across encounter, perceptions of current conditions and preference data flow from being polarized to accepting current conditions to indicating a preference for fewer people in the wilderness area.

Encounter data (i.e., objective 6) indicated that users did not feel there were too few people in the wilderness area. Ninety percent of the users agreed that there were not too few people and 6% indicated that there should be more people using the area. Users' perceptions (i.e., objective 5) of whether there were too few people in the wilderness area indicated that current conditions are acceptable. Seventy-two percent of the users indicated that there are not too few people and 7% said there were too few (21% were neutral). Users' preferences (i.e., objective 5) were consistent with both the encounter data and users' perception data. Seventy-three percent of the users were in favor of no more people whereas 4% favored more people (23% were neutral). Encounter, users' perceptions and users' preferences data addressing whether there were too few people in the wilderness was straight forward and clearly indicates that most of the users do not want an increase in the number of people in the wilderness area.

### **7.1.3 Hunting Use Levels**

Encounter data (i.e., objective 6) revealed that users' opinions were polarized concerning hunting use in the wilderness. Fifty percent of the users reported that they favored current hunting use levels while 48% favored a reduction in the amount of

hunters that use the wilderness area (2% were neutral). Users' perceptions of current wilderness conditions (i.e., objective 5) indicated that the current level of hunters was acceptable. Forty-eight percent of the users did not feel there were too many hunters and 20% indicated that there were too many (32% were neutral). Users' preferences (i.e., objective 5) however, showed that users would prefer fewer hunters. Forty-seven percent of the users stated that there should be fewer hunters and 26% indicated the contrary (27% were neutral).

Encounter data, again, showed users' opinions as polarized regarding the banning of hunting in the wilderness area (49% opposed to and 49% favoring a ban, 2% were neutral). Users' preferences indicated that 46% of the users would prefer a ban on hunting and 34% did not agree that hunting should be banned (21% were neutral). Users' responses to hunting conditions in the wilderness area flowed from being polarized in the encounter data to indicating current hunting conditions were acceptable based on users' perceptions to a preference for a reduction or ban of hunting.

Users have indicated through their varying responses that the level of people in general, and hunters specifically, must be monitored in the wilderness area. Users' opinions also, should continue to be monitored to identify changes in their polarization concerning these issues and their preference for less use. Encounter data, as well as data from users identified as feeling that fewer people and hunters were preferable, indicated that current conditions are acceptable but there is room for some reduction. Users' perceptions of current wilderness conditions however, clearly indicated that management of the area should maintain the current use conditions. These somewhat contradictory

user responses emphasize the need for management to concentrate on the maintenance of current use levels and the monitoring of changes.

#### **7.1.4 Defining Wilderness**

The results of this study indicated that visitors to the Nordhouse Dunes Wilderness area define wilderness using primarily the same characteristics as does the 1964 Wilderness Act. In addition to the six characteristics outlined in the Wilderness Act visitors also used characteristics not in the Wilderness Act to define the term wilderness.

#### **7.1.5 Wilderness Management**

Management of the wilderness area has been driven by managers' perceptions of problems in the wilderness area. The LAC process employed by this study was initiated on the basis of managers' concerns for conditions in the Nordhouse Dunes Wilderness Area. A comprehensive public involvement strategy had not been employed by managers prior to this study. Little to no information was available on the characteristics of the Nordhouse Dunes Wilderness User. The social component of the wilderness environment had not been studied prior to this study. Management of the wilderness area was a traditional top-down framework.

### **7.2 Conclusions**

#### **7.2.1 Defining Wilderness**

The 1964 Wilderness Act has succeeded in capturing the essence of the definition of wilderness as defined by the users of the Nordhouse Dunes Wilderness Area.

### **7.2.2 User and Manager Perceptions of the Wilderness Area**

User and manager perceptions differed on each of the following conditions: general use levels, beach users, nude sunbathers, horse use, hunting, and the wilderness as a place to be alone. Given these differences in perceptions managers must continue to investigate users' perceptions of wilderness conditions if they are to effectively manage the wilderness for their clientele. Managers' desire to close the wilderness to horse use based on their misperception of users' desires exemplifies the need for managers to seek visitor input.

### **7.2.3 Wilderness Management**

The management of the Nordhouse Dunes Wilderness Area is a manager driven top-down process. The status of wilderness conditions are investigated primarily only when management perceives a problem. This form of management has the potential to jeopardize the quality of the wilderness experience for wilderness users as well as the ecological state of the wilderness. This top-down process does not realize problems as users perceive them and imposes managers' perceptions on the wilderness environment.

The Limits of Acceptable Change process, even with its attempt at client participation, is a manager driven process. It is when management shows concern for wilderness conditions that the process is implemented. It is also permissible in the LAC process for managers to simply make decisions regarding indicators and standards and ask the public for limited input on the appropriateness of managerial decisions. This is *not* a bottom-up participatory approach. The LAC process allows for more public

participation than traditional land management processes such as ROS and the carrying capacity framework but, this participation is at the discretion of managers.

The legislation, namely the 1964 Wilderness Act, which outlines the management of Wilderness, is not participatory. As Tipple and Wellman (1989) pointed out laws and legislation do not ensure public participation or that bureaucracies will be responsive to peoples' needs. The Act outlines what must be managed for but, does not provide any insight on how to manage for these conditions in a participatory manner. The Wilderness Act is expert driven. Wilderness is a resource for all people. The management of these lands therefore, must incorporate all peoples' (managers and public alike) knowledge, expertise and experience if the lands are to be managed appropriately for the people.

Times have changed. The public desires an active role in the management of the nation's wilderness. The 1964 Wilderness Act, which is the basis for all wilderness management, has not changed. It has not incorporated the need for public involvement in the management of Wilderness. It is due time for a change in the legislation governing the nation's wilderness lands. There is a need for the review of the Wilderness Act in light of the changing roles of professionals, the public and wilderness.

### **7.3 Limitations of the Study**

Several limitations affect the interpretation of the study results. These limitations are grouped into two broad categories: survey design and measurement.

#### **7.3.1 Survey Design Limitations**

The cross-sectional nature of this study does not permit the generalization of the findings to other time frames, past or future. The data were collected at one point in time



and are only applicable to that time frame. Wilderness users will change over time as will wilderness conditions. If, however, the 1993-1994 sampling year was typical of other years in terms of rainfall, insects, and visitor use patterns, the data may be generalizable to other time periods. An understanding of the wilderness dynamics over time would verify or refute the generalizability of the data collected during the 1993-94 season.

A second design limitation was discovered upon the realization that some users included past experiences in the wilderness area as well as experiences occurring outside the wilderness in their response to the questionnaire. It is not, however known to what degree this occurred. For example, different percentages of day versus overnight visitors were obtained depending on the questions analyzed. Day use was recorded at 68% and 72% and overnight use at 28% and 32% analyzing questions 94 and 95 respectively, resulting in a difference of 4 % between the response rates for these questions.

Adding to the inconsistency concerning camping is that 58% of the users indicated camping as an activity in the wilderness. However, only 28% to 32% indicated they were overnight users. It is likely that visitors may have referred to the Lake Michigan Recreation Area when asked about camping, but to the wilderness when asked about whether they stayed overnight. This speculation is based on the cross referencing of users' responses and comments throughout the surveys and reports from interviewers of incidents where users were often confused about the wilderness boundaries.

Thirdly, surveys conducted on Green Road were not strictly exit interviews. The sampling strategy employed an opportunistic sampling method in which wilderness users

were sampled at campsites and the like just as long as they had used the wilderness that particular day. The users did not have to be exiting for the day. Sampling schedules were, however, strictly adhered to. Double-counting was minimized by the use of a single interviewer for Green Road and users were not sampled twice in the same stay.

### **7.3.2 Measurement and Analysis Limitations**

Measurement and analysis limitations include question wording, item omissions, and interviewer biases. In terms of question wording, respondents found the negatively worded questions in the section concerning users' preferences to be somewhat confusing. Question sixteen, which asked how many other wilderness areas users have visited, may have also received invalid responses from users as many did not know what constituted a wilderness area and, therefore, were not certain how to respond.

In addition, there were two types of item omissions that would have enhanced the analysis and interpretation of the data. First, the instrument lacked questioning concerning how many hours day use visitors were in the wilderness. This information would be useful in converting visitation figures into other units (e.g., visitor hours) for purposes of comparison with other studies. Secondly, a question should have been included after each of questions 87-93 and 96-97 (i.e., visitors' expectations for wilderness conditions) which indicated whether users' responses indicated satisfaction or dissatisfaction with their number of actual encounters versus expected encounters. This information would help evaluate the degree to which expectations and satisfaction are correlated.

Other limitations were placed on the study by interviewers. Surveys in the first sampling period in May may not have all been exit interviews, therefore, increasing the chance for double-counting visitors. Interviewers were also confused as to where survey sites were located and which sites were which (e.g., Algoma and Nordhouse Lake were mistaken for one another). Interviewers may have influenced users' responses to the questionnaire through attempts to educate users on the wilderness and its regulations and by coaching users through the survey. Finally, it was noted that people exiting the wilderness area were not appropriately recorded or contacted until after the July 4th weekend when interviewers were given clearer instructions.

## **SECTION 8**

### **RECOMMENDATIONS**

#### **8.1 Recommendations for Future Research**

Due to the fact that managers' perceptions were obtained by means of content analysis of documents and meeting notes, it is recommended that managers' perceptions of the Nordhouse Dunes Wilderness Area be gathered in a more scientific format as were users' preferences. It should be noted that manager perceptions of the wilderness conditions will have been effected by the knowledge of the results of this study. Future evaluation of wilderness conditions should be based on both the perceptions of users and managers. Wilderness conditions should be monitored on a continual basis and include evaluation of managers' and users' perceptions of both social and ecological conditions.

Further research of this nature is highly recommended based on managers' reactions to the presentation of the data which this study provided. Managers were presented with the results that indicated that they did not have an accurate perception of their clientele. Upon presentation of this information managers began to reevaluate their management intentions for the Nordhouse Dunes Wilderness Area. Managers were originally intending to implement a closure to horse use based on what they perceived to be the desires of the wilderness users. The study data however, show that horse use is not a concern of the users. Managers are now reevaluating this closure to horse use and focusing on the ecological rather than social impacts to the wilderness environment

caused by horse use. This is an encouraging result and attests to the practical use of public participation in the management process. Managers are open to change if presented with the correct stimulus. It would prove to be extremely worthwhile to pursue further studies of this nature to ensure managers have an accurate understanding of their clientele and to promote the importance of user input in the management process.

## **8.2 Management Recommendations**

Based on the results of this study, which illustrated the differences in managers' and users' perceptions of wilderness conditions, it is recommended that the LAC process be implemented on the basis of user participation. Monitoring wilderness conditions by means of both manager and user input should permit the implementation of the LAC process. The LAC process, whether initiated by managers or users, must be based both on users' and managers' knowledge and participation. Indicators and standards must be identified by both managers and users from the initial steps of the process. It is not appropriate for managers to develop indicators and standards and then only ask users to identify from given choices which are appropriate. There is a place for client participation in each of the nine steps of the LAC process.

Evaluation of the 1964 Wilderness Act is recommended on the basis of findings from this study. The Wilderness Act is still successfully defining the characteristics of wilderness. It lacks however, the concept of public participation in the management of the nation's wilderness areas. The Act gives resource managers autonomy in the decision making process regarding lands which belong to the people as a whole. Wilderness areas are not solely for the benefit of managers and should therefore not be managed based only

on the input of managers. The Wilderness Act at this times omits a vital source of knowledge for the successful management of wilderness lands. Legislation may not be able to guarantee public participation but, it is able to mandate that resource managers seek the valuable knowledge their clientele has to offer.

## **SECTION 9**

### **FINAL THOUGHTS**

The management of the nation's wilderness areas is no longer solely the responsibility of resource managers. Public interest in natural resources is growing and management must be a cooperative effort between managers and their clientele. Managers' and users' perceptions of wilderness often differ. For this reason, it is imperative to have public participation in the management process if wilderness areas are to be managed effectively and efficiently for all. The 1964 Wilderness Act, which mandates wilderness management, has not evolved as has public opinion regarding the natural resources. The Wilderness Act must be reevaluated. It is imperative that the act address the importance of public participation in the wilderness management process. The Wilderness Act must outline mandatory regulations for public involvement in, as well as ecological preservation of, the wilderness system if our wilderness lands are to endure.

This study has taken wilderness management a few steps closer to this cooperative relationship between managers and their clientele. Upon presentation of study findings, managers of the Nordhouse Dunes Wilderness Area began to reevaluate their understanding of their clientele and their intended management for the wilderness area. The preservation of well over 91 million acres of natural resources in the United States alone is in jeopardy without the pursuance of manager-client partnerships.

## **APPENDICES**



## **APPENDIX A**

### **Study Questionnaire**

## Appendix A

### Nordhouse Dunes Wilderness Study

#### *Survey Information*

- (1) Interviewer's initials \_\_\_\_\_
- (2) Date \_\_\_\_\_
- (3) Survey location  
☐ Algoma      ☐ North Beach      ☐ South Beach      ☐ Green Road  
☐ Nordhouse Lake      ☐ Ridge Trail      ☐ Nipissing Ridge
- (4) Survey time period  
☐ 10:00-1:00    ☐ 1:00-4:00    ☐ 4:00-7:00    ☐ 7:00-9:00
- (5) Time  
☐ Beginning \_\_\_\_\_      ☐ Ending \_\_\_\_\_

#### *Group Information*

- (6) How many people are in your group?
- (7) How did you travel in the wilderness area on this visit?  
 (Check all that apply, but if more than one, underline the way you traveled most.)  
☐ Hiked, carrying our equipment ourselves      ☐ Rode on horseback  
☐ Hiked, leading horses      ☐ Other \_\_\_\_\_
- (8) How would you describe your group?  
☐ Friends      ☐ Alone  
☐ Family (Immediate family and relatives)      ☐ Other (Describe) \_\_\_\_\_  
☐ Family and friends  
☐ Organized Club or School Group
- (9) How many people in your group are in the following age categories?  
☐ 6-10 \_\_\_\_\_      ☐ 21-30 \_\_\_\_\_      ☐ 51-60 \_\_\_\_\_  
☐ 11-15 \_\_\_\_\_      ☐ 31-40 \_\_\_\_\_      ☐ 61-70 \_\_\_\_\_  
☐ 16-20 \_\_\_\_\_      ☐ 41-50 \_\_\_\_\_      ☐ 71 years or over \_\_\_\_\_

**\*\* On the map provided please indicate your route of travel and places you camped in the Nordhouse Dunes Wilderness Area.**

**(Give group map and highlighter)**

10-1

1-4

4-7

7-9

### ***Nordhouse Dunes Wilderness Study***

#### ***Wilderness Visits***

- (10) When you think about the term "wilderness" what characteristics come to mind? (Please describe what "wilderness" means to you)

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- (11) Nordhouse Dunes meets my personal definition of what a "wilderness" is (check one)

☐ Strongly Agree   ☐ Agree   ☐ Neutral   ☐ Disagree   ☐ Strongly Disagree

- (12) How many times have you visited the Nordhouse Dunes Wilderness area before this trip?

- (13) How many years ago did you first visit the Nordhouse Dunes Wilderness area?

- (14) Including this visit, how many times have you visited the Nordhouse Dunes Wilderness area in the past 12 months?

- (15) How many total days have you spent at the Nordhouse Dunes Wilderness in the past 12 months?

- (16) How many wilderness areas have you visited other than Nordhouse Dunes?

- (17) People have many reasons for visiting wilderness areas. Please tell us the three most important reasons why you took this trip into Nordhouse Dunes.

☐ (1) \_\_\_\_\_  
☐ .  
☐ (2) \_\_\_\_\_  
☐ .  
☐ (3) \_\_\_\_\_

- (18) What agency or organization do you think is responsible for managing Nordhouse Dunes Wilderness Area?

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***We are interested in knowing what activities you participated in during this visit to Nordhouse Dunes and how important each was to your decision to make this trip. PLEASE CHECK ONE OF THE TWO RESPONSES AFTER EACH ACTIVITY YOU PARTICIPATED IN.***

	Participated but not a major reason for going on this trip	This activity was a major reason for going on this trip
(19) Fishing	<input type="checkbox"/>	<input type="checkbox"/>
(20) Hunting	<input type="checkbox"/>	<input type="checkbox"/>
(21) Checking out places to hunt	<input type="checkbox"/>	<input type="checkbox"/>
(22) Hiking on trails	<input type="checkbox"/>	<input type="checkbox"/>
(23) Hiking off trails	<input type="checkbox"/>	<input type="checkbox"/>
(24) Viewing scenery	<input type="checkbox"/>	<input type="checkbox"/>
(25) Nature study (Bird watching, identifying flowers etc.)	<input type="checkbox"/>	<input type="checkbox"/>
(26) Photography	<input type="checkbox"/>	<input type="checkbox"/>
(27) Swimming	<input type="checkbox"/>	<input type="checkbox"/>
(28) Sunbathing	<input type="checkbox"/>	<input type="checkbox"/>
(29) Nude sunbathing	<input type="checkbox"/>	<input type="checkbox"/>
(30) Camping	<input type="checkbox"/>	<input type="checkbox"/>
(31) Picknicking	<input type="checkbox"/>	<input type="checkbox"/>
(32) Collecting berries, mushrooms, or other "natural" foods	<input type="checkbox"/>	<input type="checkbox"/>
(33) Spending time in camp (Relaxing, performing camp chores, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
(34) Horseback riding	<input type="checkbox"/>	<input type="checkbox"/>
(35) Cross-country skiing	<input type="checkbox"/>	<input type="checkbox"/>
(36) Boating	<input type="checkbox"/>	<input type="checkbox"/>
(37) Others please specify:		
_____	<input type="checkbox"/>	<input type="checkbox"/>
(38) _____	<input type="checkbox"/>	<input type="checkbox"/>
(39) _____	<input type="checkbox"/>	<input type="checkbox"/>
(40) _____	<input type="checkbox"/>	<input type="checkbox"/>
(41) _____	<input type="checkbox"/>	<input type="checkbox"/>

*Please evaluate these statements in terms of what you believe Nordhouse Dunes Wilderness IS:*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
(42) A place to be alone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(43) A place with too many people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(44) A place with too many regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(45) A place with some areas where only hikers go.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(46) A place with many natural openings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(47) A place with many natural forested areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(48) A place to test my skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(49) A place with too few people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(50) A place with many management controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(51) A place with too many backpackers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(52) A place with too many day hikers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(53) A place with too many people on the beach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(54) A place with too many roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(55) A place with too many motorized vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(56) A place with too many horses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(57) A place with too many hunters.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(58) A place with too many facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(59) A place that is easy to access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(60) A place where management controls are too obvious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(61) A place with too many maintained trails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(62) A place with too many cross-country skiers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Please evaluate each of the following statements in terms of what you believe  
Nordhouse Dunes Wilderness SHOULD BE:*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
(63) A place to be alone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(64) A place with fewer people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(65) A place with many visitor regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(66) A place with some areas where only hikers can go	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(67) A place with many natural openings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(68) A place with many natural forested areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(69) A place to test my skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(70) A place with more people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(71) A place with fewer management controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(72) A place with fewer backpackers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(73) A place with fewer dayhikers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(74) A place with fewer people on the beach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(75) A place with fewer roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(76) A place with fewer motorized vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(77) A place with no motorized vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(78) A place with less horse travel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(79) A place with no horses allowed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(80) A place with fewer hunters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(81) A place where hunting is not allowed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(82) A place with less facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(83) A place that is not easy to access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(84) A place where management controls are not obvious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(85) A place with fewer maintained trails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(86) A place with fewer cross-country skiers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

***Encounter Information***

*How did the following compare with what you expected to see in Nordhouse Dunes? (Check the appropriate box for each statement)*

(87) The number of people you saw

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(88) The number of large groups (more than 6 people) you saw

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(89) The number of groups too close to you

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(90) The number of groups that were too noisy

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(91) The number of pets you saw

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(92) The number of immodest, indecent, or lewd behaviors

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(93) The number of nude sunbathers you saw

☐ Far Fewer

☐ Fewer

☐ About What I Expected

☐ More

☐ Far More

☐ Had No Expectation

(94) On this visit did your group stay out over night within the Nordhouse Dunes Wilderness Area? (If no skip the next page and go to question #101)

☐ Yes ☐ No

(95) If yes, how many nights?  
(Continue to next page)

***Answer these questions only if you CAMPED IN THE WILDERNESS AREA***

***How did the following compare with what you expected to see in Nordhouse Dunes? (Check the appropriate box for questions 96 and 97)***

(96) The number of groups that camped within sight or sound of your campsite in Nordhouse Dunes

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Far Fewer             | <input type="checkbox"/> More               | <input type="checkbox"/> Did Not Camp In |
| <input type="checkbox"/> Fewer                 | <input type="checkbox"/> Far More           | Nordhouse Dunes                          |
| <input type="checkbox"/> About What I Expected | <input type="checkbox"/> Had No Expectation | Wilderness Area                          |

(97) The number of groups that walked through your campsite in Nordhouse Dunes

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Far Fewer             | <input type="checkbox"/> More               | <input type="checkbox"/> Did Not Camp In |
| <input type="checkbox"/> Fewer                 | <input type="checkbox"/> Far More           | Nordhouse Dunes                          |
| <input type="checkbox"/> About What I Expected | <input type="checkbox"/> Had No Expectation | Wilderness Area                          |

(98) When you are camped in any wilderness area, about how many other groups do you tolerate camped within sight or sound of your campsite?

(99) When you camped out this trip in the Nordhouse Dunes Wilderness, were you able to find the type of campsite described in question #98?

- ☐ Every Night -- Go to #101  
☐ Some of the Time -- Go to #100  
☐ None of the Time -- Go to #100

(100) If you were not able to find this type of campsite, what did you do?

- ☐ I stayed. I found the company of others enjoyable  
☐ I stayed. I don't care how many other groups are camped nearby.  
☐ I stayed, but did not enjoy my visit as much.  
☐ I stayed, but I cut short the length of my visit.  
☐ I packed up my camp and looked for another place to camp.  
☐ I packed up my camp and went home.  
☐ Other: \_\_\_\_\_



***EVERYONE should answer the remaining questions***

(101) Do you feel that controls are needed on the number of people using Nordhouse Dunes?

- ☐ Yes, controls are needed to lower the current level of use  
☐ Yes, controls are needed now to hold use at about the current level  
☐ Controls are needed in some places, but not others  
☐ No controls are needed now, but should be imposed when overuse occurs  
☐ No, there should be no controls now or in the future  
☐ I don't know

If you felt that controls are needed, what is the maximum number that should be permitted in any one group of:

(102) People

(103) Horses

(104) Did you feel that crowding was a problem in places you visited at Nordhouse Dunes?

- ☐ Yes   ☐ Uncertain   ☐ No

(105) If yes, please note the places you felt were crowded. \_\_\_\_\_

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(106) If you felt Nordhouse Dunes was being overused, did it bother you? (Check one)

- ☐ No, not at all  
☐ Only a little  
☐ A moderate amount  
☐ It bothered me a lot  
☐ I don't know

As a result of your feeling did you:

(107) Change the route of your trip

☐ Yes   ☐ No

(108) Change the length of your stay

☐ Yes   ☐ No

(109) If you have visited the Nordhouse Dunes Wilderness before, would you say the quality of the area was:

- ☐ Getting Better
- ☐ About the Same
- ☐ Getting Worse
- ☐ I Have Not Visited Before
- ☐ Other: \_\_\_\_\_

(110) How satisfied were you, personally, with this trip into the Nordhouse Dunes Wilderness? What kind of a grade would you give it?

- ☐ A, Very Good
- ☐ B, Good
- ☐ C, Fair
- ☐ D, Poor
- ☐ F, Very Poor

### ***Information About You***

(111) Please check the box that applies to you

☐ Male

☐ Female

(112) Your age? \_\_\_\_\_

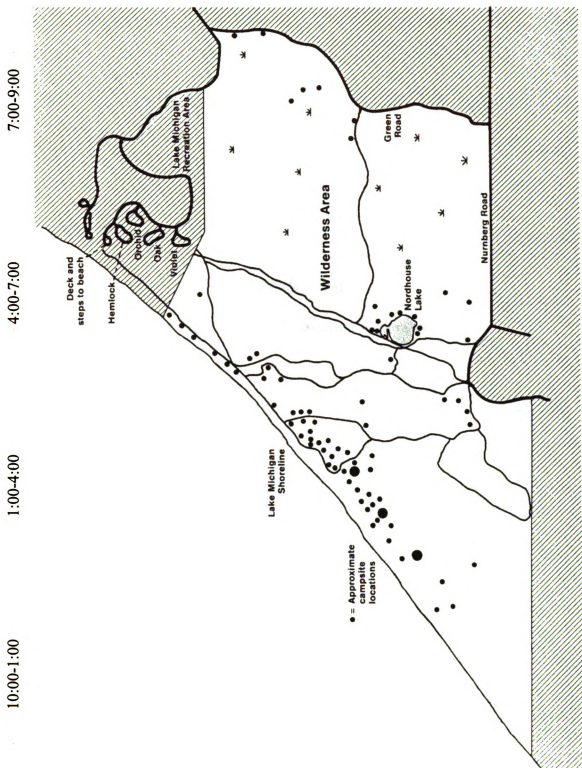
(113) In what type of community do you now live?

- ☐ On a farm or ranch
- ☐ In the country but not on a farm or ranch
- ☐ In a small town (2,500 or fewer people)
- ☐ In a town or small city (between 2,500 and 25,000 people)

- ☐ In a city (between 25,000 and 100,000 people)
- ☐ In a suburb of a large city
- ☐ In a large city (over 100,000 people)

(114) What is your zipcode? \_\_\_\_\_

**We are interested in any comments that you have about Nordhouse Dunes Wilderness Area. Please use the space below to let us know what your thoughts are.**



## **APPENDIX B**

### **Sample and Total Visitation Estimates**

## APPENDIX B

Table 19: Sample and Total Visitation in Recreation-Visits, Nordhouse Dunes Wilderness Area, 1993-94.

SEASON	HOLIDAY					SUMMER					FALL				
Sampling Periods (p)	Cp	Np	Cp/Np	Ps	Vs	Cp	Np	Cp/Np	Ps	Vs	Cp	Np	Cp/Np	Ps	Vs
MON1	0.00	3.00	0.00	3.00	0.00	6.86	3.00	2.29	12.00	27.43	4.00	1.00	4.00	9.00	36.00
MON2	44.24	3.00	14.75	3.00	44.24	18.85	3.00	6.28	12.00	75.40	0.00	1.00	0.00	9.00	0.00
MON3	33.94	3.00	11.31	3.00	33.94	8.89	3.00	2.96	12.00	35.56	3.00	1.00	3.00	9.00	27.00
MON4	1.00	3.00	0.33	3.00	1.00	3.00	3.00	1.00	12.00	12.00	0.00	1.00	0.00	9.00	0.00
TUE1	0.00	0.00	0.00	0.00	0.00	7.84	5.00	1.57	14.00	21.95	0.00	1.00	0.00	10.00	0.00
TUE2	0.00	0.00	0.00	0.00	0.00	14.25	5.00	2.85	14.00	39.90	0.00	1.00	0.00	10.00	0.00
TUE3	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	14.00	0.00	4.00	1.00	4.00	10.00	40.00
TUE4	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	14.00	0.00	0.00	1.00	0.00	10.00	0.00
WED1	0.00	0.00	0.00	0.00	0.00	2.31	5.00	0.46	14.00	6.46	0.00	1.00	0.00	10.00	0.00
WED2	0.00	0.00	0.00	0.00	0.00	15.89	5.00	3.18	14.00	44.49	0.00	1.00	0.00	10.00	0.00
WED3	0.00	0.00	0.00	0.00	0.00	13.33	5.00	2.67	14.00	37.33	0.00	1.00	0.00	10.00	0.00
WED4	0.00	0.00	0.00	0.00	0.00	11.82	5.00	2.36	14.00	33.09	0.00	1.00	0.00	10.00	0.00
THU1	0.00	0.00	0.00	0.00	0.00	12.27	5.00	2.45	14.00	34.36	7.00	3.00	2.33	10.00	23.33
THU2	0.00	0.00	0.00	0.00	0.00	20.22	5.00	4.04	14.00	56.61	0.00	3.00	0.00	10.00	0.00
THU3	0.00	0.00	0.00	0.00	0.00	2.50	5.00	0.50	14.00	7.00	2.00	3.00	0.67	10.00	6.67
THU4	0.00	0.00	0.00	0.00	0.00	2.00	5.00	0.40	14.00	5.60	0.00	3.00	0.00	10.00	0.00
FRI1	2.00	3.00	0.67	3.00	2.00	5.00	3.00	1.67	12.00	20.00	16.00	3.00	5.33	9.00	48.00
FRI2	18.00	3.00	6.00	3.00	18.00	0.00	3.00	0.00	12.00	0.00	5.00	3.00	1.67	9.00	15.00
FRI3	3.00	3.00	1.00	3.00	3.00	16.84	3.00	5.61	12.00	67.37	5.00	3.00	1.67	9.00	15.00
FRI4	2.00	3.00	0.67	3.00	2.00	4.00	3.00	1.33	12.00	16.00	0.00	3.00	0.00	9.00	0.00
SAT1	10.40	3.00	3.47	3.00	10.40	16.62	3.00	5.54	12.00	66.46	10.00	3.00	3.33	9.00	30.00
SAT2	15.83	3.00	5.28	3.00	15.83	8.94	3.00	2.98	12.00	35.76	31.88	3.00	10.63	9.00	95.63
SAT3	8.31	3.00	2.77	3.00	8.31	26.24	3.00	8.75	12.00	104.95	17.53	3.00	5.84	9.00	52.58
SAT4	8.25	3.00	2.75	3.00	8.25	10.80	3.00	3.60	12.00	43.20	0.00	3.00	0.00	9.00	0.00
SUN1	5.00	3.00	1.67	3.00	5.00	34.13	3.00	11.38	12.00	136.50	31.00	3.00	10.33	9.00	93.00
SUN2	56.92	3.00	18.97	3.00	56.92	29.46	3.00	9.82	12.00	117.86	24.00	3.00	8.00	9.00	72.00
SUN3	44.46	3.00	14.82	3.00	44.46	34.67	3.00	11.56	12.00	138.67	14.17	3.00	4.72	9.00	42.50
SUN4	16.80	3.00	5.60	3.00	16.80	0.00	3.00	0.00	12.00	0.00	0.00	3.00	0.00	9.00	0.00
TOTAL	270.15				270.15	326.72				1183.95	174.57				596.70

## APPENDIX B

Table 19 (continued)

SEASON	HUNTING					WINTER					SPRING					
	Sampling Periods (p)	Cp	Np	Cp/Np	Ps	Vs	Cp	Np	Cp/Np	Ps	Vs	Cp	Np	Cp/Np	Ps	Vs
MON1		65.17	1.00	65.17	3.00	195.50	0.00	1.00	0.00	17.00	0.00	4.00	1.00	4.00	8.00	32.00
MON2		38.12	1.00	38.12	3.00	114.35	0.00	1.00	0.00	17.00	0.00	0.00	1.00	0.00	8.00	0.00
MON3		6.86	1.00	6.86	3.00	20.57	0.00	1.00	0.00	17.00	0.00	3.00	1.00	3.00	8.00	24.00
MON4		0.00	1.00	0.00	3.00	0.00	0.00	1.00	0.00	17.00	0.00	0.00	1.00	0.00	8.00	0.00
TUE1		2.00	1.00	2.00	3.00	6.00	0.00	1.00	0.00	17.00	0.00	0.00	1.00	0.00	8.00	0.00
TUE2		13.33	1.00	13.33	3.00	40.00	0.00	1.00	0.00	17.00	0.00	0.00	1.00	0.00	8.00	0.00
TUE3		32.00	1.00	32.00	3.00	96.00	0.00	1.00	0.00	17.00	0.00	4.00	1.00	4.00	8.00	32.00
TUE4		0.00	1.00	0.00	3.00	0.00	0.00	1.00	0.00	17.00	0.00	0.00	1.00	0.00	8.00	0.00
WED1		23.63	1.00	23.63	2.00	47.25	0.00	1.00	0.00	18.00	0.00	0.00	1.00	0.00	8.00	0.00
WED2		0.00	1.00	0.00	2.00	0.00	0.00	1.00	0.00	18.00	0.00	0.00	1.00	0.00	8.00	0.00
WED3		6.60	1.00	6.60	2.00	13.20	0.00	1.00	0.00	18.00	0.00	0.00	1.00	0.00	8.00	0.00
WED4		0.00	1.00	0.00	2.00	0.00	0.00	1.00	0.00	18.00	0.00	0.00	1.00	0.00	8.00	0.00
THU1		16.00	1.00	16.00	2.00	32.00	0.00	1.00	0.00	18.00	0.00	7.00	3.00	2.33	8.00	18.67
THU2		0.00	1.00	0.00	2.00	0.00	0.00	1.00	0.00	18.00	0.00	0.00	3.00	0.00	8.00	0.00
THU3		0.00	1.00	0.00	2.00	0.00	0.00	1.00	0.00	18.00	0.00	2.00	3.00	0.67	8.00	5.33
THU4		0.00	1.00	0.00	2.00	0.00	0.00	1.00	0.00	18.00	0.00	0.00	3.00	0.00	8.00	0.00
FRI1		6.00	1.00	6.00	3.00	18.00	0.00	4.00	0.00	17.00	0.00	16.00	3.00	5.33	9.00	48.00
FRI2		1.00	1.00	1.00	3.00	3.00	5.00	4.00	1.25	17.00	21.25	5.00	3.00	1.67	9.00	15.00
FRI3		6.00	1.00	6.00	3.00	18.00	0.00	4.00	0.00	17.00	0.00	5.00	3.00	1.67	9.00	15.00
FRI4		0.00	1.00	0.00	3.00	0.00	0.00	4.00	0.00	17.00	0.00	0.00	3.00	0.00	9.00	0.00
SAT1		7.64	1.00	7.64	3.00	22.91	0.00	4.00	0.00	17.00	0.00	10.00	3.00	3.33	9.00	30.00
SAT2		9.00	1.00	9.00	3.00	27.00	5.00	4.00	1.25	17.00	21.25	31.88	3.00	10.63	9.00	95.63
SAT3		23.00	1.00	23.00	3.00	69.00	0.00	4.00	0.00	17.00	0.00	17.53	3.00	5.84	9.00	52.58
SAT4		0.00	1.00	0.00	3.00	0.00	0.00	4.00	0.00	17.00	0.00	0.00	3.00	0.00	9.00	0.00
SUN1		22.00	1.00	22.00	3.00	66.00	5.00	4.00	1.25	17.00	21.25	31.00	3.00	10.33	9.00	93.00
SUN2		17.50	1.00	17.50	3.00	52.50	0.00	4.00	0.00	17.00	0.00	24.00	3.00	8.00	9.00	72.00
SUN3		13.00	1.00	13.00	3.00	39.00	1.00	4.00	0.25	17.00	4.25	14.17	3.00	4.72	9.00	42.50
SUN4		0.00	1.00	0.00	3.00	0.00	0.00	4.00	0.00	17.00	0.00	0.00	3.00	0.00	9.00	0.00
TOTAL		308.84				880.28	16			68		174.568			575.7039	

## APPENDIX B

**Table 19 (continued)**

**Notes:**

1. YEAR= May 28, 1993 - May 28, 1994
2. Recreation-visit formula = surveys + refusals + 16 exiting alone+((did survey+not contacted)\*(survey+refusals+16 exiting alone/(survey+refusals+16 exiting alone+not exiting))).
3. Cp=No. visitors counted in given sampling period (p); Np=No. periods sampled in given season; Cp/Np=Ave. no. visitors counted per period sampled; Ps=Total possible sampling periods in given season; Vs=total visitation in given season ( $V_s = C_p / N_p * P_s$ )
4. Recreation-visit=visit by one person to Nordhouse W.A. for recreation purposes regardless of length of stay; e.g., one person making 3 visits = 3 person-visits; visit = person was leaving Nordhouse W.A. for the day
5. All seasons (holiday, summer...) are mutually exclusive
6. Holidays include: Memorial Day, 4th of July, Labor Day (no sampling occurred on Thanksgiving, Christmas, New Year's, Easter; all Fri.-Mon.)
- g visitation
- termine use
8. Season dates were: Summer (6/1 - 9/6/93), Fall (9/7 - 11/11/93), Hunting (11/12 - 11/30/93), Winter (12/1/93 - 3/31/94), Spring (4/1 - 5/28/94)



## **APPENDIX C**

### **Visitor Activities**

## APPENDIX C

Table 20: Nordhouse Dunes User-defined ROS Criteria -- Primitive and SPNM (1993-1994, Questions 19-37).

I. ACTIVITIES	MAJOR ACTIVITY		NOT MAJOR ACTIVITY		TOTAL PARTICIPATION	
	Freq.	% of 506	Freq.	% of 506	Freq.	% of 506
VIEWING SCENERY	343	67.8%	90	17.8%	433	85.6%
HIKING ON TRAILS	285	56.3%	128	25.3%	413	81.6%
CAMPING	226	44.7%	69	13.6%	295	58.3%
HIKING OFF TRAILS	178	35.2%	138	27.3%	316	62.5%
SPENDING TIME IN CAMP	154	30.4%	110	21.7%	264	52.2%
SWIMMING	152	30.0%	111	21.9%	263	52.0%
NATURE STUDY	131	25.9%	156	30.8%	287	56.7%
SUNBATHING	101	20.0%	108	21.3%	209	41.3%
HUNTING	99	19.6%	38	7.5%	137	27.1%
CHECKING OUT PLACES TO HUNT	84	16.6%	51	10.1%	135	26.7%
PHOTOGRAPHY	78	15.4%	122	24.1%	200	39.5%
PICKINICKING	71	14.0%	99	19.6%	170	33.6%
NUDE SUNBATHING	31	6.1%	65	12.8%	96	19.0%
COLLECTING BERRIES ETC.	30	5.9%	75	14.8%	105	20.8%
CROSS COUNTRY SKIING	25	4.9%	50	9.9%	75	14.8%
OTHER	24	4.7%	0	0.0%	24	4.7%
FISHING	20	4.0%	75	14.8%	95	18.8%
BOATING	15	3.0%	57	11.3%	72	14.2%
HORSEBACK RIDING	15	3.0%	50	9.9%	65	12.8%
OTHER--BIKE	8	1.6%	0	0.0%	8	1.6%
OTHER--BEACH (BE ON IT, WALK ON IT)	5	1.0%	0	0.0%	5	1.0%
OTHER--SEE SHIPWRECKS	2	0.4%	0	0.0%	2	0.4%
OTHER--KAYAK	2	0.4%	0	0.0%	2	0.4%

## **APPENDIX D**

### **Comparison of Legal and Personal Definitions of Wilderness**

## APPENDIX D

Table 21: Legal and Personal Definitions of Wilderness Compared (Northhouse Dunes, 1993-1994, Question 10).

Q10. When you think about the term "wilderness" what characteristics come to mind? (Please describe what "wilderness" means to you)

LEGAL CHARACTERISTICS (from 1964 Wilderness Act)	Freq.		Rank		SUBTOTALS	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
1. Large Size (Extent, Expanse, Vastness)	19	1.7%	14	1.7%	19	1.7%
2. Minimum Evidence of Human Influence						
a. Purist: No evidence, never developed or disturbed by modern man, untouched, untamed, wild, undisturbed, pristine, no visible human influence	58	5.1%	7			
b. Untouched looking: unhampered, unmolested, uncontaminated, untraveled unspoiled, undeveloped, unimproved, unpeopled (no homes), uninhabited unaltered, no facilities period, unspoiled by human influence	111	9.7%	2			
c. Minimum human impact/lack of civilization: no modern conveniences, no creature comforts, no -- buildings, structures, electricity, running water, bathrooms, uncommercialized, "not developed for agriculture or settlement," not developed "except ditches, gates, barriers to keep the uninformed from doing anything but walking"	38	3.3%	9			
d. Rustic accommodations, unpopulated, sparsely populated, less traveled	8	0.7%	17		215	18.9%
3. Forces of Nature Predominate (Nature, Naturalness, Natural Environment, Natural Area, What Mother Nature Provides, Wild)						
a. Wildlife, Birds, Game or Opportunities to See the Same	135	11.8%	1			
b. Water: rivers, creeks, lakes, swamps	110	9.6%	3			
c. Bugs/Insects	27	2.4%	11			
d. Sand, beach, dunes, lakeshore	6	0.5%	18			
e. Lots of natural resources	6	0.5%	18			
f. Trees, Woods, Underbrush, Forests, Flowers, Wildflowers, Vegetation	1	0.1%	22			
4. Opportunities for Solitude (No people, few people, privacy)	105	9.2%	4		390	34.2%
	109	9.6%	3		109	9.6%

## APPENDIX D

Table 21. (continued).

LEGAL CHARACTERISTICS (from 1964 Wilderness Act)	Rank		SUBTOTALS	
	Freq.	Percent (1-22)	Freq.	Percent
5. Primitive/Unconfined Recreation (hiking, walking, camping, horses, fishing, "foot access")	67	5.9%	6	6
a. no hunting (note: more said hunting was o.k.)	6	0.5%	18	
b. no roads	26	2.3%	12	
c. no motorized vehicles	43	3.8%	8	
d. no cars/RV's	9	0.8%	16	
e. no traffic	4	0.4%	19	
f. no planes	1	0.1%	22	
g. no wheels	1	0.1%	22	
h. no bikes	4	0.4%	19	
i. bikes o.k.	2	0.2%	21	
j. no horses	2	0.2%	21	
k. no c'grounds/day use facilities	2	0.2%	21	
l. unrattioned/unmarked campsites	3	0.3%	20	
m. no campfires/stoves only	1	0.1%	22	
n. no trails	2	0.2%	21	
o. limited, unmarked, or old trails	6	0.5%	18	179 15.7%
6. Ecological, Geological or Other Features of Scientific, Educational, Scenic or Historic Value				3
a. Ecological	2	0.2%	21	
b. Geological	1	0.1%	22	
c. Scenic (Beauty, Vistas)	29	2.5%	10	32 2.8%
d. Scientific, Educational, Historic Values	0			8
TOTAL LEGAL	944	82.8%	944	82.8%

## APPENDIX D

Table 21. (continued).

PERSONAL CHARACTERISTICS (not in 1964 Wilderness Act)		Rank		SUBTOTALS	
		Freq.	Percent (1-22)	Freq.	Percent Rank
1. Spiritual: Peace, Tranquility, Silence, No Noise, Oneness, Serenity, Animal/Nature Sounds OK		92	8.1%	92	8.1% 5
2. Being Away: Remote, Isolated, Secluded, Desolate, Lonely, Off the Beaten Path (not the same as inaccessible), Away from Civilization & Cities		45	3.9%	45	3.9% 7
3. Other		22	1.9%		
a. Clean: No debris, garbage, litter		3	0.3%		
b. Dangerous, Adventure, Challenge		2	0.2%		
c. Fun		5	0.4%		
d. Freedom		1	0.1%		
e. Relaxing		1	0.1%		
f. Rugged		6	0.5%		
g. Enjoyable		1	0.1%		
h. Can See Stars at Night		1	0.1%		
i. Open Space, Open Land, Openness		8	0.7%		
j. Protection, Protected Area, Preserved		8	0.7%		
k. Does not apply to Nordhouse		1	0.1%		
l. Nordhouse		1	0.1%		
Sum "Other Personal"		59	5.2%	59	5.2% 6
<b>TOTAL PERSONAL</b>		<b>196</b>	<b>17.2%</b>	<b>196</b>	<b>17%</b>
<b>TOTAL LEGAL PLUS PERSONAL</b>		<b>1140</b>	<b>100%</b>	<b>1140</b>	<b>100%</b>

## **APPENDIX E**

### **Location Specific Encounter Data**

## APPENDIX E

Table 22: Location Specific Encounter Data, Nordhouse Dunes Wilderness Study, 1993-1994.

**Wilderness Satisfaction****Visitor Satisfaction with the Wilderness**

Survey Site	n	Very Good (%)	Good (%)	Fair (%)	Poor (%)	Very Poor (%)
Algoma	239	56.9	37.7	5.0	0.4	0.0
Nordhouse Lake	38	81.6	15.8	2.6	0.0	0.0
North Beach	113	68.1	29.2	1.8	0.9	0.0
Ridge Trail	17	70.6	17.6	5.9	5.9	0.0
South Beach	18	55.6	38.9	5.6	0.0	0.0
Nipissing	21	57.1	42.9	0.0	0.0	0.0
Green Road	35	40.0	48.6	11.4	0.0	0.0
Overall	481	429.9	230.7	32.3	7.2	0.0

**Is Crowding a Problem in the Wilderness?**

Survey Site	n	Yes (%)	Uncertain (%)	No (%)
Algoma	233	8.6	10.3	81.1
Nordhouse Lake	38	2.6	15.8	81.6
North Beach	115	5.2	11.3	83.5
Ridge Trail	16	6.3	0.0	93.8
South Beach	18	5.6	5.6	88.9
Nipissing	18	0.0	0.0	100.0
Green Road	36	5.6	11.1	83.3



## APPENDIX E

Table D. (continued)

Users' Expectations for Wilderness Conditions (Aggregated Responses)  
Number of Actual Encounters Vs. Expected Encounters

## Other Visitors

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	238	34.0	38.7	17.6	9.7
Nordhouse Lake	40	37.5	37.5	17.5	7.5
North Beach	119	23.5	46.2	21.0	9.2
Ridge Trail	15	46.7	33.3	20.0	0.0
South Beach	18	38.9	44.4	11.1	5.6
Nipissing	20	30.0	50.0	0.0	20.0
Green Road	36	27.8	58.3	13.9	0.0

## Expectations for Nude Sunbathers

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	229	28.4	17.5	1.7	52.4
Nordhouse Lake	41	41.5	9.8	0.0	48.8
North Beach	115	32.2	16.5	0.9	50.4
Ridge Trail	13	38.5	0.0	0.0	61.5
South Beach	18	33.3	27.8	0.0	38.9
Nipissing	18	38.9	11.1	0.0	50.0
Green Road	33	30.3	9.1	0.0	60.6

## APPENDIX E

Table D. (continued)

Expectations for Immodest, Indecent or Lewd Behaviors

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	229	35.8	16.6	2.6	45.0
Nordhouse Lake	41	48.8	12.2	2.4	36.6
North Beach	115	28.7	25.2	3.5	42.6
Ridge Trail	14	64.3	0.0	0.0	35.7
South Beach	18	38.9	16.7	11.1	33.3
Nipissing	19	42.1	36.8	0.0	21.1
Green Road	33	45.5	24.2	0.0	30.3

Expectations for Large Groups

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	236	37.7	31.4	6.8	24.2
Nordhouse Lake	41	58.5	14.6	9.8	17.1
North Beach	118	22.9	35.6	14.4	27.1
Ridge Trail	14	64.3	14.3	7.1	11.8
South Beach	18	38.9	16.7	16.7	27.8
Nipissing	20	25.0	35.0	5.0	35.0
Green Road	36	44.4	41.7	2.8	11.1

Expectations for Groups too Close

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	236	36.4	30.1	12.7	20.8
Nordhouse Lake	41	48.8	34.1	4.9	12.2
North Beach	117	24.8	46.2	11.1	17.9
Ridge Trail	14	57.1	21.4	0.0	21.4
South Beach	18	33.3	50.0	11.1	5.6
Nipissing	20	40.0	40.0	0.0	20.0
Green Road	36	27.8	52.8	13.9	5.6

## APPENDIX E

Table D. (continued)

Expectations for Noisy Groups

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	234	40.2	29.9	8.5	21.4
Nordhouse Lake	41	51.2	24.4	4.9	19.5
North Beach	114	41.2	36.8	3.5	18.4
Ridge Trail	13	46.2	23.1	0.0	30.8
South Beach	18	44.4	22.2	22.2	11.1
Nipissing	20	45.0	30.0	0.0	25.0
Green Road	35	31.4	45.7	8.6	14.3

Expectations for Pets

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)
Algoma	234	29.9	29.9	17.1	23.1
Nordhouse Lake	41	53.7	22.0	2.4	22.0
North Beach	118	28.0	39.8	16.9	15.3
Ridge Trail	14	50.0	14.3	14.3	21.4
South Beach	18	38.9	22.2	16.7	22.2
Nipissing	18	44.4	33.3	16.7	5.6
Green Road	34	32.4	35.3	5.9	26.5

Expectations for Groups Camped Within Sight or Sound

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)	Did not Camp (%)
Algoma	97	37.1	30.9	20.6	11.3	0.0
Nordhouse Lake	10	60.0	20.0	0.0	20.0	0.0
North Beach	19	26.3	47.4	21.1	5.3	0.0
Ridge Trail	2	50.0	0.0	0.0	50.0	0.0
South Beach	11	18.2	36.4	27.3	18.2	0.0
Nipissing	1	100.0	0.0	0.0	0.0	0.0
Location Neutral	138	36.9	31.9	19.6	11.6	0.0

## APPENDIX E

Table D. (continued)

Expectations for Groups That Walked Through Campsite

Survey Site	n	Fewer (%)	What Expected (%)	More (%)	No Expectation (%)	Did not Camp (%)
Algoma	96	42.7	24.0	17.7	13.5	2.1
Nordhouse Lake	10	90.0	0.0	0.0	10.0	0.0
North Beach	19	26.3	36.8	26.3	10.5	0.0
Ridge Trail	2	50.0	0.0	0.0	50.0	0.0
South Beach	11	54.5	18.2	9.1	18.2	0.0
Nipissing	1	100.0	0.0	0.0	0.0	0.0
Location Neutral	137	45.2	22.6	16.9	13.9	1.5

CampingAbility to Find Desired Type Of Campsite

Survey Site	n	Every Night (%)	Some of the Time (%)	None of the Time (%)
Algoma	96	81.3	14.6	4.2
Nordhouse Lake	9	77.8	0.0	0.0
North Beach	16	68.8	25.0	25.0
Ridge Trail	1	0.0	100.0	100.0
South Beach	10	70.0	20.0	20.0
Nipissing	1	100.0	0.0	0.0

# APPENDIX E

Table D. (continued)

## Use Levels

### Are Controls on Use Levels Needed in the Wilderness?

Survey Site	n	Yes, lower use	Yes, maintain use	In some places	No, only w/overuse	No, never	Don't know
Algoma	231	8.7	17.7	13.4	38.5	12.6	9.1
Nordhouse Lake	36	5.6	19.4	19.4	38.9	13.9	2.8
North Beach	113	3.5	26.5	16.8	38.1	6.2	8.8
Ridge Trail	16	6.3	18.8	6.3	56.3	12.5	0.0
South Beach	17	11.8	11.8	29.4	47.1	0.0	0.0
Nipissing	19	0.0	21.1	5.3	47.4	5.3	21.1
Green Road	36	0.0	11.1	22.2	47.2	13.9	5.6

### Change in Route of Trip Due to Crowding (Entire Sample Population)

Survey Site	n	Yes (%)	No (%)
Algoma	156	16.0	84.0
Nordhouse Lake	24	8.3	91.7
North Beach	70	7.1	92.9
Ridge Trail	9	22.2	77.8
South Beach	12	8.3	91.7
Nipissing	12	0.0	100.0
Green Road	22	9.1	90.9

### Change in Route of Trip Due to Crowding (Campers Only)

Survey Site	n	Yes (%)	No (%)
Algoma	61	16.4	83.6
Nordhouse Lake	6	16.7	83.3
North Beach	10	0.0	100.0
Ridge Trail	2	100.0	0.0
South Beach	7	14.3	85.7

APPENDIX E

Table D. (continued)

Change in Length of Stay Due to Crowding (Entire Sample Population)

Survey Site	n	Yes	No
Algoma	148	4.1	95.9
Nordhouse Lake	23	0.0	100.0
North Beach	68	5.9	94.1
Ridge Trail	9	11.1	88.9
South Beach	12	16.7	83.3
Nipissing	11	9.1	90.9
Green Road	21	4.8	95.2

Change in Length of Stay Due to Crowding (Campers Only)

Survey Site	n	Yes (%)	No (%)
Algoma	58	1.7	98.3
Nordhouse Lake	6	0.0	100.0
North Beach	10	0.0	100.0
Ridge Trail	2	50.0	50.0
South Beach	7	28.6	71.4

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