

**Finding common ground: Horse riders' preferences and potential for conflict  
for varying management actions**

by

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## **Abstract**

The need to balance increasing recreation demands with resource conservation in parks and protected areas presents a challenge for land managers. Managing recreational use of vast land and river areas often encompasses concerns about increasing numbers of recreation visitors, including horse riders. These increases in visitor use may cause adverse impacts to natural resources. A typical outdoor recreation activity, like horse riding, can lead to such impacts as soil erosion, compaction, damage to vegetation, wildlife disturbance, and water pollution. Parks and protected areas require diligent monitoring of these impacts. Along with biophysical impacts, potential social conflicts usually revolve around shared trail use with other horse riders, mountain bikers, and/or hikers. Self-administered questionnaires were given to recreationists (i.e., horse riders) at Ozark National Scenic Riverways (OZAR) in Missouri, U.S.A. Data were collected about levels and patterns of visitor activities on trails at OZAR via stratified random sample at multiple locations, times of day, days of the week and time of year (e.g. summer and fall), thus capturing a representative sample of the riders throughout the whole park.

The study examined horse riders' perceptions of potential management scenarios regarding horse riding trails. Additionally, experience use history data at OZAR were collected. The objective of the research was to explore management options when looking at seasonality, temporal differences, experiential level and the perceived severity of the actions to horse riders at OZAR. The Potential for Conflict Index was used for measuring the potential for conflict between users at different times of the week and times of year (e.g. summer and fall), as well as between horse riders and managers (through proposed management actions). This study sought to help inform park and protected area managers about horse riders' perceptions of potential management actions and the potential for conflict related to said management actions.

Of the management scenarios, there is a lower potential for conflict for trail permitting than trail management. Fall visitors had a higher potential for conflict regarding trail permitting (PCI<sub>2</sub> value = 0.43) and fall users also had a higher potential for conflict for trail management (PCI<sub>2</sub> value = 0.25). For expert and novice users, both groups felt similarly about trail conditions, trail permitting, and trail management; however, there was an overall lower potential for conflict for expert horse riders than novice horse riders. The results revealed the complexity of managing horse use in a protected area. Even during periods of high use, horse riders did not report crowded conditions, nor did horse riders favor restricting use on the trails. Additionally, horse riders felt that the trail conditions were acceptable. As past research has shown, increased horse use often leads to degraded ecological conditions (though none was perceived) and possible conflicts with other users (but not intra-activity). Limiting use may be the only viable way to maintain the ecological integrity of the park, regardless of horse riders lack of desire for restricted use or the presence of experiential impacts. Managers often have to make difficult decisions in the face of conflicting information, and this study clearly displays this dilemma.

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# **Chapter 1 - Introduction**

## **Background**

In the 21<sup>st</sup> century, parks and protected areas are forced to contend with a new suite of management issues, especially when they are sustaining hundreds of millions of recreation visitors annually (National Park Service, 2016). Some of these management issues include pollution, invasive species, and environmental degradation. Wildland recreation activities disturb the natural environment to some degree (Manning, 2011). Although the specific impacts associated with each activity differ to some extent, they all potentially can affect soil, vegetation, wildlife, and water. Some activities can also affect basic geology and air, for example ATV or UTV use (Hammit & Cole, 1998).

As well as environmental impacts, social impacts can also occur in parks and protected areas. Some social impacts include conflicts with other users, crowding, the negative perceptions of other users and depreciative behavior (Newsome et al., 2008; Manning, 2011). This study examined horse riders' social impacts, the acceptance of different hypothetical management scenarios, and the potential of limiting horse rider use at site of known high horse rider use. Such complications exist at Ozark National Scenic Riverways (OZAR), a unit of the National Park Service (NPS). Public perceptions of management and the associated policy related to recreation, and more specifically horse riding, has been eroding in recent years (Missouri Coalition for the Environment, 2016).

Issues with recreational users have affected the managers at OZAR since its inception in the mid-twentieth century, especially when pertaining to horse riders. The physical resource impacts of horse riding in protected areas (including OZAR) has been studied for many years (Schneider et al., 2013; Park, 2011; Pickering et al., 2010; Newsome et al., 2008; Newsome et



al., 2004; Wilson & Seney, 2004; Newsome et al., 2002; Chilman & Vogel, 2001; Cole & Spilidie, 1998; Whinam & Comfort, 1996; Whinam et al., 1994; Harris, 1993; Dale & Weaver, 1974), especially because it is a potentially high impact activity that may make it difficult to adequately conserve ecosystems. However, social impacts of horse riding are not as well studied or understood.

Horse riding in protected areas brings to the forefront the central dilemma facing protected area managers, the compatibility of visitor use and the protection of the cultural and environmental resources of protected areas (Newsome et al., 2008). Although negative impacts of horse riding have been shown in some empirical studies, there are mixed findings as to whether horse riding is truly detrimental to natural areas. For example, some studies show that horse riding has more environmental and social impacts than other forms of recreation; whereas other studies show no difference between types of recreational activities (Manning, 2011). Despite these mixed findings, National Parks, have a dual mandate of protecting the natural environment while at the same time providing opportunities for visitors without degrading this environment (Worboys et al., 2005). How much change (both social and environmental) in these protected areas is acceptable? In the case of U.S. National Parks, managers have been provided guidance by laws and policies (e.g. 1916 NPS Organic Act) to manage these areas unimpaired for future generations, a difficult mandate in light of increased recreational use.

It is important to monitor impacts, both experiential and ecological, of recreational activity in a protected areas, especially an activity that is potentially high impact, such as horse riding. The first step in assessing both the social and environmental impacts of any type of recreational activity in protected areas is to ensure that there is adequate visitor data for the park, including information on the frequency, timing, and location of visitors (Eagles et al., 2002;

Buckley, 2003, 2004; Hadwen et al., 2007). This study was designed to help guide the management of horse riding impacts at OZAR. Its purpose was to collect data about levels, types, patterns, and perceptions of impacts on visitor activities along horse trails in OZAR in rural southeastern Missouri (Sharp & Skibins, 2016). Additionally, this study explored how horse riders perceive different management scenarios related to permitting and different levels of restrictive use (e.g., segregating use by activity, restrictions on group size). The data collected and analyzed will also help inform the Roads & Trails Plan OZAR is implementing within the next year. Planning ensures that the trails are designed to meet the experiential and ecological requirements of their users and are suitable for the characteristics of the land (Marion & Leung, 2004).

## **Research Objectives**

**Objective 1. To investigate temporal variations in potential for conflict for restrictive management scenarios.**

### Hypotheses

H<sub>1</sub> Summer horse riders will be more in favor of restrictive management options than fall visitors (i.e., lower potential for conflict).

H<sub>2</sub> Week day horse riders will be more in favor of restrictive management options than weekend visitors (i.e., lower potential for conflict).

**Objective 2. To investigate the relationship between horse riders' level of experience and support for restrictive management scenarios.**

### Hypotheses

H<sub>3</sub> As horse riders' level of experience (i.e., novice, expert) increase, support for restrictive management scenarios will decrease (i.e., higher potential for conflict).

H<sub>4</sub> As the horse riders' years of visitation to the park increases, support for restrictive management scenarios will decrease (i.e., higher potential for conflict).

**Objective 3. To investigate the relationship between horse riders' level of crowding and support for restrictive management scenarios.**

Hypothesis

H<sub>5</sub> The more crowded the horse riders feel, the more horse riders will support the management scenario (i.e., lower potential for conflict).

## **Chapter 2 - Finding common ground: Horse riders' preferences and potential for conflict for varying management actions**

*To be submitted to Society and Natural Resources*

### **Abstract**

Managing use of protected areas encompasses concerns about high impact recreation such as horse riding. Increased horse rider visitation may cause adverse impacts to natural and social resources. Therefore parks and protected areas require diligent monitoring of these impacts. Ample research has been done on biophysical impacts of horse riding. However, there is little research on the social impacts. This study examined horse riders' perceptions of management scenarios at a protected riverway in the southeastern United States. Data were collected about levels and patterns of horse riding activities on trails via stratified random sample. The Potential for Conflict Index<sub>2</sub> was utilized for measuring the potential for conflict between riders, as well as between riders and management. Trail permitting had a lower potential for conflict, while summer horse riders showed a lower potential for conflict for all management options. As the number of years of visitation increased, the potential for conflict for all management options decreased. Limiting use may be the one of the only viable ways to maintain the ecological integrity of the park, regardless of horse riders lack of desire for restricted use or the presence of experiential impacts. Managers often have to make difficult decisions in the face of conflicting information.

**Keywords: outdoor recreation, horse riding, potential for conflict index, natural resource management**

## **Introduction**

Parks and protected areas around the world provide opportunities for recreation, engagement with nature, and time to spend with family and friends. Recent trends in outdoor recreation in the United States suggest that public interest in nature-based recreation and appreciation of natural areas continues to grow (Cordell, 2008; Fisichelli et al., 2015). Participation in most outdoor activities has increased significantly since 1960, with camping, bicycling, canoeing, horse riding and skiing increasing as much as tenfold during this time (Cordell, 2004; Cordell et al., 2008). Worldwide, participation in recreation in parks and protected areas exhibit similar trends, although no global tabulation of park and protected area usage is available (De Lacy & Whitmore, 2006; Eagles & McCool, 2002). However, there has been significant and well documented increase in visitation to U.S National Parks. Visitation rose from 307 million visitors in 2015 to 332 million in 2016 (National Park Service, 2016), with many parks continuing to see a rise in visitation through 2017. This increase in visitation will continue to put added pressure on the ecological and experiential resources available at parks, which may require more restrictive management actions to preserve these resource.

Different recreational activities have different impacts on the social and natural environments in which they take place. Environmental impacts may include trampling, erosion and compaction, increased muddiness and the spread of non-native plant species (Cole, 1987, 2004). Social impacts include user conflict, crowding, the negative perceptions of other users and depreciative behavior (Newsome et al., 2008; Manning, 2011). While going to protected areas is promoted (e.g., Find Your Park, the NPS's centennial promotion) as an outdoor experience or for recreation, locations that receive concentrated visitor use are likely to see impacts to flora, fauna, water resources, and potentially the visitor experience. Thus, it is imperative that protected area

managers diligently monitor use levels and impacts of recreationists as well as the perceptions of visitors about conditions and levels of support for proposed management actions (United States Department of the Interior, 2015). Although the aforementioned social and environmental impacts are common to several forms of recreation, these impacts are especially prevalent for horse riding (Cole & Spildie, 1998; Dale & Weaver, 1974; Marion & Wimpey, 2007; Newsome et al., 2004; Thurston & Reader, 2001; Wilson & Seney, 1994). The popularity of this activity across the United States (and the globe) has led to a significant increase in number of horse riders (Newsome et al., 2008).

Understanding visitors' attitudes and perceptions may assist in managing impacts of horse riding, and addressing the potential for conflict of horse riders to natural and social conditions, impacts, and proposed management strategies (Newsome et al., 2008). Such research is critical if socially acceptable management practices are to be identified and implemented (Newsome et al., 2008). Due to these issues, managers may need to mitigate impacts to places of high use and/or high impacts. In areas of higher conservation or archeological value, management action may be needed to reduce or redirect the use elsewhere (Manning, 2011). These management actions need to be founded on specific empirical evidence regarding the use conditions. For example, the number of visitors and types of visitors, their distribution in location and time, and the visitors' preference for recreation visit conditions (Manning, 2011). Of equal importance is to understand how visitors perceive potential management actions that will be based on social and environmental factors.

Due to the impacts these recreation activities have on their surrounding environments, it is crucial that managers of protected areas assess both social and environmental impacts of all types. The first step in assessing impacts of any recreational activity in protected areas is to

ensure there is adequate visitor data for the park, including information on the frequency, timing and location of visitors (Eagles et al., 2002; Buckley, 2003, 2004; Hadwen et al., 2007). This study collected visitor use data to inform managers of the types of horse rider use (e.g. trail riding in large groups or solitary riding) and frequencies of horse rider use, as well as data on visitors' perceptions of potential management actions to ensure a complete picture of visitation is present to managers. The purpose of this study was to examine horse riders' acceptance of different possible management scenarios and the potential of limiting horse rider use at locations of known high horse rider use. This study also examines levels of conflict between different subsets of horse riders to understand if this user group is monolithic, or if perhaps differences exist in this community that can be utilized to build support for management actions.

## **Literature Review**

Since the early 1980s, participation rates for many trail-related activities, such as running/jogging, biking, wildlife viewing, hiking, horse riding, and backpacking, have increased substantially (Cordell, 1999; Olive & Marion, 2009). American National Parks alone had 278 million recreation visitors in 2011 and in 2016, that increased to 330 million recreation visits (National Park Service, 2016). The growing research base on outdoor recreation indicates that increasing recreation use often exacerbates impact or change (Manning, 2011, p. 84). Associated with this increasing visitation are human disturbances and impacts to the ecological and social conditions of public parks, forests, wilderness, and private lands open to visitation (Monz et al., 2010).

Environmental impacts, such as impacts to flora, fauna, and water resources are generally most pronounced at locations receiving concentrated visitor use, including trails, campsites, and various types of day-use recreation sites (Olive & Marion, 2009). Social impacts, such as

crowding and user conflicts, can impede on the satisfaction of different user groups in these parks and protected areas. Lynn and Brown (2003) found a strong negative relationship between recreational impacts and indicators of hiking experience, including solitude, remoteness, naturalness, and artificialism (i.e., the absence of human impact and interaction). In a study of national park visitors' perceptions of specific impact situations, Noe, Hammit and Bixler (1997) found that perceptions varied widely but visitors expressed the least tolerance for litter. Hikers', specifically expressed a similar concern, stating they had the lowest tolerance for litter found on trails (Lynn & Brown, 2003). Australian and North American studies have shown that, because of increased visitation to reserved areas and the public requirement for a diversity of recreational experiences, user conflicts have risen (Newsome et al., 2002; Schneider et al., 2013).

Although all recreational activities contribute to social and ecological impacts, specific activities, such as horse riding, may lead to increased conflicts with other users, including objection to the presence of horse feces, increased incidences of insects attracted to manure, introduction of smells and the sight of horses and horse related infrastructure, and general feelings of the inappropriateness of horses in certain areas that may conflict with visitors' values (Newsome et al., 2008). Because recreational horse trail riding is projected to grow significantly in the next decade and is often experienced on multiple-use trails, information about horse recreational rider experience is of interest (Schneider et al., 2013, p. 282). Of the nearly 124,000 miles of horse and pack stock trails in the United States, 85% are managed at the federal level and 78% in "natural settings" (American Horse Council, 2005). Participation in recreational horse riding is projected to grow by 42% by 2060 (Schneider, 2013, p. 283), thus the added importance of understanding horse riders' perceptions and attitudes towards potential management actions that may result from such growth.



Recent empirical studies surrounding recreational horse riding present mixed findings. Some studies show that horse riding has more environmental and social impacts than other forms of recreation (Pickering et al., 2008); whereas other studies show no difference between types of recreational activities (Manning, 2011). The greater weight of horses can result in more damage to vegetation and soils than people hiking while grazing by horses can result in more damage to grasses and other palatable species along the trail (Weaver & Dale, 1978; Liddle, 1997; Newsome et al., 2004, 2008; Carter et al., 2008). Weaver and Dale (1978) found that horses caused greater increases in soil compaction, litter, trail width and depth compared to hikers and motorcycles. Hiking, off-road bicycling, ATV use and horse riding all have impacts on the areas surrounding areas where the activities take place. The difference between these recreation activities is the severity of impacts. Many impacts from horses are similar to those from hiking chiefly soil compaction and erosion, loss of organic litter, loss of ground cover vegetation, loss of species, trail erosion and widening and potentially the dispersion of weeds and pathogens into natural vegetation (Pickering et al., 2010). Regardless of the difference in impacts, the amount of use by any type of recreational activity can have adverse impacts on the social and environmental conditions in which it is present.

Direct change to the trails' surface can have water flow effects, with trail widening, increased depth of trails, exposure of tree roots, loss of vegetation on the side of trails and changes in hydrology along the trail and in neighboring areas (Harris, 1993; Whinam & Comfort, 1996; Newsome et al., 2002, 2004). When horse riders take informal (social) trails, the impacts to the natural environment can be more severe. Impacts of horse riding on social trails or off trail are much greater because of direct trampling of vegetation (Whinam et al., 1994; Newsome et al., 2002, 2004). Damage to vegetation along informal trails can be so great that the result is a

loss of a great deal of vegetation, exposing the leaf litter and soil surface (Pickering et al., 2008). Impacts from horse riding on trails are often a result of the large ground pressure accompanying horses' hooves which can change trail surfaces (Whinam & Comfort, 1996; Liddle, 1997; Newsome et al., 2004).

Despite the mixed findings surrounding horse riding, a majority of findings suggest that it does have an impact on the surrounding environment, however minimal in some cases. As a result of these potential impacts, it is important to evaluate what is, and is not known, about the impacts of horse riding in protected areas (Pickering et al., 2010). This includes what types of impacts have been found, their severity, if there are activity-specific impacts, what indicators can be used to assess impacts, what methods are being utilized, analysis of methodological limitations to existing research, and what directions and methods should future research take to address the needs of users and of managers who are making decisions about recreation use in protected areas (Pickering et al., 2010). It is also important to understand the inherent resilience of the natural environment and how much of different types of use the natural area can support (Cole, 2004). Despite increasing knowledge about recreation use and resulting environmental impacts, the critical question remains: how much impact or change should be allowed (Manning, 2011, p. 84)? Additionally, the ecological impacts of horse riding are well documented, but the understanding of experiential and perceptions of management actions is less understood.

Along with potential environmental impacts, potential social conflicts tend to revolve around shared trail use with other horse riders, mountain bikers, and/or hikers (Sharp & Skibins, 2016). Research has continued to identify and study many types of conflict in outdoor recreation, and conflict appears to be expanding as demand for outdoor recreation continues to grow, as technology and innovation contribute to development of new recreation equipment and activities,

and as contemporary lifestyles become increasingly diverse (Devall and Harry, 1981; Owens 1985; Williams, 1993; Hendricks, 1995; Watson 1995a; Manning, 2011, p. 206). The multifunctional use of trails may reduce the ecological impacts elsewhere in the park, but it may also create social conflicts between user groups who have to share the same trails (DSB, 2001; AUbE, 2002). Watson et al. (1993,1994) studied the interactions between hikers and recreational livestock (horses). They found that up to 44% of hikers disliked encounters with horse riders, although not all hikers disliked these encounters (Watson et al., 2003, 2004). Conflict in these cases tend to be asymmetric, or unidirectional in nature (Manning, 2011, p. 206).

Previous studies reveal that conflict experienced related to horse riders is generally unidirectional and that horse riders are more often the source of conflict than those experiencing it (Watson & Kajala, 1995). For example, hikers generally object to the presence of horse riders in protected area settings, but the reverse is not true, at least not to the same degree (Newsome et al., 2008). In the Schneider et al. (2009) study, compared with the experiences of hikers and mountain bikers, the conflict frequency and stress attributions related to horse riders were both higher.

A strong predictor of conflict between hikers and horse users were general feelings of inappropriateness of horse use in certain protected area settings (Newsome, 2008). In addition, level of experience or commitment to a recreation activity has also been found to influence conflict (Manning, 2011; Todd and Graefe, 1989; Vaske et al., 1995). Sometimes, there is even intra-activity conflict, where horse riders experience conflict with other horse riders. For example, horse riders experienced conflict with other horse riders when they heard other users on the trail, litter on or near the trail, seeing evidence of off-trail or road use and rude or discourteous users (Schneider et al., 2013, p. 284).

Recreation conflict management is a strategy containing two parts: a spatial and temporal distribution of recreationists in nature, as well as adjusting visitor behavior by either direct or indirect management efforts (Manning & Absher, 2008). The experiential components of horse riders has been understudied, but even more so, is how horse riders perceive different management actions aim for curbing some of these ecological and experiential impacts that may affect their experience (either positively or negatively).

Natural resource planning and implementation is enhanced when the attitudes and management preferences of constituents are understood (Chase et al., 2004; Decker & Bath, 2010). Recreation managers are concerned about conflict (intra-activity, inter-activity and between recreationist and managers) because it affects visitors' experiences (Miller & Vaske, 2016). Conflict can influence displacement, where visitors will no longer visit an area (Schneider, 2000). As the demand for recreation opportunities on public lands increases, a need for solutions to conflict situations becomes more important (Miller & Vaske, 2016). As park management and conservation are reliant on public cooperation, it is essential to reduce conflict so that visitors who want to enjoy natural values can fully appreciate their outdoor experience (Newsome et al., 2002). A major goal in protected area research is to conceptualize, measure, and interpret variables and their relationships in a way that bears meaning on problems of managerial or scientific interest (Manfredo, Vaske, & Teel, 2003, p. 220). A major goal of this study was to investigate the conflict between horse riders and management actions, and how best to operationalize this conflict.

The Potential for Conflict Index (PCI<sub>2</sub>) was developed to help address these issues related to user or user/managerial conflicts and it can be used to characterize individuals' attitudes toward management actions (e.g., strongly favor to strongly oppose) or behavioral intentions

regarding participation in an activity such as horse riding (e.g., highly likely to highly unlikely) (Vaske et al., 2010; Vaske et al., 2006). The PCI<sub>2</sub> has been utilized by asking respondents to evaluate the acceptability of several management actions regarding various recreational endeavors (Vaske et al., 2013). Variable responses framed in this manner reflect an evaluation of the appropriateness of a given management action (e.g., require trail users to be charged a fee for a permit) (Vaske et al., 2006).

The PCI<sub>2</sub> and the associated graphic technique for displaying results were developed to facilitate understanding and interpretation of statistical information (Vaske et al., 2013). This approach requires little statistical training to understand results, minimizes effort required to process information, and improves comprehension (Vaske et al., 2010). This method of relaying data to protected area managers allows for a more comprehensive and understandable look at what is occurring with horse riding recreationists in protected areas.

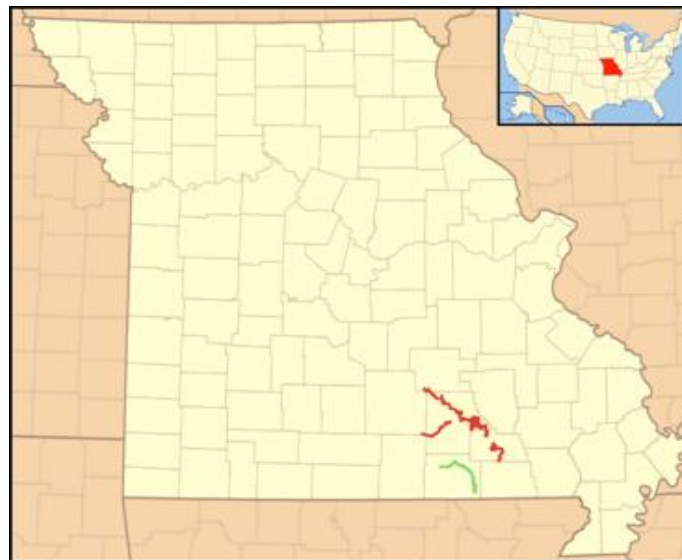
There is very little information on the attitudes, expectations and reactions of horse riders to proposed management strategies (Newsome et al., 2008), thus the primary research objectives of this study are to understand: 1) how temporal variations may influence potential for conflict for restrictive management scenarios; 2) the relationship and potential for conflict between horse riders' level of experience and support for restrictive management scenarios (i.e. beginner, intermediate, expert and years of visitation to the park); 3) horse riders' support and potential for conflict for differing levels of restrictive management scenarios.

## **Methods**

### *Description of Research Location*

This study was conducted at Ozark National Scenic Riverways (OZAR) and is located in southeastern Missouri, U.S.A (Figure 1), and was the first federally protected river system under

the National Park Services' management. Congressionally authorized in 1964, OZAR served as a prototype for the National Wild and Scenic Rivers Act of 1968. This park unit is home to hundreds of freshwater springs, caves, trails and historic sites. Some of the recreation opportunities offered at OZAR include: canoeing and kayaking, camping, horse riding, hiking, boating, hunting, fishing, ATV and ORV use, sightseeing at archaeological sites and/or natural sites, bicycling, stargazing, and birdwatching. Horse riding offers an excellent opportunity to experience the Ozark landscape – from open fields where one may encounter feral horses, forested riparian bottomland where one can observe song birds, raptors and water fowl, and upland oak-pine ridges with panoramic views of the river below (National Park Service, 2016). Horse riders at OZAR participate in organized and informal trail rides throughout the year at five primary locations throughout the park.



**Figure 1.** Location of OZAR (red outline)

### *Questionnaire Development*

Questionnaire data were collected over 7 week days and 5 weekend days (Saturdays and Sundays) from August 2016 to October 2016 with all of these days occurring during known trail rides (i.e. periods of known high use). Trail rides are weeklong events where thousands of horse

riders congregate on park trails and county roads. For example, over a 4-day period in October 2016, 1,792 horse riders were counted on the trails involved in this study (Algrim et al., 2017). All research was conducted within NPS boundaries.

This study explored horse riders' perceptions of varying management actions, as well as horse riders' perceptions of the current conditions at OZAR. The questionnaire focused on potential management actions, perceptions of crowding, visitation history, and reasons for visiting OZAR (Appendix C). The goal was to provide data to inform management action(s) with the least potential for conflict. Horse riders were presented with four scenarios to 'better manage trail conditions.' Respondents were asked to rate their agreement for being required to obtain: a free permit, be charged a fee for a permit, an annual permit, or a daily permit. Respondents were not supportive of any permit system. The least objectionable scenario was a free permit. The remaining scenarios all had means less than -1, indicating strong levels of disagreement. These data indicate implementing a permit system, even if free, may produce high levels of conflict with horse riders.

The second set of management scenarios centered on managing use. The same scale was used as in the previous scenarios. Respondents were asked to rate their level of agreement on requiring education on low impact use, and for limiting: group size, number of groups on trails, river crossings, and trail use by activity. All of the scenarios had means less than -1 with the exception of designating trails based on activity. This indicates strong levels of disagreement with nearly all management scenarios aimed at limiting use.

The researchers used standard best practices for questionnaire construction, such as those set forth by Vaske (2008) and Dillman (2007). The questions were modeled after a study by Chilman and Vogel (2001) as well as in collaboration with the National Park Service and their

Pool of Known Questions (2015). The research sites were chosen in coordination with park staff to represent horse rider use throughout the park. Each of the management questions were presented on a 7-point Likert-type scale, ranging from -3 (“extremely unacceptable”) to +3 (“extremely acceptable”), with a midpoint of 0 (“neither unacceptable or acceptable”).

### *Data Collection*

Data for this study were obtained via self-administered intercept questionnaire of a random sample of 448 horse riders at OZAR. The sample frame for this study was individuals over 18 years of age who visit OZAR for horse riding. Data were collected via stratified random sample, stratified by days of the week and hours of the day, seasons and by sites. Questionnaires were conducted on each of the sites at the riverways: Alley Spring, Shawnee Creek campground, the park boundary on County Road 19-203, Flying W and Susie Nichols Cabin from 8am to 3pm each day of the sampling period. These sites were identified by NPS staff as high-use locations.

Trained research assistants approached each visitor or group, informed them about the study, and invited them to participate. Participants were asked to complete the questionnaire while they tethered their horses, and congregated with other horse riders in their group. Visitors usually tethered their horses for a minimum of fifteen minutes, thus giving them plenty of time to complete the questionnaire. Despite having ample time, some horse riders opted out of participating in the questionnaire. A study completed in 2013 by Schneider et al. yielded a 59% response rate from horse riders, we collected a total of 448 questionnaires, for a response rate of 55%. A few common reasons visitors declined taking the questionnaire were they didn't have enough time, they didn't want to dismount off their horse, their horse was getting impatient or their group was moving on to the next location.



## Data Analysis

Data were screened for missing values and univariate and multivariate outliers. A total of 20 cases were removed. Composite variables (Table 1) were assessed using confirmatory factor analysis. Confirmatory factor analysis is a function of structural equation modeling and provides a more robust method for assessing the validity of composite variables (Skibins & Sharp, 2017). The following composite variables were created: trail conditions, trail permit, and trail management. The trail conditions variable measured the visitors' perceptions of the quality of the trail conditions at OZAR. The trail permit variable measured the visitors' support for requiring trail users to obtain different types of permits at OZAR (e.g., daily, annual, or free). The trail management variable measured the visitors' support of OZAR managing the trails more strictly (e.g., limit group size, limit number of groups, trail designation). The composite variables were generated to help represent the more complex concepts as well as the fact that they are more robust than uni-dimensional variables (Grace & Bollen, 2008). Trail conditions were scored on a -3 (extremely unacceptable) to 3 (extremely acceptable) scale. Trail permit and trail management were scored on a -3 (strongly disagree) to 3 (strongly agree) scale. Data were analyzed using analyses of variance (ANOVAs), *t*-tests, confirmatory factor analysis and the Potential for Conflict Index<sub>2</sub> (PCI<sub>2</sub>).

The PCI<sub>2</sub> ranges from 0 (minimal potential for conflict) to 1 (maximum potential for conflict) and to facilitate visual understanding of this type of data, it simultaneously describes a variable's central tendency, dispersion, and shape using a graphic display (Vaske et al., 2010). The size of the bubble depicts the magnitude of the PCI<sub>2</sub> and indicates the degree of dispersion (e.g., extent of potential conflict regarding acceptance of a management strategy) (Vaske et al., 2010). A small bubble represents little potential for conflict (i.e., high consensus) and a larger

bubble represents greater potential for conflict (i.e., low consensus) (Sponarski et al., 2015).

This graphical representation allows for a quick, visual inspection of the possible conflict related to different types of management actions.

## Results

The sample ( $n = 428$ ) was 47% male ( $M$  age 54), 53% female ( $M$  age 51) with 50% of the respondents residing in Missouri. Many visitors (44%) indicated that they had completed their education past high school and only 16% indicated a total household income of \$100,000 or higher. Most visitors had been to OZAR before with only 11% reporting that they were first time visitors. Ninety percent of visitors reported their main reason for visiting OZAR was for horse riding, with smaller percentages reporting hiking (7.1%), camping (30%), nature viewing (11%), and 12% for visiting historic sites (the total is over 100% because respondents could check multiple boxes for their main reason for visiting OZAR).

Means, fit indices (confirmatory fit index [CFI], non-normed fit index [NNFI], and standardized root mean residual [SRMR]), and reliability coefficients (Cronbach alpha, rho) for the composite variables are reported, respectively: trail conditions ( $2.22 \pm .84$ ; .96; .89; .03; .74; .75), trail permit ( $-2.79 \pm 1.89$ ; .99; .98; .02; .93; .93), trail management ( $-2.71 \pm 1.65$ ; .97; .90; .05; .88; .88). Fit indices and reliability coefficients were within acceptable limits (Table 1) (Lee & Kyle, 2012).

One-way ANOVAs with Bonferroni post-hoc  $t$ -tests (Table 2) were completed to reveal differences within the users who have been visiting OZAR for number of years, experience level, level of crowding, season and time of week (weekend or weekday). The years of visiting the park variable revealed a significant difference for trail management ( $F(3, 331) = 2.77, p < .05, \eta = .16$ ). A significant difference was found for trail management and level of experience ( $t(381) = -$

3.36,  $p < .001$ ,  $\eta^2 = .17$ ). For the level of crowding variable, a significant difference was found for trail management ( $F(2, 380) = 16.08$ ,  $p < .001$ ,  $\eta^2 = .28$ ) and for trail permit ( $F(2, 383) = 16.14$ ,  $p < .001$ ,  $\eta^2 = .28$ ). A significant difference was found for trail conditions ( $t(380) = -3.26$ ,  $p < .001$ ,  $\eta^2 = .16$ ) and for trail permit ( $t(388) = -2.14$ ,  $p < .05$ ,  $\eta^2 = .11$ ) by season. Within the time of week variable, a significant difference was found for trail conditions ( $t(382) = 2.95$ ,  $p < .05$ ,  $\eta^2 = .14$ ) and for trail permit ( $t(267.8) = 2.44$ ,  $p < .05$ ,  $\eta^2 = .13$ ). Although there were statistically significant differences for several of the variables, the effect size measures were minimal.

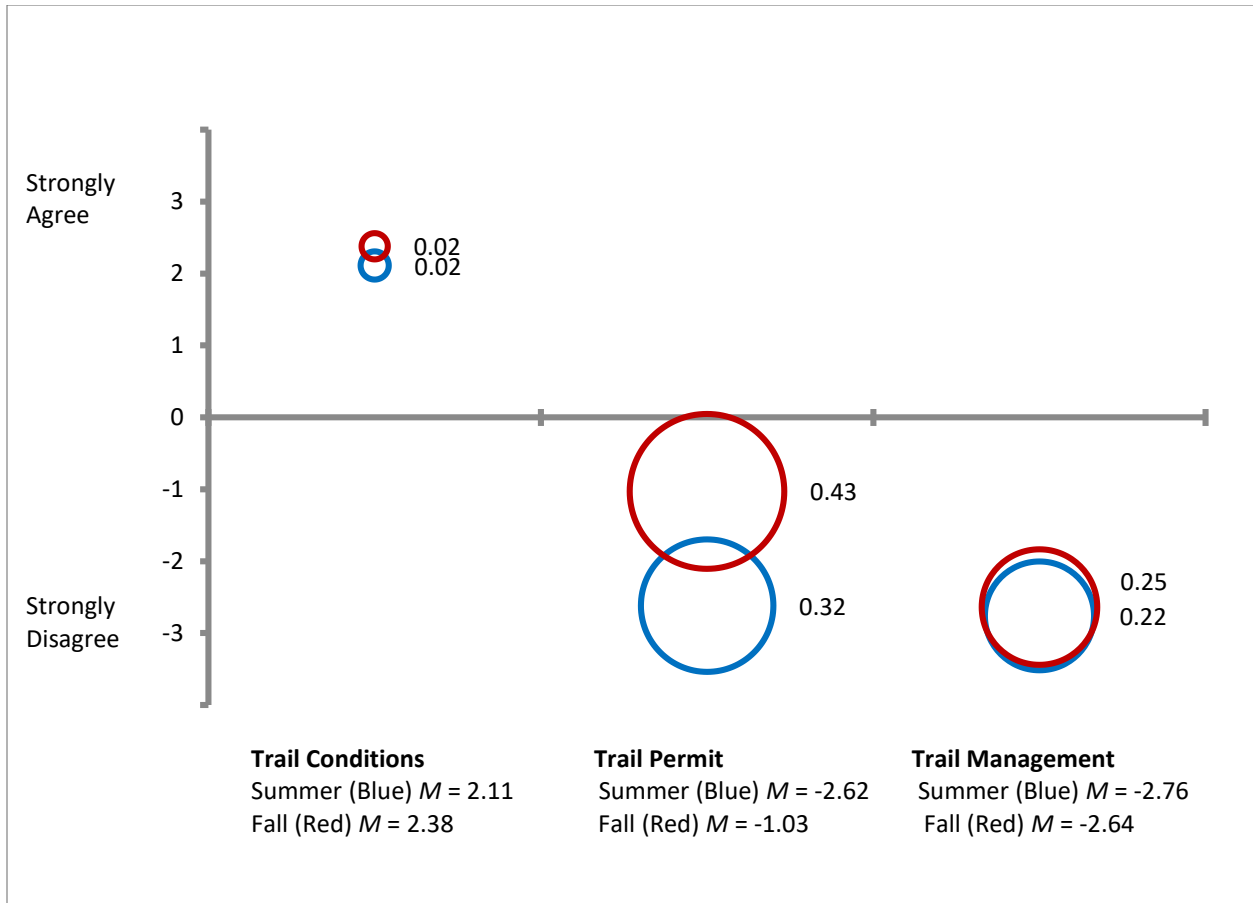
**Table 1.** Descriptive statistics, fit indices, and reliability coefficients for composite variables and survey items for horse riders at OZAR

Item	M ± SD	CFI	NNFI	SRMR	$\alpha$	<i>P</i>
<b>Trail conditions</b>	2.22 ± .839	.96	.89	.030	.74	.75
Rate your acceptability of the trail conditions	2.35 ± 1.01					
Rate your acceptability of trail markings (e.g. signs)	1.57 ± 1.48					
Rate your acceptability of the number of trails	2.23 ± 1.23					
Rate your acceptability of water quality of rivers and streams	2.72 ± .694					
<b>Trail permit</b>	-2.79 ± 1.89	.99	.98	.019	.93	.93
Rate your level of agreement with requiring users to obtain a free permit	-1.41 ± 2.28					
Rate your level of agreement with requiring users to be charged a fee for a permit	-2.67 ± 2.11					
Rate your level of agreement with implementing an annual permit system	-2.67 ± 2.01					
Rate your level of agreement with implementing a daily permit system	-2.41 ± 1.95					
<b>Trail management</b>	-2.71 ± 1.65	.97	.90	.050	.88	.88
Rate your level of agreement with limiting maximum group size on trails	-2.37 ± 1.88					
Rate your level of agreement with limiting maximum number of groups on trails	-2.27 ± 1.82					
Rate your level of agreement with designating trails based on type of activity	-1.56 ± 2.21					
Rate your level of agreement with limiting trail related river crossings	-2.38 ± 1.87					

**Table 2.** One-way ANOVAs, post-hoc, and *t*-tests

IV	Trail Conditions			Trail Permit			Trail Management		
	<i>n</i>	Mean ± SD	eta	<i>n</i>	Mean ± SD	eta	<i>n</i>	Mean ± SD	eta
<b>Years visiting OZAR</b>									
0-10	159	2.21 ± .90 <sup>a</sup>	.10	160	-1.01 ± 1.84 <sup>a</sup>	.15	158	-2.92 ± 1.69 <sup>a</sup>	.16
11-20	71	2.37 ± .64 <sup>a</sup>		71	-2.51 ± 1.93 <sup>a</sup>		69	-2.29 ± 1.65 <sup>b,c</sup>	
21-30	66	2.13 ± .95 <sup>a</sup>		67	-2.63 ± 1.94 <sup>a</sup>		67	-2.48 ± 1.58 <sup>a,c</sup>	
31+	44	2.20 ± .78 <sup>a</sup>		41	-2.27 ± 1.68 <sup>a</sup>		41	-2.61 ± 1.45 <sup>a,c</sup>	
<b>Experience level</b>									
Expert	168	2.26 ± .81	.04	171	-2.64 ± 1.93	.08	168	-2.41 ± 1.55 <sup>**</sup>	.17
Novice	215	2.19 ± .86		215	-2.93 ± 1.87		215	-2.97 ± 1.69 <sup>**</sup>	
<b>Level crowding</b>									
Not crowded	153	2.28 ± .90 <sup>a</sup>	.07	168	-2.24 ± 1.75 <sup>a</sup>	.28	167	-2.24 ± 1.45 <sup>a</sup>	.28
Slightly crowded	117	2.24 ± .77 <sup>a</sup>		125	-1.00 ± 1.90 <sup>b</sup>		125	-2.92 ± 1.63 <sup>b</sup>	
Moderately crowded	88	2.15 ± .76 <sup>a</sup>		93	-1.53 ± 1.87 <sup>b</sup>		91	-1.36 ± 1.75 <sup>b</sup>	
<b>Season</b>									
Summer	223	2.11 ± .91 <sup>**</sup>	.16	228	-2.62 ± 1.82 <sup>*</sup>	.11	226	-2.76 ± 1.66	.04
Fall	161	2.38 ± .70 <sup>**</sup>		162	-1.03 ± 1.99 <sup>*</sup>		161	-2.64 ± 1.64	
<b>Time of Week</b>									
Weekday	230	2.13 ± .91 <sup>*</sup>	.14	249	-2.61 ± 1.82 <sup>*</sup>	.13	141	-2.92 ± 1.69	.10
Weekend	154	2.37 ± .70 <sup>*</sup>		141	-1.11 ± 2.00 <sup>*</sup>		246	-2.59 ± 1.62	

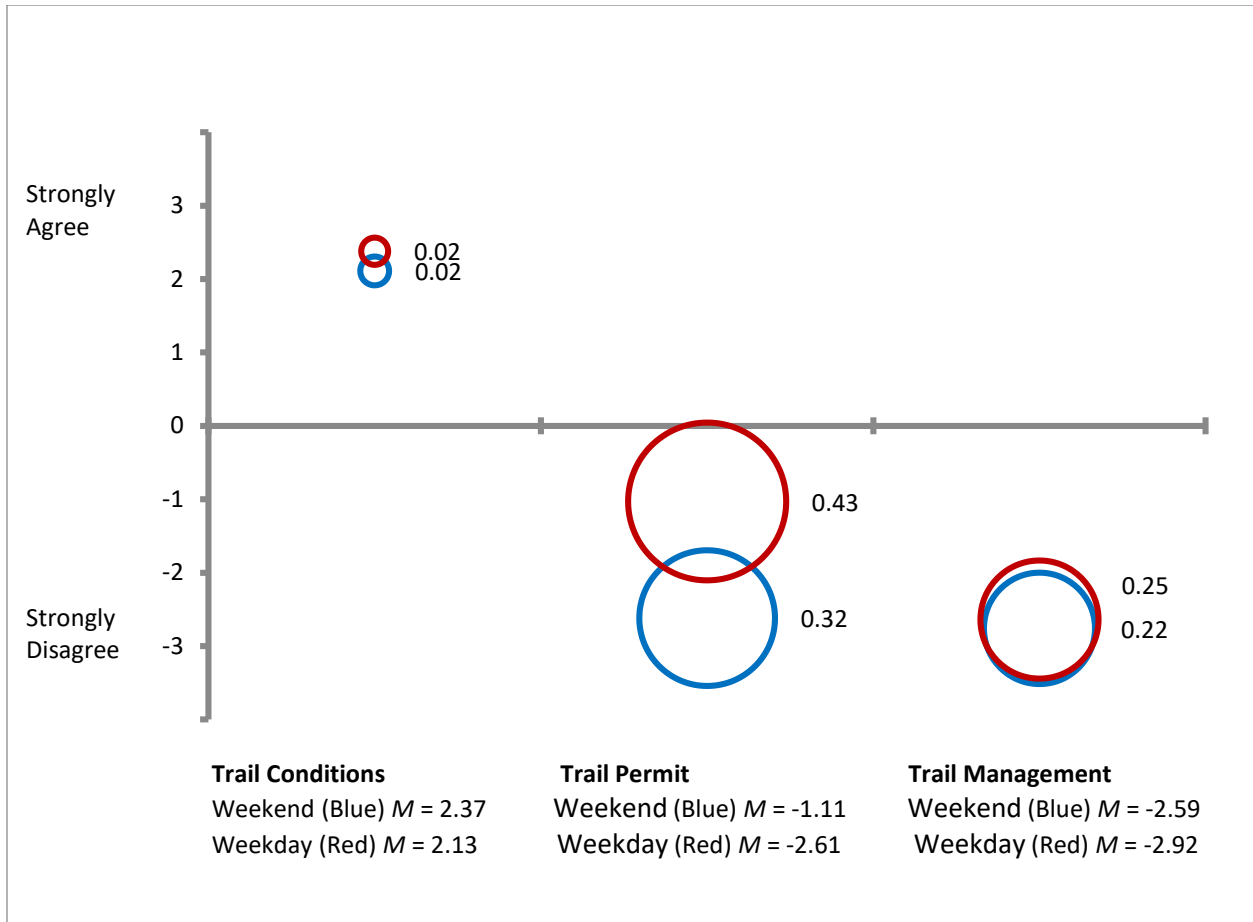
Notes: \**p* < .05, \*\**p* < .001, means with different superscript differ at *p* < .05, NS = not significant.



**Figure 2.** The Potential for Conflict Index<sub>2</sub> for summer and fall visitors regarding trail conditions and management scenarios

*Note:* Trail conditions are rated on a scale from extremely unacceptable (-3) to extremely acceptable (3), with 0 being neutral and trail permit and trail management are rated on a scale from strongly disagree (-3) to strongly agree (3), with 0 being neutral.

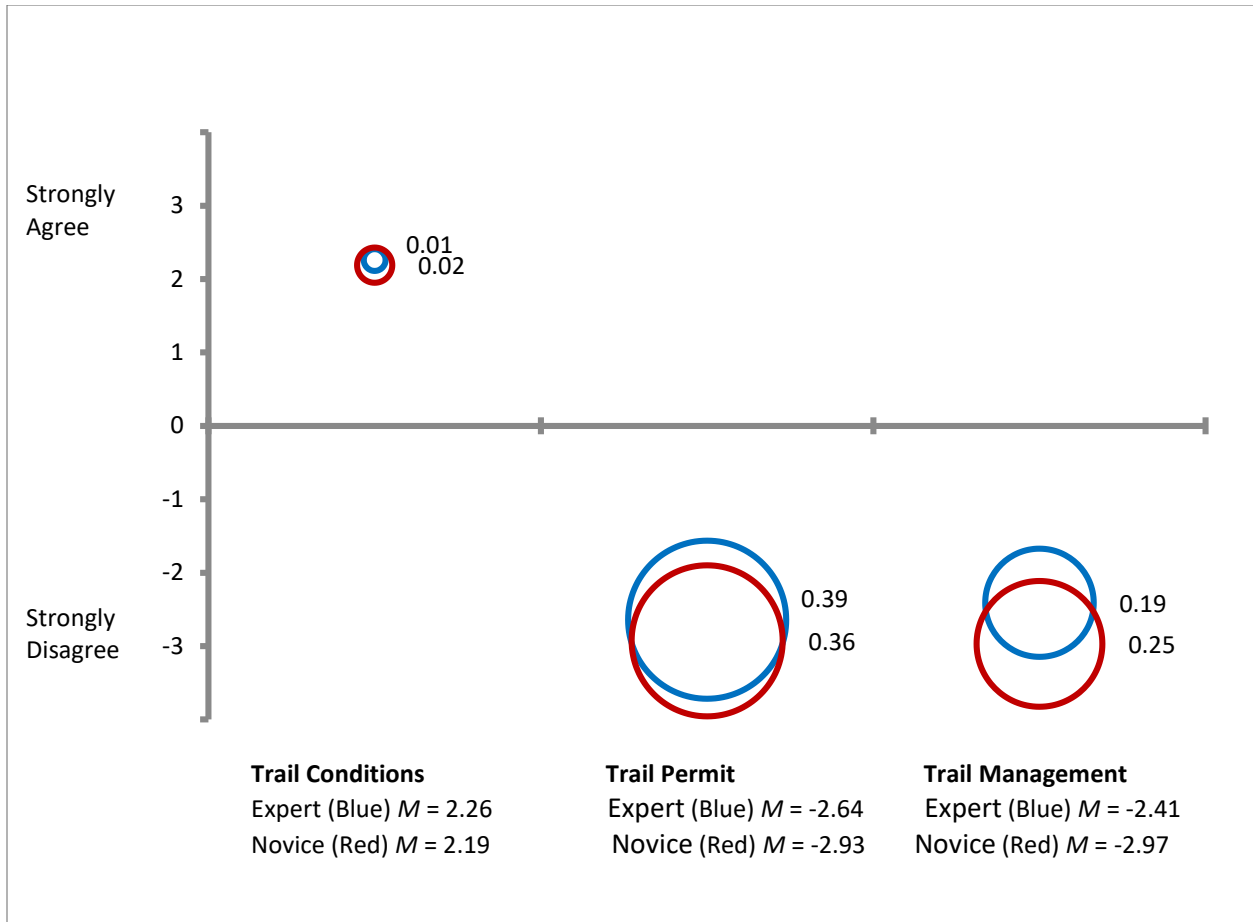
To further test and understand the temporal and experiential differences between visitors, the PCI<sub>2</sub> index was utilized. Many of the composites showed polarization on the various scales, with few people falling in the middle of the 7-point scales. Summer and fall horse riders felt similarly about trail conditions, trail permitting and trail management; however, there appears to be less opportunity for conflict for summer users when compared to fall users (Figure 2).



**Figure 3.** The Potential for Conflict Index<sub>2</sub> for weekend and weekday visitors regarding trail conditions and management scenarios

*Note:* Trail conditions are rated on a scale from extremely unacceptable (-3) to extremely acceptable (3), with 0 being neutral and trail permit and trail management are rated on a scale from strongly disagree (-3) to strongly agree (3), with 0 being neutral.

Weekend and weekday horse riders felt similarly about trail conditions and trail management. There appears to be less opportunity for conflict for weekday horse riders than weekend horse riders (Figure 3). Weekend horse riders were more favorable towards trail management than trail permitting. Trail permitting, however, has a higher potential for conflict for weekend horse riders.

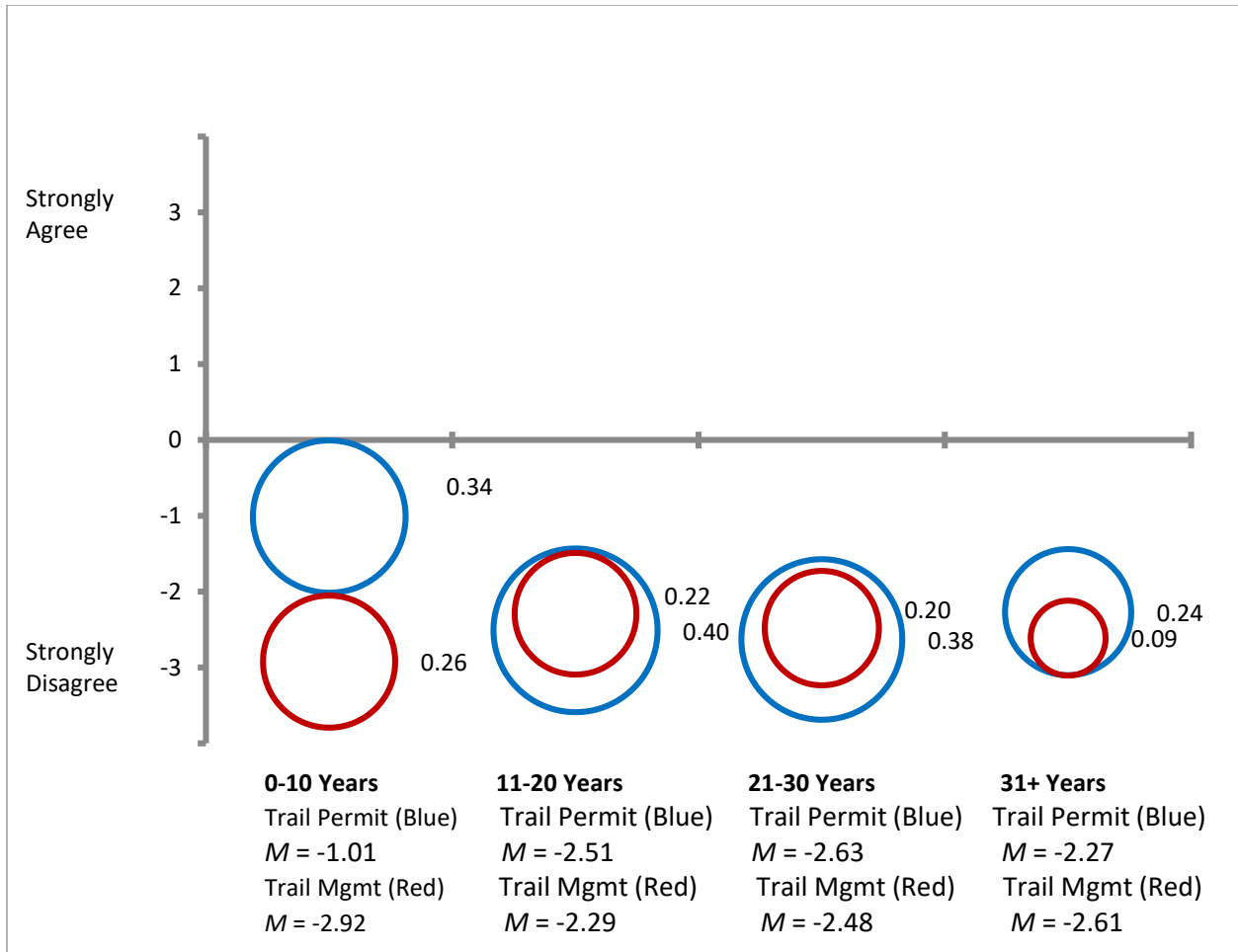


**Figure 4.** The Potential for Conflict Index<sub>2</sub> for novice and expert visitors regarding trail conditions and management scenarios

*Note:* Trail conditions are rated on a scale from extremely unacceptable (-3) to extremely acceptable (3), with 0 being neutral and trail permit and trail management are rated on a scale from strongly disagree (-3) to strongly agree (3), with 0 being neutral.

Expert and novice horse riders felt similarly about trail conditions, trail permitting, and trail management; however, there appears to be less opportunity for potential for conflict for expert users when compared to novice users (Figure 4).

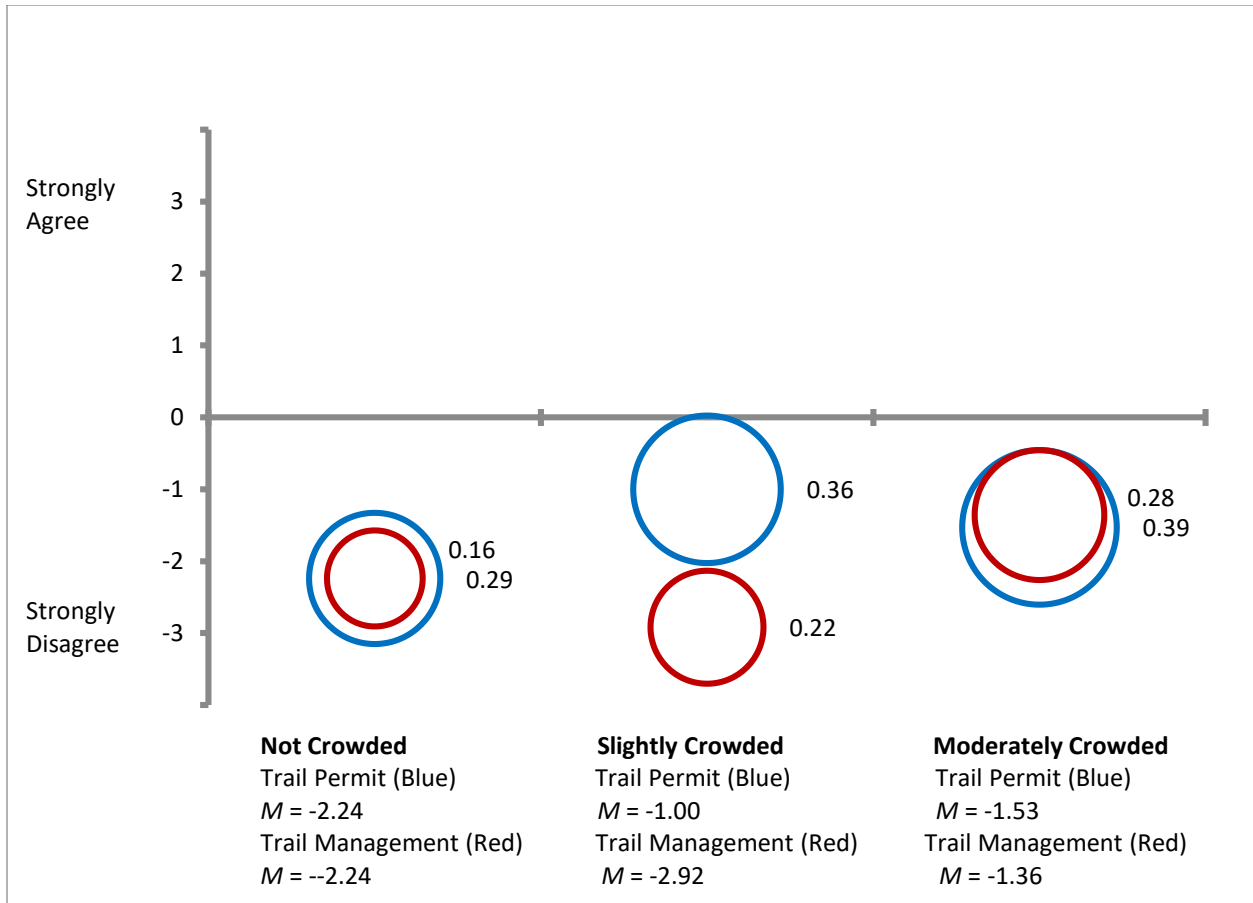




**Figure 5.** The Potential for Conflict Index<sub>2</sub> for respondents' years of visitation regarding trail permit and trail management

*Note:* Trail permit and trail management are rated on a scale from strongly disagree (-3) to strongly agree (3), with 0 being neutral.

Horse riders in all years of visitation felt similarly about trail permitting and trail management. However, there appears to be less opportunity for conflict as the years of visitation increases (Figure 5). However, horse riders who have visited for 31+ years were more in favor of restrictive management options. As the horse riders' perceived level of crowding increased, the more in favor they are for restrictive management actions (Figure 6).



**Figure 6.** The Potential for Conflict Index<sub>2</sub> for respondents' self-reported level of perceived crowding regarding trail permit and trail management

*Note:* Trail permit and trail management are rated on a scale from strongly disagree (-3) to strongly agree (3), with 0 being neutral.

## Discussion

The PCI<sub>2</sub> figures suggest that of the management scenarios, trail management has a lower potential for conflict than trail trail permitting, except for years of visitation (Figure 5) and crowding (Figure 6). Trail permitting had no statistically significant differences for years of visitation, however crowding did have statistically significant differences. Of the trail permit questions, a free permit had the highest consensus among visitors. It is likely that this is the permit option that most visitors were least objectionable to.

Fall visitors had a higher potential for conflict regarding trail management and trail permitting while summer visitors still had a high potential for conflict regarding trail permitting. Perhaps these visitors come during these times to avoid busier conditions (that are in the fall). Fall visitors may be more in favor of a permit system because they are looking for those social conditions. These riders could be seeking out a more social and less backcountry experience. For expert and novice users, it was discovered that both groups felt similarly about trail conditions, trail permitting, and trail management; however, there was an overall lower potential for conflict for expert horse riders than novice horse riders. Expert riders had a higher potential for conflict for trail permitting and novice riders had a higher potential for conflict for trail management. This may be due to expert horse riders having more place attachment to the location (Sharp, Sharp & Miller, 2015), therefore being more in favor of restricting recreation use in some capacity.

All horse riders with differing years of visitation felt similarly about trail permitting and trail management. However, there appeared to be less opportunity for conflict as the years of visitation increased. This disputes hypothesis 4. Perhaps the horse riders who have been visiting OZAR for a number of years have seen the ecological and experiential components of their recreation experience diminished over time. Although it is not certain that horse use has been increasing over the past 15 years at the park, use has been consistent at very high levels, thus potentially leading to degraded experiential and ecological conditions (Chilman & Vogel, 2001).

As horse riders' perceived level of crowding increased, the more in favor they were for restrictive management actions. However, there were no respondents who indicated that they truly felt crowded (mean = -2.26, with 3 being extremely crowded). In fact, 48% of the riders who responded to the questionnaire stated that encountering other horse riders on the trails was a

positive experience, while only 5% reported encountering other horse riders as having a negative impact on their experience (Algrim et al., 2017).

Management strategies that appear to target restricting and/or reducing use may be met with resistance by horse riders. The strong levels of disagreement for all management scenarios combined with the high levels of acceptability of trail conditions, lack of perceived crowding and the positive impact of the presence of other riders would suggest horse riders do not perceive any need for a change in current management objectives. New management strategies could include a strong interpretive component designed to target attitudes and behaviors. Additionally, management actions and interpretive messaging should be framed in such a way as to be sensitive to the components of the experience contributing to the current high levels of satisfaction. This could include interpretive messaging targeted at specific times of the year, as use is heavier during weekends and in the fall. Visitors that come to the park at lower use times may have differing attitudes, motivations and expectations which may help explain these use trends. Riders present during lower visitation periods may be intentionally selecting these periods and managers may want to consider this when developing their outreach materials and management plans.

Horse riders were not in favor of any permit system. In fact, over a third of horse riders strongly disagreed to the proposal of a free permit. Horse riders were also mostly against limiting group size, the number of groups, limiting river crossings and requiring low impact education. Horse riders were satisfied with the current ecological and social conditions and nearly half the horse riders indicated that they were satisfied with the number of people, even during the busiest times at the park. Outside of the pulses of high use related to the organized trail rides, use appears to be relatively low (Algrim et al., 2017), which may call for the management of horse

riders during peak use times. Additionally, ecological conditions have been shown to be degraded in certain areas of the park and in need of immediate management action (Park, 2011), thus regardless of visitors perceptions of conditions management action may need to be implemented to maintain the desired conditions of the park. Although there was little support for implementing any management action that may limit type of use or amount of use, there have been recent successful examples of implementing permits, or use limit driven systems in the National Park Service (e.g., Zion National Park Shuttle System, Yosemite National Park Half Dome Hike).

### **Limitations**

Research limitations should be considered when reviewing results of any study (Bryman, 2008). Limitation can be attributed to setting and context, measurement, sampling design, and a host of other factors (Vaske, 2008). The ability to generalize these results to the larger horse riding population within OZAR is statistically supported. Though the number of respondents to the questionnaire fits into acceptable ranges for generalizing to a larger park audience, OZAR visitors may be different from the general public. The uniqueness of the park and the complex issues may not be transferable to the general population.

This questionnaire only targeted visitors from August through October and thus cannot accurately assume that visitors to OZAR in other months would provide similar responses. The weather during the summer and early fall of 2016 was varied (thunderstorms and down trees as a result) and may have impacted the number and type of people who visited the park.

There also may have been self-reporting errors, which is a common limitation for social science questionnaires (Manning, 2011). Participants were encouraged to answer as truthfully as possible, but this may not have occurred. Some participants may have provided an answer based

on what they thought the administrator wanted (e.g. social desirability bias). Participants also might not have been willing to admit that they lacked knowledge in a particular area. Another possible contribution to reporting errors could have resulted from an administrator having an effect on how participants responded, regardless of the principal researcher's efforts to provide a script and to ask the administrators to adhere to it. However, all the questionnaire administrators were briefed, trained, and debriefed to ensure consistency.

### **Future Research and Conclusion**

A weakness and source of criticism in horse riding impact research is the lack of standardization in the methodologies employed and the variables studied, which can hinder comparisons between studies (Newsome et al., 2002, p. 150). Although this is the case, our study tried to simulate, as closely as possible, other studies (e.g., Chilman and Vogel, 2001). Future social research on horse riding in parks and protected areas should be informed by methodologies used for previous research. A limited amount of research and reporting has been undertaken regarding the perceived preferences of horse riders for particular management strategies and the associated responsibilities (Newsome et al., 2002, p. 158). Such research is essential if socially acceptable management practices are to be identified and implemented (Newsome et al., 2002). This study aimed to shed light on the preferences of horse riders at one National Park site, but in future research, there needs to be a more comprehensive methods of surveying horse riders across seasons and locations. Future studies could attempt to evaluate attitudes and motivations to determine linkages to perceptions and clarify broader use trends.

As the PCI<sub>2</sub> graphics revealed, overall trail permitting has a lower potential for conflict than trail management. This is valuable information to managers at parks that may have similar issues related to horse riding. Newsome et al. (2002) states that open access of protected areas

for recreational horse riding is inconsistent with conservation objectives and should not be allowed. Therefore, some sort of managerial actions restricting the number of horse riders at one time in parks and protected areas, especially during peak use times (e.g., weekends and trail rides) may be the best option. Although this may be the best option for land managers to protect the resource, it's likely that the horse riders will not be in favor of restrictive policies, which they are not accustomed to in similar locations. A possible solution to this would be to increase the amount of supply of trails available to horse riders, which may disperse use and reduce possible experiential and ecological impacts (Manning, 2011). Perhaps a tiered introduction to a permit system that begins with a free permit that doesn't restrict use would be a good way to get horse riders used to such a system. Later, managers could phase in more restrictive policies. To that end, if managers were to ask horse riders to register for trail use instead of using the term permit, it may be less objectionable. Permits seem to have the connotation of restricting use with this population.

Despite relatively high levels of horse rider use, results from this study indicate that the quality of the reported visitor experience at the park is high. Although riders felt that their experience was improved by other riders, these trail rides and high use time will likely have adverse impacts to the natural environment in which they occur. The results of this study reveal the complexity of managing horse use in a protected area. Even during periods of high use, horse riders did not report crowded conditions, nor did horse riders favor restricting use on the trails. Additionally, horse riders felt that the trail conditions were acceptable. As past research has shown, increased horse use often leads to degraded ecological conditions (though none was perceived) and possible conflicts with other users (but not intra-activity). Limiting use may be the one of the only viable ways to maintain the ecological integrity of the park, regardless of

horse riders lack of desire for restricted use or the presence of experiential impacts. Managers often have to make difficult decisions in the face of conflicting information, and this study displays this dilemma. Understanding the publics' perceptions is important but perhaps not always in alignment with managers' perceptions and the park's desired conditions.



## **Chapter 3 - Summary and Conclusions**

### **Reflections on Learning**

#### *Introduction*

The intent of this chapter is to review the thesis experience and share the trials, successes, and findings that occurred during the process, as well as offer advice to other students. The “reflections on learning” section accounts for the entire thesis progression and is an honest reflection of the process. This section provides insights gained through all of the successes and failures. The following paragraphs explore what I have learned about research, writing, and myself during the entire thesis process.

#### *Challenges*

The challenges began at the data collection stage, as the thesis project and preliminary round of data collection had already been completed in October 2015. The first round of data collection went surprisingly smooth, with plenty of graduate and undergraduate researchers willing to help out with the project. As summer set in, it seemed like the numbers of willing researchers dwindled. Despite this issue, I kept advertising my need for field researchers and luckily I found a solid group after the first few data collections.

After finding a group of researchers, everything in the field went smoothly, aside from a few unexpected storms (preventing us from getting to a research site for one day) and the respondents (horse riders) being very skeptical of the questionnaires intent. After the first round of questionnaire collection, most of the researchers figured out how to approach the actively-recreating horse riders. It’s one thing to administer questionnaires to hikers and a whole other set of circumstances for horse riders, especially when there is are historical issues between them and the National Park Service.

Some of the respondents were very friendly and willing to help, while others were very skeptical of the questionnaires intent. Many of the skeptical horse riders referenced closures of some equine trails at Shawnee National Forest in Illinois, thinking OZAR possibly had the same intentions. When I encountered horse riders with these ideas, I very clearly stated that this research is for a thesis and is to help horse riders at OZAR. As it is evident in my thesis research, OZAR doesn't have much of a problem with horse rider use (expietntially).

### *Successes*

The greatest success of the thesis process was the development of my leadership abilities. On several occasions, I was confronted with issues in the field. I quickly learned that it was not wise to let the issue slide, but to immediately seek advice and assistance. I found that I was able to resolve these issues within our group of researchers that I initially perceived as trivial or unresolvable. Seeking assistance typically began with a phone call or meeting with my advisor to discuss the issue. This was productive because it helped me fully understand the many facets of the issues. From there I would discuss the problem with committee members, other professors, and students.

Another great success was learning how to appropriately administer questionnaires. I had come into the thesis process having never administered a survey, but I learned very quickly that the best way to get responses is to be kind, friendly and approachable. By the end of the field research, I was very worn out from walking all around the research sites and talking to all of the horse riders, but taking time for every conversation was worth it.

During this process, there were many low points that tested my grit. Luckily, I have an incredible advisor and committee. They helped me stay on track and to keep my head up, even when the going got tough. My passion for the outdoors and helping parks and protected areas

better manage visitor use helped me explore many curiosities, and ultimately persevere through the process.

The last success that I will mention was learning to be kind to everyone in all situations, regardless of how I was feeling. When I was at the 2016 Northeastern Recreation Research Symposium conference in Annapolis, Maryland, I was having a conversation with a scientist at the coffee table during a break between presentations. As it turns out, the man I was speaking to was Jerry Vaske, a pioneer in visitor use management, human dimensions of wildlife, recreation conflict, and the creator of the Potential for Conflict Index<sub>2</sub>. After having a conversation with him, he offered to be on my committee, and I couldn't believe that he wanted to be on my committee. He has been a huge help with the Potential for Conflict Index<sub>2</sub>, as well as generating ideas for the study.

### *Discoveries*

The overall learning from this study include its major findings. It is very encouraging that the managers at OZAR will use these findings to help inform their management of (horse rider) visitor use. I am thrilled that the findings and the implications from this study are potentially transferable to other settings and populations, with visitation on the rise in many parks and protected areas.

The small discoveries encountered during this process were just as important. For example, I discovered that I needed to develop an outline for all writing projects. It helps me get an overall idea for what direction I want the paper to go. This discovery became evident when I was writing the proceedings for the 2016 Northeastern Recreation Research Symposium. I now practice drafting outlines before all writing endeavors.

I also discovered what it meant to maintain integrity as a scientist. I learned that there were many opportunities while doing research to solve problems using approaches that lack integrity. For example, on the first day of data collection, I realized I forgot to tell the researchers to record the time the questionnaire was administered, I could have easily made up times they were administered. But this was not the type of scientist I wanted to be, and doing this would have violated my ethical standards. All aspects of this research were executed with the highest level of integrity and reflected the professionalism of my advisor, my committee members, Kansas State University, and myself.

### *Advice*

One of the first things I learned during this thesis process is that time management is critical in conducting successful research. It's inevitable that problems will arise during the research process. You have to allow yourself enough time to properly address these issues and to learn from them, so that the lessons can be utilized. During the writing process, time management is exceptionally critical. To effectively write a professional document, there are going to be numerous revisions. Hastily completing the writing process can result in mistakes that may reflect poorly on the researcher.

It is also very important to maintain patience throughout the thesis process. Patience aids in learning, and also helps keep a sound mind. As well as patience, remaining humble through the thesis process is important. Humility also aids in learning and helps one swallow their pride and seek assistance when needed. Through humility, one can identify their weaknesses and tend to them. Mistakes are going to happen as a part of the process, and solving them in a professional manner, and maintaining integrity, is the best way to develop as a scientist.

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## Appendix A - IRB Statement



University Research Compliance Office

TO: Ryan Sharp  
HFRR  
2021 Throckmorton

Proposal Number: 8216

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 03/18/2016

RE: Proposal Entitled, "Monitoring Visitor Use Impact at Ozark National Scenic Riverways"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

## Appendix B - Visitor comments on questionnaire

Comments
We were here solely for a float trip and so didn't experience trails...some answers based on experience at other national parks
Do not erect signs on the highway and have the road locked by landowner like Cedargrove access of k –
The great spirit believes that nature is a master of adaptation, accommodation and self-management, deserving human respect and very limited interference in enjoying it.
I would like to see more people be responsible for their trash!!
1) More shaded hitching rails at campgrounds, etc. 2) More seating at campgrounds, etc.
We want the hamburger ride back in October.
Would like to see more horse trails and river crossings.
I messed up a little.
If these activities are limited etc., I and our groups will go to another state to vacation.
Would NEVER return if any horse activities change.
Wonderful experience for riding horses on trails and cross rivers!
I don't see why charge a permit if the conservation is federally funded.
Horse restrictions will cause tourists/visitors to go elsewhere.
The trail ride is a great experience but its only because of the whole package of riding, hiking, swimming, golfing, canoeing, and tubing...
Keep our horseback riding rights
Jim (last name not legible) 573-259-6813
Love the parks
The trails have been here for years and shouldn't be charged for use.
Please keep the trails open. As a horseback rider, I appreciate having the trails to enjoy <a href="mailto:bucknermj@mst.edu">bucknermj@mst.edu</a> – if have questions and I can help.
We ride year around and also pick up trash during winter season.
Love it here! ☺
Love the Ozark park
I appreciate the park allowing horseback riding. I hope they never change that, it is important to the area and to visitors.
Trash on trails, need to have group pick up for community service.
I love this place!!
We love riding these trails! Thanks for the bathrooms, hitching rails and great trails.
First time here and we are loving it!
Need more trails.
We would never do anything that would cause us not to be able to continue to do this.
One of the best rips we make every year. Would do more often if it was closer to home.
Not crowded at all.
Leave as is.
Never crowded.

We enjoy the beauty = better maps – or trail marking would be better – however we love riding here – we wait all year for this vacation. Toilet paper and trash cans
Trails much better than 20 years ago.
Born and raised in area // Should fine those who abuse rules/trails
Tickets for ATV's and trash being left on trails.
Great ride
We love it here!
Need bathroom
Love this part of the country!
Enjoying it
It would be nice to have water hook up at campground.
Water hook up at COUNTY ROAD campground
Love it
Love it here in Eminence.
Best experience ever. Glad to be able to ride these trails.
Nice trails. Enjoy the horseback riding here.
People pick up trash
Trash!
Need better maps for the trails. Charge for maps if you want to make some money.
Awesome!
Love the NPS! NPS visitors/trail riders get blamed for trash – reality is it's from the locals.

## Appendix C - Visitor questionnaire

OMB Number: 1024-0224  
Expiration Date: 12/31/2016

# Ozark National Scenic Riverways Visitor Questionnaire 2016



**Past Visitation History**

1. Have you ever visited Ozark National Scenic Riverways (OZAR) before today?  
 YES                       NO  
     1a. If yes how many times in the past 12 months? \_\_\_\_\_  
     1b. How many years have you been visiting OZAR? \_\_\_\_\_ Years  
     *(please write in number of years; if this was your first visit please enter 1)*
2. Other than OZAR, have you visited any other National Park sites in the past 12 months?  
 YES                       NO                       NOT SURE
3. Did you know that OZAR is a part of the National Park Service system of parks and protected areas?  
 YES                       NO
4. Did you know that OZAR was the first federally protected river system in the United States?  
 YES                       NO

**Recreational Activities**

1. Below is a list of activities available at OZAR. Please indicate which of these activities was your **main reason** for visiting:  
 Horse Riding                       Hiking                       Camping                       Nature/Wildlife Observation  
 Visit Historic Sites                       Other \_\_\_\_\_
  2. Below is a list of activities available at OZAR. Please indicate **ALL** the activities you participated in during your visit:  
 Horse Riding                       Hiking                       Camping                       Nature/Wildlife Observation  
 Visit Historic Sites                       Other \_\_\_\_\_
  3. For the main reason for your visit to OZAR, please indicate your experience level:  
 Expert                       Intermediate                       Beginner
  4. On this visit, did you (or your group) use a paid guide?  
 YES                       NO
  5. Did the actions of any other group or individual limit your enjoyment on the park's trails today?  
 YES                       NO
  - 5a. If YES, which action(s) affected your enjoyment the most? *(please select all that apply)*  
 Large groups                       Lack of trail etiquette                       Littering                       Noisy behavior                       Other \_\_\_\_\_
  - 5b. Which activity(ies) was the other group or individual participating in? *(please select all that apply)*  
 Hiking                       Camping                       Horse Riding                       River use (canoes/kayaks/tubers)                       Other \_\_\_\_\_
  6. Please rate how appropriate you feel the following types of trail activities are at OZAR.
- |                 | Extremely<br>Inappropriate | Moderately<br>Inappropriate | Slightly<br>Inappropriate | Neither<br>Inappropriate<br>nor<br>Appropriate | Slightly<br>Appropriate | Moderately<br>Appropriate | Extremely<br>Appropriate |
|-----------------|----------------------------|-----------------------------|---------------------------|--|-------------------------|---------------------------|--------------------------|
| Horse Riding    | -3                         | -2                          | -1                        | 0  | 1                       | 2                         | 3                        |
| Hiking          | -3                         | -2                          | -1                        | 0  | 1                       | 2                         | 3                        |
| Mountain Biking | -3                         | -2                          | -1                        | 0  | 1                       | 2                         | 3                        |



7. Please indicate how acceptable you found the following conditions at OZAR:

	Extremely Unacceptable	Moderately Unacceptable	Slightly Unacceptable	Neither Unacceptable nor Acceptable	Slightly Acceptable	Moderately Acceptable	Extremely Acceptable
Trail condition	-3	-2	-1	0	1	2	3
Marking of trails (e.g. signs)	-3	-2	-1	0	1	2	3
Number of trails	-3	-2	-1	0	1	2	3
Water quality of rivers and streams	-3	-2	-1	0	1	2	3

8. Please rate how important each of the following reasons for visiting OZAR are to you:

	Not At All Important	Moderately Important	Slightly Important	Neutral	Slightly Important	Moderately Important	Extremely Important
Appreciate scenic beauty	-3	-2	-1	0	1	2	3
Experience solitude	-3	-2	-1	0	1	2	3
Spend time with family/friends	-3	-2	-1	0	1	2	3
Experience sounds of nature	-3	-2	-1	0	1	2	3
Experience a connection with nature	-3	-2	-1	0	1	2	3
Experience a sense of challenge	-3	-2	-1	0	1	2	3
Appreciate archaeological and cultural sites	-3	-2	-1	0	1	2	3

***Perceptions of Management Scenarios***

1. Please indicate your level of agreement with the following management scenarios at Ozark NSR:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
To better manage trail conditions, require trail users to obtain a free permit	-3	-2	-1	0	1	2	3
To better manage trail conditions, require trail users to be charge a fee for a permit	-3	-2	-1	0	1	2	3
To better manage trail conditions, implement an annual permit system for trail use	-3	-2	-1	0	1	2	3
To better manage trail conditions, implement a daily permit system for trail use	-3	-2	-1	0	1	2	3
Limit maximum group size on the trails	-3	-2	-1	0	1	2	3
Limit maximum number of groups on the trails	-3	-2	-1	0	1	2	3

Designate trails based on type of activity	-3	-2	-1	0	1	2	3
Limit trail related river crossings	-3	-2	-1	0	1	2	3
Require education on low impact trail practices	-3	-2	-1	0	1	2	3

**Perceptions of Crowding**

1. Using the scale below, please rate the level of crowding you experienced at Ozark NSR today.

Please circle the number that best matches your response:

Not Crowded	Barely Crowded	Slightly Crowded	Moderately Crowded	Crowded	Very Crowded	Extremely Crowded
-3	-2	-1	0	1	2	3

2. At which times of day did you feel crowded? Please select all that apply.

- MORNING (8am-Noon)    Afternoon (Noon-5pm)    Evenings (5pm to 9pm)    I can't remember

3. How did the number of trail users you encountered affect your overall experience today? (*Select one response*)

	Extremely Negative Impact	Moderately Negative Impact	Slightly Negative Impact	No Impact	Slightly Positive Impact	Moderately Positive Impact	Extremely Positive Impact
Horse Riding	-3	-2	-1	0	1	2	3
Hiking	-3	-2	-1	0	1	2	3

4. During your experience on the trail today, how acceptable is it for you to see the following number of other people participating in the same activity during your time at Ozark NSR?

# of other people	Extremely Unacceptable	Unacceptable	Not Sure	Acceptable	Extremely Acceptable
Zero	1	2	3	4	5
1-5	1	2	3	4	5
6-10	1	2	3	4	5
11+	1	2	3	4	5

**Demographics**

1. In what year were you born? \_\_\_\_\_

2. Please check the highest amount of education you have completed:

- elementary school       high school       some college or professional schooling  
 Bachelor's degree       some graduate work    graduate degree

3. What is your gender?

- Male       Female

4. Please select the choice below that best describes your travelling party. (Please select only one)

- Individual       Family only       Friends only       Family plus friends  
 Tour or other group

4a. How many people are in your group? \_\_\_\_\_

5. Which of these categories best indicates your race? Answer only for yourself. Please select one or more.

- American Indian or Alaska Native       Asian       Black or African American

Native Hawaiian or other Pacific Islander    White    Do not wish to answer

6. What is the ZIP Code of your primary residence? \_\_\_\_\_

7. Which category best represents your annual household income? Please select only one.

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Less than \$25,000     | <input type="checkbox"/> \$75,000 to \$99,999 | <input type="checkbox"/> \$25,000 to \$34,999   |
| <input type="checkbox"/> \$100,000 to \$149,999 | <input type="checkbox"/> \$35,000 to \$49,999 | <input type="checkbox"/> \$150,000 to \$199,999 |
| <input type="checkbox"/> \$50,000 to \$74,999   | <input type="checkbox"/> \$200,000 or more    | <input type="checkbox"/> Do not wish to respond |

**COMMENTS?**

**Thank you for your help with this questionnaire! Please return it to the person who gave it to you.**

PAPERWORK REDUCTION ACT statement: The National Park Service is authorized by 54 USC 100101 to collect this information. This information will be used by park managers to better serve the public. Response to this request is voluntary and anonymous. Your name will never be associated with your answers, and all contact information will be destroyed when the data collection is concluded. No action may be taken against you for refusing to supply the information requested. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

BURDEN ESTIMATE STATEMENT: Public reporting burden for this form is estimated to average 10 minutes per response. Direct comments regarding the burden estimate or any other aspect of this form to: Russell Runge, Deputy Superintendent, Ozark National Scenic Riverways, Van Buren, MO