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NORMATIVE EVALUATIONS OF RESOURCE CONDITIONS: THE INFLUENCE
OF VISITOR CHARACTERISTICS AND IMPLICATIONS FOR RECREATION
MANAGEMENT IN URBAN-PROXIMATE PARKS

by

Jordan E. Nesbitt

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

of

MASTER OF SCIENCE

in

Recreation Resource Management

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2022

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ABSTRACT

Normative Evaluation of Resource Conditions: The influence of Visitor Characteristics and Implications for Recreation Management in Urban-Proximate Parks

by

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Utah State University, 2022

Major Professor: Dr. Christopher A. Monz
Department: Environment and Society

Urban-proximate parks and protected areas provide a unique recreation landscape to individuals living in and near urban centers. They have been shown to provide similar recreation experiences to traditionally studied parks and protected areas such as National Parks, National Forests and Wilderness areas. This study takes place in a set of four urban-proximate parks in Orange County, California, USA. These parks are designated as urban-proximate because they are located within 100 miles of an urban center with 1 million or more people. Using norm theory, a well vetted social science theory, this work sought to identify thresholds of acceptability for five social and ecological resource conditions; people at one time, bikes at one time (both a measure of crowding index), informal trail proliferation, recreation preferences for trail width and trail width as recreation impact. Using the recreation preference literature, we identified four visitor characteristics that may be influencing normative evaluations; gender, race, recreation

activity type and local ecological knowledge. These four categories were then tested against the five resource conditions to determine their influence on resource condition evaluations.

Chapter 1 will provide an overview of the existing literature pertaining to urban-proximate parks, diverse recreation visitation and the application of normative theory in the field of recreation research management. Chapter 2 is the first manuscript within this thesis which establishes evaluations and thresholds for the five aforementioned resource conditions and is formatted for submission to *Landscape and Urban Planning*. Chapter 3 is the second manuscript which identifies potential influential factors for these normative evaluations in order to provide managers with more detail on the evaluations of specific visitors. This chapter is formatted for submission to the *Journal of Park and Recreation Administration*. Lastly, Chapter 4 will conclude with my thoughts on this research and the contributions it makes to the literature.

(158 pages)

PUBLIC ABSTRACT

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Jordan E. Nesbitt

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CHAPTER 1 – INTRODUCTION

In 2021 roughly 160 million Americans participated in an outdoor recreation activity at least once, which was an increase of about 7 million from the year before, resulting in the largest one-year growth in outdoor recreation participation on record (Outdoor Industry Association, 2021). This growth further establishes the importance of visitor use management research. Several frameworks have been established in this field to manage resource impacts; Limits of Acceptable Change (LAC) and Visitor Experience and Resource Protection (VERP) are two more historical frameworks and the Interagency Visitor Use Management Framework (IVUMF) presents more contemporary ideas and processes. These planning processes have been applied to various lands that are protected or designated for recreational opportunities, herein referred to as parks and protected areas (PPAs). Planning frameworks take into consideration the current state of resources and visitor preferences to guide managers in understanding acceptable conditions within PPAs (Krymkowski et al., 2009). Measuring visitor's evaluations of resource conditions through the application of normative theory is a single step in understanding the current state of resources.

This study seeks to understand visitors' evaluations of resource conditions in urban-proximate parks using normative methods. Urban-proximate parks differ from more rural PPAs, such as national parks and forests, in that they receive a high level of year-round use (as opposed to more seasonal use patterns of rural PPAs) and have added

pressure from the high-density population that surrounds them (Budruck & Manning, 2003). Current projections predict that by 2050 approximately 89% percent of the North American population will live in urban areas (United Nations, 2012). Researchers believe that this will have an impact on human health (Brown et al., 2014) and suggest that urban-proximate parks may be more accessible to and representative of the growing urban population and their expectations and behaviors while recreating on public lands.

Most normative research has been completed in backcountry settings, with few studies having focused specifically on urban-proximate PPA's. Past research agendas have focused on the preferences of visitors in urban green spaces and backcountry settings, but urban-proximate parks are a unique blend of both, where visitor preferences, behaviors and norms may be different. Previous research (Arnberger & Eder, 2011; Ho et al., 2005; Rosa et al., 2020; Anderek & Knopf, 2007) has allowed visitors to state what they want out of a recreation experience, but there is little evaluative information about what visitors to urban-proximate park spaces are actually experiencing. It is rather unknown what, if anything influences evaluations of social and ecological conditions in urban-proximate wildlands.

Winter and Chavez (1999) emphasize that recreation areas that are more difficult to access show decreased levels of visitation from individuals of underrepresented race/ethnicities and that urban-proximate areas may account for more visitation from diverse visitor groups. Recreation activities and immersion in natural spaces has been proven to be beneficial for human health (Godbey, 2009). Additionally, natural spaces

have a positive effect on the sense of community in a location (Gomez et al., 2015) as well as increase the property value surrounding PPA's. With a growing urban population, the importance of urban-proximate PPA's to surrounding communities, which often reflect a more diverse population than typical visitors to more rural PPAs, this suggests a need to focus research specifically on these areas and not broadly apply traditional management actions from National Parks or other backcountry PPA's.

Literature Review

2.1 Urban-Proximate Wildlands

Urban-Proximate wildlands provide invaluable access to green and wild spaces for populations near urban centers. Hammit et al. (2015) defined wildland recreation as outdoor activities that place an emphasis on the natural resources of the area in settings that are largely natural and are managed for natural appearance. An urban-proximate wildland, sometimes located in the wildland-urban interface can best be described as “as an area where increased human influence and land use conversion are changing to natural resource goods, services, and management” (Macie & Hermansen, 2002 pg.1).

Urban-proximate wildlands provide access to PPA's and the positive health benefits associated with them to people living near urban centers (Brown et al., 2014). Gomez and Hill (2016) define an urban-proximate parkland as a wild area typically found outside of a large urban center. This summarizes Ewert's (1998) definition of urban-proximate parks- a PPA within 100 miles of an urban population of one million or more.

It is projected that by 2050 89% of the North American population will live in urban areas (United Nations, 2012) further positioning individuals away from major rural parks and wildlands. As urban areas and populations become more densely populated, urban proximate parks will provide an open-space to establish environmental values that may be increasingly important as these cultural conditions change (Brown, 2008). A benefit of these parks being located so close to urban centers is that they provide a place for community outreach and engagement (D'Antonio et al., 2016) allowing these parks to be a common meeting ground for individuals and community leaders.

Work has been completed in identifying who visits urban-proximate parks, but less research has been conducted that more directly informs management practices in these parks by providing evaluative data on the acceptability of resource conditions. Winter and Chavez (1999) suggest that managing these parks may be more complex as they are serving populations with greater demographic diversity. Visitors who utilize these parks have a different perceived sense of place, recreation patterns and site preferences (Winter & Chavez, 1999). Studies have found that LatinX and Black/African-Americans have the highest preference for recreation facilities such as bathrooms, picnic areas and sport courts. These two visitor groups also have a strong preference for traditional park landscapes including; open forests, mowed grass, shade trees and paved paths (Ho et al., 2005). Ho et al., also notes that individuals who are part of these sub-culture groups rarely recreate alone and tend to recreate as more of a social activity.

There is also some concern from managers that common problems in urban areas such as; litter, graffiti and noise pollution may spill over into these parks. Andereck and Konpf (2007) found that litter, trash dumping and vandalism were the top environmental concerns of survey respondents at an Arizona urban-proximate wildland. An Austrian study at an urban green space using normative evaluations of park conditions found that trails with shrubbery alongside them were less acceptable to visitors (Arnberger & Eder 2011). Past literature suggests that objects alongside the trail that obstruct the field of vision lead to an increased fear of crime or potential for accidents. Although the high levels of diversity may present some challenges, increased diversity can also provide opportunities for cross-cultural engagement and understanding (Winter & Chavez, 1999). Urban-proximate PPA's may have added pressure from year-round use and the high population density that surrounds them (D'Antonio et al., 2016). These visitation characteristics suggest that managers may need to adapt traditional management practices to meet the unique demands of urban-proximate areas.

2.2 Normative Theory and Visual Simulation Research

Norms suggest what is acceptable within a culture, they guide behaviors and rules and have formal or informal sanctions when broken (Manning, 2013). Jackson's Return Potential Model (RPM) uses the structural characteristics of norms to test the "normativeness" of behaviors (Jackson, 1965; Nolan, 2014). Personal norms/subjective

norms measure thresholds of acceptability for an individual, while group norms represent shared thresholds and commonly referred to as social norms (Jackson, 1965; Manning, 2013). This model establishes a range of tolerable behaviors and identifies the amount of agreement around a condition, which represents the relative power of a norm amongst a group of individuals (Nolan, 2014). Vaske's (2010) Potential for Conflict Index (PCI₂) is utilized in the contemporary norm literature to assess the level of agreement around each condition. The RPM also measures norm intensity- how important visitors within the sample believe the norm is, measured by the difference in mean acceptability from the first condition to the last. The greater the difference or steepness of the slope, the more intense the norm is (Nolan, 2014; Jackson, 1965). When individuals are undecided about a norm, the curve trends flatter (Jackson, 1965) indicating that these behaviors or conditions may not have high consequences or an overall norm for that condition may not exist. Norm strength/intensity is one way to test the prevalence or the consequences of a norm and how they apply to a specific setting. Strength also summarizes the consensus around and the importance of a norm (Keuntzel et al., 2008). The strength of a norm may also be dependent on the consequences experienced when one violates a norm.

The RPM can be applied to settings where the goal is to test the acceptability of a condition or behavior. It has been applied to a variety of disciplines across the social sciences; education (Henry et al., 2004), environmental psychology (Nolan, 2014) and organizational behavior (Linnan et al., 2005). In recreation resource management norms have been used to measure the acceptability of a variety of both social and ecological

conditions with applications to crowding being the most common in the literature (Manning, 1985; Manning et al., 1996; Budruk & Manning, 2004; Vaske & Shelby, 2008; Needham, 2014).

Survey research is conducted using methodology that has been thoroughly vetted in the social sciences. A random intercept model allows for a sample that can statistically represent the population as a whole without administering a survey to every individual in the study area. Using this method, you define a set number of surveys to be completed each hour to reach the desired sample size. Selection of groups and members of those groups is assumed to be random so there is an equal probability that any visitor could be selected (Hicks et al., 2000). Visitors are administered a survey that requires them to evaluate resource conditions using visual or auditory simulation. The use of visual simulation methods provides survey respondents with a standardized image so that each respondent is perceiving the same condition- this also allows for each image to have a controlled treatment, only changing one condition (i.e. people at one time or trail width) (Manning & Freimund, 2004). Visual simulations present altered images or videos that are meant to replicate a range of possible conditions that a visitor may experience within a recreation setting. With this method, respondents are given a set of photos that simulate a recreation experience and are asked to rate the acceptability of resource conditions on a Likert scale of 'Very Acceptable' (4) to 'Very Unacceptable' (-4). A mean acceptability value is calculated for each condition and then plotted onto a graph. The x-axis represents different resource conditions and the y-axis represents the participant's evaluation of that

resource condition on the 4 to -4 Likert scale (Keuntzel et al., 2008). A *neutral line* is plotted at 0 on the y-axis to dictate when the condition drops below the *range of acceptable conditions*. The intersection of the curve and the *neutral line* represents the *minimum acceptable condition* or the *threshold*. The *crystallization* of a specific point on the curve is “degree of consensus” around a condition.

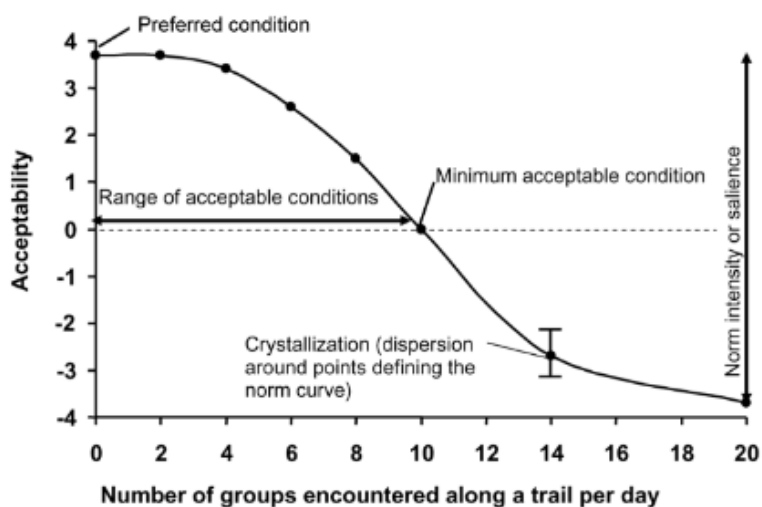


Figure 1. Hypothetical norm curve representing number of groups encountered on a trail per day (Manning, 2011)

Early studies in the field focused on social indicators, and they asked visitors their preference for contact with other groups or number of encounters (Shelby & Herberline 1986; Manning et al., 1996). These studies focused on acceptability and preferences but did not include visual simulation methods and failed to address the structural aspect of norms (Whittaker & Shelby, 1988). The use of a visual simulation research method allows researchers to create constant and standardized images that assure the persons

being sampled are experiencing the same conditions; this controls for outside factors and any bias that may occur from visitors being at the study locations at different times and experiencing different conditions or behaviors during their visit (Kim et al., 2003; Manning & Freimund, 2004). Technological advancements in photo editing interfaces have simplified the creation of images that accurately portray conditions that are almost indistinguishable from reality (Manning & Freimund, 2004). While using curated images instead of the current observed conditions does control for outside factors of an experience, it is hard to portray smells, sounds and specific visitor behaviors through still photographs (Kim et al., 2003). Most recently, visual simulation has been used in human-wildlife management to understand the acceptability of encounters with wildlife and the distance in which visitors interact with wildlife and the size of the group (Freeman et al., 2020). With advancements in audio technology, the application of structural norms has been used to assess thresholds of anthropogenic sound in PPA's (Marin et al., 2011; Miller et al., 2020). Aside from the work of Budruk and Manning in Boston Harbor Island (2004) regarding graffiti and littering and Zajchowski et al. (2019) regarding air pollution in the Wasatch National Forest in Salt Lake City, UT - both the historical and contemporary existing literature have largely taken place in national parks or other backcountry sites rather than urban-proximate PPA's.

For ecological indicators, visitors may be more concerned with the aesthetic of a trail or PPA rather than the complex biophysical features that managers and experts tend to be more concerned with. Therefore, ecological conditions have been largely

understudied in relation to crowding, number of encounters, and campsite conditions (Kim et al., 2003). How visitors perceive recreation impacts on trails and how those affect the experience of their visit is important information that managers should know (Verlic et al., 2015). Normative theory has been used to measure visitor preferences of campsite conditions (Shelby & Harris, 1985; Shelby et al., 1988) trail conditions (Kim et al., 2003; Verlic et al., 2015; D'Antonio et al., 2012) and air pollution (Zajchowski et al., 2019), but little of this work has been applied to urban-proximate wildlands. However, one study published by Verlic et al., (2015) looks at recreation trail impacts in an urban forest and how they may vary by age or education level. This study concluded that education has a significant effect on the perception of trail impacts. Due to the importance of understanding visitor behavior and the implications it has on recreation impacts there is a need to further understand visitor's acceptability of these impacts.

There are a few well stated arguments against the use of normative studies in PPA research. The concept of *existing conditions* examines how first-time visitors have little knowledge about the place they are visiting, therefore they accept the current observed conditions as the norm (Kuentzel et al., 2008). *Product shift*, a concept prevalent in the existing literature, argues that when visitors are presented with conditions that are outside of the norm, they may shift their standards so they more closely align with the conditions they are currently experiencing (Keuntzel et al., 2008). Similar to *product shift*, but happening over a greater amount of time is the process of *shifting baseline syndrome*;

over time visitors may change their expectations to meet changing conditions in PPA's suggesting that normative evaluations may not remain stable.

Finally, it must be noted that the use of normative and visual simulation research cannot be the only criteria that informs management decisions. By establishing social norms, researchers can understand the agreement around conditions and impacts, which can provide evaluative information to inform management actions (Whittaker & Shelby, 1988). Norms with high agreement among survey participants are useful, therefore managers should further consider crystallization and the curve itself before deciding on any management actions solely on the threshold (Whittaker & Shelby, 1988). Although normative data provides empirical information on thresholds, visitor evaluations should be supplemented with additional information (Manning et al., 2005). Managers should also take into consideration; legal mandates, socio-ecological values of the PPA, recreation opportunities available, vulnerability of the PPA, and outside stakeholder opinions (Budruk & Manning, 2004; Stewart & Cole, 2003). Stewart and Cole (2003) establish that management actions should not be created solely from opinions of visitors and that a "broad range" of managers and stakeholders also need to be included in the creation of management objectives and actions. They also provide a complex opinion that visitor survey research tends to "privilege the interests of particular elites and management agencies" (pg.124).

2.3 Visitor Characteristics and Normative Influence

The United States is seeing a change in the demographic make-up of communities, especially those around urban centers. Such demographic changes include increased race/ethnicity diversity and an increase in median age (Dwyer & Klenoksy, 2004). A 2020 U.S. Census Bureau report shows that non-Hispanic, Caucasian individuals are no longer projected to be the majority race by 2045 (Vespa et al., 2020). It is likely that these shifts will present new values and behaviors towards public lands that differ from those of the traditional visitor (Chavez & Olson, 2008). This suggests that managers may start to see less of a homogenous visitor base in their parks (Payne et al., 2002). Of the demographic changes, those regarding race and ethnicity have been identified as critical pieces that will impact recreation facilities and the ways they are managed (Sasidharan, 2002). Winter et al. (2019) found that while a majority of respondents (83.5%) had visited a National Forest before, the ones who had not were more likely to be Latinx, Black/African American males or females. Authors suggest that further research is needed in order to understand the inequities that lead to disproportionate usage of PPA's by underrepresented groups in order to provide managers with information to remedy equity issues. Managers of urban park and forest facilities can meet the needs of underrepresented racial and ethnic groups by incorporating their values, perceptions and needs into the planning and decision-making process (Sasidharan, 2002).

Urban-proximate parks are characterized by high year-round use and are known to have greater racial/ethnic and cultural diversity than their backcountry counterparts

(Budruk & Manning, 2004). In a study of urban parks in Philadelphia and Atlanta, Ho et al. (2005) found that underrepresented groups including LatinX and Black/African-Americans prefer more developed recreation sites with increased access to facilities. Results from this study also show that diverse populations rate encountering groups of their own culture/ethnicity and representation as important aspects of their recreation experience. Visitors of underrepresented groups prefer signage and interpretive information in their first language to help them better connect with landscapes and understand safety concerns within PPA's (D'Antonio et al., 2016; Ho et al., 2005). Access to water faucets was also of great importance to diverse visitors to urban-proximate forests as were trash canisters, which suggests a discrepancy with a traditional Leave No Trace principle of 'pack it in pack it out' which some park locations have incorporated by not placing trash canisters at trailheads and viewpoints.

Much of the literature regarding diverse populations and recreation has covered the varying preferences of different race/ethnicity groups. Black/African-American visitors preferred to recreate in places that are open, close to urban centers, that are not secluded, and that provide amenities/facilities that are clean and well-maintained (Burns et al., 2008). This study also found that Asian-Americans prefer to recreate in areas where they "feel safe" and often choose trails that are shorter and allow them to stay close to other visitors, which may explain some of the spatial barriers to recreation for this group (Burns et al., 2008). In a study conducted in Xi'an, China during peak tourism season, individuals of Asian countries of origin had a lower tolerance for crowding than

westerners (North American or European) (Jin et al., 2016). While this study was not conducted in the U.S. it may be representative of individuals from those countries and concluded that nationality was an important indicator of perceived crowding.

The prominent frustration and barrier for Latinx individuals are PPA's that do not provide enough space on trails or picnic areas for large families (Roberts et al., 2009). This suggests that Latinx individuals may have lower thresholds for crowding as they see more visitors at an area as a barrier for park visits with a large family. Additionally, important for Latinx visitors is an open space for children to play and facilities that accommodate children; clean bathrooms, playgrounds and various sport courts (Burns et al., 2008). A main concern of Black/African-Americans in this study is the stereotypical bias they feel and how that becomes a barrier to outdoor recreation participation. This bias may include notions that Black/African-American individuals aren't outdoorsy or do not traditionally participate in outdoor recreation activities and prefer more sports-based recreation activities. Overall, the experiences and benefits sought out by individuals in diverse racial/ethnic groups pertain to spiritual renewal and escape from everyday life and the ability to experience the parks with friends or family members. Ho et al. (2005) noted due to the importance of family in LatinX and Asian cultures, these visitors rarely recreate alone- they often visit parks in large groups as a way to share the restorative aspects of parks with family.

Non-traditional forest visitors, classified as any visitor that is not Caucasian or born outside of the U.S or Canada tend to face more constraints when it comes to

outdoor recreation than traditional visitors, and lack of information about parks and protected areas is the primary barrier (Metcalf et al., 2013). To meet the anticipated growth in demand for recreation in urban-proximate areas managers will need to understand the values, constraints and preferences of this changing visitation trend. While the preferences of various demographic groups and activity types are well documented in the literature, there is a deficit in the translation of preferences to normative evaluations across the landscape, if this relationship is occurring.

The study of patterns within and between various race/ethnicity groups is crucial to managers, as intra-ethnicity variations may influence site and activity preference especially in PPA's that have high levels of visitation from diverse groups (Sasidharan, 2002). However, it is important to note that these preferences, values and behaviors should not be generalized to all members of a particular race/ethnicity group. PPAs are often reflections of broader societal happenings and are not sheltered from changes happening worldwide. The growth and change that is projected in urban and urban-proximate PPA's will allow for cross-cultural communications and the sharing of cultural values and norms.

Thesis Purpose

Since 2017, the Monz Recreation Ecology Lab has worked with the Natural Communities Coalition (NCC) in Orange County, California. The NCC is a non-profit organization that unites stakeholders, managers and researchers to implement land

management planning across a 38,000-acre reserve system (NCC, 2019). The reserve is a protected open space that aims to protect the wildlife and plants that define the uniqueness and diversity of the landscape (NCC, 2019). The reserve and the parks that lie within are proximate to the City of Irvine. Irvine has a population of 212,357 and is a major metropolitan area in Orange County which has a population of nearly 3.2 million (United States Census Bureau, 2021). The Orange County Nature Reserve spans across multiple jurisdictional boundaries and management agencies. As part of a larger multi-year project to analyze park usage and implement recreation and ecological management, a primary goal of this coordination is to identify social and ecological thresholds of acceptable and sustainable conditions across the reserve's park system. Understanding the thresholds of resource conditions provides managers with empirical information that they can use to inform planning processes and ultimately management actions.

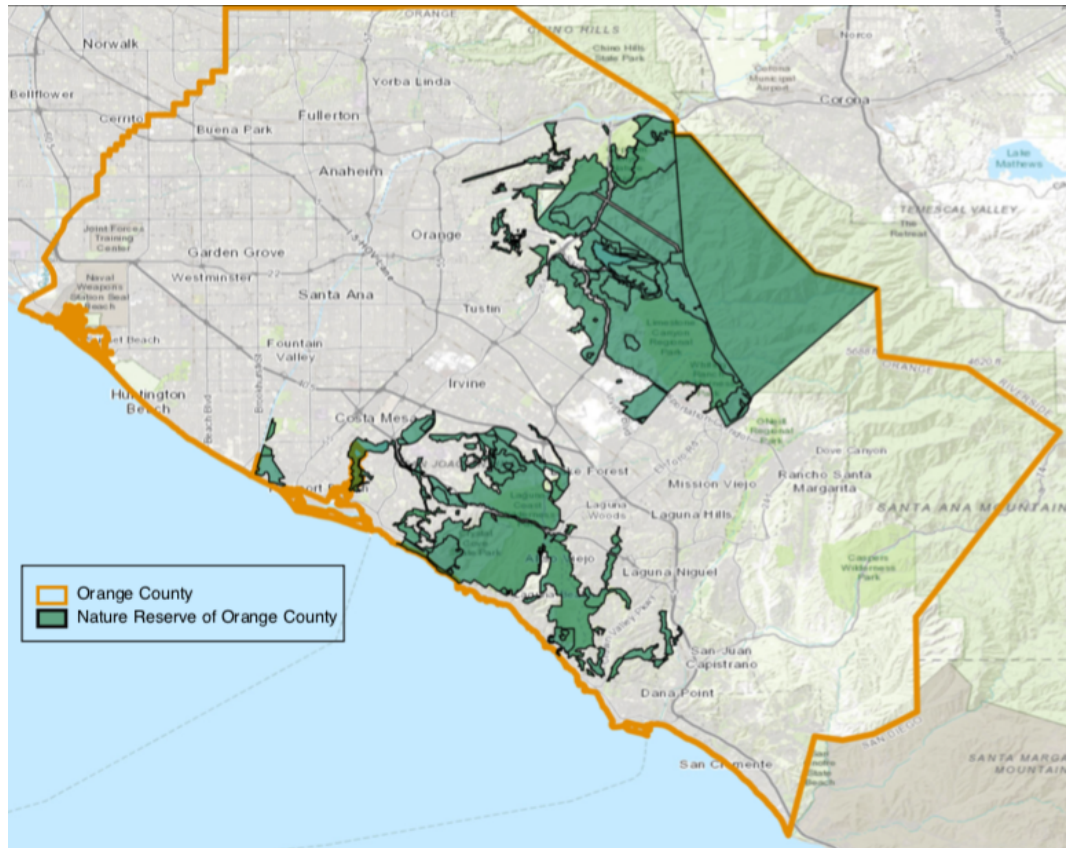


Figure 2. Map showing the outline of Orange County, California, USA and the lands associated with the Nature Reserve of Orange County

This study took place in four PPA's in Orange County, California; Peter's Canyon Regional Park (PECA), Whiting Ranch Wilderness Park (WHRA), Laguna Coast Wilderness Park (LCW) and Crystal Cove State Park (CCSP). These specific parks were chosen out of the 22 units due to their geographic location across the county, diversity of user characteristics and visitation rates in order to collect a robust and diverse sample. This effort was the third social science survey conducted as part of an ongoing collaboration with the NCC; results from these surveys help us to understand human

valuations of the landscape and knowledge of the Natural Communities Habitat Conservation Plan. All of this helps contribute to the overarching goal of the project which is to unite the recreation planning of the reserve with the Habitat Conservation Plan.

Research Questions

PPA's of the Nature Reserve of Orange County (NROC) lie within a 100-mile radius of an urban center of one million or more which classifies these parks as urban-proximate. These parks also fall within the traditional definition of the Wildland Urban Interface (WUI) - they meet housing areas and have some level of ecological disturbance (Gomez & Hill, 2016). The PPA's within the NROC often meet up with residential areas and community infrastructure. Urban-proximate parks are faced with increasing pressures from urban areas and year-round visitation (Budruk & Manning, 2004) which suggests that these lands may require a different management than National Parks or Wilderness areas that see more seasonal use and less intense patterns of use.

Q1: What are the normative thresholds of select social and ecological resource conditions within four park and protected areas in the NROC?

This project hypothesizes that visitors to urban-proximate parks receive different recreation experiences and perceive different resource conditions than those that have previously been studied in traditional wildland recreation management settings. Using

normative approaches, this study seeks to understand how the ecological and social thresholds of visitors may be different than those of backcountry settings to inform proper management of parks within the reserve unit to continue to satisfy their diversifying visitation.

Q2: What visitor characteristics influence the subjective normative thresholds of social and ecological resource conditions?

The second gap in the existing literature pertains to the factors that influence normative evaluations. In order to better understand the visitors of the preserve we must first understand the potentially different thresholds of diverse visitors. Normative research has typically been used in backcountry settings (Budruk & Manning, 2004) and represents a different visitor than what we see in PPA²s within the NROC.

Thesis Outline

The following pages of this thesis will contain three additional chapters. Chapter 2 will seek to describe the descriptive normative thresholds for three social indicators and two ecological indicators. It will also provide basic descriptive statistics of the visitor population sampled. This chapter will establish normative thresholds in an urban-proximate wildland and describe how they differ from those studied in traditional recreation landscapes like National Parks and Wilderness areas. This chapter will be written independently with the intent to be published in *Landscape and Urban Planning*, a

journal that focuses on landscapes in or near urban areas that are experiencing social and ecological change.

Chapter three will focus on the influential factors of normative evaluations. This chapter seeks to fill gaps in the existing literature. Current research has established general thresholds, but few lines of research have explored different visitor characteristics that may be influencing evaluations of social and ecological resource conditions. This chapter will also be written independently and will pursue publishing in the *Journal of Parks and Recreation Administration*, a journal that places an emphasis on research into theory and problem solving in the administration of park and recreation services. Finally, chapter four will include a discussion of my insights on this project as well as the lessons learned from conducting this research and ultimately how this research progresses the field of natural resource and recreation management.

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CHAPTER 2 - NORMATIVE EVALUATIONS OF SOCIAL AND ECOLOGICAL CONDITIONS IN AN URBAN-PROXIMATE NATURE RESERVE

Prospective Journal: Landscape and Urban Planning

Abstract

The use of Normative Theory is well established as a method to measure and establish thresholds for resource and social conditions in parks and protected areas (PPA). The outcome of these evaluations can be used within a management framework alongside other variables to establish a management action. This research was conducted in an urban-proximate PPA to understand the implications that this unique designation may have on normative evaluations. This study was conducted at several locations in the Nature Reserve of Orange County, California USA. Orange County is a major population center between Los Angeles and San Diego. In May of 2021 researchers administered a survey using visual simulation techniques to visitors across four park units. We sought out to establish thresholds for five resource conditions: (1) people at one time, (2) bicycles at one time, (3) informal trail proliferation (4) social aspects of trail width and (5) ecological aspects of trail width. We found that visitors were not particularly sensitive to the number of people on foot, however, they were sensitive to the number of bikes on the trail, likely due to continued conflict between bikers and other activity types within the reserve. Ecological conditions did not resonate strongly with visitors with evaluations of increasing trail width never becoming unacceptable on the social norm curve. Overall, our research found that visitors were less sensitive to changes in resource conditions than in other traditionally studied National Park, backcountry and Wilderness areas. These findings suggest that the unique locations of these parks require a different set of management objectives and expectations due to their proximity to densely populated urban centers.

KEYWORDS

Outdoor recreation
Urban-proximate
Parks and Protected Areas
Norm Theory
Social Norms
Ecological Impacts

1.Introduction

For decades, survey research has been the primary mode of gaining knowledge from visitors about park experiences, preferences, and evaluations (Manning, 2011). Jackson (1965) established the foundation of Normative Theory in the field of social psychology. This theory and approach have since been applied across a diverse range of social science disciplines, including recreation, environmental psychology and natural resource management. Normative research has helped to identify acceptable levels of both social (crowding, litter, off-leash dogs) and ecological (campsite size, trail conditions, informal trail proliferation) impacts (Shelby et al., 1988; Shelby et al., 1996; Budruk and Manning, 2003; Moore et al., 2012; D'Antonio et al., 2013). The focus of this research is to apply these traditional methods to an urban-proximate park system and further expand their use to ecological indicators.

As the social structure of our country continues to change, growth of urban populations is a consistent trend. With this urbanization comes increased pressure on natural landscapes and fragmentation of the native ecosystems (Goddard et al., 2010) due to the construction of housing developments, infrastructure and increased population in these areas. As individuals, families and companies move into these spaces and the need for infrastructure and housing development grows, the amount of greenspace for recreation is often reduced. The lands included in this study are consistent with two categories of natural areas that have been established, urban-proximate wildlands and the

Wildland Urban Interface (WUI) (Gomez & Hill, 2016; Kyle & Graefe, 2007; Ewert, 1998)

Urban-proximate natural areas are defined as wildland areas no more than 100 miles away from an urban center of 1 million or more (Ewert, 1998). WUI's are areas 'where urban lands meet and interact with rural, wild, or undeveloped lands' (Kyle & Graefe, 2007 pg. 1). Gomez and Hill (2016) summarize the existing literature about urban recreation into four categories; (1) urban-proximate national parks or natural areas, (2) varying patterns of use between racial/ethnic groups, (3) the impact these parks have on physical activity and (4) the role of urban parks in neighborhoods. Oftentimes outdoor recreation activities take place in the WUI or in urban-proximate areas, therefore, it is crucial to understand the relationship between recreation and these landscapes.

Urban parks tend to be "islands" in densely populated regions, providing an area for recreation and natural habitat while still being surrounded by development. These parks provide a natural space to instill environmental values and knowledge even in areas of increasing urbanization and development (Brown, 2008). Gomez et al. (2015) found a significant relationship between park use and perceptions of safety on blocks that contained urban parks, either inferring those places need to be safe in order for a park to be placed there, or parks foster safer communities. Urban-proximate parks provide important intangible benefits to residents of the communities they are near, such as added scenery (Baur et al., 2016) and water storage, carbon sequestration and wildlife habitat

(Brown, 2008). These parks are important community resources for people who live in areas of high development and urban population pressures.

While the knowledge about acceptable conditions is limited in urban-proximate areas, the methods used to determine these have been well vetted and thoroughly applied in the field of recreation management. Foundational work in the United States has mainly been conducted by Budruck and Manning in the Boston Harbor Islands (2004) and in Europe by Arne Arneberger and various colleagues and in Korea (Kim et al, 2013; Park & Dawson, 1998). From a social perspective we can reasonably expect visitors to urban-proximate wildlands to identify with different social and demographic characteristics. And from an ecological perspective, these lands may have different visitation and resource disturbance pressures than National Parks and Wilderness areas. “Wilderness” lands are those federally designated under the Wilderness Act of 1946 (P.L. 88-577) which are managed solely by National Park Service, Bureau of Land Management, US Fish and Wildlife Service, and US Forest Service and are not designated within any of the parks in this study. Due to these perceived differences, it is important to study urban-proximate wildlands separately and define a specific set of indicators, thresholds and normative evaluations for social and ecological resources.

Visitors to urban-proximate parks may have different values and sought experiences than those of backcountry areas. Visitors to urban-proximate areas tend to visit their parks more frequently than visitors to backcountry wildland areas.

Additionally, backcountry visitors have greater preference for pristine settings and fewer encounters with other visitors in these remote settings (Kil et al., 2014). Urban forests also open up recreation opportunities to non-traditional forest users, which Metcalf et al. (2013) defines as any visitor who is not Caucasian. Metcalf et al. (2013) found that members of underrepresented race/ethnicity groups have different constraints to park visitation that those of the traditional Caucasian, middle to upper-class visitor. The constraints include; cultural and language accessibility issues, lack of time due to work or school, and preference for other recreational activities (i.e. traditional sporting activities). They also found significant differences between traditional and non-traditional forest users on most constraint options. Most constraints for non-traditional forest visitors fell under the structural domain- lack of access, not enough time due to work or school, fees, lack of information, etc. Urban-proximate parks provide natural areas for recreation closer to urban centers which eliminates many of the structural constraints experienced by non-traditional forest users, and thereby results in a more diverse user base in these parks than in traditional wildland settings (Winter & Chavez, 1999)

Social norm research techniques are derived from theoretical constructs rooted in sociology and the social sciences. "Norms" represent what is considered to be normal within a group of people or what is acceptable to a culture (Manning, 2013). Normative methods have been used in visitor management frameworks such as the National Park Service's Visitor Experience and Resource Protection (VERP) (Hof & Lime, 1997), the USDA Forest Service's Limits of Acceptable Change (LAC) (Stankey et al., 1984), and

the Interagency Visitor Use Management Framework (IVUMF) (IVUMC, 2016) to examine current conditions and visitation within PPA's.

Norms have a structural approach established by Jackson (1965) and the return potential model (RPM) which created the standard norm curve that has been well documented in the existing literature. Ultimately, norms help us to measure how much impact to social and ecological resources is acceptable to visitors (Manning & Krymkowski, 2010). Traditionally norms have been used to measure social carrying capacities of recreation wildlands. "Carrying capacity" is a term borrowed from ecology and applied to social sciences and recreation by Wagar (1964) to define acceptable levels of visitors in PPA's.

The use of visual simulation methods is the primary technique for measuring normative thresholds in PPA's. Visual simulation methods utilize images that provide a standardized representation of a resource condition that can be manipulated through photo editing and GIS software (Manning & Freimund, 2004). Visitors are then asked to respond to each image with their personal level of acceptability using a Likert-style scale. The scale traditionally ranges from (-4) very unacceptable to (+4) very acceptable and when applied to a curve (see figure 3) provides you with three interpretable points; the preferred condition (+4), the minimally acceptable (0) and displacement (-4) (Manning, 2011). Studies have also examined displaying photos to visitors in a random order in order to remove condition anchoring, and to prevent a bias when displaying the visual simulations (Gibson et al., 2014; Cribbs et al., 2019).

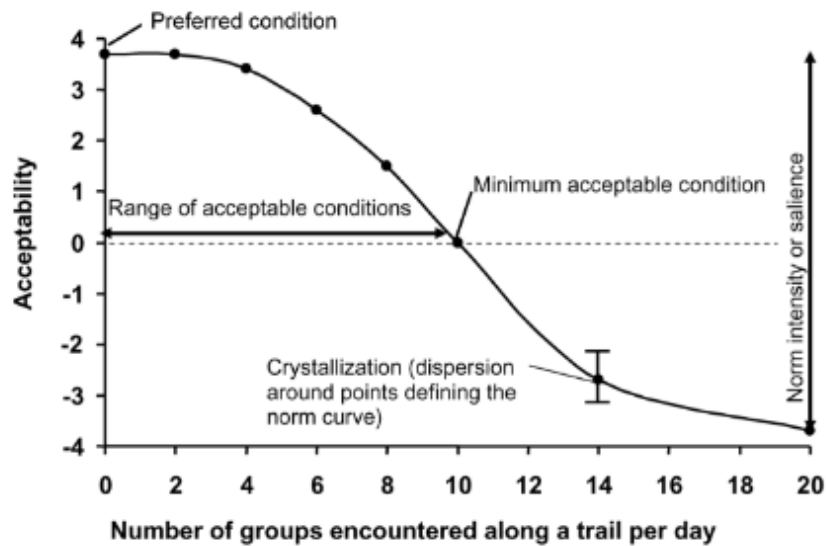


Figure 3. Hypothetical norm curve from Manning, 2011.

The majority of the normative work conducted in PPAs has focused on crowding or other social conditions. Previous ecological studies have focused on trail width and condition class in Acadia National Park (Goonan et al., 2009) trail disturbance and landscape fragmentation in Rocky Mountain National Park (D'Antonio et al., 2013) campsites in the Wasatch National Forest (Price et al., 2018) and bare soil exposure in a Provincial Park in Korea (Kim & Shelby, 2006). This study looks to build upon the existing literature with evaluations of two different ecological indicators; trail width and informal trail proliferation in an urban-proximate recreation area setting.

1.1 Study Location

This study takes place within the Nature Reserve of Orange County (NROC) which contains 22 reserve units in Orange County, California. The county has a population of ~3.2 million people (U.S. Census Bureau, 2021) and is a major metropolis between Los Angeles and San Diego. The parks units provide for a unique urban-proximate wildland recreation experience within a protected natural reserve. The reserve is a California Chaparral and Woodlands Ecoregion and contains a variety of species covered under state and federal endangered species act (NCC, 2021). The reserve's park units and this project are united under the Natural Communities Coalition (NCC); a non-profit which aims to unite stakeholders and researchers to establish and maintain biophysical and social resources within the reserve (NCC, 2021). The Reserve's lands are managed by several different jurisdictions at the local, state and federal level.

Four parks within the NROC were selected as study sites for this project- Laguna Coast Wilderness Park (LCW), Peters Canyon Regional Park (PECA), Crystal Cove State Park (CCSP) and Whiting Ranch Wilderness Park (WHRA) (Figure 4). These parks were chosen for their diverse representation of visitor demographics, spatial distribution around the county as well as their park type designations and management agencies. LACO, WHRA, and PECA are managed by Orange County Parks and CCSP is managed by California State Parks.

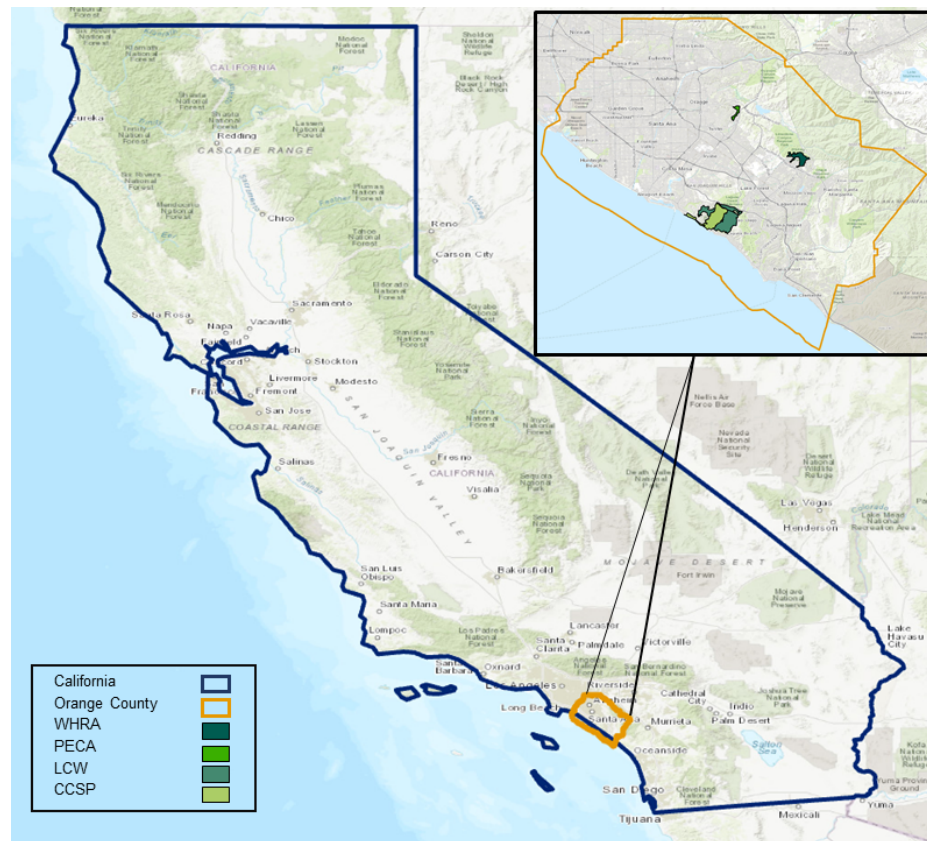


Figure 4. Map of the four park units utilized in the study.

PPA's of the NROC lie within a 100-mile radius of an urban center of one million or more, classifying these parks as urban-proximate. However, these lands also can be classified as a Wildland-Urban Interface (WUI) - they meet housing areas and have some level of ecological disturbance (Gomez & Hill, 2016). The PPA's within the Orange County Nature Reserve often border housing developments or community infrastructure. Urban-proximate parks are faced with increasing pressures from urban areas and year-round visitation (Budruk & Manning, 2004) which suggests that these lands may require

different management strategies than national parks or Wilderness areas that see more seasonal use and less intense patterns of use.

1.2 Purpose of Study and Research Question

This study is part of a multi-year project to unite recreation management practices with the habitat conservation plan for the nature reserve. The primary goal of this study is to identify the thresholds of acceptability of social and ecological resource conditions within an urban-proximate nature reserve. Identifying these thresholds provides interpretable and empirical information for park staff that can be used within a framework to assist in making management actions. This research seeks to answer the following question:

Q1: What are the thresholds for five resource conditions within urban-proximate PPAs within the Nature Reserve of Orange County; People at one Time (PAOT), Bikes at one Time (BAOT), informal trail proliferation, trail width as a recreation preference and trail width as an impact from recreation.

2. Methods

A visitor intercept survey (see Appendix) method was deployed in May 2021 within the four aforementioned parks. Researchers were stationed at trailheads from 7am to 6pm each sampling day and participants were randomly selected at six random times

throughout each hour. Visitors could be intercepted either before or after their recreation experience. If a visitor declined, researchers continued to intercept passing visitors until the next person or group agreed to participate. All declined surveys were recorded as a non-response, and to account for a non-response bias, several pieces of data were recorded from those who declined to participate, including; park location, activity type, group size and reason for not participating. Those who agreed to participate were administered a 5-10-minute survey which could be completed on their own or read to them by a researcher. To adhere to Covid-19 guidelines at the time of data collection, all researchers wore masks, surveys were self-administered with Qualtrics software (Qualtrics, 2022) on iPads that were sanitized after each use.

2.1 Visual Simulation

The use of visual simulation techniques is the primary method for measuring normative thresholds in the field of recreation resource management. Photographs for this study were taken by field researchers during the previous research seasons and were manipulated in the program Adobe Photoshop 2020. For the purpose of this project, we assessed the acceptability of three social indicators and two ecological indicators. The first two social indicators measured were crowding indexes for people at one time (PAOT) and bikers at one time (BAOT), the last was the acceptability of trail width for their recreation experience. For ecological indicators, we measured informal trail expansion at the park level and trail width as an impact from recreation.

Open-source photography websites Pixabay (Pixabay.com) and Unsplash (Unsplash.com) were used to obtain images of people participating in various recreation activities that are common across all reserve units. Images were manipulated and produced in Adobe Photoshop 2020 (Adobe Inc., 2020) using standard editing tools. A photo with 0 PAOT was used as the base image with each following image having an increase in 5 PAOT. This same process was repeated to create the BAOT image series. For the informal trail expansion photo series, editing tools within Photoshop 2020 were used to add vegetation coverage to the base image. The series was then run through GIS software to classify the percentage of exposed soil in each image using the image classification tool in ArcGIS Pro (ESRI, 2021) which is how informal trail expansion was measured. Lastly, the trail width was measured with a pixel analysis based off the known measurements of a sign in the base photo. Then using a depth of field tool in Adobe Illustrator (Adobe Inc., 2020) the manipulation of the trail width was standardized with the depth of field. Once transferred into Adobe Photoshop the clone stamp tool was used to manipulate the trail width by adding vegetation on either side of the trail. These images were printed on photo paper and displayed to visitors during this portion of the survey. They were displayed in a random order so as to not give respondents anchoring points for each of the conditions.

2.2 Independent and dependent variables

Visitor activity type was asked based on the commonly observed recreation activities within the NROC from past visitor surveys (Sisneros-Kidd et al., 2019); walking/hiking, running, biking, dog walking, horseback riding or “other”. A 12-item relational values scale adapted from Klain et al. (2017) was included to understand visitors’ socio-ecological valuation of the reserve, and was modified to match the characteristics of the reserve’s ecology. Experience use history (EUH), a motivation scale adapted from Sisneros-Kidd et al. (2021) and a local ecological knowledge (LEK) (National Park Service, 2019) scale was included to gather additional information about visitors to the NROC. Gender, race, level of education, zip code of primary residence and annual household income were also collected to keep updated data on the demographic characteristics of visitors.

Perceived levels of crowding were measured using two image series, PAOT and BAOT, as both activity types are prevalent within the parks. Furthermore, in recent years, visitors and managers have noted conflict between the two user groups. Each photo series consisted of five images ranging from 0-20 people increasing by intervals of 5 people. Acceptability of trail width was measured using a series of four images simulating common trail widths; <50cm, 50-100cm, 1-2m and >2m. Informal trail proliferation was measured using a series of five images with varying percentages of soil exposure, 11.1 to 15.3%. For all images respondents were given an 8-point scale to rate the acceptability of each image from (-4) extremely unacceptable to (+4) extremely acceptable with no (0) neutral point.



Figure 5. Persons at one time series with an increasing interval of five people per image, ranging from 0-20 people.



Figure 6. Bikers at one time series with an increasing interval of five bikers per image, ranging from 0-20 people.



Figure 7. Trail width series with trail widths of <50cm, 50-100cm, 1-2m and >2m.

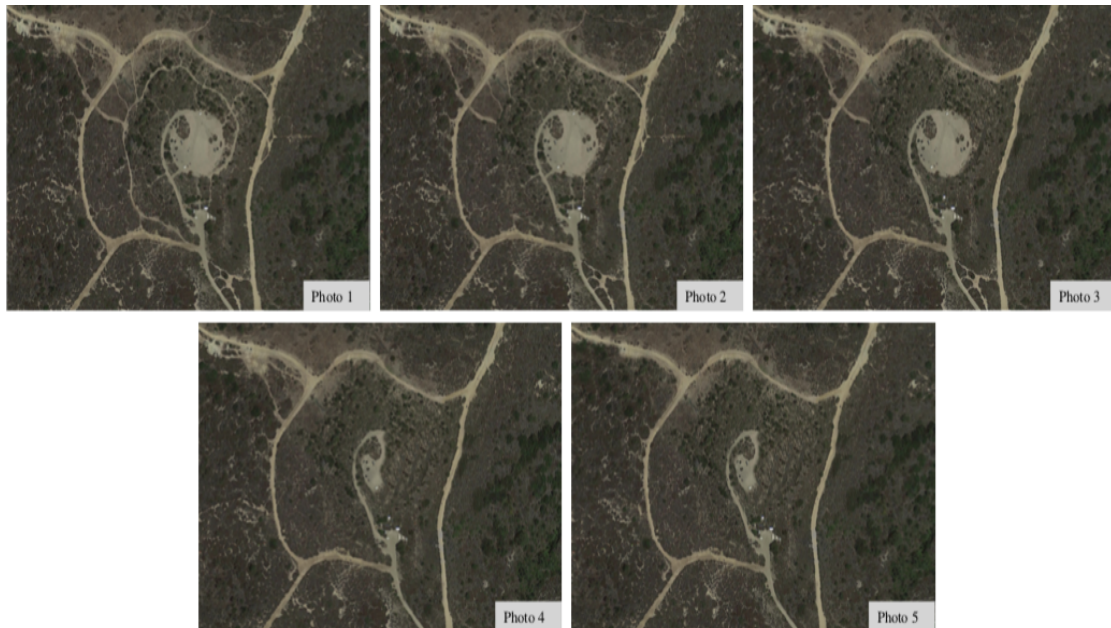


Figure 8. Informal trail expansion series detailing five different levels of resource conditions

3. Results

3.1 Response Rates and Demographics

A total of 1415 surveys were solicited during the May sampling period and 908 were completed, for a response rate of 64.2%. Response rates by park unit varied from 62.7% to 66.8%. Non-response data was collected in order to test for any bias. The most common reasons for not participating were “not enough time” (N=292), followed by “no interest” (N=203).

Among survey respondents (N=889) 57.3% (N=509) identify as White/Caucasian, 16.2% (N=144) Hispanic/Latinx, 12.3% (N=109) Asian and 6.2%

(N=55) Multi-racial/Multi-Ethnic. American Indian/Alaskan Native, Black/African-American, Middle Eastern/North African, Hawaiian/Pacific Islander, don't know and self-describe made up the remaining ~8% of survey respondents. The age of survey respondents ranged from 19-86 years old, with the mean age being 45 with a standard deviation of 15.4 (N=871). Of survey respondents the most prevalent age range was 25-34 years old, making up 21.4% (N=186) of the total.

Table 1. Demographic characteristics of study participants.

Characteristic	N	%
Gender		
Male	488	54.7
Female	389	43.6
Non-Binary	1	0.1
Gender-queer or Non-Conforming	1	0.1
Prefer not to answer	10	1.1
Self-Identify	3	0.3
Race		
Asian	109	12.3
American Indian/Alaska Native	1	0.1
Black/African	13	1.5
Hispanic/LatinX	144	16.2
Middle East/Northern Africa	7	0.8
Hawaiian/Pacific Islander	8	0.9
White	509	57.2
Don't Know	23	2.6
Self-Describe	20	2.2
Multi-Racial/Multi-Ethnic	55	6.2
Income		
<35k	74	8.9
35-50k	58	7
50-75k	91	10.9
75k-100k	117	14.1
100-150k	143	17.2
150-200k	136	16.3
200k+	213	25.6
Education		
High School Graduate or Less	57	6.4
Some College/Associates Degree	177	20
B.A/B.S.	392	44.2
M.S./Ph.D./J.D./M.D.	261	29.4
Mean Age	45	

The most prevalent income category from our sample (N= 832) was 200k or greater 25.6% (N= 213) (Table 1). Respondents with a B.A or B.S. degree were the most represented at 44.2% (N=392). Male was the predominant gender identity of respondents 54.7% (N=488), while the sample (N=892) proved to be largely binary, two (N=2) respondents identified a non-binary or gender-queer or gender non-conforming.

3.2 Normative Evaluations

Analyses for normative evaluations were completed using the structural norm methods established by Jackson (1965). A mean acceptability rating was calculated for each condition represented by a simulated image to identify the overall acceptability from the sample (Jackson, 1965; Manning et al., 1996). The Potential for Conflict Index (PCI₂) was used to measure the level of agreement or consensus around each mean; a score of 0 indicates the least potential for conflict (maximum agreement) where a score of 1 indicates the maximum potential for conflict (minimal agreement) (Vaske et al., 2010). PCI₂ was used for this analysis as it accommodates bipolar scales without a neutral point which was the measurement utilized in this study.

Table 2. Mean Acceptability and PCI₂ for Each Image

Image Series	Condition	<i>M</i>	PCI ₂
PAOT	0 people	2.57	0.42
	5 people	2	0.37
	10 people	0.96	0.56
	15 people	-0.82	0.67
	20 people	-1.75	0.57
BAOT	0 people	2.89	0.32
	5 people	0.84	0.55
	10 people	-0.63	0.64
	15 people	-2.65	0.34
	20 people	-2.7	0.35
Trail Width as an Amenity	<50cm	2.64	0.25
	50cm-100cm	2.46	0.23
	1-2m	2.62	0.2
	2m+	1.94	0.47
Trail Width as a Recreation Impact	<50cm	2.2	0.33
	50cm-100cm	1.7	0.36
	1-2m	1.68	0.37
	2m+	0.61	0.69
Informal Trail Proliferation	11.1%	1.23	0.53
	12.2%	0.67	0.61
	14.1%	0.66	0.62
	15.0%	0.25	0.68
	15.3%	-0.32	0.75

3.2.1 People at one time (PAOT)

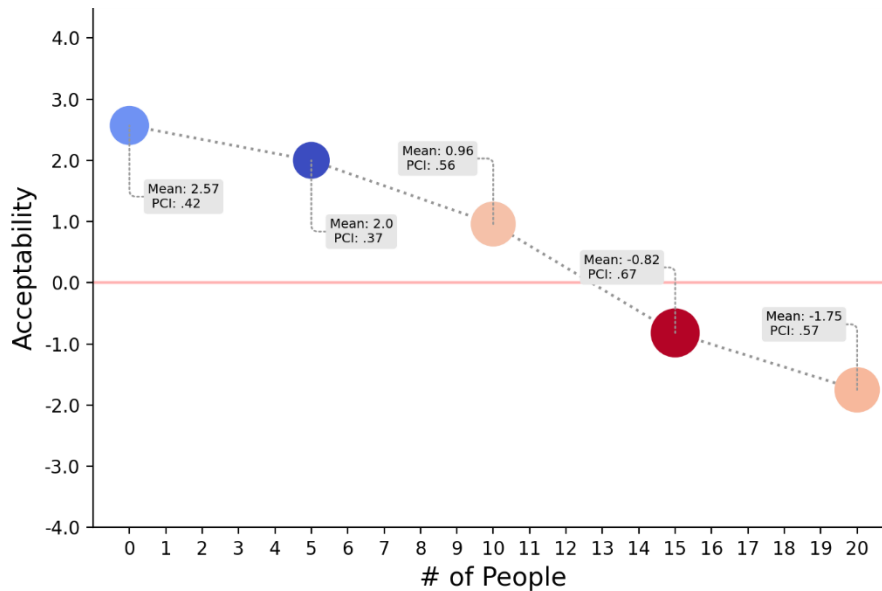


Figure 9. Mean acceptability and PCI₂ for each condition of persons at one time.

Mean acceptability for people at one time ranged from 2.57 to -1.75 (Figure 9) as the number of people at one time increased from 0 to 20; crossing the neutral line and becoming unacceptable at ~ 13 people. Congruent with overall trends in the literature, the more people per image the more unacceptable the condition becomes. Crystallization (agreement) of the mean acceptability measure using the PCI₂ ranged from .37 to .67 indicating a moderate level of consensus around the acceptability of each condition. The crystallization was the highest (PCI₂ = .37) at 5 people per image, indicating the greatest

agreement around this evaluation. The lowest level of agreement ($PCI_2=.67$) was for the image containing 15 people.

3.2.2 Bikes at one time (BAOT)

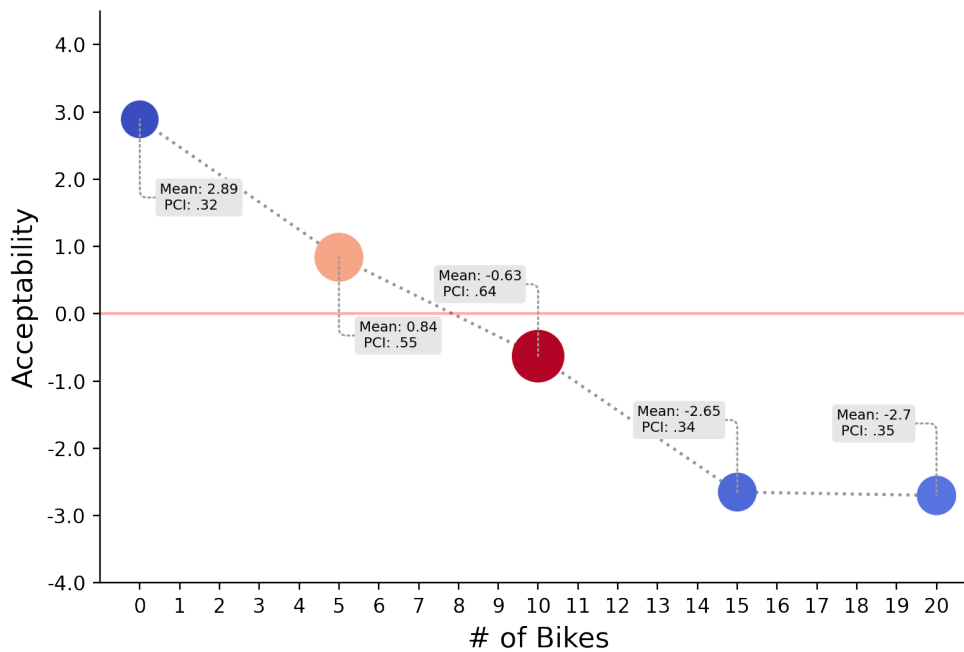


Figure 10. Norm curve showing the evaluations of BAOT

Acceptability of bikers followed a linear path ranging from 2.89 to -2.7 (Figure 10). The trendline crosses the neutral axis at ~ 8 bikers per image. From 10 bikers per image to 15 the mean acceptability descends sharply to -2.56 at 15 bikers and remains

nearly stable at -2.7 for 15 bikers. Agreement around the conditions in each image ranged from a PCI_2 value of .32 to .64 and is not consistent across the norm curve. The highest level of disagreement occurs around 5 bikes per image and 10 bikes per image indicating a lack of consensus around these conditions. There is strong agreement that zero bikes per image is highly acceptable and that a range of 15-20 bikers is highly unacceptable.

3.2.3 Trail Width as a Recreation Amenity

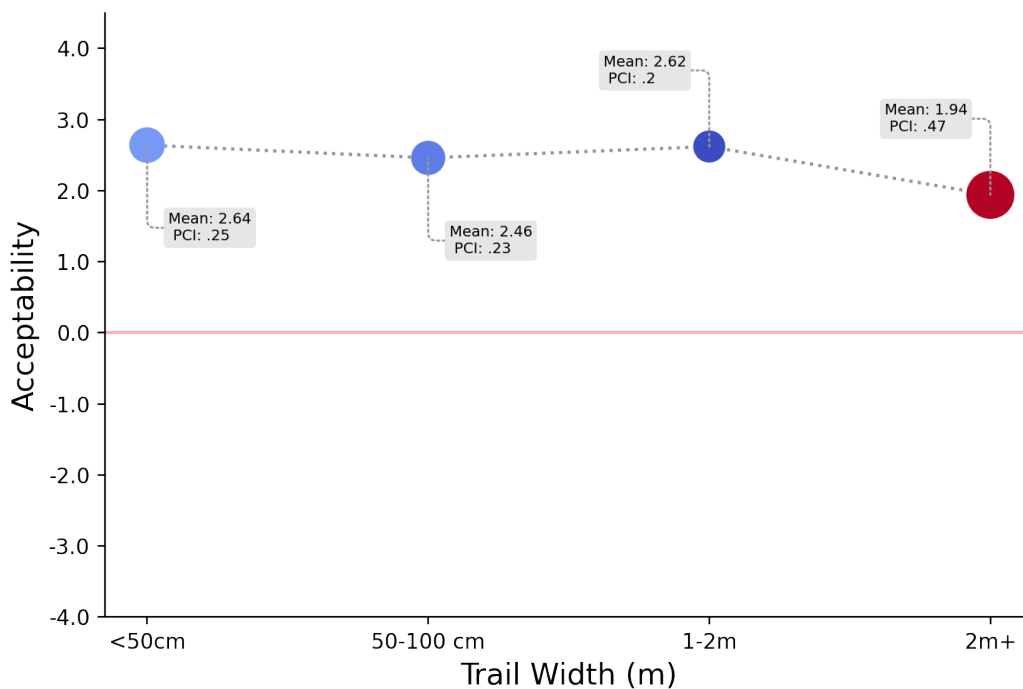


Figure 11. Norm curve of evaluations of trail width as a recreation amenity

Due to cultural norms and visitation rates, trail width was identified as a potential recreation amenity to visitors to the NROC. For this set of conditions visitors were asked to “rate the acceptability of the trail width for their recreation experience”. The mean acceptability of these conditions ranges from 2.64 to 1.94 (see Figure 11). A trail width of <50cm (traditional single track) had a mean acceptability of 2.64, while a photo representing a trail width of 50-100 cm had an acceptability rating of 2.46. Trail width of 1-2m had a mean of 2.62, and a width of 2m+ had a mean acceptability of 1.94. The variance in means is only .74 creating a mostly flat curve that never crosses the neutral line, indicating that all represented trail widths are acceptable for individual’s recreation experiences.

Across the whole study the PCI_2 values for trail width indicate the highest level of agreement across most conditions. For represented trail widths of <50cm, 50-100 cm and 1-2m the PCI_2 values are .25, .23 and .2 respectively (Table 2). Agreement becomes weakest around the acceptability of the 2m+ trail width ($PCI_2 = .47$). A variety of trail widths are acceptable to visitors and there is a strong to moderate consensus on the overall acceptability of these trail conditions.

3.2.4 Trail Width as a Recreation Impact

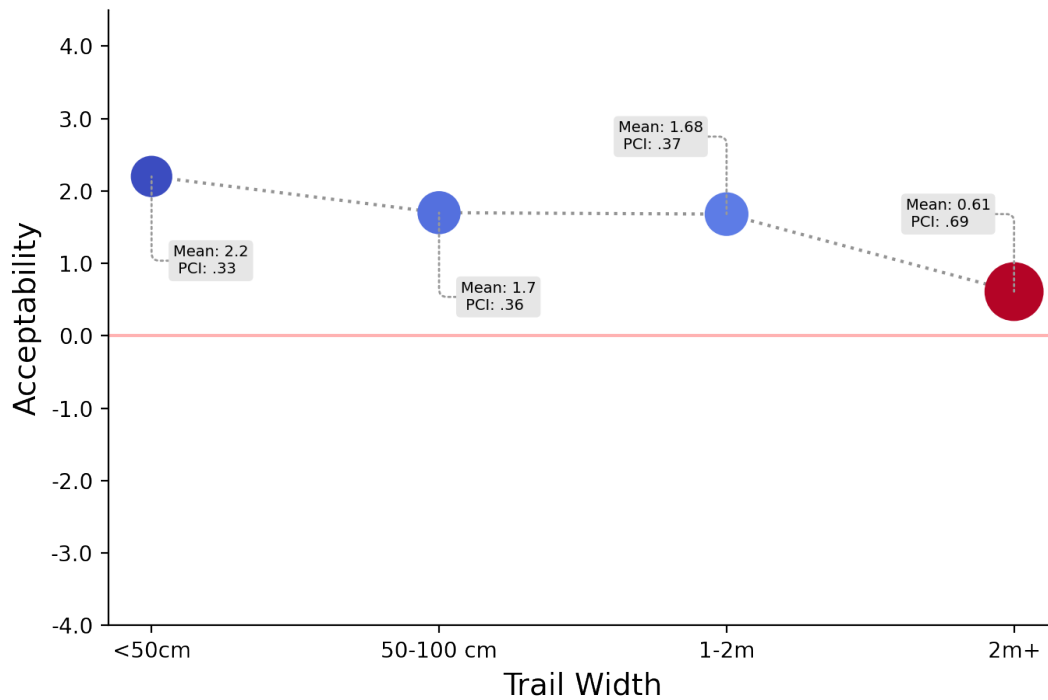


Figure 12. Norm curve of evaluations of trail width as a recreation impact

The mean acceptability of trail width as an ecological impact displays in a descending linear fashion with means ranging from 2.2 to .61 (see Figure 12)- never crossing the neutral line, similar to the previous section. With a variance in means of 1.59, the norm strength is weak, but does indicate that trail width as a recreation impact is a slightly more sensitive condition than trail width as a recreation amenity.

PCI₂ scores for this curve range from .33 to .69. Values for these conditions are consistent with the trail widths of <50cm, 50-100 cm and 1-2m with strong to moderate consensus for the first three conditions and weak consensus around the fourth.

3.2.5 Informal Trail Proliferation

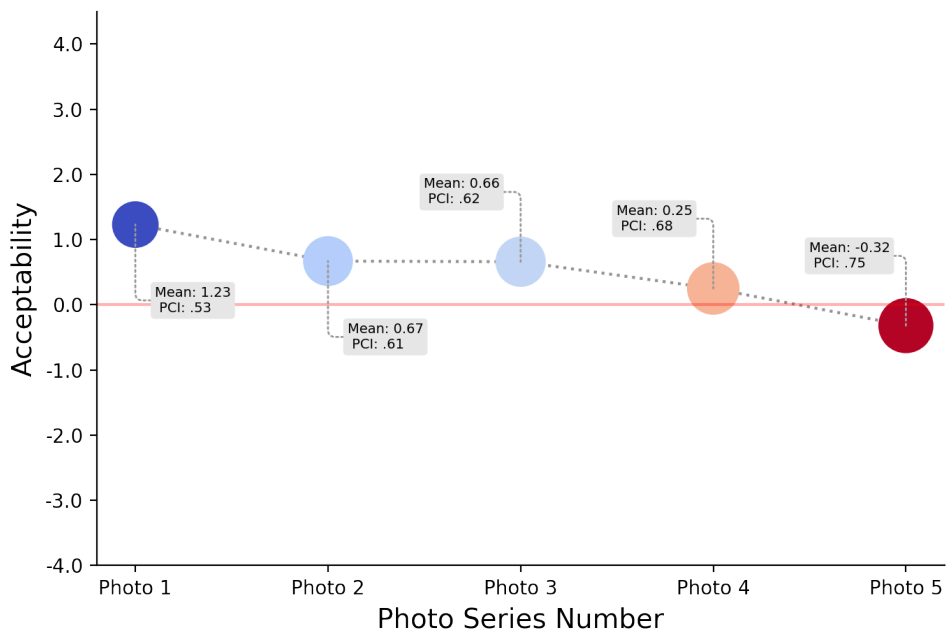


Figure 13. Norm curve of evaluations of informal trail proliferation

The image series displayed an aerial view of trail conditions ranging from the current conditions (with informal trail expansion) to a visualization containing only the designated trails in the defined region. The mean acceptability for these images ranged from 1.23 to -.32 (see figure 13) indicating that this was not a sensitive indicator for

many visitors within the NROC. There was also a lack of consensus around the acceptability ratings with PCI_2 values ranging from .53 to .75.

4. Discussion

Using visual methods for normative research that have been thoroughly tested and validated in the existing literature (Manning, 2007), the goal of this study was to identify the threshold for social and ecological resource conditions within an urban-proximate PPA. Urban-proximate recreation areas provide recreation lands to individuals who live in the outskirts of urban centers (Arnberger & Brandenburg, 2007) and have a critical role in providing access to nature and wellness opportunities (Kyle & Graefe, 2007).

For visitors to the NROC their preferred or optimal condition was 0 PAOT, the threshold or least acceptable condition for this measurement was ~ 13 PAOT which is consistent with the findings in Acadia National Parks on the Carriage roads, which had a threshold of 14 PAOT (Manning et al., 2009). The Carriage Roads in Acadia were once constructed for horse drawn carriage travel creating similar trail conditions to the fire roads in the NROC that were used as the base trail in the visual simulation series. As in most crowding studies, the more people per image the less acceptable the condition tends to be- however, there are always exceptions to this general assumption. In this study, the general norm curve for PAOT never reached the point of displacement at the -4 value. The lowest value of the curve is a mean acceptability of 1.75, suggesting that 20 PAOT is the most unacceptable condition, but it is not enough to displace visitors from the park.

Visitor use studies however do favor the people who are currently visiting PPA's and do not account for individuals already displaced. Higher thresholds may be indicative of a crowding tolerance of visitors who live in urban areas where crowding may be seen as a trade-off to access to parks and natural areas (Sharp et al., 2015). In conversations with visitors to the NROC they understand that Orange County is a densely populated region and that busy trails are a trade-off to having access to these PPA's.

A 2012 study conducted in the Olympic Wilderness found visitors to have a threshold of 9 PAOT on trails at a coastal wilderness attraction site (Vinson-Pierce & Manning, 2015). A Muir Woods study focused on crowding conditions within the park concluded that visitors had a threshold of ~16 PAOT on the primary trails in the park and a threshold of ~7 PAOT on the secondary trails (Manning, 2007). Consistent with our study, a multi-park study on the Colorado Plateau that used a 100m segment of trail as their base photo found a threshold of acceptability ranging from ~10-13 PAOT (Budruck & Manning, 2003). These results compared with our own suggest that different locations and features within a PPA have varying thresholds and levels of acceptability for PAOT. While a direct statistical comparison cannot be made between our urban-proximate thresholds and those of rural Wilderness areas and traditional National Parks there is not a standardized difference between the two sets of parks

Using Vaske et al. (2010) model for PCI_2 we measured the consensus around each resource condition. This formula returns a value between 0 and 1 – where 0 indicates the

maximum amount of agreement and 1 indicates maximum disagreement. We found there to be a moderate amount of agreement across the whole curve ($M=.52$) and the greatest consensus was around 0 PAOT and 5 PAOT signifying that most visitors agree about the acceptability of these conditions. The lowest consensus was at 15 PAOT which is just above the level of acceptability. At this condition, visitors' opinions about crowding became conflicting. While sampling in the field, several visitors expressed discomfort when there were zero people in the image- mostly related to concerns of being out on trails alone for personal safety or fear of mountain lion activity in the area. However, others noted that having the trails to themselves was their ideal condition to experience when showing up to a park within the NROC. These contradicting fears and desired conditions expressed by visitors likely created the lack of consensus around the mean acceptability.

Minimal existing literature has examined the normative aspects of crowding for bikers. Needham et al. (2010) studied levels of acceptability of bikers at alpine ski areas but this study is limited in that they only surveyed mountain bikers and did not include the opinions of varying activity types. Work in Acadia National Park looked at acceptable levels of mixed (bikers and foot travel) on Carriage Roads but did not exclusively examine crowding indices of bikes (Manning et al., 2009). This specific indicator was chosen for our study due to past noted conflict between bikers and pedestrians on park trails in the NROC. In most cases conflict is caused by perceived discourteous behaviors by other visitors and social values (Carothers et al., 2001) or outgroup membership

(Ramthum, 1995) meaning members of an outside group perceive conflict with other groups that they are not a part of (i.e., hikers vs. bikers, bikers vs. dog walkers).

Generated norm curves concluded that 8 BAOT is the threshold of acceptability for bikers at one time on trails within the NROC. The aforementioned study of bikers in alpine ski resorts found on average 6 BAOT to be the threshold for visitors- due to the front country characteristics of both the NROC and these alpine ski resorts it was likely that these thresholds would be similar. The threshold for BAOT is much lower than for PAOT (~13) suggesting that visitors are more sensitive to bikers than foot traffic. In comparison to PAOT there are higher levels of agreement around each condition on the ends of the curve, indicating that a majority of visitors agree that no bikes is the most ideal and any number of bikers over eight in the viewshed is unacceptable. There is a lack of consensus in the middle of the curve near the threshold, similar to PAOT which may be due to lower levels of agreement around what the threshold actually is. Following Vaske et al. (2010) PCI₂ structure-the highest consensus around conditions-occurs on the outside of the curves, suggesting that the conditions on either end tend to be the most polarizing and elicit stronger responses from visitors.

Existing literature has looked at the acceptability of ecological trail conditions from a normative perspective, but previous work has primarily been completed in well-visited National Parks – trail impacts in Acadia National Park (Goonan et al., 2009), Wilderness trail impacts in Zion National Park (Manning, 2007) and condition class in

Rocky Mountain National Park (D'Antonio et al., 2013). All studies asked visitors about the acceptability of the ecological aspects of the trails and used the standard -4 extremely unacceptable to +4 extremely acceptable scale also used in this study. Unique to this study, we looked at trail width as both a recreation preference and an ecological impact, as trail width pertains to both ecological and aesthetic evaluations (Wimpey & Marion, 2010). We found no existing studies that have examined preferences for trail width from a normative theory perspective- studies have asked visitors their preference, but have not asked them to evaluate actual conditions. The question was asked from both an ecological and a social perspective because we hypothesized that visitors to the NROC may view trail width as an amenity as it may allow them to recreate with their family or friends in a larger group. For the recreation amenity prompt, visitors were asked to "Rate the acceptability of the trail width for their recreation experience today." And for the ecological impact they were asked to "rate the acceptability of the trail width as it may be due to impacts from recreation."

The curve for informal trail proliferation is nearly flat ($\Delta=0.7$) with an average intensity of 2.07 and the most popular intensity amongst respondents was 0 (N=248) meaning they had no variation in their acceptability for each condition represented. The norm curve for this condition never crossed the threshold line and became unacceptable, and the lowest value of mean acceptability was 1.94. This finding is starkly different from those of the study in the Zion Wilderness, where researchers found a steep curve reaching the -4 value for trail impacts and a curve that reached -2 for trail development

(Manning, 2007). This is not to say that there are not visitors who view these conditions as unacceptable, but as a whole sample, all trail width conditions have some level of acceptability among visitors.

Within the literature, visitors to PPAs have shown preference for trails with less dense vegetation as they allow for a greater visual of the surrounding area which has been shown to increase visitors' perceptions of safety (Reynolds et al. 2007). Further, research suggests that visitors may hold certain 'situational concerns' while recreating in natural areas. Chiang et al. (2014) summarized these concerns into four categories; environmental fears, fear of crime or a threat to personal safety, fear of wildlife and legibility or one's ability to navigate the environment. This could explain the high acceptability ratings for trail width across the sample and why the ratings for the trail never reach an unacceptable level. The visitors sampled showed greatest preference for trails that are 50cm or less in width which is a traditional single-track trail- however not many of these trails exist within these parks. Although the narrowest trail is the most acceptable, the 1-2m trail segment has nearly the same level of acceptability. It is possible that acceptability levels at the 1-2m width were so high because trails of this width could potentially assuage situational concerns of visitors.

All widths of trails simulated were acceptable to visitors indicating that trail width as a disturbance from recreation was not a sensitive indicator for visitors. The most acceptable trail width for our sample was 50cm or less ($M=2.2$) and the least acceptable was 2m or greater ($M=.61$) - while this curve never crosses the neutral line, a trail width

over 2m is the least desirable. A majority of visitors (N=156) had no variability in their personal acceptability of trail width as an ecological impact. Excessive trail width has been classified as trails of >3ft to 6ft (.9m to 1.8m) in a study by Marion and Leung (2001), meaning visitors did not view trails with excessive width due to recreation impacts as unacceptable across the reserve. Respondents noted the importance of wider trails for wildfire crews, utility work and rescue operations which may influence levels of acceptability for both trail width measures.

Counter to the work of D'Antonio et al. (2013) in Rocky Mountain National Park, we found that visitors were not able to judge resource impacts as unacceptable and that their threshold for impacts was not reached. Our findings also contradict Goonan et al. (2009) work in Acadia National Park- this study found that individuals were highly sensitive to resource impacts on trails and there is a low tolerance for vegetation disturbance and trail widening within the park. However, Moore et al. (2012) notes that visitors may recognize ecological impacts but not consider them problematic or a serious issue within a landscape, which may be the case in the urban-proximate parks because visitors expect a high level of use due to their proximity to a dense population. Another factor to consider is the difference in vegetation between these two parks; whereas Acadia is very lush and forested, parks within the NROC are made up of a coastal sage scrub and chaparral habitat (NCC, 2021).

Lastly, visitors also were not sensitive to measurements of vegetation loss due to informal trail proliferation. Although this curve did drop below the threshold line, the

lowest mean acceptability for informal trail proliferation was -.32. There was also a high level of disagreement around these resource conditions. This is likely due to a common notion from visitors for a need of additional trails within the park due to increased visitation and perceptions of crowding within the parks. Some visitors noted the impacts additional trails have on habitat fragmentation, but for most this did not outweigh the desire for more trails. A similar study was completed in Rocky Mountain National Park by D'Antonio et al. (2013) using the same methods. In this study, researchers concluded that visitors were highly sensitive to vegetation loss due to informal trail proliferation across a landscape and viewed any vegetation loss over 6% as unacceptable. In contrast, visitors to the NROC only started to view vegetation loss as unacceptable (-.32) at 15.1%. Previous vegetation impact studies have found that visitors can effectively judge trail impacts and are sensitive to them (Manning et al., 2004; Shelby et al., 1988), while visitors to the NROC are not as sensitive. This may be due to their desire for more trails within the park systems or the preference for wider trails to accommodate more visitors and multi-use visitation.

5. Conclusion

In addition to the steady increase in outdoor recreation participation since 2016 (Outdoor Industry Association, 2022) many wildland recreation areas saw a steep increase in visitation in 2020 and 2021 due to the novel Coronavirus pandemic (Rice & Pan, 2021), and the parks within the NROC were no exception to that. Most individuals

halted cross-country or international trips to well-renowned parks, which drove them into their local parks at higher rates (Hamidi & Zandiatashbar, 2021; Shoari et al., 2020).

The primary goal of this study was to understand visitor evaluations of social and ecological resource conditions at parks within the NROC. Urban-proximate wildlands differ from the traditional National Park experience and may cause visitors to have different evaluations of social and ecological conditions. In contrast to most National Parks and Wilderness areas which experience seasonal upticks in use, recreationists use these urban-proximate NROC parks on a daily basis and value them as a place for regular exercise rather than a recreation destination for an immersive experience. The creation of a social norm curve allows us to understand three important evaluations from urban-proximate visitors; the preferred condition, threshold of acceptability, and the point of displacement. This type of evaluative research has not yet been conducted across the reserve, and is lacking for urban-proximate recreation areas generally. As such, this data can be an important piece of information for managers in the adaptive management process. As previously stated, and well noted in existing literature, empirical data derived from normative evaluations cannot be the only information that results in a management action being created, managers must consider other factors into these decisions.

A majority of the work on urban-proximate parks has taken place in Europe and Asia, and this study establishes some novel data for parks of this nature in the United States. While this work cannot represent every urban-proximate wildland, it can help us to understand the differences in these parks as compared to National Parks and

traditionally managed wilderness and backcountry recreation sites. We found that visitors are not as sensitive to resource impacts in the urban-proximate parks sampled in our study, and may be more inclined to accept resource impacts as trade-offs to have access to wildlands in such a densely populated county. However, survey respondents were sensitive to the amount of people at one time on a trail. It is hard to make direct comparisons to existing literature due to differing social norms and visitor characteristics in each study, but overall, we found that visitors to the NROC tend to have higher crowding thresholds than visitors in well-studied National Parks.

This study sets a baseline for the four conditions studied to be evaluated at a later time and compared to these data as an evaluation of shifting preferences and resource conditions. While these evaluative thresholds should not be prescriptive, they are intended to provide managers with one piece of the puzzle. For PAOT and BAOT, the respective thresholds of 13 and 8 could be a starting point for regulating group sizes within parks. Like any defensible management action, an implementation of a new regulation should be monitored and reevaluated over time to ensure visitor satisfaction and compliance as well as habitat conservation goals. Although not originally intended to specifically examine impacts of pandemic-related visitor use, our research took place during the Spring of 2021 and may present a “new normal” for visitation and visitor evaluations at parks within the NROC due to the Covid-19 pandemic.

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CHAPTER 3 - INFLUENTIAL FACTORS OF NORMATIVE EVALUATIONS IN AN URBAN PROXIMATE NATURE RESERVE

Abstract

The growth of urban populations will likely have an influence on visitation to and the management of urban-proximate parks and protected areas. This study seeks to understand possible influential factors of normative evaluations at four urban-proximate parks and protected areas in Orange County, California, USA. We used four independent variables as potential influences: gender, race, recreation activity type and self-reported levels of local ecological knowledge. We tested these variables against five normative responses determined via visual simulation; people at one time, bikes at one time, informal trail proliferation, trail width as a recreation preference and trail width as a recreation impact. Statistical analysis suggests race to be an influential variable in predicting acceptability of people at one time, an index of crowding. Activity type produced a significant relationship with the condition representing 10 bikers at one time, suggesting bikers find fellow bikers more acceptable than visitors of different activity types. Levels of local ecological knowledge proved to be a predictor of ecological impacts in both measurements of trail width as a recreation impact and informal trail proliferation. Last, we found a relationship between gender and trail width preferences that suggest that wider trails increase perceptions of safety. This research contributes to the growing body of literature pertaining to both urban-proximate parks and protected areas and contemporary measurements of social norms in outdoor recreation.

Introduction

The use of Normative Theory is a well-established method to measure visitor evaluations of resource conditions in parks and protected areas (PPA). It has been used in both historic and contemporary literature to measure social and ecological conditions

such as crowding (Manning & Freimund, 2004) graffiti and littering (Budruck & Manning, 2004), vegetation loss due to informal trails (D'Antonio et al., 2013) and campsite impacts (Shelby et al., 1998) visitor distance from wildlife (Miller & Freimund, 2018) and soundscapes (Marin et al., 2011; Miller et al., 2020). Norm theory can be used to explain how visitors are socially influenced by their perceptions and acceptability of resource conditions or impacts (Zajchowski et al., 2020).

Despite this being a vetted method in the field, only a few studies have looked at what factors may be influencing visitor's evaluations- country of origin (Vaske et al., 1996), place attachment (Zajchowski et al., 2020; Kyle et al., 2004), motivations (Marin et al., 2011), cultural influence (Sayan et al., 2013) and place identity and experience use history (White et al., 2008; Eder and Arnberger, 2012). Information derived from visitor evaluations of resource conditions could prove to be valuable to park managers when using thresholds and standards as a part of their management framework. Knowing the opinions of specific user groups can then help managers identify the importance of conditions to these groups.

Past studies have identified the preferences of individual groups of visitors through survey research and have established valuable descriptive data on the preferred characteristics and attributes of PPA's. However, they have not established evaluations of different visitor groups to urban-proximate PPA's through the utilization of norm theory or their potential to influence normative evaluations of resource conditions. This work seeks to build on past studies and address the gap between preferences and evaluations to

identify the potential influence that visitor activity type, levels of ecological knowledge, gender and race have on normative evaluations of social and ecological conditions within urban-proximate PPA's.

For this study we utilized three social indicators and two ecological indicators to measure these potential influences. People at one time (PAOT), bikes at one time (BAOT), and trail width preference were studied as social indicators and informal trail proliferation and trail width as a recreation impact were the ecological indicators studied. These were tested using survey data collected in the Nature Reserve of Orange County (NROC)- a 38,000 acre urban-proximate wildland situated between Los Angeles and San Diego, California.

Activity type

Understanding visitors by the activity that they choose to participate in while recreating is an important dynamic to recreation research. A visitors' activity type is the first behavior a visitor engages in to achieve a desired outcome. Existing literature has looked at activity-based benefits that visitors receive from participating in outdoor recreation activities. In one particular meta-analysis, they found that two benefits were strongly associated with activity type, "*keep/get physically fit*" and "*feel healthier*" (Pierskalla et al., 2004).

A wide variety of activity types can be observed across the reserve, in order to narrow down the analysis we gave respondents the following activities to choose from; walking/hiking, biking, running, dog walking, horseback riding and 'other'. Visitor's activity type may be restricted by economic or geographic conditions in their personal lives or area of participation (Vaske et al. 1990). Visitors may also identify with a more specific subcategory of their activity type (i.e. bikers identifying more accurately as a mountain biker, e-biker or gravel biker). We did not ask visitors to identify within a specific subgroup, but it is important to note that visitors may not solely identify with one group. Visitors engage in activities to achieve specific psychological outcomes, meet needs or to accomplish certain goals which draws them to a specified activity type and setting to aid in the accomplishment of the objectives (Manning, 2011).

Assignment to an activity group can predispose a visitor to certain perceptions of conflict and stances on management issues within a park or protected area. In the NROC there is historical conflict between hikers and bikers that has led to social and safety concerns within the parks. Visitors may also identify with different levels of specialization within their activity type. This can lead to different perceptions about conflict, resource conditions and adherence to social norms of the group. An understanding of visitors within an activity type can help managers learn more about their behavior, communication strategies, preferences and characteristics (Spencer, 2012). Activity type has been shown to explain variances in trail type preferences and trail use behavior (Mowen et al., 1998), this study also found that visitors who traveled further to

participate in a specific activity may be more dissatisfied with their visit if conditions and opportunities for that activity are not acceptable.

Various barriers may exist when a visitor is deciding which activity type to participate in. Jackson (1983) categorized barriers into three groups; lack of time, lack of opportunity and lack of knowledge. Barriers to specific activity types may force individuals into a different less desirable group, or out of recreation all together. Setting characteristics may also be a determining factor for visitors when choosing which recreation activity to participate in (Manning, 2011).

Race and Ethnicity

A vast majority of the existing literature regarding race/ethnicity and recreation has focused on barriers to participation (Baas et al., 1993; Stanis et al., 2009; Hipp et al., 2013). Additionally, a lot of work has been published stating the recreation preferences of diverse race and ethnicity groups (Grill et al., 2019; Ho et al., 2005; Virden & Walker, 1999; Whiting et al., 2017). This work seeks to expand on this existing research base by identifying and establishing resource impact evaluations of different race/ethnicity groups who visit urban-proximate park and protected areas. However, it should be noted that the evaluations and results being assigned to a specific race or ethnic group do not represent every member of that group and are broadly generalizable to the study and specific geographic region.

Several previous studies have illustrated varying preferences between Caucasian visitors and those of non-Caucasian races. These differences include setting preferences such as; types of overnight accommodations, facility development, day-use areas, cellular service, vegetation coverage, contact with law enforcement and delivery of information about PPA's (Grill et al., 2019; Bass et al., 1993; Whiting et al., 2017). Established literature has also found differences in recreation motivations amongst race and ethnicity groups. A study conducted in urban-proximate State Parks in Georgia found that race/ethnicity was a statistically significant variable for health and fitness, nature interaction and social interaction with Latinos expressing a high motivation for health and fitness as well as social interaction. The only category where race was not a significant influence were rest and relaxation motivations (Whiting et al., 2017).

Race and ethnicity focused research have implications for the management of PPA's. Research that has been conducted on marginality, ethnicity and discrimination hypotheses in recreation suggests that actions such as increasing public transportation to wildlands, designing recreation landscapes for the values of minority groups and examining interagency programs and messaging for discriminatory practices could increase sense of belonging and participation within minority cultures (Manning, 2011). Grill et al. (2019) suggest managers needs to consider who they are managing their parks for, not just what they are managing their parks for in order to reduce the possibility for structural discrimination within their PPA. By analyzing acceptable levels of resource impacts by various racial and ethnicity groups, we hope to contribute a new level of

evaluative data to the literature to understand the preferences and thresholds of specific visitor groups.

Gender

As with race/ethnicity, much of the literature regarding gender in the outdoors has focused on constraints and barriers to access and preferences (Warren, 2015; Shores et al., 2007; Johnson et al., 2001). In addition to these two topics, literature in the Recreation and Leisure studies field has focused on gender specific programming and the benefits and outcomes of those programs (McAnirlin & Maddox, 2020; Overholt & Ewert, 2015; Hornibrook et al., 1997). Gender is best defined as “the socially constructed characteristics of women and men, such as norms, roles, and relationships of and between groups of women and men. It varies from society to society and can be changed” (World Health Organization, 2019). Most of these studies focus on differences between males and females when it comes to participation and preferences (Virden & Walker, 1999; Johnson et al., 2001; Rosa et al., 2020). However, few of these studies have looked outside of the gender binary. Some focused studies have assessed participation rates of non-binary and transgender individuals (Bren & Prince, 2022; Oakleaf & Richmond, 2017) but little of the existing literature has assessed all gender identities within the same study. We sought to make our survey design as all-inclusive of gender identity as we were currently knowledgeable about- but unfortunately, our survey returned a binary sample, which may be a common constraint to gender research.

The constraints literature can be summarized into three categories; structural, intrapersonal, and interpersonal.

- Structural; lack of time, finances, inadequate upkeep of activity areas, transportation and crowding
- Intrapersonal: safety concerns, outdoor pests, feeling unwelcome and uncomfortable, personal fear, physical limitations
- Interpersonal: no one to participate with, a household member requiring extra assistance (Ghimire et al., 2014)

The most prevalent constraint discussed in the literature is fear. Wesley and Gaarder (2014) looked at negotiations of fear and danger in an urban-proximate park in Arizona. They found that women fear being harassed both verbally and physically and that 20% of women feel unsafe on trails. They also measured differences in concerns and feelings while recreating alone and recreating with others, and in all five categories that they measured, there was a significant difference between recreating with others and recreating alone. Women have shown a preference for recreating in busier areas (Wesley and Gaarder, 2014) as well as for trails with less dense vegetation (Jansson et al., 2013).

Continued research focused on gender in PPA's has implications for park managers and planners. It is important to understand the setting preferences of various gender identities- this may result in more complex planning of park facilities, trail design, representation in promotional materials and presence of law enforcement (Virden & Walker, 1999). Manning (2011) writes that stronger representation of non-male PPA employees should be an important focus of agencies and employers. He also notes that

managers should consider gender specific programming within their parks and think of gender specific safety concerns while designing trails and activity areas.

Local Ecological Knowledge (LEK)

The concept of Local Ecological Knowledge is studied prolifically in the field of fisheries management (Murray et al., 2006; Farr et al., 2013). LEK can be described as a social and cultural knowledge system, but it is also dynamic in that it incorporates a generation's experience, understanding, and needs regarding natural resources (Davis & Wagner, 2003). Local resource users are an integral part of ecosystem management and LEK creates a link between citizen knowledge and established science (Gadil et al., 2003).

The fields of visitor use management and recreation ecology have borrowed the original concept of LEK and adapted it to fit the needs of the field. Measures of ecological knowledge often ask the survey respondents to self-report levels of knowledge about local ecological systems, plants, animals and minimum impact education (D'Antonio et al., 2012). By gauging visitor's levels of LEK, managers can better understand where they should focus interpretive resources and guide communications regarding natural resources and management actions (D'Antonio et al., 2012). It is important for managers is urban-proximate PPA's to understand levels of ecological knowledge of their visitors to help reduce the urban-rural and urban-natural binary and to understand what topics would be most important to focus environmental education

programming on (Cebrián-Piqueras et al., 2020). The scale we used to measure LEK is adapted from the National Park Service's "Pool of Know Questions", a statistically tested and validated set of questions utilized in visitor use research (National Park Service, 2019).

Methods

Project Purpose

This study is part of a larger multi-year project assessing visitor use and resource impact across the Nature Reserve of Orange County, CA USA. Main project coordination is through the Natural Communities Coalition, a non-profit based in Irvine, California, USA focused on landscape-scale habitat conservation across twenty-two reserve units in the County (NCC, 2021). Through this work with NCC we have coordinated four field seasons of social science and ecological data collection throughout several coastal and inland PPA's within the reserve. This study was in an effort to assess baseline conditions of resource conditions and understand visitor valuation of the Reserve.

The goal of this portion of the study was to determine different visitor characteristics and understand their influence on levels of acceptability for social and ecological resource conditions. Using existing literature in the field we identified activity type, gender, race and LEK as variables that could potentially influence normative evaluations.

Study Location

This study took place in Orange County California, USA, which is a metropolitan area located between Los Angeles and San Diego and has a population of approximately 3.2 million people (U.S. Census Bureau, 2021). We sampled visitors at four different urban-proximate wildlands within the county; Crystal Cove State Park (CCSP), Laguna Coast Wilderness (LCW), Whiting Ranch Wilderness Park (WHRA) and Peters Canyon Regional Park (PECA). These parks are situated in a California Chaparral and Woodlands Ecoregion and are home to a variety of endangered species that are protected under state and federal endangered species act legislation (R.J. Meade Consulting, 1996). CCSP and LCW are proximate to the coast and PECA and WHRA are located inland. Both coastal and inland regions provide for excellent recreation opportunities including hiking, mountain biking, birding, backpacking and horseback riding.

The PPA's chosen for this study are classified as urban-proximate wildlands under the traditional definition; a park or wildland within a 100-mile radius of 1 million people or more (Ewert, 1998). Although urban-proximate wildlands differ from traditional wildland settings, they have been proven to meet the experiential needs of outdoor recreationists despite their unique location (Andereck & Knopf, 2007). These wildlands are characterized by higher levels of year-round use (Budruck & Manning, 2004) and more frequent use from individual visitors (Kil et al., 2014). Urban-proximate PPAs have their own unique management problems to solve, part of this is identifying and managing acceptable levels of resource impacts (Budruk & Manning, 2004).

Design

These data were collected in May of 2021 in four PPAs in Orange County, California, USA. Using a stratified random sampling design, visitors were administered a 5-10-minute survey (see Appendix) on an iPad via the Qualtrics XM platform (Qualtrics XM, 2022), a survey design and administration user interface. Visitor questionnaires were administered at trailheads at Crystal Cove State Park (CCSP), Whiting Ranch Wilderness Park (WHRA), Laguna Coast Wilderness (LCW) and Peter's Canyon Regional Park (PECA) from park open to park close (approx. 7am-7pm). Sampling days were scheduled to ensure a stratified spatial and temporal sample that captured weekday and weekend visitation at each park as well as various times of peak use. Following the structure of a random-intercept sampling design, six visitors were approached each hour and asked to participate in the survey. If a visitor declined, researchers approached the next passing visitor to see if they were willing to participate until one agreed. Non-response data was collected from visitors who declined to participate in the survey to account for a non-response bias in the data analysis. Surveys were conducted over 22 days across the four parks.

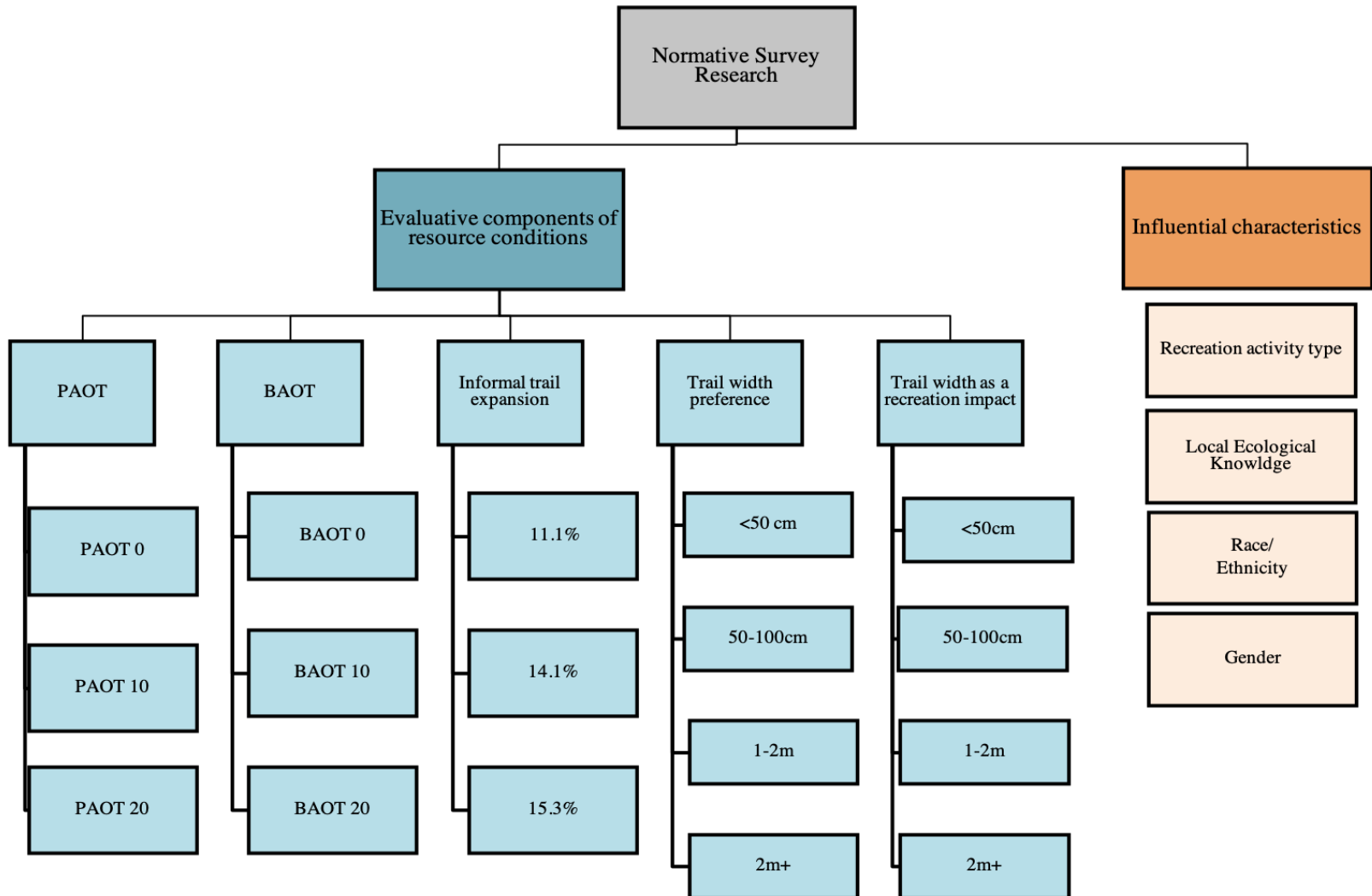


Figure 14. Conceptual design of survey components

Data Analysis

All data were analyzed using SPSS (IBM, 2021) a statistical software program geared to the social sciences.

The four independent variables used in this analysis were activity type, gender, race and self-reported levels of LEK. To run a post-hoc analysis for a one-way ANOVA in SPSS, some response options needed to be removed due to low sample sizes. For race, American Indian or Alaskan Native and Native Hawaiian or Pacific Islander were removed. Horseback riding was the only activity type removed due to a low response rate (N=1). And for gender we needed to remove non-binary and gender-queer or gender non-conforming from the ANOVA analysis. For LEK, visitors answered six questions adapted from the National Park Service Pool of Known Questions (National Park Service, 2019) and could respond with “not familiar at all”, “moderately familiar” and “very familiar”. A similar scale was utilized by D’Antonio et al., (2012) to assess levels of visitors LEK in Rocky Mountain National Park. The sum of each response (max of 18) was divided by the number of LEK questions (N=6) to assign visitors a score of 0-3. We then categorized each response score into a level of ecological knowledge; low (0-.9), moderate (1-1.9) and high (2-3).

The dependent variables for this study were five different measures of social and ecological resource conditions. People at one time (PAOT), bikers at one time (BAOT), informal trail proliferation, trail width as a recreation preference, and trail width as an impact from recreation. For PAOT, BAOT and informal trail proliferation we chose three

out of the five images from each series; the lowest, the middle and the highest level of resource impact. PAOT and BAOT were measured in counts of people in each image, One-way ANOVAs were conducted at counts of 0, 10 and 20 people or bikes per image. Similarly, different points along the social norm curve were chosen for analysis rather than just the threshold to better understand evaluations at multiple levels. Informal trail proliferation was measured by calculating the percentage of exposed soil in each image simulation; this calculation was done in ArcMap (ESRI, 2021) GIS software using an image classification analysis. One-way ANOVAs were completed at 11.1%, 14.1% and 15.3% of soil exposure (see fig. 13). For trail width we measured at each width since there were only four images that corresponded with commonly measured trails widths; <50cm, 50-100cm, 1-2m and 2m+. A One-way ANOVA was run at each of these trail width points.

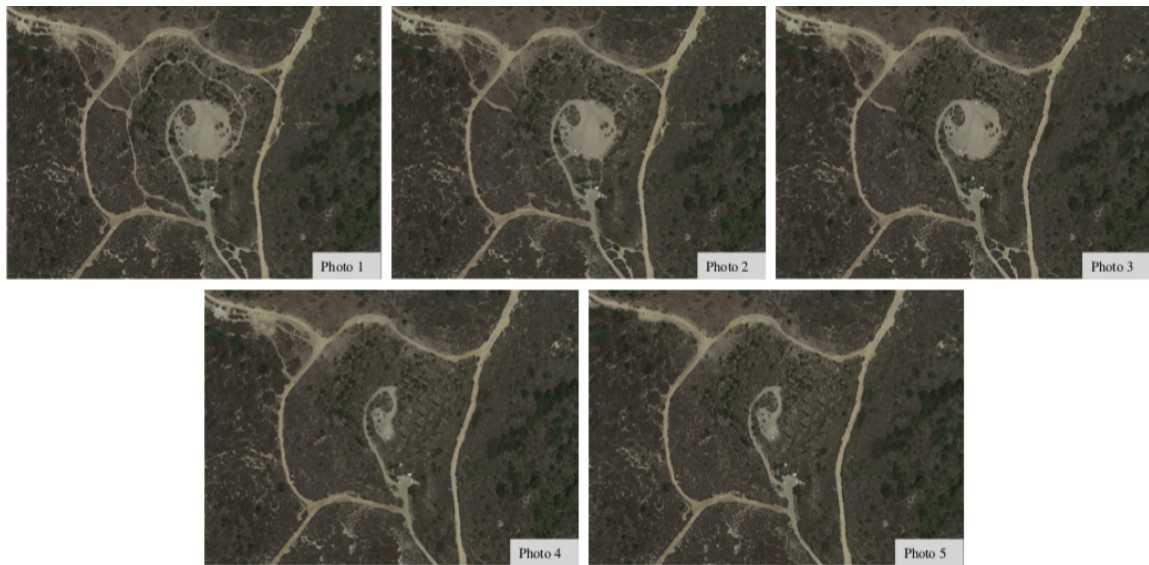


Figure 15. Visual simulation series depicting five different levels of informal trail proliferation.

Results

Survey Response

1415 surveys were solicited from visitors to four parks within the NROC. We received 908 responses for a total response rate of 64.2%. Despite Orange County's diverse population, our sample was still dominated by responses from well-educated, Caucasian, high income individuals. Of non-respondents, the most frequent reason most visitors noted for not participating was that they did not have enough time (N=292) with the next most prevalent response being "not interested" (N=203). Only two (N=2) visitors did not participate due to safety concerns because of Covid-19.

Table 3. Demographic Characteristics of Study Participants

Characteristic	N	%
Gender		
Male	488	54.7
Female	389	43.6
Non-Binary	1	0.1
Gender-queer or Non-Conforming	1	0.1
Prefer not to answer	10	1.1
Self-Identify	3	0.3
Race		
Asian	109	12.3
American Indian/Alaska Native	1	0.1
Black/African	13	1.5
Hispanic/LatinX	144	16.2
Middle East/Northern Africa	7	0.8
Hawaiian/Pacific Islander	8	0.9
White	509	57.2
Don't Know	23	2.6
Self-Describe	20	2.2
Multi-Racial/Multi-Ethnic	55	6.2
Income		
<35k	74	8.9
35-50k	58	7
50-75k	91	10.9
75k-100k	117	14.1
100-150k	143	17.2
150-200k	136	16.3
200k+	213	25.6
Education		
High School Graduate or Less	57	6.4
Some College/Associates Degree	177	20
B.A/B.S.	392	44.2
M.S./Ph.D./J.D./M.D.	261	29.4
Mean Age	45	

In addition to demographic information, we collected information on several recreation characteristics to be used for ANOVA analysis, including activity type and local ecological knowledge (LEK). Walking/hiking (N=638) was the most common activity type amongst survey responses, followed by biking (N=168) and running (N=59). A majority of visitors (N=517) have a moderate level of LEK with high levels of LEK being the next highest (N=280).

Table 4. Recreation Characteristics of Survey Respondents

Characteristic	N	%
Activity Type		
Walk/Hike	638	70.3
Running	59	6.5
Biking	168	18.5
Dog walking	23	2.5
Horseback riding	2	0.2
Other (Please specify)	16	1.8
Local Ecological Knowledge		
Low	70	8.1
Moderate	517	59.6
High	280	32.3

Mean Acceptability and One-Way ANOVA Results

People at one time

For PAOT 0 we found that race was the only significant variable tested ($p < .001$). A Games-Howell pairwise comparison concluded that Hawaiian/Pacific

Islander was significantly different than Asian ($<.001$), Hispanic/LatinX ($<.001$), Caucasian ($<.001$) and “self-describe” (.016). Caucasian was also significantly different from Hispanic/LatinX (.025). Race was also significant for PAOT 10- however, there were no significant post-hoc values between the different categories

Table 5. Mean Acceptability and One-Way ANOVA Results for People at One Time

Characteristic	PAOT 0		PAOT 10		PAOT 20	
	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.
Gender		0.357		0.817		0.638
Male	2.57 ^b		1.0		-1.7	
Female	2.64 ^b		1.0		-1.9	
Prefer not to answer	1.5		.30		-2.30	
Self-Describe	4.0		1.33		-.67	
Race		<.001*		0.033*		0.22
Asian	2.64 ^b		1.4		-2.0	
Black/African	1.3		2.3		-0.5	
Hispanic/LatinX	1.9 ^b		1.2		-1.5 ^b	
Middle East/North Africa	3.0		1.0		-3.1	
Hawaiian/Pacific Islander	3.9		1.8		-2.4	
White	2.78 ^c		0.8		-1.8	
Don't Know	2.5		0.5		-1.8	
Self-Describe	1.05 ^b		1.6		-0.9	
Multi-Racial/Multi-Ethnic	3.0		1.0		-1.9	
Activity Type		0.452		0.775		0.18
Walk/Hike	2.54		1.04		-1.62	
Running	2.32		0.95		-2.15	
Biking	2.76		0.84		-1.93	
Dog walking	2.35		0.7		-2.74	
Other	3.06		0.44		-2.25	
LEK		0.688		0.251		0.751
Low	2.6		1.1		-1.6	
Moderate	2.5		1.1		-1.8	
High	2.7		0.8		-1.7	

^{b, c} denotes significant interactions in Games-Howell post hoc test

Bikes at one time (BAOT)

Similar to PAOT 0, Race was significant ($<.001$) for BAOT 0. Games-Howell post-hoc test showed a significant difference between White and Hispanic/LatinX (.002) with a mean difference of $-.92$ (see Table 6). Activity type was significant for BAOT 10 with bikers perceiving fellow bikers more favorably than other activity types do. All other activity types had evaluations below the threshold point for BAOT 10. Post-hoc tests resulted in significant differences between Bikers and Walk/Hike ($<.001$), Runners (.049), and dog walkers ($<.001$) as well as between Walk/hikers and dog walkers (.013).

Table 6. Mean Acceptability and One-Way ANOVA Results for Bikes at One Time

Characteristic	BAOT 0		BAOT 10		BAOT 20	
	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.
Gender		0.489		0.066		0.269
Male	2.9 ^b		-0.5		-2.6	
Female	2.94 ^b		-0.8		-2.9	
Prefer not to answer	2.1		0.0		-3.4	
Self-Describe	4.0		-2.3		-2.7	
Race		<.001		0.33		0.618
Asian	2.8		-0.8 ^b		-2.9 ^b	
Black/African	1.5		-0.2		-2.0	
Hispanic/LatinX	2.24 ^b		-0.4 ^b		-2.6	
Middle East/North Africa	3.1		-2.4		-4.0	
Hawaiian/Pacific Islander	3.0		-0.1		-3.0	
White	3.2		-0.7		-2.8	
Don't Know	3.2		-0.7		-2.7	
Self-Describe	2.9		-1.1		-2.5	
Multi-Racial/Multi-Ethnic	3.0		-0.2		-2.6	
Activity Type		0.066		<.001*		0.158
Walk/Hike	2.85 ^b		-0.75 ^b		-2.7	
Running	2.6		-0.86 ^b		-3.0	
Biking	3.2		0.16		-2.4 ^b	
Dog walking	2.6		-1.96 ^{bc}		-3.5	
Other	3.6		-1.12		-2.5	
LEK		0.162		0.824		0.806
Low	3.0		-0.6		-2.6	
Moderate	2.8		-0.6		-2.7	
High	3.1		-0.7		-2.7	

^b denotes significant interaction from a Games-Howell post hoc test

Informal trail proliferation

At Photo 1 (11.1%), Photo 3 (14.3%) and Photo 5 (15.1%) self-reported LEK was a significant indicator ($p < .001$) of acceptability. At Photo 1 individuals with a high level of LEK reported the lowest acceptability level ($M = .8$) and were significantly different than those with a low level of LEK ($p < .001$) and a moderate level of LEK ($p = .025$). Individuals with a moderate amount of LEK were also significantly different than those with both low ($p = .025$) and high ($p = .025$) levels of LEK. Individuals with a high amount of LEK were also significantly different from others with low ($p = .001$) and moderate ($p = .004$) levels of LEK for Photo 3. Visitors with high levels of LEK consistently report the lowest mean acceptability for each photo. Photo 5 was significant at every interaction with the exception of the interaction between low and moderate levels ($p = .199$).

Activity type was also significant ($p = .023$) at Photo 5 (15.3%). Walk/hikers viewed this condition most favorably ($m = -.2$) with bikers viewing it marginally less acceptable ($m = -.3$). A Games-Howell pairwise comparison did not result in any significant differences between activity types.

Table 7. Mean Acceptability and One-Way ANOVA Results for Informal Trail Proliferation

Characteristic	Photo 1 (11.1%)		Photo 3 (14.1%)		Photo 5 (15.3%)	
	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.
Gender		0.575		0.642		0.872
Male	1.2		0.6		-0.4	
Female	1.3		0.7		-0.3	
Prefer not to say	2.1		1.4		0.0	
Self-Describe	0.3		0.3		-0.3	
Race		0.498		0.549		0.453
Asian	1.4		0.9		-0.1	
Black/African	2.4		1.6		0.4	
Hispanic/LatinX	1.0		0.6		-0.1	
Middle East/North Africa	1.7		1.0		0.5	
Hawaiian/Pacific Islander	0.9		-0.5		-1.5	
White	1.2		0.6		-0.5	
Don't Know	1.4		0.3		-0.2	
Self-Describe	1.1		0.6		0.6	
Multi-Racial/Multi-Ethnic	1.6		0.9		-0.4	
Activity Type		0.969		0.371		0.023*
Walk/Hike	1.2		0.7		-0.2	
Running	1.4		0.5		-0.8	
Biking	1.2		0.8		-0.3	
Dog walking	1.3		0.4		-1.0	
Other	1.5		-0.2		-2.1	
LEK		<.001*		<.001*		<.001*
Low	2.0		1.3		0.4	
Moderate	1.3 ^b		0.8 ^b		-0.2 ^b	
High	0.8 ^{bc}		0.2 ^b		-0.9 ^b	

^{b, c} denotes significant interactions in Games-Howell post hoc tests

Trail width as a recreation preference

Gender influences the acceptability of trail width at the three levels examined; 50-100cm ($p=.008$), 1-2m ($p<.001$), and 2m+ ($<.001$). Females consistently view greater trail widths as more acceptable than males. The greatest mean difference is at 2m+ ($\Delta 0.8$) where the interaction between males and females is also statistically significant ($p<.001$).

Activity type is also a predictor of acceptability at the 2m+ trail width ($p=.004$) with walk/hikers viewing this trail more favorably than other activity types ($M=2.1$). Games-Howell post-hoc test result in a significant difference ($p=.006$) between walk/hikers and bikers. Additionally, LEK is significant at 2m+ ($p<.001$). There were significant pairwise comparisons between high levels of LEK and low ($p<.001$) and moderate ($p=.003$) levels of knowledge.

Table 8. Mean Acceptability and One-Way ANOVA Results for Trail Width Preference

Characteristic	<50cm		50-100cm		1-2m		2m+	
	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.
Gender		0.107		.008*		<.001*		<.001*
Male	2.7		2.4		2.5		1.6	
Female	2.6		2.7		2.9		2.4	
Prefer not to answer	1.3		1.3		1.4		2.0	
Self-describe	2.3		2.0		2.7		1.0	
Race		.05*		0.184		0.358		0.125
Asian	2.6		2.7		2.8		2.4	
Black/African	2.3		2.6		3.0		2.5	
Hispanic/LatinX	2.2		2.2		2.5		2.3	
Middle East/North Africa	2.3		2.4		2.6		2.3	
Hawaiian/Pacific Islander	3.4		3.4		3.3		2.5	
White	2.8		2.5		2.6		1.8	
Don't Know	2.3		2.0		2.0		1.7	
Self-Describe	2.8		2.1		2.5		1.6	
Multi-Racial/Multi-Ethnic	2.8		2.5		2.7		1.7	
Activity Type		0.221		0.765		0.601		0.004*
Walk/Hike	2.6		2.5		2.7		2.1	
Running	2.9		2.5		2.6		1.8	
Biking	2.9		2.3		2.4		1.3	
Dog walking	2.0		2.3		2.4		2.0	
Other	2.9		2.6		2.6		1.8	

LEK		0.091		0.449		0.231		<.001*
Low	2.4		2.7		2.8		2.5	
Moderate	2.6		2.5		2.7		2.1	
High	2.8		2.4		2.5		1.5	

Trail width as a recreation impact

Despite only one classification of visitor viewing any width of trail as unacceptable (“other” $m=-.3$), trail width as a recreation impact proved to be significantly influenced by several visitor characteristics. Gender was a significant indicator at a trail width of $<50\text{cm}$ with a mean difference of $.4$ between males and females. Race was a significant indicator at $<50\text{cm}$ ($p=.003$) and $2\text{m}+$ ($p=.019$). At $<50\text{cm}$ there is a significant post hoc relationship between Caucasian and Hispanic/LatinX individuals ($.005$). Again, at $2\text{m}+$ there is also a significant interaction, albeit a less strong relationship, between Caucasian and Hispanic/LatinX individuals ($.047$). At $<50\text{cm}$ activity type is a significant ($p=.012$) indicator of mean acceptability with bikers finding the trail width to be most acceptable ($m=2.7$). Games-Howell pairwise comparison shows a significant interaction between walk/hikers and bikers ($p=.001$). Additionally, LEK is significant at a trail width of $2\text{m}+$ with significant post hoc relationships between those with low and high levels of LEK ($p=.018$) and moderate and high level ($p=.034$).

Table 9. Mean Acceptability and One-Way ANOVA Results for Trail Width as a Recreation Impact

Characteristic	<50cm		50-100cm		1-2m		2m+	
	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.	<i>M</i>	sig.
Gender		0.037*		0.281		0.228		0.081
Male	2.4		1.7		1.6		0.4	
Female	2.0 ^b		1.7		1.8		0.9	
Prefer not to answer	1.6		1.9		1.6		1.1	
Self-Describe	2.3		-0.3		1.0		-0.3	
Race		0.003*		0.945		0.772		0.019*
Asian	2.2		1.7		1.8		0.7	
Black/African	1.5		1.5		1.8		2.4	
Hispanic/LatinX	1.6 ^b		1.6		1.6		1.2	
Middle East/Northern Africa	2.7		2.3		2.4		1.4	
Hawaiian/Pacific Islander	2.1		2.0		2.0		0.5	
White	2.4		1.8		1.7		0.4 ^b	
Don't Know	2.0		1.5		1.4		0.7	
Self-Describe	2.1		1.9		1.5		1.1	
Multi-Racial/Multi-Ethnic	2.1		1.6		1.3		0.1	
Activity Type		0.012*		0.913		0.957		0.306
Walk/Hike	2.1 ^b		1.7		1.7		0.7	
Running	2.3		1.9		1.6		0.5	
Biking	2.7		1.8		1.8		0.4	
Dog walking	2.6		1.8		1.7		0.1	
Other	2.5		1.4		1.4		-0.3	
LEK		0.153		0.372		0.828		0.005*
Low	2.0		2.0		1.8		1.3	
Moderate	2.1		1.6		1.7		0.7 ^b	

High

2.4

1.7

1.6

0.2^b

Discussion

Urban-proximate PPAs provide for unique recreation opportunities due to their proximity to large residential areas in the urban-rural fringe (Arnberger and Brandenburg, 2007). PPA's near urban areas are characterized by higher year-round use and have a more diverse racial and cultural diversity than traditionally studied backcountry areas and have their own complex managerial problems, one of them being identifying acceptable levels of resource conditions (Budruk and Manning, 2004). By identifying the acceptability of social and ecological conditions we can provide empirical data to managers to assist in the decision-making process for management actions. We decided to analyze the acceptability of each condition by various visitor characteristics in order to better understand the visitors to the NRCO to provide more detailed information to managers and stakeholders.

Understanding perceived levels of crowding within the Reserve was a primary goal of this study. We found an interaction between race and acceptability of crowding with a significant relationship between Caucasians and Hispanic/LatinX individuals at PAOT 0. Hispanic/LatinX individuals viewed PAOT 0 less acceptable than Caucasian individuals which aligns with past findings that Hispanic/LatinX individuals prefer socialization and collectivism while recreating (Payne et al., 2002; Cordell et al., 2002). Thomas et al., (2022) found that LatinX individuals expected larger crowds on recreation lands than Caucasian individuals which may be why they view zero people on a trail segment as less acceptable. LatinX individuals also tend to recreate with larger groups of

family and friends (Chavez, 2001; Chavez & Olsen, 2009) making them less sensitive to large groups around them since they are in one themselves.

Wesley and Gardner (2004) collected qualitative statements from women in an urban-proximate park in Arizona in which several women noted a preference for recreating in busier parks or on more populated trails to increase their perceptions of safety. Women also noted the tradeoff they make- by recreating in busier areas to feel safer they are giving up aspects of solitude in their recreation experience. Despite previous literature suggesting that women prefer to recreate in wildland areas that are more populated due to perceptions of safety, we did not find any differences between males and females' acceptability of levels of crowding in our study.

Due to previous statements of conflict from different activity types provided by recreationists in the NROC in previous survey years, we expected to see differences between activity types for PAOT. However, activity type was not a significant variable in predicting acceptability of crowding. Covid-19 has also caused an uptick in park visitation over the past two years so we have reason to believe that some people are welcoming of this change despite the fact that it is making parks busier.

For BAOT the most notable relationship was between activity type at BAOT 10 ($p < .001$). The range of acceptability for this condition between activity types was 0.2 to -2 (see table 6). Bikers were the only activity type to view 10 BAOT at acceptable, with the smallest mean difference being 1. This finding suggests that bikers are more tolerant than other activity types of other bikers. Carothers et al. (2001) found that hikers were

more likely than bikers to report conflict with mountain bikers. This may be due to intragroup relationships and a sense of belonging within their specific activity group.

We chose to study informal trail proliferation at the park level so that visitors could understand the connection of informal trails and formal trails across the landscape. We found that activity type was a significant variable for Photo 5, the photo that depicted the most amount of exposed soil, therefore the most proliferation of informal trails across the park. Walkers/hikers and bikers viewed Photo 5 more favorably than the other activity types (see table 7). In conversations with visitors during the sampling period some expressed preference for more trails regardless of who created them. Specifically, throughout the Reserve there are well known mountain biking trails cherished by that community that are not park sanctioned trails- in LCW specifically, one of the most popular mountain biking trails used to be a visitor-created trail. To improve relationships with the biking community the park adopted the trail and now regularly maintains it as a formal trail. Farrell et al., (2001) found that visitors are more accepting of vegetation loss when it enhances the utility of the area- in this case trails.

Existing literature in recreation management has found that people with higher levels of local ecological knowledge tend to be more aware of and sensitive to ecological impacts in PPA's. A study done in Rocky Mountain National Park found a significant positive relationship between LEK and noticing resource impacts and being affected by resource impacts (D'Antonio et al., 2012). In this study, a majority of visitors reported having a moderate level of LEK which matches the distribution of self-reported LEK in

our study. Consistently across all three photos simulating the condition, LEK was a significant variable for predicting the acceptability of informal trail proliferation. Individuals with a high level of LEK reported on average an acceptability score that was 1.3 points lower on the acceptability scale than individuals with a low level of knowledge. There was also a consistent interaction between individuals with a moderate level of knowledge and those with a low level- suggesting that anyone with a moderate to high level of LEK are sensitive to resource impacts in PPAs.

As hypothesized, gender plays a significant role in perceptions of the acceptability of trail width. Past studies have concluded that women show a preference for trails where they have a wide view of the area around them and trails that are not forested or have dense vegetation on the sides (Jansson et al., 2013; Carr, 2000). Women ranked the two widest trails as significantly more acceptable than males showing the greatest preference for trails that were 1-2m wide.

As expected from conversations with bikers within the parks and personal awareness of the sport, bikers show a greater preference for trails that are <50cm (common width of single-track trails). Bikers were also the group that viewed trails of 2 meters plus in width as the most unacceptable, however it is important to note that their acceptability score never crossed the threshold of 0, meaning that all trail conditions fell in the acceptable range. The significant interaction between bikers and hikers at the 2m+ width is likely due to conflict between bikers and hikers within the Reserve. Walkers/hikers likely show a greater preference for the 2m+ trail than bikers because of

the ability to see when bikers are coming and narrow single-track trails do not always allow for that safety measure.

We recognize that measuring only trail width as an indicator of recreation impact does not fully encapsulate all the possible ecological measures for this impact- however, it is a likely impact resulting from increased use and was a manageable indicator to simulate across a series of images. Leung and Marion (1996) established that both trail width and incision are the primary indicators of trail impacts. Across the Reserve there are trails of all measured widths from single track (<50cm) to dirt roads (2m+) used for fire crew and utility access. Commonly the roads are used to access the single-track trails and create a trail network that visitors use throughout their visit to create loops and extend their trip. The safety aspects (fire and utilities) of the 2m+ trails are acknowledged by visitors as a necessary component of the landscape, but visitors anecdotally noted disapproval of trails that used to be single trail but have now widened to the 2m+ width due to increased use. Marion and Leung (2001) categorized excessive trail width as trails of >3ft to 6ft (.9m to 1.8m). Corresponding to the images we used in this study, excessive width categorization is assigned to the 1-2m photo and the 2m+ photo.

Gender produced a significant relationship ($p=.037$) for trail width as a recreation impact, men consistently viewed wider trails as more unacceptable than females. While there is nothing in the literature to suggest this relationship, we hypothesize that perceptions of perceived safety may linger in females' perceptions of trail width even as it pertains to ecological impacts.

Understanding visitors' knowledge of habitat conservation and local ecological issues is a primary interest to Reserve stakeholders. Race proved to be a significant predictor for acceptability of trail width expansion due to recreation impacts. Visitors of non-Caucasian races showed higher levels of acceptability for excessive trail widths than Caucasian respondents (see table 9). This finding suggests that minimum impact education such as the seven Leave No Trace Principles may not be reach non-white visitors as well. Few studies have looked at factors that influence perceived levels of minimum impact knowledge (Clark et al., 2020; Lawhon et al., 2013), but none have looked specifically at the impact of race as an influential factor on levels of Leave No Trace knowledge. This knowledge gap in the research likely parallels the knowledge gap in LNT principles in underrepresented communities in outdoor recreation. Additionally, high levels of LEK were associated with lower levels of acceptability for excessive trail widths which was expected due to findings that knowledge about resources has shown to influence negative evaluations of depreciative behavior and ecological impacts (D'Antonio et al., 2012).

Conclusion

This research contributes to the growing body of contemporary literature pertaining to outdoor recreation social norms and normative evaluations of ecological resources. This research expands the study of norms into urban-proximate wildlands and

uses commonly defined visitor characteristics as potential influential factors of resource evaluations. We found that some of the stated preferences of user groups translated into matching evaluations of social and ecological impacts which suggests a relationship between perceptions and evaluations of observed conditions. Additionally, this research sought to include the evaluations of underrepresented groups in recreation research. Despite our best efforts to capture a highly demographically diverse sample, we acknowledge that recreation research tends to favor traditionally white, male and well-educated individuals. However, we are excited to contribute to the growing body of literature with the findings of our study specifically pertaining to race and gender. There are still critical knowledge gaps in public land management research pertaining to race and underrepresented populations. As minority populations continue to grow and as these groups increase participation in outdoor recreation, especially in areas surrounding urban-proximate wildlands, continuing research in this study area is pertinent.

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CHAPTER 4 - CONCLUSION

One of my major motivations for starting a Master's program came from interactions with youth and adults while working in Outdoor Education in Michigan. During this time, I began to learn about individuals' experiences with the natural environment and outdoor recreation and how attitudes and perceptions pertaining to the outdoors vary between groups of people. This motivated me to apply to M.S. programs that would allow for a multidisciplinary study of recreation and the environment. During the start of my degree program and work on the Orange County project the need for normative assessments of social and ecological conditions was identified in alignment with project deliverables. It soon became clear that little existing norms literature focused on urban-proximate PPA's or influential factors of normative evaluations. This gap in the literature pushed me to develop a thesis surrounding the establishment of normative thresholds for urban-proximate PPA's and to identify and test visitor characteristics that have an influence on the evaluations.

It is my hope that this work opens the door to other studies of similar focus. Urban-proximate PPA's provide access to wildland recreation for folks who live in and around high-density populations. They provide for a wide variety of outdoor recreation activities and incur high use levels due to their proximity to urban centers and likelihood of daily use from routine visitors. With increasing populations in urban areas across the United States urban-proximate parks will play a large role in the development of

recreation skill and environmental knowledge and behaviors. These parks will require new and innovative approaches to management. While this research can be broadly applied to other urban-proximate PPA's it should not be used as the only informing factor.

It was incredibly important to me to be involved in research that contributed in some way to understand the perceptions and opinions of underrepresented visitors. I hope that my conclusions about the differences between racial and ethnic groups' perceptions of resource conditions help to bring light to the voices of these populations and their recreational behaviors and values. With the conclusions derived from this research, it would be great to see management agencies and organizations like Leave No Trace design minimum impact education programs for urban communities and underrepresented visitors. Unfortunately, we were not able to capture a sample of individuals identifying outside of the gender binary. Survey research has always favored the "traditional" recreationist and has been historically poor at capturing the responses of underrepresented populations. Hopefully continued research in urban-proximate PPAs provides an avenue for sampling and obtaining survey responses from diverse populations.

During this process, I was heavily drawn to the work of Patricia Winter and Deborah Chavez out of the USDA Forest Service Pacific Southwest Research Station. Their work focusing on the study of urban-proximate and urban National Forests was influential in the initial research through the writing process of this thesis. These women

have done an excellent job at assessing the visitor base of these PPA's and including the voices of diverse populations into recreation management research and I have been incredibly inspired by their work. Most of their research is focused in Southern California and provided an avenue to understanding the recreation behavior and preferences of urban-proximate recreationists and conducting research with diverse populations. I hope there is a group of rising researchers and managers that continue on with the work that they have already completed in order to make PPA's managed for and more accessible to underrepresented groups.

Ultimately this work and these data will be presented and provided to the management agencies of the NROC and the NCC to be a piece of empirical information to assist in the creation of management actions. These data provide a baseline evaluation of social and ecological resource conditions within the reserve and allow for managers to repeat this study at a later date to understand if the acceptability of conditions shift over time.

There are many challenges facing the PPA's in the future- climate change, increased visitation, natural resource extraction and shifting political ideologies towards land management. It is my hope that these challenges fuel continuous research in efforts to protect and restore these wildland landscapes for generations to come. I feel incredibly fortunate to be able to contribute to the literature and provide work that may make an impact in the field and within PPA's and equip managers with the data and tools they need to solve complex management issues.

APPENDIX

2021 Normative Survey

ORCO Norm Survey

Start of Block: Survey Intro

Q1.1 Which Park are you visiting today?

- Crystal Cove State Park*
- Laguna Coast Wilderness Park*
- Peters Canyon Regional Park*
- Whiting Ranch Wilderness Park*

Q1.3 Purpose:

You are invited to participate in a research study conducted by Dr. Chris Monz, a professor of Recreation Resource Management at the Department of Environment & Society at Utah State University. The purpose of this research is to understand visitor recreation experience preferences, motivations, and values to help management plan for high-quality and sustainable recreation in Orange County Parks and Protected Areas.

Participation in this Study: By continuing on to the survey, you agree to participate in this study. You indicate that you understand the risks and benefits of participation and that you know what you will be asked to do. You also agree that you have asked any questions you might have and are clear on how to stop your participation in the study if you choose to do so. Please be sure to retain a copy of this form for your records.

Q1.4 Would you like to participate in this survey?

Yes

No

End of Block: Survey Intro

Start of Block: NR Visitor Characteristics

Q2.1 What was your primary constraint for not participating in this survey?

Language Barrier

Not enough time

No Interest

Safety concerns due to COVID-19

Other _____

Q2.2 How many people are in your group?

Q2.3 What was the primary activity you planned to participate in during your visit?

- Walking/Hiking*
- Running*
- Biking*
- Dog walking*
- Horseback riding*
- Other (Please specify)* _____
-

Q2.4 Non-Response Survey ID Label

End of Block: NR Visitor Characteristics

Start of Block: Visitor Characteristics

Q3.1 Survey ID Label

Q3.2 How many people are in your group?

Q3.3 What was the primary activity you planned to participate in during your visit?

- Walking/Hiking*
- Running*
- Biking*
- Dog walking*
- Horseback riding*
- Other (Please specify)* _____
-

Q3.4 How often have you visited this Park before today?

	Never	About once a month	About once every other week	About once a week	Multiple times per week
In the Past Year	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the Past 5 Years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In Your Lifetime	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Visitor Characteristics

Start of Block: Normative Evaluations

Q5.1 NOTE: At this point in the survey, please ask the researcher for the photo series binder to answer the following questions.

Q5.2 Please review the first series of images and rate the acceptability of the number of people for the section of trail in each image.

	Extremely unacceptable (-4)	Very unacceptable (-3)	Moderately unacceptable (-2)	Slightly unacceptable (-1)	Slightly acceptable (+1)	Moderately acceptable (+2)	Very acceptable (+3)	Extremely acceptable (+4)
Photo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Extremely unacceptable (-4)	Very unacceptable (-3)	Moderately unacceptable (-2)	Slightly unacceptable (-1)	Slightly acceptable (+1)	Moderately acceptable (+2)	Very acceptable (+3)	Extremely acceptable (+4)
Photo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5.3 Please review the second series of images and rate the acceptability of the number of bikes for the section of trail in each image.

Q5.4 This is a photo of a park in Orange County that shows the expansion of informal trails due to recreation. Please review the third series of images and rate the acceptability of the presence of informal trails in each image.

	Extremely unacceptable (-4)	Very unacceptable (-3)	Moderately unacceptable (-2)	Slightly unacceptable (-1)	Slightly acceptable (+1)	Moderately acceptable (+2)	Very acceptable (+3)	Extremely acceptable (+4)
Photo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Extremely unacceptable (-4)	Very unacceptable (-3)	Moderately unacceptable (-2)	Slightly unacceptable (-1)	Slightly acceptable (+1)	Moderately acceptable (+2)	Very acceptable (+3)	Extremely acceptable (+4)
Photo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5.5 Please review the fourth series of images and rate the acceptability of these trails for your recreation experience in each image.

Q5.6 Please review the fifth series of images and rate the acceptability of the trail width due to recreation impacts in each image.

	Extremely Unacceptable (-4)	Very unacceptable (-3)	Moderately unacceptable (-2)	Slightly unacceptable (-1)	Slightly acceptable (+1)	Moderately acceptable (+2)	Very acceptable (+3)	Extremely acceptable (+4)
Photo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Photo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Normative Evaluations

Start of Block: Motivations, Experience Pref, Values

Q4.2 We would like to know more about your knowledge of ecological topics related to Orange County and Parks. For each item below, please rate your knowledge of

this topic as it relates to Orange County Open Spaces by checking the appropriate box.

	Not familiar at all	Moderately familiar	Very familiar
The effects of invasive species on plant and animal habitat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The effect of erosion on water quality and trail conditions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The effect of visitor-created trails on plant and animal habitat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The role of fire in the coastal sage scrub, chaparral, and mixed conifer forests of So. California	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Threatened or endangered species endemic to Orange County/So. California	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The importance of Orange County to migratory birds along the Pacific Flyway	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4.3 Below is a list of possible experiences you may want (prefer) to have while visiting lands in the Natural Reserve of Orange County. For each item,

please indicate how important each experience is to you on your visit to the Nature Reserve.

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
To test my abilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get away from the demands of life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To experience psychological renewal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To spend time with friends/family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get some exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To share an experience with friends/family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To learn about plants and wildlife	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be close to nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To experience a sense of challenge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To learn about the history and cultural significance of this area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To grow spiritually	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To experience a connection to nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To experience calmness or peace	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be in touch with spiritual values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To view scenic beauty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To experience a positive change in mood/emotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be away from crowds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To learn about conservation values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To improve physical health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4.4 For the following statements, please respond with your level of agreement.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
The landscape of Orange County says something about who we are as a community, and as a people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans have the right to use nature to meet our needs, even if this includes impacts that will take a decade or more to recover from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To say that natural areas have value just for themselves is a nice idea but we just cannot afford to think that way; the welfare of people has to come first.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My health or the health of my family is related one way or another to the natural environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to protect nature so we have clear air and water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My feelings about nature including all plants, animals, the land, etc. are part of who I am and how I live my life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Natural areas are important to me because I use them for recreation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We can lose Coastal and Chaparral ecosystems as long as we are keeping enough for the environment to function.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How I use the land, and its impact on plants and animals into the future, reflects my sense of responsibility and stewardship towards the land	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans have the right to use nature any way we want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Natural areas must be protected for my own and future generations use into the future	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Humans have a responsibility to
account for our own impacts to the
environment because they can harm
other people



End of Block: Motivations, Experience Pref, Values

Start of Block: Demographics

Q6.1 Which gender do you most identify with?

- Male*
 - Female*
 - Non-binary*
 - Genderqueer and or gender non-conforming*
 - Prefer not to answer*
 - Prefer to self-identify* _____
-

Q6.2 Which of the following race/ethnicity do you most closely identify with?

Answer only for yourself.

Please select all that apply:

- Asian*
- American Indian or Alaskan Native*
- Black or African*
- Hispanic or Latina/o/x*
- Middle Eastern or North African*
- Native Hawaiian or Pacific Islander*
- White*
- Don't know/Prefer not to respond*
- Prefer to self-identify _____*
-

Q6.3 What is the highest level of education you have completed?

- High School Graduate or Less*
- Some College/Associates Degree*
- B.A./B.S.*
- M.S./Ph.D./J.D./M.D.*
-

Q6.4 What is the Zip Code of your primary residence?

Q6.5 What year were you born?

Q6.6 Which category best represents your annual household income?

- \$35,000 or less
- \$35,000-\$50,000
- \$50,000-\$75,000
- \$75,000-\$100,000
- \$100,000-\$150,000
- \$150,000-\$200,000
- \$200,000 or more

End of Block: Demographics
