Nature Centers in Local Communities:

Perceived Values, Support Factors, and Visitation Constraints

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Abstract

This dissertation examines three relationships between nature centers and their local communities. First, what are the values provided by local centers as perceived by community members? Second, what factors lead community members to support local centers? And third, what are the constraints to visiting local centers as perceived by community members? We surveyed random samples of community members living around 16 diverse nature centers across the United States and conducted quantitative and qualitative analyses to address these questions. Chapter one introduces the study and provides a literature review of theories and empirical research related to the research questions. Chapter two reports the results of an exploratory factor analysis on the level of importance communities assign to fourteen nature center services. The factor analysis revealed four underlying values: environmental connection, leisure provision, civic engagement, and community resilience. Chapter three tests sixteen hypothesized predictors of community support for nature centers. All these variables were significant, suggesting people volunteer at, donate to, or respond to threats at nature centers for a range of reasons. These include those related to supporting nature center missions (e.g. environmental connection significance and commitment to nature) but also other reasons such as friends' and family's perceptions of nature centers and assessments of the center staff members. Chapter four explores constraints that emerge during different stages of the decision-making process people go through when considering whether or not to visit a local nature center. The greatest constraints emerge in early stages (e.g. center awareness) and late stages (e.g. limited finances, transportation, and time) of decision-making. Chapter five discusses the study's implications to theory, including ecosystem service and educational leisure setting valuation, environmentally significant and charitable support behavior, and leisure constraints, as well as nature center practice. Centers that consider these implications might better serve their local communities and achieve their missions.

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Chapter 1: Introduction

The construction of nature centers[1] proliferated during the U.S. environmentalism movement of the 1960s and 1970s (McNiel, 2011). Spurred by such events as the publication of Rachel Carson's *Silent Spring,* the Cuyahoga River fire, and the Santa Barbara oil spill, the U.S. citizenry increasingly became concerned about the urgency and impact of environmental issues. This fueled the creation of several regulatory and legislative authorities such as the Environmental Protection Agency, Clean Air Act, Clean Water Act, and Endangered Species Act. It also spurred the building of some of the oldest nature centers existing today in the United States, including Kalamazoo Nature Center (1960), The Wilderness Center (1964), Cincinnati Nature Center (1965), Baltimore Woods Nature Center (1966), Blandford Nature Center (1968), and Chippewa Nature Center (1969). In the next twenty years, rapid construction produced approximately 1,200 more nature centers across the U.S. and Canada (Touvell, 1990).

Many nature centers were built for the purpose of educating and informing the public about those environmental issues of increasing concern to communities (Bruner, 1972; Hoban, 1973; Jung & Tonso, 2006; Roller & Green, 1967). The Environmental Education Act - one major source of funds for these centers written in 1970 – supported "the planning of outdoor ecological study centers; to provide for community education programs on preserving and enhancing environmental quality and maintaining ecological balance" (Environmental Education Act of 1970, p. 1). The American Association for Museums - a professional organization which accredited nature centers - required that a center "manages and interprets its lands, native plants and animals and facilities to promote an understanding of nature and natural processes… and conducts frequent environmental education programs and activities for the public" (American Association of Museums, in Touvell, 1990, p. III). Studies in New York (Guzewich, 1978), Wisconsin (Cherem, 1974), and Maryland (Lustig, 1976) confirmed that nature centers during this time focused primarily on education about environmental issues.

The environmental movement has changed over the last 50 years. Many science writers and scholars now frame environmental issues within larger socio-ecological frameworks that incorporate local people's health and well-being into environmental sustainability. This is a

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[1] I use "nature center" as a term to describe a place focused on informal education about environmental issues. This definition could also include environmental education centers, outdoor education centers, natural science centers, and nature preserves, and interpretive centers (Masters, 1976).

change from earlier conceptualizations of "nature" by scientists and environmentalists in which pristine wilderness areas were understood as separate entities from human ecosystems (Cronon, 1996). Scientists in many fields of study, such as restoration ecology (Marris, 2011), conservation biology (Minteer & Miller, 2010), and natural resource management (Machlis et al., 1997), have begun talking about environmental conservation differently, and have included local communities into their management recommendations. Some evidence suggests the missions and goals of nature centers have expanded in similar ways, including such themes as improving communities' health and safety at the same time as providing environmental education and outdoor recreation programs (Leinbach, 2012; Price, 2013).

The intent of this study was to investigate the roles of nature centers in today's society. Three types of connection between nature centers and communities were included: reasons that community members value nature centers, factors that lead community members to support nature centers, and factors that prevent community members from going to nature centers.

Rationale

I studied nature center's perceived value and factors of support, because centers must constantly justify the funding they receive and these topics would help them to do so. Nature centers are non-profit organizations whose goals are environmental and public interest rather than profit generation. As a result, they must compete for limited resources, such as governmental funding and also public donations, volunteering, and political support. The more information organizations have about their worth in society, the better they can justify private donation requests and tax levies (Adams et al., 1992). Additionally, the more information organizations have about what factors lead people to support them, the better they can solicit private support (Park & Rhee, 2010). These pathways toward support would allow nature centers to better serve their local communities and thereby strengthen the connections with them.

I studied visitation constraints, because people who perceive direct benefit from an organization's existence are more likely to donate to them (Ostrander, 2007), volunteer for them (Donald, 1997), and politically support them (Stern, 2000). In addition, visitors of educational

leisure settings[2] (such as nature centers) are largely non-Hispanic whites earning above-average incomes (Andorka, 1999; Falk & Andelman, 2003; Falk et al., 2010; Floyd, 1999; Hong & Anderson, 2006; National Endowment for the Arts, 2009; Skibins et al., 2013 Steinhauer et al., 2007), and these settings' donors and volunteers have similar racial/ethnic and socio-economic makeups as their visitors (Taylor et al., 2011). Although non-Hispanic Whites currently compose the U.S. majority, census projections suggest this group will decrease in proportion to other races and ethnicities in future years and, by 2060, will be outnumbered by today's minority populations (U.S. Census Bureau, 2012). If center staff members don't work toward increasing perceived relevancy and helping diverse populations negotiate visitation constraints, they might witness increasingly lower numbers of visitors and supporters. It is for these reasons that Yocco et al. (2009) argued understanding visitation constraints and how to overcome them are one of the most pressing questions in the field of visitor studies.

Literature Review

Perceived Value

Research on communities' perceived value of local nature centers is limited. Most recently, Price (2013) conducted a mixed-methods study with visitors, members, staff members, and other stakeholders at Ijams Nature Center (Knoxville, TN) and found that all groups valued the center for three services it provided the community: environmental education programs, advocacy opportunities for environmental issues, and access to protected natural areas. In the 1980s, a census of staff members from United States and Canadian nature centers suggested they believed centers were valuable for environmental education provision as well as pro-environmental attitude and behavior encouragement (Touvell, 1990). In the 1970s, phone interviews with ten Wisconsin nature center staff members revealed that these people believed their centers were valuable for fulfilling cultural needs for aesthetic experiences, increasing awareness and respect for the natural world, and providing teaching laboratory experiences

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[2] I borrow this term from Packer (2004). Educational leisure settings are those that offer direct experience with real objects, people, or places; learning opportunities that are voluntary, frequently socially mediated, and based on the needs and interests of the visitor; and visitor bases comprised of individuals, small groups, or families of mixed sex, age, expertise, experience and learning style. These settings include, but are not limited to, nature centers, museums, science centers, botanical gardens, cultural and natural parks, zoos, and aquaria.

(Cherem, 1974). These studies generally suggest nature centers are most valuable for providing connections between local communities and the natural environment. However, other values may be provided by nature centers. Such values can be collected from other bodies of literature including valuation of ecosystem services and protected natural areas (e.g. Costanza et al., 2014) as well as perceived benefits of educational leisure settings, such as libraries, museums, and zoos (e.g. Fraser et al., 2002).

Valuation of Ecosystem Services and Protected Natural Areas

The term "ecosystem services" refers to the translation of ecosystem structures and processes into goods and services useable by people (Millennium Ecosystem Assessment, 2005). Valuation is often attached to the dollar amount an individual or society assigns to the worth of these services (Turner & Daily, 2008). Some researchers have advocated that this economic worldview captures some direct benefits of ecosystems, such as their provisioning, regulating, and supporting functions, but not less tangible cultural values of nature (Satterfield & Kalof, 2005). Cultural services of nature might include aesthetic, artistic, educational, social, spiritual, and scientific benefits (Costanza et al., 1997) as well as inspiration, existence/bequest, option, social capital, identity, and employment benefits (Chan et al., 2012). The World Commission on Protected Areas (Harmon & Putney, 2003) identified a similar suite of intangible values specifically at protected natural areas. These included recreational, therapeutic, spiritual, cultural, identity, existence, artistic, aesthetic, educational, scientific, and peace values. Nature centers and their associated nearby natural areas might provide any or all of these values.

Benefits of Educational Leisure Settings

Educational leisure settings benefit local communities in diverse ways. Benefits include both "direct" services to those who visit and "indirect" benefits to those who do not visit (Fraser et al., 2002). Scott (2006) conducted one of the few studies on direct and indirect benefits of these settings. She found that Australian museums provided three types of values, as perceived by community members and museum staff. Individual benefits included services directly provided to visitors (e.g. creative, learning opportunities) and existence/bequest opportunities provided to non-visitors. Societal benefits included reducing crime in urban areas and

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maintaining cultural histories and traditions. Economic contributions included increasing property values and tourism. This three value-sets theory was since been tested and confirmed in visitors and non-visitors at the Columbus Museum of Art (Yocco et al., 2009), although further testing is needed to determine its relevance to nature center contexts.

Factors of Support

Community support for nature centers can be understood as one branch of environmentally significant behavior (Stern, 2000). More specifically, center support might consist of environmental activism (e.g. active involvement in environmental organizations and demonstrations), citizenship (e.g. stated approval of environmental regulations), and private behavior (e.g. consumer purchase, use, and disposal of products). On the other hand, community support for nature centers might be understood as a type of charitable support behavior (Peloza & Hassay, 2008), which involves citizenship behaviors (e.g. referrals and recruiting, volunteering, and "in kind" gifts), financial contributions, purchases from an organization, and donations of goods or services. Nature centers require these types of behaviors to achieve their missions as well as charitable support behaviors to remain sustainable.

Donations

Nonprofit philanthropy is often framed within the context of donor commitment. This term refers to an enduring intention and desire to create and maintain a stable relationship between an individual and an organization (Sargeant & Woodliffe, 2005). This concept is rooted in other fields of psychology such as interpersonal relationship and social relations theory (Morgan & Hunt, 1994; Ostrander & Schervish, 1990) which define commitment with three dimensions: attachments (emotional feelings for a partner), long-term orientations (goals and aspirations for being in a relationship), and intentions to persist (conscious choices to remain in a relationship) (Rusbult & Arriaga, 1997). This theory has been applied to a variety of fields relevant to nature center philanthropy. Davis et al. (2009, 2011) applied interrelationship theory to people's connection with the natural world and described three dimensions of a person's "commitment" to nature: satisfaction (extent to which experiences with the natural world meet

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behaviors), and alternatives (availability of other social causes and leisure activities that would meet an individual's altruistic and leisure needs). Researchers from the field of organizational behavior (Allen & Meyer, 1990; Meyer et al., 2002) suggest that organizational commitment includes three components: affect (emotional attachments to a partner), norms (feelings of obligation to remain in a relationship), and continuance (perceived costs of leaving a relationship). Similarly, marketers have identified commitment as a multi-dimensional construct that includes affective components (emotional feelings about a relationship), continuous components (intentions to remain in a relationship), and calculative components (rational assessments of the costs and benefits of staying in a relationship) (Fullerton, 2003; Gilliland & Bello, 2002; Kim & Frazier, 1997; Kumar, et al., 1994).

Despite the diversity of theoretical approaches and specific dimensions of non-profit philanthropy, the antecedents leading to non-profit commitment are relatively well-established and consistent from one theory to the next. Sargeant and Woodliffe (2005) identified antecedents from diverse bodies of literature and tested the extent to which they existed in donor commitment to nonprofit organizations. They found a specific set of antecedents predicted whether donors would be committed to an organization and ultimately donate to that organization. These antecedents included trust, payment methods, personal links to staff members, perceived organizational performance, risk, links to people who directly benefited from an organization's existence, multiple engagements from an organization to solicit funds, the manner in which an organization communicated the need for donations, perceived shared beliefs with an organization's staff, knowledge about an organization, and availability of alternative organizations to which to donate.

A related body of literature identifies the underlying psychological motivations behind why these antecedents predict philanthropic behavior. Many philanthropists are motivated by altruistic causes, such as the perceived need to help others (Harvey, 1990) or self-interest goals, such as increased self-image (Harvey, 1990), enhanced social relationships with individuals or organizations (Beatty et al., 1991), and tax avoidance (Colombo, 2001). Donors might also be categorized into different types of "market segments" according to seven factors identified by Cermak et al. (1994): family traditions (perceiving familial expectations to donate), being a beneficiary (benefiting directly or indirectly from the nonprofit's services), social affiliation

(having friends or business connections tied to a nonprofit), nonprofit orientation (assigning worth and perceiving adequate performance of a nonprofit), humanitarianism (desiring to help those in need or meet spiritual needs), tax advantages (mitigating imposed taxes), communitarianism (extending business ties to someone associated with the organization), and efficacy (believing that an organization needs the money). Neither behavioral motivations nor identified antecedent variables have been tested in the nature center context. As such, any or all of these may be predictors of center donation behavior.

Volunteering

Volunteering activities at nature centers might include environmental stewardship (e.g. restoring ecosystems by clearing exotic plant species and planting native species, or building and maintaining trails) and teaching (e.g. providing formal programs to visitors or answering visitors' questions at information booths). Past research on environmental stewardship volunteers suggest that while people participate for a variety of reasons, altruism is one of the most common. This variable has been found in studies of urban forestry volunteers (Westphal, 1993), stream monitoring volunteers (Roggenbuck et al., 2000), and ecosystem restoration volunteers (Schroeder, 1998). Other motivations include learning new things (Grese et al., 2000), opportunities to be outside and witness fascination in nature (Miles et al., 1998), expressions of values and self-concept (Bruyere & Rappe, 2007), and opportunities to negotiate through lifestyle changes (Martinez & McMullin, 2004). Research suggests that additional motivations, including social interaction and emotional connections to a particular natural area (Donald, 1997; Ryan et al., 2001), are factors that specifically encourage people to participate in repeated volunteer activities. Research on museum docents suggest the motivations for teaching are similar to the motivations for stewardship activities. People seem to participate in volunteer educational opportunities primarily to fulfill lifelong learning desires (Abu-Shumays & Leinhardt, 2002) although other benefits are gained and enjoyed while participating, such as socialization (Jones, 2012). Studies in zoo contexts also identified that people build self-concept and self-esteem through participation (Fraser et al., 2009). These studies generally suggest nature center volunteering are motivated by diverse factors that may include environmental, altruistic, and socialization goals.

Threat Response

      Threat response describes community member support of nature centers in ways other than donations or volunteering (e.g. writing letters or attending community members to prevent development of nature centers' protected natural areas). Such behaviors can be understood as forms of "environmental activism" (Stern, 2000), since they require active involvement in environmental organizations and stated approval for environmental laws or regulations. Predictors of environmental activism have been studied through various theoretical lenses. Séguin et al. (1998) developed a model that predicted activism and included perceived health risks, autonomy, perceived responsibility, and knowledge and perceived importance of an environmental problem. Lubell (2002) applied the collective interest framework (Hardin, 1982) from sociology and political science to explain how intentions to join an environmental group, sign an environmental petition, or protest about an environmental issue can be predicted by the perceived value of the collective good (in this case, the natural world) as well as the perceived costs and benefits of participating in environmental activism behavior. Fielding et al. (2008) applied socio-psychological theories including the theory of planned behavior (Ajzen, 1991) and social identity theory (Hogg & Abrams, 1988; Tajfel & Turner, 1979) to show how behavioral intentions to engage in environmental activism can be predicted by environmental attitudes, perceived behavioral control, and social and personal norms. These norms were operationalized as membership in an environmental group and self-identification as an environmentalist. Any of these theories and identified predictors of environmental activism may apply to threat response in nature center contexts.

Leisure Constraints

      For several decades, researchers have been examining what factors might prevent certain people from engaging in certain types of recreational leisure activities (e.g. Craig, 1972; Buchanan & Allen, 1985; Floyd, 1999; Gomez, 2006). These factors were originally conceptualized as "barriers" that could not be overcome – as such, they prevented participation in certain leisure activities. This concept has since been criticized by such scholars as Samdahl & Jekubovich (1997) and Henderson (1997), and the term "barriers" has been replaced by the term "constraints." This replacement of terms prevents the assumption that factors necessarily

preclude participation. Additional, "recreation" was replaced with the term "leisure" to broaden the field of study. Today, "leisure constraints" refers to a study of "factors that are assumed by researchers and perceived or experienced by individuals to *limit* the formation of leisure preferences and to inhibit or prohibit participation and enjoyment in leisure" (Jackson, 1997, p. 461). One well-established and tested model is the hierarchical model of leisure constraints (Crawford & Godbey, 1987) which demonstrates how intrapersonal constraints (psychological states such as stress or mood and individual attributes such as attitudes and beliefs), interpersonal constraints (social interaction with friends, family, and other groups), and structural constraints (intervening factors such as limited time, finances, and accessibility) affect people's leisure preferences, coordination efforts, and participation (Figure 1.1).
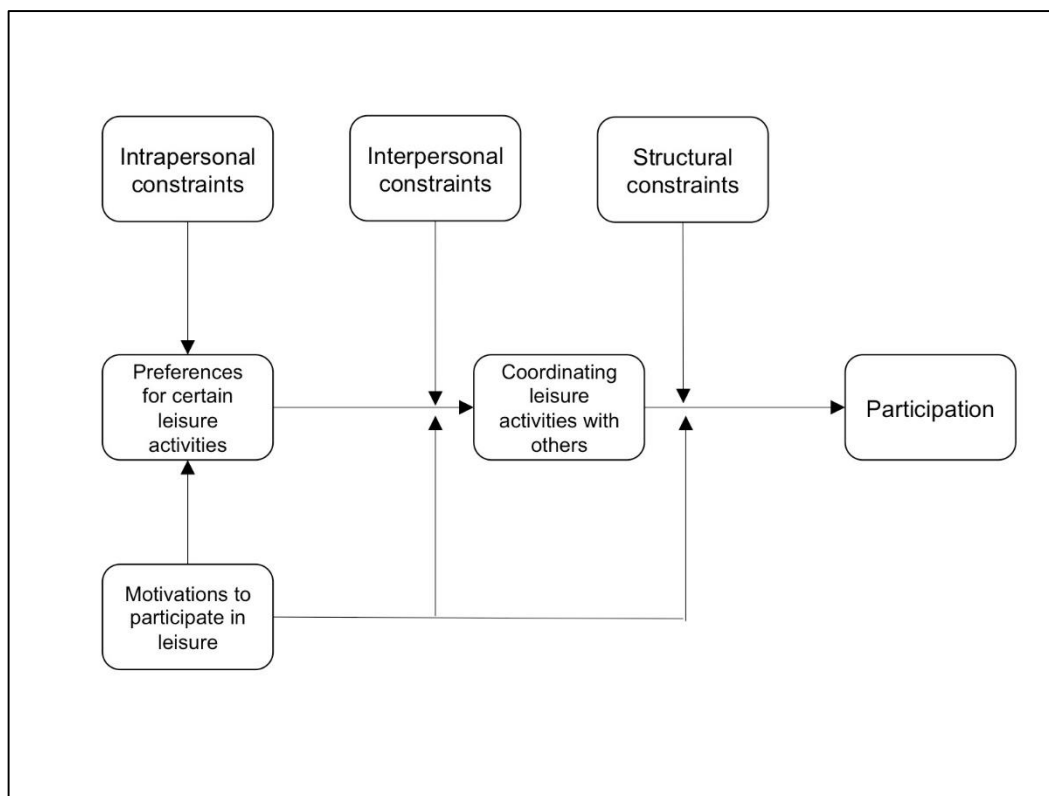

Figure 1.1 Hierarchy of Leisure Constraints Model (Crawford & Godbey, 1987)

Models of constraints specifically for minority adult populations (rather than people in general) may be of particular interest to places like nature centers. The majority of educational

leisure setting and nature park visitors and supporters in the U.S. are not from minority groups. Rather, they are non-Hispanic Whites adults with higher than average socio-economic statuses (Floyd, 1999; National Endowment for the Arts, 2009; Taylor et al., 2011). Three theories are commonly discussed as possible explanations for these biases.

The subcultural hypothesis (Washburne, 1978) suggests that cultural characteristics (e.g. leisure motivations and valuation of leisure settings) vary by ethnicity/race, and many leisure settings in the U.S. were developed to better meet the needs/desires of non-Hispanic whites than of other groups. As a result, minority populations visit these settings less than the majority. There are not yet standardized variables or concepts with which to test this hypothesis, but several studies support its validity in the leisure-based needs/desires of African Americans (Craig, 1972; Edwards, 1981; Floyd & Shinew, 1999; Stamps & Stamps, 1985), Hispanics (Bowker & Leeworth, 1998; Carr & Williams, 1993; Chavez & Olson, 2009; Dwyer, 1992; Hutchinson 1987), Hmong (Hutchison, 1993), Chinese (Walker et al., 2001; Walker, 2008), and Puerto Ricans (Gomez, 2006).

The marginality hypothesis (Washburne, 1978) suggests that populations with lower incomes, levels of educational achievement, or occupational statuses have more constraints on their leisure behavior. Consequently, these groups use leisure settings less than other populations (on average) as a result of cost, transportation, and information limitations. This hypothesis has been tested by comparing participation rates across racial/ethnic groups while controlling for socio-economic status. If participation rates are *not* significantly different across groups, this hypothesis is supported. Studies of the marginality hypothesis include those comparing participation rates of non-Hispanic whites and African Americans (Johnson & Floyd, 2006; Shinew et al., 1995; Woodward, 1988) or Hispanics (Hospodarksy & Lee, 1995). These studies found these minority groups were constrained by socio-economics more than other populations.

The discrimination hypothesis (Floyd et al., 1993) suggests that certain populations are discriminated against, or perceive they are discriminated against, in certain leisure settings. Therefore, these populations are less inclined to visit these settings than other populations. This theory has been tested by asking certain populations how welcome and comfortable they feel and by comparing their responses with their participation rates (Philipp, 1997; West, 1989). If participation rates are significantly different at different levels of welcome or comfort, this

hypothesis is supported. Evidence of discrimination in leisure settings has been found in African Americans (Shinew et al., 2007; Stanfield et al., 2005), Hispanics (Santos & Rozier, 2007), interracial couples (Hibbler, 2002), Koreans (Scott et al., 2006), Muslims (Livengood & Stodolska, 2004), and Native Americans (Flood & McAvoy, 2007).

Previous research suggests that any, or all, of these theories may influence the extent to which different groups participate in and support certain leisure activities (Floyd, 1999; Manning, 2011). For instance, Craig (1972) suggested cultural attitudes influenced recreation participation, but that this influence was partially mediated by income and rural/urban residency. Washburne (1978) suggested that two factors directly influenced participation: socio-economic status and discrimination. Klobus-Edwards (1981) expanded Washburne's model and suggested that socio-economic status directly affected participation but that the pathway was more complicated: it was a combination of interacting variables and concepts including ethnicity, rural/urban residency, sex, motivations, and perceived barriers. Floyd et al. (1993) simplified this model and suggested three separate pathways directly influenced participation: subcultural effects, socio-economic (marginality) effects, and perceived discrimination effects.

More recently, Gomez (2002, 2006) proposed the Ethnicity and Public Recreation Model, which combines the concepts from Floyd et al. (1993) and others into a path model that describes how these effects interact to affect recreation participation. According to this model, the extent to which a subgroup adopts aspects of the dominant culture ("acculturation") influences recreation participation both directly and indirectly through pathways of socioeconomic status, perceived benefits of engaging in outdoor recreation, perceived discrimination in outdoor recreation settings, and self-identified ethnicity ("subcultural identity") (Figure 1.2).
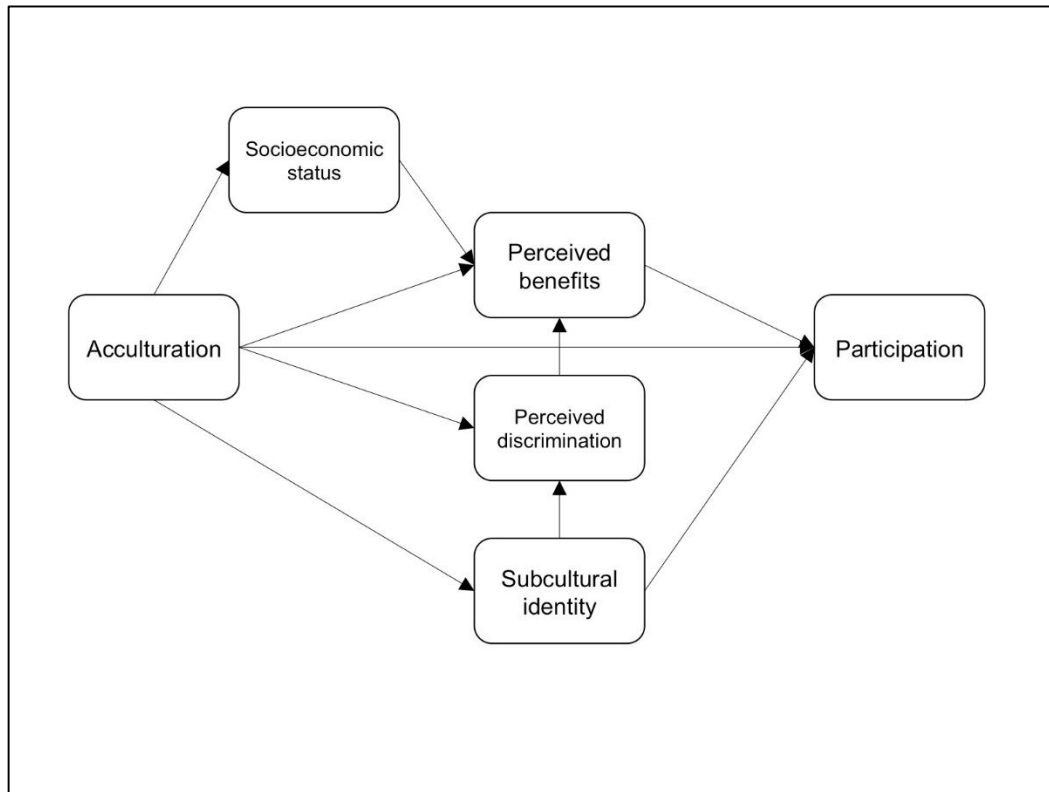
Figure 1.2 The Ethnicity and Public Recreation Participation Model (Gomez, 2006)

A small number of published studies suggest minority leisure constraints exist in community groups living around nature centers. Rideout & Legg (2000) discovered differences in barriers to visiting Fort Worth Nature Center (Fort Worth, TX) between different races and ethnicities. In support of the marginality hypothesis, African Americans reported that discrimination and harassment were the most important barriers. American Indians reported crowds of people being the greatest barrier - a finding that supported the subcultural hypothesis assuming that American Indians were less tolerant of large groups of people on average compared with other races/ethnicities. Meanwhile, non-Hispanic Whites were more constrained by lack of awareness or knowledge about the center, suggesting that additional factors may affect participation not already captured in leisure constraint theory. A study of Hispanic communities living around Dodge Nature Center (West Saint Paul, MN) also supported the application of leisure constraint theory to nature center contexts. The authors interviewed fifteen community leaders and ten community members about perceived motivations and constraints regarding Latino visitation as well as strategies to increase Latino participation in programs at the nature

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center. Leaders identified constraints associated with marginality (lack of knowledge and awareness; program fees; dates and timing of programs), subcultural differences (program/staff not culturally appropriate for Latino people; different experiences than expected/familiar for Latino people; similar programs preferred elsewhere), and perceived discrimination (not feeling welcome; lack of Latino staff). Community members identified additional barriers, such as staff not being able to speak Spanish, programs not being oriented toward adults, cold Minnesota winter days not being comfortable, and time being limited. Neither of these studies statistically compared different groups of community members, and further testing is needed to examine the relevance of leisure constraint theory to nature center communities.

The Current Study

In this dissertation, I hope to extend bodies of literature on valuation of ecosystem services and protected areas management, benefits of educational leisure settings, factors of support for environmentally significant behavior, and leisure constraints, by examining these topics within the context of nature centers' connections with their local communities. In chapter two, I investigate underlying perceived values of nature centers in hopes of giving centers baselines from which to understand how well they are doing and in what ways they could grow and better serve their local communities. In chapter three, I investigate what factors lead to support for nature centers. I hope this investigation allows centers better understandings of why (or why don't) people volunteer, donate, or otherwise support their centers so that centers can ultimately better connect with their communities and become more sustainable. In chapter four, I investigate communities' perceived constraints to visiting local nature centers. I hope these results aid centers in better helping community members negotiate visitation constraints and ultimately benefit from those services provided by their local nature centers. In all three chapters, I test for differences between different groups of respondents (e.g. non-Hispanic Whites and other races/ethnicities) and explore possible trends in the general public that could be tested in further research with representative samples. More broadly, these three chapters and corresponding exploratory analyses provide cross-sectional understandings of nature centers and their connections with local communities in today's society. Some redundancy is present throughout these chapters, particularly in methods sections, because I intend to submit these

chapters separately for publication and each study uses the same survey data. I conclude in chapter five with a summary of these studies' contributions to theory and nature center practice.

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Chapter 2: The Values of Nature Centers to Local Communities

Abstract

Nature centers are generally associated with providing environmental education and related services. Literature on other educational leisure settings, such as museums, suggests these places may also serve other societal values. We conducted an exploratory study on the perceived values of sixteen nature centers held by community members living around them. Exploratory factor analysis identified four underlying values. The *environmental connection* factor included education about, protection of, and increased awareness of the natural world. *Leisure provision* described opportunities for safe outdoor recreation and retreat or restoration from everyday life. *Community resilience* included enhanced beauty, economic contributions, and pride for the local community. *Civic consciousness* described nature centers' roles in racial/ethnic integration and political action. In our sample, these values were believed to be both important for centers to provide and performed well by centers, although levels varied by socio-demographic characteristics and center visitation. The findings suggest that nature centers may play broader roles in their local communities than might be typically inferred from their mission statements. We discuss implications for nature center programming and outreach.

Introduction

Nature centers generally focus on programming and unstructured experiences in natural environments. Nature-based programming may include environmental education, which can develop skills, motives, beliefs, and perceptions that lead to pro-environmental behaviors (Roczen et al., 2013), and environmental interpretation, which can enhance enjoyment of natural areas (Moscardo, 1999), appreciation for these areas (Powell et al., 2009), and stewardship in these areas (Ham, 2009). Unstructured experiences might include leisure activities like hiking and picnicking as well as children's nature play (Browning et al., 2013), which can promote pro-environmental attitudes (Chawla, 2009), behaviors (Wells & Lekies, 2006), and career interests (Bixler et al., 2002).

Although past research suggests several positive impacts from nature-based programs and experiences upon visitors, research on the broader values that nature centers provide their local communities is rare. The most comprehensive source is a 25 year-old census of 1,225 nature centers across the United States and Canada (NSYF, 1990). This study found the majority of staff members believed they were important to their communities, because their centers provided opportunities for nature study, taught local natural history lessons, and encouraged pro-environmental attitudes and behaviors (Simmons, 1991). The ways in which other sources have defined nature center value echo this study's findings. The American Association of Museums described a nature center as a place that "manages and interprets its lands, native plants, animals, and facilities to promote an understanding of nature and natural processes" (NSYF, 1990, p. 3). The National Audubon Society defined a nature center as "a green island of undeveloped land set aside by a private community group or political body for the learning and enjoyment of its citizens… [and] a place within a city or near it where children, family groups and persons of all ages can renew their rightful kinship with the land... and all of Nature" (Ashbaugh, 1963, p. 74). The Association of Nature Center Administrators stated nature centers bring "environments and people together under the guidance of trained professionals to experience and develop relationships with nature" (Byrd, 1998, p. xvii). These sources claim centers are valuable for several reasons, such as increasing appreciation of and visitation to local natural environments, and encouraging stewardship behavior to protect the natural world. They also implicitly suggest that centers provide value primarily to those people who visit. A small body of recent research suggests that nature centers may serve broader values to community members who do not visit.

These values might include reducing crime and revitalizing neighborhoods (Leinbach, 2012) as well as preventing urban sprawl and promoting healthy lifestyles (Price, 2013).

Literature on other educational leisure settings (Packer, 2004, 2006) builds theory on the potential value of nature centers. Educational leisure settings provide recreational spaces for people to engage in free-choice learning (Hooper-Greenhill, 1995) and include nature centers as well as botanical gardens, arboretums, museums, libraries, zoos, aquariums, and other institutions. One study by Scott (2006) examined how communities and staff members value museums and uncovered evidence for individual values (e.g. visitors being inspired, deriving pleasure, developing personal perspective, practicing new skills, and learning about personal interests), societal values (e.g. people gaining leisure opportunities, access to the past and historical collections, places for social interactions, and forums for social issues), and economic values (e.g. communities at large securing employment, tourism, branding, urban regeneration, and economic stimulation). Similar value sets have been found for other museums (Yocco et al., 2009), libraries (Aabø & Strand, 2004; Barron et al., 2005), and science education centers (Persson, 2000).

Our current study builds on these findings by studying sixteen diverse nature centers and neighboring communities in the United States. The primary objectives of this study were to explore the ways in which community members value local nature centers and how well nature centers provide these values. By investigating these questions, we hope to provide a framework for understanding the various roles that centers may play in their communities. This understanding can not only influence service provision, communication strategies, and constituency-building efforts, but might also allow re-examination of mission and related goals at nature centers and other educational leisure settings.

Methods

Center Selection

We aimed to select a sample of nature centers that would encompass a wide range of diversity in both programming and setting. To create this sample, we first developed a list of U.S. centers that experts believed to be successful. We targeted "successful" nature centers to

best enable an investigation of the range of potential values provided and in hopes that community awareness might be high enough around these particular centers to achieve better response rates on subsequent survey efforts. We also hoped that these centers would represent what most centers aspire toward: centers serving their local communities in broad ways and with high levels of quality. We asked three senior staff members from the National Audubon Society (NAS) and the Executive Director of the Association for Nature Center Administrators (ANCA) to create lists of the 20 "most successful" nature centers in the U.S. We also asked them to break-down these 20 centers by urbanity: five rural, five suburban, five urban, and five from any urbanity level but from geographic areas not already covered. The experts collectively identified 50 centers (Appendix A). Several of the centers listed by individual experts were cross-listed by other experts. We reduced this list to 40 by only including those nominated by more than one expert and those consisting of a permanent interpretive building and adjacent natural area. We also excluded residential environmental education centers, because they offered unique multiday experiences with different intended and measured outcomes than other nature center experiences (Ardoin et al., 2015; Stern et al., 2013). Some experts had difficulty specifying certain centers as urban, suburban, or rural. We supplemented ANCA and NAS urbanity estimations with census tract data (population density and distance to nearest metropolitan area) to create our own urban, suburban, fringe, and rural classifications for the 40 potential study sites.

Our original aim was to achieve a representative sample of community members surrounding each selected center. Our budget enabled us to choose 16 centers, with the expectation that 4,000 survey invitations in the communities surrounding each would result in a sufficient number of responses to provide a reasonable representation of these communities. We predicted an expected response rate of 10-13% using findings from previous general population web-based survey studies (Link & Mokdad, 2005, 2006) and pre-paid incentive studies (Dillman et al., 2009; Göritz, 2006). We selected eight NAS and eight ANCA centers by choosing equal numbers of centers from each urbanity classification and by simultaneously maximizing geographic spread throughout the lower 48 United States (Appendix B). We later clumped fringe and suburban centers for statistical analyses due to similarities uncovered in interviews with center directors, some ambiguities in distinguishing these two classifications using census data, and our own observations of the settings of each center. These reasons led us to believe that the settings of suburban and fringe centers were more similar to each other than different.

Data Collection

We invited random samples of community members living around each of the 16 centers to web-based surveys (Appendix C). In these surveys, we asked about the perceived importance and performance of 14 items reflecting services that nature centers might provide. These 14 items were initially based on the sets of values found for museums (Scott, 2006) and further developed through a proof-of-concept study at six diverse U.S. nature centers. The proof-of-concept study entailed interviewing the six center directors and thirty-two local residents who were identified by center directors as community leaders or important community members who would be well-informed about the role(s) of the nature center in the local community. While Scott's individual, economic, and societal value sets previously discovered at museums were also relevant at these six nature centers, we discovered two additional value sets: organizational values (e.g. centers supporting mission achievement for a larger organization such as the National Audubon Society) and environmental values (e.g. centers protecting the natural environment through land management and influencing behavior change in visitors). Twenty survey items were developed out of the proof-of-concept study. Further pilot testing with 25 Virginia Tech and 13 Stanford University students suggested we remove six highly redundant items that consistently received similar scores. The remaining items allowed us to ask about perceptions of the importance of the provision of specific services as well as perceptions about how well nature centers actually provided those services (Table 2.1). Perceptions of importance were solicited by asking, "How important is it to you that [the nature center's name] does each of the following?" (range = 1 to 5 where 1 = "not at all important" and 5 = "extremely important"). Perceptions of performance were measured by asking, "How well does [the nature center's name] actually accomplish each of the following?" (range = 1 to 5 where 1 = "not at all well" and 5 = "extremely well").

We developed our survey invitation protocols to maximize response rates and minimize response biases in both English and Spanish. We used a cross-platform software (Qualtrics, Provo, UT) to encourage people familiar with computers, smartphones, or tablets to respond. We provided hyperlinks to English and Spanish versions of the survey to encourage non-English speakers to participate. We attempted to follow the Tailored Design Method (Dillman et al., 2009) and contact each person five times (pre-notice, invitation, and three reminders), but we

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were limited by our Institutional Review Board to contacting each person a maximum of only three times (Appendix D).

We hired a marketing firm (DirectMail, Frederick, MD) to develop the sampling frame and deliver the invites. We asked them to generate sampling frames that included random, representative samples of people living around each center from their marketing lists. They orchestrated the invitation of 4,000 people per center (64,000 in total) with a postal letter and two email reminders between July 31st and August 13th, 2014, sent from the research team's mailing and email address (Appendix E). Half of the invitees received a $2 bill with their letter as a pre-paid incentive to take the survey. These invitees were randomly-selected from the marketing firm's mailing list. All invitees were geographically limited to a circular area surrounding each center (urban = three miles, suburban = six miles, and rural = twenty miles). These radii were determined by averaging community directors' estimations of what geographic areas encompassed their center's "local community" and by calculating the smallest radii that included adequate numbers of people from the marketing firm's mailing list.

Because our initial survey invitation effort resulted in a lower than expected response rate (4.0% after accounting for invitation bounce-backs), we conducted a second round of survey invitations with 8,000 additional randomly selected people per center (128,000 total) using an initial email and two email reminders (Appendix D). These were sent between November 13th and 25th, 2014. The sampling frame was again developed from the marketing firm's mailing lists to avoid re-contacting the same respondents and limited to each center's local geography. Circle radii were set at the minimum size required to obtain adequate new sampling frames at each center (urban = four to five miles, suburban = six to twelve miles, and rural = twenty miles). This second round of invites resulted in 583 additional survey completions (response rate = 0.6% after accounting for invitation bounce-backs) for a total of 2,402 responses and overall response rate of 1.7%.

The marketing firm provided some socio-demographic data about respondents (sex, age, level of education, and presence/absence of children in home), and we asked additional data (racial/ethnic self-identification) in the survey. Marketing firm data were estimated from multiple sources at 95% confidence (Experian, 2012).

Data Analyses

SPSS Version 22 for Windows was used for all data screening and analyses except as noted below. Of the 2,402 community survey responses downloaded, thirty-six were removed for survey completion times less than 2.5 to 3.5 minutes (thresholds required to read and thoughtfully respond to each item, as determined in pilot tests, for unaware and aware respondents, respectively), forty-six were removed for survey completion percentages of less than 25%, and 43 were removed for multivariate outlier status (Tabachnick & Fidell, 2007). The final number of usable community surveys was 2,276. In this paper, we focus only on data collected from respondents who confirmed they were aware of their local nature center (n = 1,399).

We conducted exploratory factor analysis (EFA) on respondents' importance scores to determine the structure of underlying sets of values held toward nature centers. Data met all assumptions required for EFA. Intercorrelations between individual items were not consistently low or high, suggesting items were related but extreme multicollinearity was not present. A Kaiser-Meyer-Olkin statistic above 0.5 verified an adequate sample size (n = 1,294, KMO = .922), and Bartlett's test of sphericity verified correlations between items were sufficiently large ($\chi^2 (91) = 7,833, p < .001$) (Field, 2009). The diagonals of the anti-image correlation matrix were all above 0.5, suggesting each item was appropriate to include in the analysis. Commonalities were all above 0.3, further confirming each item shared adequate common variance with other items. We extracted factors with principal axis factoring, because our data was skewed and this method functions well with non-normally-distributed data (Costello & Osburne, 2005). We obliquely rotated the factors with the direct oblimin technique, because we expected factors to be correlated.

The first three factors extracted explained 64% of the variance and produced Eigenvalues over Kaiser's recommended cutoff of 1.0 (Kaiser, 1970). The fourth component explained an additional 5% of variance and produced an Eigenvalue over Jolliffe's cutoff of 0.7 (Jolliffe, 1986). Scree plot inflection points suggested a two or four factor extraction. We chose a four factor solution based on these considerations and theoretically meaningful fit. We randomly split our sample in half and re-ran the EFA to test the consistency of the loadings. This effort produced similar results as the EFA run with the entire sample. We created importance indices

for each factor by averaging respondents' importance scores for those items that loaded most strongly on each factor. Similarly, we created performance indices by averaging performance scores for the paired items used in importance indices.

We compared differences between groups and factor means using MANOVA significance tests. In the case of greatly different sample sizes (e.g. the largest group size was more than 50% larger than the smallest group size), a random sample of respondents from the largest group was taken to create a similar sample size to smaller groups, and the analysis was run three times to ensure consistent results. Box-Cox transformations were conducted to normalize variables and reduce heterogeneity of variance between groups (Box & Cox, 1964). MiniTab 17 for Windows was used to run Box-Cox analyses and calculate the power exponent, Lambda.

Results

Sample Descriptives

Sixty-two percent of our respondents were aware of their local center, and of these, 60% had visited their center. Respondents' ages ranged from 19 to 97, with a mean age of 54. The majority of the sample was non-Hispanic White (79%) and male (71%). Twenty-six percent had children eighteen years or younger living with them in their home. Five percent had less than a high school diploma while 19% had earned their diploma, 23% had attended some college, 25% had completed a bachelor's degree, and 21% had completed a graduate degree.

In comparison to census tracts in which the sixteen centers were located, our sample over-represented males, non-Hispanic Whites, people without children in their home, older people, and people with higher levels of education. Census populations contained 50% males, 71% non-Hispanic Whites, and 29% people with children in their home. The average age of census populations was 38, and 14% percent had less than a high school diploma while 25% had earned their diploma, 26% had attended some college, 21% had completed a bachelor's degree, and 16% had completed a graduate degree.

Underlying Values

Exploratory factor analysis suggested four underlying values held by community respondents toward nature centers (Table 2.1). The *leisure provision* factor included providing opportunities for physical exercise, safe outdoor recreation, retreat, restoration, and relaxation. The *environmental connection* factor included promoting pro-environmental awareness and behaviors, protecting wildlife habitats and natural areas with ecosystem services, and providing children places to learn. The *civic engagement* factor included bringing together people from different races and ethnicities and linking people to political action. The *community resilience* factor included making the community a more beautiful place, contributing to the local economy, and developing a sense of pride in the local community.

We assigned the cross-loaded item "provides a place for people in the local community to gather" to the *civic engagement* factor based on underlying theory as well as an analysis of the internal consistency of the each of the indexes with and without the item. Including the item in the *civic engagement* factor raised Cronbach's alpha, a measure of internal reliability of the items included in a latent factor, by 0.14. Including it in the *leisure provision* factor had a negligible impact on the change in Cronbach's alpha of the index (0.03). The structure matrix of the correlation coefficients between items and factors supported this assignment. Index reliabilities were all above the recommended minimum threshold of 0.6 (Field, 2009).

Importance of Nature Centers Providing Underlying Values

The majority of our respondents believed it was important for nature centers to provide all 14 specific nature center services in the survey battery. The mean value for all items combined was 3.70, which represented "somewhat important" (value = 3.0) to "very important" (value = 4.0). Average levels of importance assigned to factor indices varied from one factor to the next ($p < .001$). *Environmental connection* was rated the most important. *Leisure provision* and *community resilience* were slightly less important. *Civic engagement* was the least important factor, although it was still rated near "somewhat important" on average.

Average levels of importance for each factor differed along several socio-demographic lines (Table 2.2). *Leisure provision* was less important for graduate degree holders than for those with lower levels of education. *Civic engagement* and *community resilience* were less important

for respondents 60 years and older than for respondents 18-35 years old. *Civic engagement* and *community resilience* were rated more important by respondents living in urban areas than respondents living in rural and suburban areas. *Civic engagement* and *community resilience* were more important for non-Whites than Whites. *Leisure provision* was more important for visitors than non-visitors. Females indicated all four factors were more important than did males.

Performance of Nature Centers Providing Underlying Values

On average, respondents believed nature centers performed all 14 items "very well" (M = 4.01, SD = .70). Levels of performance varied by factor (*p* < .001). The *environmental connection* factor was rated the highest, while *leisure provision*, *community resilience*, and *civic engagement* factors were rated somewhat lower (Table 2.3). Average levels of performance for each factor differed along fewer socio-demographic lines than importance levels (Table 2.4). The *environmental connection* factor was perceived as being performed better in rural and suburban areas than in urban areas. Visitors believed *leisure provision* was performed better than non-visitors. Females believed *civic engagement* and *community resilience* were performed better than did males.

Table 2.1 Summary of Exploratory Factor Analysis Results[a]

	Factor loadings[b]			
Item	Leisure provision	Environmental connection	Civic engagement	Community resilience
Provides a place for physical exercise	**.708**			
Provides a safe place for outdoor recreation	**.653**			
Provides a place for retreat, restoration, or relaxation	**.616**			
Increases environmental awareness		**-.820**		
Provides access to nature	.207	**-.779**		
Provides a place for children to learn		**-.643**		
Encourages environmental behavior		**-.613**	.255	
Provides wildlife habitat or ecosystem services		**-.593**		-.202
Helps bring together people from different races/ethnicities	.272		**.605**	
Links people to political action			**.467**	
Provides a place for people in the local community to gather	**.411**		**.413**	
Makes the community a more beautiful place	.253	-.291		**-.459**
Contributes to the local economy	.209		.206	**-.438**
Develops a sense of pride in the local community		-.226	.239	**-.362**
Eigenvalues	5.98	1.66	1.13	0.71
Variance explained (%)	42.7	11.8	8.1	5.0
Cronbach's α	.79	.85	.67	.72

[a]Pattern matrix; Principal axis factoring extraction with Oblimin rotation and Kaiser normalization, [b]Loadings over .30 appear in bold; loadings under .20 are not shown.

Table 2.2 Differences in Mean Importance Scores for Underlying Values

Group	Leisure provision[a] Differences	d[d]	Environmental connection[b] Differences	d[d]	Civic engagement Differences	d[d]	Community resilience Differences	d[d]	MANOVAs[c] df[e]	F	p
Level of education achieved									16(5008)	2.389	.001
Less than high school diploma (LHS)											
High school diploma (HS)	HS > G**	.31									
Some college (SC)	SC > G*	.30					SC > G**	.28			
Bachelor's degree (B)					LHS > B**	.39					
Graduate degree (G)					LHS > G***	.53					
Age									4(1210)	2.243	.022
18-39 years old (18)					18 > 60**	.35	18 > 60*	.28			
40-59 years old (40)											
60+ years old (60)											
Nature center urbanity level									8(1890)	11.8	<.001
Rural (R)	R > S***	.36			U > R***	.50					
Suburban (S)					U > S***	.34	U > S***	.31			
Urban (U)	U > S***	.35									
Race/ethnicity									4(325)	5.43	<.001
Non-white (NW)					NW > W***	.51	NW > W**	.28			
White (W)											
Sex									4(1250)	10.01	<.001
Male (M)											
Female (F)	F > M***	.27	F > M***	.22	F > M***	.33	F > M***	.25			
Nature center visitation									4(1362)	8.36	<.001
Non-visitors (NV)											
Visitors (V)	V > NV***	.21									
	Mean (SD)		*Mean (SD)*		*Mean (SD)*		*Mean (SD)*				
Entire sample	3.67 (.90)		4.35 (.65)		2.87 (.94)		3.56 (.87)				

[a]*Leisure provision* had heterogenous variance between groups and underwent Box-Cox transformation with $\lambda = 2$ for analyses, [b]*Environmental connection* was left-skewed and underwent Box-Cox transformation with $\lambda = 4$ for analyses, [c]Pillai's Trace statistic was calculated for MANOVA significance tests, [d]Cohen's *d* effect sizes: 0.2 = small, 0.5 = medium, 0.8 = large, [e]degrees of freedom for hypothesis (degrees of freedom for errors), * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2.3 Descriptive Statistics of Performance and Importance Scores for Underlying Values

Items and factors	Importance		Performance	
	Mean	*SD*	*Mean*	*SD*
Civic engagement	**2.87**	**.94**	**3.56**	**.95**
Links people to political action	2.85	1.24	2.85	1.14
Helps bring together people from different races/ethnicities	3.50	1.30	3.50	1.10
Provides a place for people in the local community to gather	3.78	1.10	3.78	.96
Community resilience	**3.56**	**.87**	**3.84**	**.85**
Contributes to the local economy	3.34	1.25	3.34	1.11
Develops a sense of pride in the local community	3.88	1.03	3.88	.96
Makes the community a more beautiful place	4.13	.95	4.13	.89
Leisure provision	**3.67**	**.90**	**4.03**	**.78**
Provides a place for physical exercise	3.92	1.21	3.92	.95
Provides a place for retreat, restoration, or relaxation	4.09	1.00	4.09	.86
Provides a safe place for outdoor recreation	4.18	.99	4.18	.86
Environmental connection	**4.35**	**.65**	**4.25**	**.70**
Encourages environmental behavior	4.09	.95	4.09	.90
Provides wildlife habitat or ecosystem services	4.23	.87	4.23	.83
Increases environmental awareness	4.29	.78	4.29	.83
Provides a place for children to learn	4.33	.76	4.33	.77
Provides access to nature	4.42	.70	4.42	.75

Table 2.4 Differences in Mean Performance Scores for Underlying Values

Group	Leisure provision Differences	d^b	Environmental connection Differences	d^b	Civic engagement Differences	d^b	Community resilience Differences	d^b	df^c	F	p
Level of education achieved									16(2844)	1.49	.10
Less than high school diploma (LHS)											
High school diploma (HS)											
Some college (SC)											
Bachelor's degree (B)											
Graduate degree (G)											
Age									8(1422)	2.18	.03
18-39 years old (18)											
40-59 years old (40)											
60+ years old (60)											
Nature center urbanity level									8(1560)	6.56	<.001
Rural (R)			R > U**	.31							
Suburban (S)			S > U *	.21							
Urban (U)											
Race/ethnicity									4(749)	1.24	.29
Non-white (NW)											
White (W)											
Sex									4(709)	4.35	.002
Male (M)											
Female (F)					F > M**	.22	F > M***	.28			
Nature center visitation											
Non-visitors (NV)	V > NV***	.36	V > NV***	.23					4(631)	6.25	<.001
Visitors (V)											
	Mean (SD)		*Mean (SD)*		*Mean (SD)*		*Mean (SD)*				
Entire sample	4.03 (.78)		4.25 (.70)		3.56 (.95)		3.90 (.85)				

[a]Pillai's Trace statistic was calculated for MANOVA significance tests, [b]Cohen's *d* effect sizes: 0.2 = small, 0.5 = medium, 0.8 = large, [c]degrees of freedom for hypothesis (degrees of freedom for errors), * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

We identified our sample of community members held four distinct value sets toward local nature centers. The *environmental connection* factor included education about, protection of, and increased awareness of the natural world. *Leisure provision* described opportunities for safe outdoor recreation and retreat or restoration from everyday life. *Community resilience* included enhanced beauty, economic contributions, and pride for the local community. *Civic consciousness* described nature centers' roles in racial/ethnic integration and political action. In our particular sample, all four of these factors were perceived as moderately to very important for centers to provide, with the first two factors valued most highly. Individual nature centers could examine whether their communities at large hold these underlying values at similarly high levels when deciding on which services to prioritize offering to these communities.

On average, respondents reported that nature centers performed these diverse sets of values "very well." In our particular sample, *environmental connection* was perceived as performed the best of all underlying nature center values, followed by *leisure provision*, *community resilience*, and *civic engagement*, respectively. These findings suggest that respondents felt that the centers in our sample exceled at performing their core missions, which are typically associated with providing environmental, educational, and recreational services. Collectively, however, these findings suggest that centers also provide other, less obvious, services that appear to be of substantial value to local communities.

We discovered that the importance assigned to different underlying values varied by community subgroup. Some of these differences may exist in other nature center populations and may be important for centers to consider as they try to build relevancy in diverse communities. Specifically, the valuation of *leisure provision* differed between visitors and non-visitors to the centers, while the valuation of the other three factors did not. This discovery supports previous research (Falk & Adelman, 2003; Scott, 2006; Yocco et al., 2009) that suggests community members value the existence of educational leisure settings even if they don't personally visit these places. These findings build a case for nature centers to consider marketing their impact in ways that speak to both local visitors and non-visitors.

Non-Whites, less educated people, younger respondents, and urban audiences valued *community resilience* and *civic engagement* more than other audiences. These differences might

be explained by past research on valuation of the natural environment and educational leisure settings. Non-whites holding above-average societal values toward centers might reflect subcultural differences in leisure motivations and interests between different racial/ethnic populations. In particular, many Latino populations (a large portion of our non-White sample) value places like nature centers for family gatherings and other socially-oriented activities more than other groups (Floyd, 1999). These types of visitation motivations were referenced in our *community resilience* and *civic engagement* value factors. Meanwhile, past research on museums suggests some societal values of educational leisure settings, such as urban renewal, are more relevant to urban audiences than others (Scott, 2006). Museum research also suggests younger people visit and value these places especially for social reasons rather than reasons associated with these places' missions (e.g. education and learning) (Hood, 1989). Environmental valuation studies suggest people with less education have more anthropogenic, or utilization-focused, value orientations toward nature than people with more education (Vaske et al., 2001). In the nature center context, these studies explain why people with less education might especially value nature centers more for societal (e.g. use-focused) reasons than for environmental (e.g. ethically or spiritually-driven) reasons. Furthermore, people with less education have fewer financial resources (on average) and thus may especially value natural areas for economic opportunities for themselves and their local community (Milbrath, 1984; Nelson, 1999). More generally, these findings suggest nature centers could try engaging younger, non-White, less educated, and other traditionally underserved audiences by providing services beyond those explicitly related to their missions (e.g. environmental and educational).

Females valued nature centers in all ways more than males. This finding supports past research on women having greater levels of "connection" to nature (Haluza et al., 2014), pro-environmental attitudes and behaviors (Zelezny et al., 2000), valuation of and visitation at educational leisure settings (Yocco et al., 2009), and motivations for socially-oriented outdoor recreation (S.-H. Lee et al., 2007) than men on average. This body of literature generally suggests nature centers and places like them could examine how to increase male participation and perceived value as well as better understand whether and why nature programs may be more attractive to female audiences.

Limitations

Our findings were limited both by our site selection and by the non-representative sample of survey respondents in selected communities. First, we selected only nature centers believed by experts to be among the most successful in the United States. As such, we might expect awareness levels and performance evaluations to be more positive than in a broader suite of sites. Our sample of respondents over-represented certain socio-demographic characteristics (male, non-Hispanic White, education level, and older people) while under-representing other characteristics (presence/absence of children in the home). As a result of these biases, mean scores for importance and performance assigned to the four underlying values cannot be interpreted as representative of any single community around any particular nature center, nor of people living around nature centers nationally. Furthermore, correlations between the 14 survey items representing nature center services represent how our particular sample associated these items rather than the way in in which all people might associate these items. Thus, our exploratory factor analysis presents only a tentative understanding of the ways in which communities might value local nature centers. The identification and relative rankings of these factors, as well as differences in rankings between community subgroups, are testable hypotheses for further investigation rather than fully validated theories.

Future Research

Our proposed nature center value framework could be used in future research with different populations to further test factor reliability and generalizability. We recommend researchers use different methods to capture representative samples of local populations, such as door-to-door sampling of representative addresses. Studies that successfully gather and interpret representative general population data could provide great value by providing more generalizable findings, as well as findings that may be specifically actionable by individual nature centers in their own communities.

Future studies might re-use our 14 importance/performance survey items or develop new item banks based on our four identified value sets. If our items are re-used, we recommend "provide a place for people in the local community to gather" be reworded to explicitly state for what reason(s) people might gather. This item cross-loaded on *leisure provision* and *civic*

engagement and was likely interpreted as serving both of these purposes by our respondents. Further psychometric testing and factor construction would help develop reliable indices and understand how these values vary by center and population. The indices could also be used to examine whether our preliminary findings on significant differences between community subgroups exist in other contexts.

The four factors identified in this study might be adaptable for use in other educational leisure settings as well, such as botanical gardens, arboretums, museums, zoos, aquariums, and libraries. In such settings, the *environmental connection* factor could be redefined according to the institution's mission. For example, history museums might provide "historical connections," and libraries might provide "knowledge connections." By further studying these factors, researchers can better understand the broad value of these settings in our society and how to apply such results. Possible research questions include: how do different levels of perceived value importance and performance correlate with different levels of mission-centric behaviors? How can these value sets be used in market segmentation studies of community members? What factors lead different types of people to value educational leisure settings in different ways? How might values change over time as the United States population shifts in socio-demographics, and how might educational leisure settings stay relevant to changing populations? Also, how do different values predict different forms of support for nature centers, such as donating, volunteering, or supporting politically (Browning et al., 2015, in prep.)? We believe investigating these questions with other data sets would provide researchers and administrators opportunities to strengthen mutually beneficial ties between educational leisure settings and their local communities.

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Chapter 3: Predictors of Community Support for Local Nature Centers

Abstract

Nature centers rely on the support of their local communities to carry out their missions. This study examined the predictors of local community members' likelihood to donate to, volunteer at, or respond to threats faced by local nature centers. Random samples of community members living around sixteen diverse nature centers across the United States were invited to an online survey. Fourteen hypothesized predictors drawn from diverse bodies of literature were significantly related to nature center support. Respondents who believed centers provided environmental connection, leisure activities, civic engagement, and community resilience services were significantly more likely to have positive support intentions for their local centers. Other significant predictors included positive perceptions of center staff; favorable attitudes about the center from friends, family, and community members; past visits to, donations to, and volunteering at the center; awareness of center services; and a general commitment to nature. Two other hypothesized predictors (financial and time limitations) were related to specific types of support (donation or volunteer likelihood, respectively). Six variables were included in the most parsimonious model for predicting highest levels of support: Friends, family, and local community attitudes; commitment to nature; positive perceptions of the center's provision of environmental connection and community resilience services; and previous donations and visits to the center. We discuss the significance and application of the findings for enhancing constituency-building efforts on behalf of nature centers and similar institutions.

Introduction

Nature centers commonly struggle with obtaining the support they need to thrive. One potential source of support is the local community. Community members may be likely candidates to visit, value, and support nature centers due to their close proximity to it. There are many types of support community members might provide, such as giving financial donations, volunteering free time, and responding to threats of development or closure. Certain people may provide support in particular ways but not in others, and certain centers may need particular types of support more than others. Centers would therefore benefit from better understanding the range of factors that lead community members to support them in different ways. This understanding would allow centers to better plan for eliciting the support they need to effectively achieve their missions.

Several bodies of literature and theory help explain why some people might support local nature centers. Non-profit organizational commitment literature (e.g. Sargeant & Woodliffe, 2005) suggests people donate to places like nature centers for reasons related to perceived organizational significance and social influence. Organizations which are perceived as serving crucial roles in society are more likely to elicit support than other organizations (Naskert & Siebelt, 2011; Sargeant & Woodliffe, 2005). Assessments of the performance of organization's ability and past history of serving their missions is also linked to donor support (Bradley & Sparks, 2012; Kelley & Davis, 1994; Mittal & Lassar, 1995). The influence of organizational value on future support might be explained by the predictive nature of rational assessments in behavioral intentions (Ajzen, 1991). In other words, people who believe the benefits of donating to or volunteering at local nature centers outweigh the opportunity costs of using time or money in other ways are likely to support these places. Several staff perceptions are additional predictors of commitment, including knowing someone who works in an organization (Dwyer et al., 1987; Ostrander & Schervish, 1990), believing staff members have similar values as one's own (Sargeant & Woodliffe, 2005), and trusting staff to do their jobs well (Moorman et al., 1992; Morgan & Hunt, 1994; Payton et al., 2005). Normative beliefs of how other people feel about an organization also seem to influence an individual's intention to support an organization (Allen & Meyer, 1990; Clary et al., 1992). These social influences might be explained with reference group theory (Merton, 1968) and trust theory (Stern & Coleman, 2014) which describe how people's perceptions of others' behaviors, as well as evaluations of their own behaviors,

cause people to act in ways that are consistent with meeting the expectations of themselves and others.

Pro-environmental behavior literature (e.g. Stern, 2000) suggests that environmental activism, including support for organizations like nature centers, is influenced by environmental predispositions, past behavior, utilization, and personal capability. Consistent with social psychology theory (e.g. Ajzen, 1991; Gugnano et al., 1995), environmental predispositions describe how holding pro-environmental attitudes, beliefs, and values might encourage people to take part in pro-environmental behaviors. Behavioral theory (Heimlich & Ardoin, 2008) suggests past behaviors may form habits and influence future behaviors. Utilization, or actively benefiting from an organization's existence, references social exchange theory (Amos, 1982). This theory describes how people who believe they will receive direct benefits from philanthropic actions are more likely to engage in these actions, even if these actions require a sacrifice (e.g. spending money). Personal capability refers to the theory that people need to overcome intervening factors such as limited time and money in order to enact behavioral intentions. This variable's influence on organizational support references leisure constraint theory (e.g. Floyd, 1999), which describes how leisure activities are necessarily constrained by diverse factors, and that people must negotiate through these factors in order to participate in desired activities.

In this study, we examine sixteen hypothesized factors from these bodies of literature and their ability to predict nature center support. Our primary research question is: "what causes community members to support their nature centers?" We hope our findings build an understanding of the reasons why people might support nature centers in different ways so that centers, and places like them, might be more effective in their constituency-building efforts.

Methods

Sampling

Data for this study were obtained from online surveys of community members living around sixteen U.S. nature centers. We selected these centers by asking a panel of experts (senior staff members from the National Audubon Society and the Executive Director of the Association for Nature Center Administrators) to each identify twenty of the "most successful" nature centers

in the U.S. incorporating five rural, five suburban, and five urban centers as well as five additional centers from any urbanity level but from geographic areas not already covered.[3] We targeted "successful" nature centers in hopes that community awareness levels for local centers would be greater and response rates in surveying efforts would be higher. We also hoped that these centers would represent what most nature centers aspire toward: providing potential best-case scenarios with regard to generating public support.

The experts collectively identified 50 nature centers. We reduced their list to 40 by excluding eight centers nominated by only one expert and one center consisting of a mobile school bus rather than a permanent interpretive building and adjacent local nature area. We assumed mobile centers would be less embedded in communities and would have slightly different predictors of support than stationary centers. We also excluded one residential environmental education center, because this type of center offers unique multiday experiences with different intended and measured outcomes than other nature center experiences (Ardoin et al., 2015; Stern et al., 2013). Our budget enabled us to study sixteen of the 40 potential centers. We supplemented ANCA and NAS urbanity estimations with census tract data (population density and distance to nearest metropolitan area) to create our own urban, suburban, fringe, and rural classifications for the 40 potential study sites, and we selected equal numbers of centers from each category.

We hired a marketing firm (DirectMail, Frederick, MD) to invite random samples of people living around each center to the online survey. The firm invited 4,000 people per center (64,000 in total) with a postal letter and two email reminders between July 31st and August 13th, 2014. Half of the invitees received a $2 bill with their letter as a pre-paid incentive to take the survey. This survey invitation effort resulted in a lower than desired sample size (n = 1,819; response rate = 4.0% after accounting for bounce-backs).[4] We conducted a second round of

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[3] We desired a range of urbanity levels, because past research suggests programming at nature centers is conducted differently in urban and rural settings (Kostka, 1976).
[4] We aimed for approximately 400 respondents per center and initially assumed a response rate of 10-13% using findings from general population web-based survey studies (Link & Mokdad, 2005 & 2006) and pre-paid incentive studies (Dillman et al., 2009; Göritz, 2006). We attempted to follow the Tailored Design Method (Dillman et al., 2009) and contact each person five times (pre-notice, invitation, and three reminders), but we were limited by our Institutional Review Board to contacting each person a maximum of only three times. Our calculated response rate

survey invitations with 8,000 additional randomly selected people per center (128,000 total) using an initial email and two email reminders sent between November 13th and 25th, 2014. The sampling frame was again developed from the marketing firm's mailing lists to avoid re-contacting the same respondents. Both samples were geographically limited to a circular area surrounding each center with radii determined by averaging community directors' estimations of what geographic areas encompassed what they felt to be their center's "local community" and by calculating the smallest radii that included adequate numbers of people from the marketing firm's mailing list (urban = four to five miles, suburban = six to twelve miles, and rural = twenty miles). The second round of invites resulted in 583 additional survey completions for a total of 2,402 responses and overall response rate of 1.7%.

The marketing firm provided some socio-demographic data about respondents (sex, age, level of education, and presence/absence of children in home), and we asked additional data (racial/ethnic self-identification) in the survey. Marketing firm data were estimated from multiple sources at 95% confidence (Experian, 2012).

Measured Variables

We measured 16 hypothesized predictors of nature centers support grouped into seven categories: nature center significance, social influence, environmental predisposition, past behavior, utilization, personal capability, and awareness. We also measured three types of behavioral intentions of supporting nature centers, and we created one unifying measure of center support by combining the responses to the three other measures (Table 3.1).

Nature Center Significance

The perceived significance of nature centers providing diverse services to their local communities was measured with four factors identified in an exploratory factor analysis of 14 survey items (Browning et al., in prep). Indices were composed of three to five survey items each

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was adjusted for the 51,072 unique email and letter bounce-backs we received. We had no way of counting how many emails were filtered by spam folders. As such, we don't know how many respondents actually received our email invitations.

and included the following factors: *environmental connection* (promoting pro-environmental awareness; encouraging environmental behavior; protecting wildlife habitats and ecosystem services; providing children places to learn; and providing access to nature), *leisure provision* (providing opportunities for physical exercise; providing safe outdoor recreation; and providing retreat, restoration, and relaxation), *community resilience* (making the community a more beautiful place; contributing to the local economy; and developing a sense of pride in the local community), and *civic engagement* (bringing together people from different races/ethnicities; linking people to political action; and providing a community gathering place).

The significance of each set of values was a function if the level of importance assigned to that factor and the perceived performance of centers providing that factor. Importance was solicited by asking, "how important is it to you that [nature center name] does each of the following?" (range = 1 to 5 where 1 = "not at all important" and 5 = "extremely important"), and perceived performance was solicited by asking "how well does [nature center name] actually accomplish the following?" (range = 1 to 5 where 1 = "not at all well" and 5 = "extremely well"). We chose to combine these measures, because theory suggests perceived importance and perceived performance are causally linked (importance informs expectations which informs performance) (Oh, 2001), and because multicollinearity was present (correlation coefficients between importance and performance were above 0.40 for each value). Composite scores were calculated as $(i * p) / 5$ where i represented the importance index for a specific value and p represented the performance index for that same value. We labeled these composite scores as measures of "significance," because they represented the extent to which respondents believed their local nature center was significant for excelling at providing very important values.

Social Influence

We measured several types of social influences that might predict nature center support. Drawing on reference group theory (Merten, 1968), we measured how respondents believed groups of people against whom they might compare themselves felt about their local nature center. More specifically, we asked whether respondents' believed their friends, family, and other community members liked their local nature center. We also predicted that the perceptions of staff members would influence nature center support by drawing on trust theory (e.g. Stern &

Coleman, 2014). We included measures of shared salient values with staff members, reliable performance by staff members, and reciprocity by staff members in the form of volunteering in the local community.

Environmental Predisposition

We used a pre-existing scale of "commitment to nature" (Davis et al., 2011) to measure the extent to which respondents held generally positive attitudes to the natural environment. Such attitudes have been found to be substantive predictors of diverse types of pro-environmental behaviors, including supporting environmental organizations (Stern, 2000).

Past Behavior

We included past behaviors as future predictors of nature center support, because many actions are results of habits, learned acts, or other behavioral patterns (Heimlich & Ardoin, 2008). Consequently, we hypothesized that previous volunteering and/or donating would lead to future likelihoods of repeating these actions.

Utilization

Consistent with social exchange theory (Amos, 1982), we believed people who used nature centers would perceive value in its existence and would thus perceive direct benefit from supporting these places. Consequently, we hypothesized past visits to a nature center would lead to an increased likelihood of supporting that center.

Personal Capability

Drawing from findings of pro-environmental behavior (e.g. Stern, 2000), we predicted that a person's capabilities would influence their engagement in nature center support. We measured two types of capabilities: financial resources and time availability. The former has been linked to active engagement in environmental organizations (Stern et al., 1999), and the

latter has been linked to nature center visitation – a necessary condition for nature center volunteering (Hong & Anderson, 2006; Rideout & Legg, 2000). We measured these two capabilities by asking respondents whether limited money or time prevented them from visiting their local nature center. Although this did not directly measure respondents' money available for donating or time available for volunteering or threat response, we believe that these measures provided approximate measures that had some advantages over direct measures. Explicitly asking respondents about socio-economic status or lifestyle may have led to non-response biases as a result of sensitivity about these topics and/or of perceptions that we were soliciting for nature center support in the survey.

Awareness

Several of our hypothesized predictors (e.g. past visitation and performance assessments) required basic understandings of the types of services nature centers offer. As such, we included a specific predictor in our study that examined the extent to which respondents' knew about local nature centers. "Awareness of center services" measured respondents' level of confidence about their local nature center providing five different types of services, all of which were provided by all the centers in our sample.

Future Support

Support was measured as the self-reported likelihood of donating, volunteering, or responding to a threat at a center under distress. We also created a fourth variable ("overall support"), which was a compilation of the three measured support variables. This was a binary measure representing whether or not respondents indicated highest likelihoods of engaging in at least one type of support. Selecting the highest end of the scale provided the most conservative assessments of behavioral intentions that might best reflect actual future behavior (Stern et al., 2012).

Data Analysis

We used SPSS Version 22 for Windows for data screening and analyses. Of the 2,402 community survey responses, thirty-six were removed for survey completion times less than 2.5 to 3.5 minutes (thresholds required to read and thoughtfully respond to each item, as determined in pilot tests, for respondents aware of their local center and for respondents unaware of their local center, respectively), forty-six were removed for survey completion percentages of less than 25%, and 43 were removed for multivariate outlier status (Tabachnick & Fidell, 2007). This effort resulted in 2,276 responses, of which 877 were from people who didn't know their local nature center existed. In this paper, we focus only on the data collected from respondents who confirmed they were aware of their local center ($n = 1,399$).

We examined bivariate relationships with Pearson's and point-biserial correlation analyses and chi-square tests. We examined multivariate relationships with stepwise linear regression and binary logistic regression. Linear regressions created models of predicted support for the three measured types of support over the range of response categories ("very unlikely" to "very likely"). A binary logistic regression created an overarching model that best explained the binary (most conservative) likelihood of nature center support in general. We used backward stepwise methods, because forward methods are more prone to suppressor effects and Type II errors (Field, 2009). We cross-validated regression models by randomly splitting data and running forced-entry regressions with the variables included in stepwise regressions on a random sample of 50% of cases (Field, 2009). Similar R^2 values and standardized beta coefficients in cross-validation tests confirmed consistent findings.

Data met assumptions required for regression. Variance inflation factors were less than 10.0, and tolerance scores were more than 0.2, suggesting multicollinearity was not present (Menard, 1995; Myers, 1990). Visual examinations of Q-Q plots and regression residual plots as well as non-significant Kolmogorov-Smirnov tests suggested data were approximately normally distributed. Non-significant Levene statistics indicated predictor variables displayed homogenous variance across the range of data. Durbin-Watson values between 1.0 and 3.0 suggested residual terms were uncorrelated (Durbin & Watson, 1951; Field, 2009). There were no influential cases identified by Cook's distance values greater than 1.0 or by the percentage of cases with absolute standardized residual values above 2.0 being less than 5%.

Results

Sample Descriptives

Sixty percent of our sample had visited, 19% had donated to, 8% knew someone who worked at, and 5% had volunteered at their center. Respondents' ages ranged from 19 to 97, with a mean age of 54. The majority of the sample was non-Hispanic White (79%) and male (71%). Twenty-six percent had children eighteen years or younger living with them in their home. Five percent had less than a high school diploma while 19% had earned their diploma, 23% had attended some college, 25% had completed a bachelor's degree, and 21% had completed a graduate degree.

In comparison to census tracts in which the sixteen centers were located, our sample over-represented males, non-Hispanic Whites, people without children in their home, older people, and people with higher levels of education. Census populations contained 50% males, 71% non-Hispanic Whites, and 29% people with children in their home. The average age of census populations was 38, and 14% percent had less than a high school diploma while 25% had earned their diploma, 26% had attended some college, 21% had completed a bachelor's degree, and 16% had completed a graduate degree.

Table 3.1 Measured Variables

Nature Center Significance

Name	Description	Range
Environmental connection significance	Perceived significance (importance and performance) of centers: • Encouraging environmental behavior (e.g. recycling or saving electricity and water) • Increasing environmental awareness (e.g. introducing people to native wildlife or plants) • Providing access to nature • Providing a place for children to learn • Providing wildlife habitat or ecosystem services (e.g. slowing storm water runoff) Responses averaged to create "*environmental connection significance*" index (Cronbach's α = .90).	Index ranged from 1 to 5 where 1 = not significant (center provides these unimportant services poorly) and 5 = highly significant (center provides these important services very well)
Leisure provision significance	Perceived significance (importance and performance) of centers: • Providing a place for physical exercise • Providing a place for retreat, restoration, or relaxation • Providing a safe place for outdoor recreation Responses averaged to create "*leisure provision significance*" index (Cronbach's α = .82).	(same as above)
Civic engagement significance	Perceived significance (importance and performance) of centers: • Helping bring together people from different races/ethnicities • Linking people to political action • Providing a place for people in the local community to gather Responses averaged to create "*civic engagement significance*" index (Cronbach's α = .79).	(same as above)
Community resilience significance	Perceived significance (importance and performance) of centers: • Contributing to the local economy (e.g. increasing property values or attracting businesses) • Developing a sense of pride in the local community • Making the community a more beautiful place Responses averaged to create "*community resilience significance*" index (Cronbach's α = .84).	(same as above)

Social Influence

Name	Description	Range
Normative beliefs	Perception of the following groups' feelings about the local center: • friends • family • other people in your community Each item above was measured on a scale from 1 (they don't like it) to 3 (they like it). Item responses were averaged to create *"normative beliefs"* index (Cronbach's α = .82).	Index ranged from 1 to 3 where 1 = they don't like it and 3 = they like it

Staff acquaintance	Response to: "Do you know anyone who is currently employed at [nature center name]?"	0 = No 1 = Yes
Staff performance	The extent to which respondents agreed/disagreed with the following statement: "I trust [nature center name] staff members to do their jobs well."	1 = Strongly disagree 2 = Disagree 3 = Neither agree or disagree 4 = Agree 5 = Strongly agree
Staff volunteering	Response to: "To the best of your knowledge, do [nature center name] staff members volunteer in the local community?	1 = No, they definitely do not 2 = I don't think they do 3 = I have no idea about this 4 = I think they do 5 = Yes, I'm sure they do
Staff shared values	Response to: "To the best of your knowledge, do [nature center name] staff members have values similar to your own?"	1 = Definitely not 2 = Probably not 3 = Probably 4 = Definitely

Environmental Predisposition

Name	Description	Range
Commitment to nature	The extent to which respondents agreed/disagreed with the following statements: • "I feel more content with my life when I spend time in the natural environment." • "I find spending time in the natural environment to be rewarding." • "Spending time in the natural environment makes me happy." • "The natural environment does a good job of meeting my needs for activity, relaxation, or adventure." • "The natural environment is a good place to spend time." Each statement was measured on a scale from 1 (strongly disagree) to 5 (strongly agree). Responses were averaged to create "*commitment to nature*" index (Cronbach's α = .93).	Index ranged from 1 to 5 where 1 = low levels of commitment to nature and 5 = high levels of commitment to nature

Past Behavior

Name	Description	Range
Past donation	Response to: "Have you ever donated money to [nature center name]?"	0 = No 1 = Yes
Past volunteering	Response to: "Have you ever volunteered at [nature center name]?"	(same as above)

Utilization

Name	Description	Range
Visitation frequency	Responses to "Have you ever visited [nature center name]?" and [if yes to previous question]… "How many times have you visited [nature center name] in the last year?"	0 = Never visited 1 = Not visited in last year 2 = 1 time in last year 3 = 2-5 times 4 = 6-9 times 5 = 10-14 times 6 = 2 times per month 7 = 1 time per week 8 = > 1 time per week

Personal Capability

Name	Description	Range
Limited financial resources	Extent to which respondent believes "Program or entrance fees being too expensive" are issues that prevent him/her from visiting the local center.	1 = Not an issue 2 = A minor issue 3 = A major issue
Busyness	Extent to which respondent believes "I'm too busy with other commitments" is an issue that prevents him/her from visiting the local center.	(same as above)

Awareness

Name	Description	Range
Awareness of center services	Response to: "To the best of your knowledge, how likely is it that [nature center name] does any of the following?" for the following items: • Offers rental facilities (e.g. picnic shelters or indoor meeting rooms) • Participates in community events (e.g. street parades or farmers markets) • Provides educational programs for youth • Provides educational programs or trainings for adults • Provides volunteer opportunities Each item above was measured on a scale from 1 (definitely not) to 5 (definitely yes). Item responses were averaged to create *"awareness of center services"* index (Cronbach's α = .80).	Index ranged from 1 to 5 where 1 = very unaware of center services, and 5 = very aware of center services

Future Support

Name	Description	Range
Donation	Response to: "If [nature center name] were facing budgetary problems, what is the likelihood you would donate money to the center?	1 = Very unlikely 2 = Unlikely 3 = Somewhat unlikely 4 = Undecided 5 = Somewhat likely 6 = Likely 7 = Very likely
Threat response	Response to: "If [nature center name] were threatened (e.g. with development or closure), what is the likelihood you would do something to protect it? You might do this, for example, by attending a public meeting or writing a letter to a political official."	(same as above)
Volunteering	Response to: "If [nature center name] asked you to volunteer your time, what is the likelihood you would do it?"	(same as above)
Overall support	Composite score created from responses to three other support measures.	0 or 1 where 0 = "very likely" was not assigned to any support measure and 1 = "very likely" was assigned to at least support measure

Predictors of Support

Fourteen of our hypothesized factors were significantly related to all three types of support and the binary outcome variable representing overall support in bi-variate analyses (Table 3.2). The two personal capability items (limited financial resources and busyness) were both related to threat response but individually related to donation or volunteering.

In multivariate analyses, threat response was the best predicted type of support with approximately one-third of its variance explained by six variables (Table 3.3).[5] Donation and volunteering were more weakly predicted with approximately one-fifth of their variances being explained by four or five variables, respectively. Predictor variables varied from one model to the next with few exceptions. Visitation frequency was a predictor in all three models. Environmental connection significance predicted threat response and donation. Commitment to nature predicted threat response and volunteering. Normative beliefs predicted donation and volunteering. Past donation and volunteering predicted future donation and volunteering models, respectively.

The binary logistic regression model explained the highest likelihood of overall support with six predictors: normative beliefs, commitment to nature, environmental connection significance, past donation, community resilience significance, and visitation frequency. This model predicted whether respondents indicated highest likelihood or not highest likelihood of nature center support with 77% accuracy (Table 3.4).

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[5] Twenty-four percent of our sample ($n = 308$) did not provide performance scores. An additional 425 respondents did not know whether their friends, family, or community liked or knew about their local center. We excluded these cases for multivariate regression analyses, and the resulting sample size used was 666.

Table 3.2 Bivariate Tests of Relationships between Hypothesized Predictor Variables and Outcome Variables

Ordinal and interval-level predictor variables	Outcome variables			
	Threat response[a]	**Donation**[a]	**Volunteering**[a]	**Overall support**[b]
Environmental connection significance	.435***	.347***	.211***	.335***
Civic engagement significance	.349***	.264***	.265***	.325***
Community resilience significance	.338***	.310***	.225***	.313***
Leisure provision significance	.365***	.297***	.221***	.298***
Visitation frequency	.270***	.244***	.313***	.277***
Commitment to nature	.328***	.223***	.213***	.255***
Staff performance	.312***	.269***	.167***	.243***
Staff shared values	.294***	.274***	.180***	.237***
Awareness of center services	.292***	.292***	.211***	.233***
Normative beliefs	.316***	.296***	.193***	.199***
Staff volunteering	.196***	.207***	.152***	.139***
Limited financial resources	-.067*	-.176**	.017	-.019
Busyness	-.063*	-.031	-.109**	-.031
Binary predictor variables	**Threat response**[b]	**Donation**[b]	**Volunteering**[b]	**Overall support**[c]
Past donation	.256***	.284***	.152***	77.7(1) ***
Staff awareness	.174***	.177***	.143***	45.9(1) ***
Past volunteering	.117***	.119***	.211***	28.3(1) ***

[a]Pearson correlation coefficients, [b]point-biserial correlation coefficients, [c]chi-square test statistics (and degrees of freedom)

Table 3.3 Best Models for Predicting Likelihood of Three Types of Support[a]

Predictor	Threat response β	Donation β	Volunteering β
Environmental connection significance	.312***	.285***	
Past volunteering			.210***
Civic engagement significance			.186***
Past donation		.158***	
Visitation frequency	.195***	.152***	.178***
Commitment to nature	.150***		.128**
Staff shared values	.115***		
Normative beliefs		.153***	.109**
Staff shared values	.115**		
Staff performance	.108**		
R^2	.330	.224	.201
Adjusted R^2	.325	.220	.195

[a]ordinary least squares linear regression using backward stepwise methods, **$p < .01$, ***$p < .001$

Table 3.4 Best Model for Predicting Overall Support[a]

Classification

Observed	Predicted		Correct
	0	1	
Not very high (0)	409	47	90%
Very high (1)	106	104	50%
Overall			77%

Predictors	*Odds ratio*
Normative beliefs	2.48[*]
Commitment to nature	2.21[***]
Environmental connection significance	2.14[***]
Past donation	1.61[*]
Community resilience significance	1.47[**]
Visitation frequency	1.33[***]

Model fit	
Cox & Snell R^2	.250
Nagelkerke R^2	.350

[a]binary logistic regression using backward stepwise methods and likelihood ratio statistics to estimate coefficient significance values, [*]$p < .05$, [**]$p < .01$, [***]$p < .001$

Discussion

We found all of our hypothesized predictor variables were related to respondents' support for local nature centers, including those related to nature center significance, social influence, environmental predisposition, past behavior, utilization, personal capability, and awareness. Specific predictor variables included characteristics that may be traditionally associated with nature center visitors and members, including commitment to nature, perceived environmental connection significance, and past behaviors of support. We also found variables related to support that may *not* be traditionally associated with nature centers, including provision of leisure, civic engagement, and community resilience services; familiarity with center staff members; perceptions of staff members; perceptions about how friends, family, and the community feel about nature centers; awareness of center services; and available finances and time. As such, our study extends prior research suggesting community members think about nature centers in broad ways (Browning et al., in prep.) as well as prior research suggesting people support non-profit organizations for reasons beyond their missions and the particular services they provide (e.g. Sargeant & Woodliffe, 2005). Together, this research suggests nature centers and similar organizations that are respected by their local communities for reasons including, and extending beyond, their missions may garner more support from these populations.

Using a conservative approach to identify which predictors might have the highest likelihoods of linking with support, we created a binary variable indicating the presence/absence of the strongest behavioral intentions. Fourteen of the sixteen hypothesized predictors were significantly related to this binary measure. Logistic regression suggested the most parsimonious model of support - including normative beliefs, commitment to nature, environmental connection significance, past donation, community resilience significance, and visitation frequency - accurately assigned over three-quarters of the respondents to "very likely" or "not very likely" support categories.

The influence of normative beliefs might be explained by these beliefs contributing to trust, as has been shown in other studies, for organizations that are well-respected by relevant social groups (Stern & Coleman, 2014). An alternative explanation is that some people support organizations, because their support is noticeable to and positively perceived by others within

their social group (Stroebe & Frey, 1982). In addition, people who compare themselves to others in their reference group, such as their friends and family or local community, are likely to judge their personal behaviors against these groups' behaviors and attitudes. As such, these people may want to behave in ways that meet the perceived expectations of these groups (Merton, 1968).

The model's inclusion of a respondent's commitment to nature and their perception that centers hold environmental connection significance demonstrates a strong link between views of the natural environment and participation in a range of activities that directly and indirectly contribute to its protection. Similar results have been found in studies of pro-environmental behavior (Stern et al., 1999), activism (Fiedling et al., 2008), philanthropy (Cermak et al., 1994), and volunteerism (Ryan et al., 2001). These results may be a function of people's pro-environmental values influencing peoples' beliefs and attitudes and ultimately leading them to develop pro-environmental personal norms which lead to a variety of supportive behaviors (Stern & Dietz, 1999).

The inclusion of past donations and volunteering in the model is supported by research on habits leading to behavioral intentions through numerous pathways such as self-perception, affected attitude, perceived social pressure, and perceived controls (Heimlich & Ardoin, 2008).

Our finding that respondent's who perceived centers hold more community resilience significance had higher likelihoods of support suggests some communities associate nature centers with "social capital" (Putnam, 1995). We conceptualized "community resilience" as community-building services that nature centers might provide, such as aesthetics, economics, and sense of pride. If these services are perceived as contributing to social relationships and support networks that represent a collective community resource, people may want to invest in nature centers so that they in turn reciprocate and build the communities' social capital stocks.

The relationship between support and utilizing a nature center's services (e.g. visiting a center frequently) has been found in volunteer motivation studies (e.g. Donald, 1997) and pro-environmental behavioral intention studies (e.g. Halpenny, 2010). This relationship supports social exchange theory (Amos, 1982) and implies people who visit nature center's protected lands are more likely to support these places as a result of support behaviors ensuring these people can continue to engage in outdoor leisure activities in their local communities.

Implications

These findings reveal many practical implications for nature centers, particularly with regard to their involvement in local communities. Although some predictors of support may be outside of a center's immediate control (e.g. someone's level of commitment to nature if they don't visit the center), other factors can be enhanced through outreach and programming. Particular focus might be placed on increasing community members' positive evaluations of diverse center services. Centers might describe the ways in which they provide such services in marketing materials, thereby increasing community members' perceived significance for issues about which they lack objective criteria to evaluate progress (e.g. intangible, long-term changes in community pride, cohesion, inclusivity, and environmental literacy) (Ardoin & Bowers, 2012; Coleman, 1990; Gounans, 2005; Polonsky & Macdonald, 2000). Centers might also consider expanding programs and initiatives to explicitly promote those services not traditionally associated with nature centers, including civic engagement and community resilience. Centers might prioritize building relationships between community and staff members during off-site activities. Centers might consider incentivizing staff to volunteer locally outside of their day jobs so they interact in the community in different capacities. Such efforts might increase positive perceptions about staff members as well as feelings that friends, family members, and the larger community like local nature centers.

Limitations

Our findings were limited both by our site selection and by the non-representative sample of survey respondents in selected communities. First, we selected only nature centers believed by experts to be among the most successful in the United States. As such, we might expect levels of donation, volunteering, visitation, and staff familiarity to be higher than in a broader suite of sites. Our sample of respondents over-represented certain socio-demographic characteristics (male, non-Hispanic White, education level, and older people) while under-representing other characteristics (presence/absence of children in the home). Furthermore, correlations between the predictor and support variables represent how our particular sample associated these items rather than the way in in which all people might associate these items. Thus, our regression analyses present only a tentative understanding of the reasons why community members might support

local nature centers. The identification and relative rankings of these predictors, as well as differences in rankings between community subgroups, are testable hypotheses for further investigation rather than fully validated theories.

Another limitation of our study was the ability of our most conservative model for nature center support to classify respondents. This model accurately classified only 50% of our respondents to the "very likely" category of support. This result may indicate our cutoff point (respondents answering 7, "very likely," on a 1-7 scale) was too strict. Alternatively, this result may highlight the difficulty of explaining behavioral intentions with a limited number of variables. Other well-studied models, such as the theory of planned behavior, only predict up to 50% of behavioral intentions (Armitage & Conner, 2001; Sutton, 1998). Behavioral models may be necessarily limited to explaining a portion of the reasons why people engage in certain behaviors. Consequently, we believe our study also includes only a sample of the factors that might predict nature center support.

Future Research

Our research findings begin to build an understanding of the reasons why people support nature centers, and as a result, open avenues for future research. Our study promotes future studies examine additional predictors drawn from other empirical research and theories to explain larger portions of the variance in support. For instance, self-efficacy (the belief that actions will lead to desired outcomes) is commonly related to environmental activism behavior (Séguin et al., 1998) and might correlate with threat response at nature centers. People who believe representing centers at public meetings and voting for tax increases accrue substantive benefit may be more likely to engage in such behaviors. An additional predictor might be the belief that there are immediate serious threats to the natural environment. This belief seems to motivate people to donate to political groups with environmental agendas (Lubell, 2002; Miller & Krosnik, 2004). These beliefs may also translate to nature center donations in people who assign significance to environmental connection and civic engagement factors.

Conclusion

In summary, our study suggests that nature centers should look beyond the supporters to which they usually appeal (e.g. those highly committed to nature and visitors to protected natural areas) to become more sustainable. We posit that a broader array of people in local communities might support centers not just because they are "nature" centers, but also because they are meaningful places with engaged staff that contribute broadly to the social and environmental fabric of a local community. However, further scholarship is needed before these theoretical and practical interpretations are assumed to be present in all nature center contexts.

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Chapter 4: Understanding Visitor Constraints at Educational Leisure Settings

with the Hierarchy-of-Effects Model

Abstract

Nature centers and other educational leisure settings might receive a greater number and diversity of people visiting if they better understand, and help negotiate, visitor constraints. We conducted an exploratory study on the perceived constraints to visitation with community members living around 16 U.S. nature centers. We used marginality, discrimination, and subcultural hypotheses from leisure constraints theory (e.g. Floyd, 1999) to understand possible reasons some community members might not visit nature centers. We then applied a seven-stage marketing model (Lavidge & Steiner, 1961) to categorize these constraints according to stages of decision-making regarding whether or not to visit a nature center. Both early stages (lack of awareness) and late stages (intervening factors such as financial, time, and transportation constraints) of the process were most limiting to visitation. Middle stages (feeling unwelcome/unsafe and preferring alternative leisure activities) were less limiting to visitation in our sample, although they were still major issues for some community members. We provide suggestions for centers to build campaign strategies that move potential visitors through the stages of the hierarchy-of-effects model when deciding whether to visit (or not) nature centers.

Introduction

Past research suggests that visitors to educational leisure settings, such as nature centers and museums, are not entirely representative of the diverse populations living around them (Farrell, 2010). Various theoretical perspectives can be used to explain why some populations participate at lower rates than others (e.g. Crawford & Godbey, 1987; Floyd et al., 1993; Gomez, 2006). The hierarchy-of-effects model (Lavidge & Steiner, 1961) provides a way to organize established theories and empirical findings regarding visitor constraints to educational leisure settings. Using a marketing lens, the model suggests people move through the following seven stages before deciding to purchase something: (1) unawareness, (2) awareness, (3) knowledge, (4) liking, (5) preference, (6) intention, and (7) conation. For the purposes of this study, this model represents the seven stages someone goes through when deciding to visit (or not) an educational leisure setting. Advancing from stage one to three requires knowledge that a setting exists as well as knowledge about what services that setting offers. Moving from stage four to five requires favorable attitudes toward those services and preference for those services over all other leisure possibilities. Advancing to stage six requires intentions to actually visit a setting, and reaching stage seven requires overcoming intervening factors[6] that might prevent visiting, such as limited access, finances, or time.

These seven steps can be grouped according to the roles they play in cognitive psychology (Hilgard, 1980; Kawashima, 1998). The first three steps deal with cognition (information and facts), the middle steps with affect (attitudes and feelings), and the final steps with intervening factors separating behavioral intentions from behavior (Figure 4.1). Leisure constraint theories can be grouped according to these stages. The subcultural hypothesis suggests different populations have different associations with and preferences for leisure places (Floyd et al., 1993; Meeker, 1973; West, 1989). This hypothesis further posits that certain leisure settings are managed to meet some population's leisure preferences better than others. As a result, these settings encourage some groups to visit and discourage other groups from visiting. Because this theory discusses perceptions about leisure settings and activities, this theory and associated constraints fall within the middle affective stages of the hierarchy-of-effects model. The

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[6] Although intervening factors were not explicit in Lavidge & Steiner's original model, we chose to include them, because the resulting model separates behavioral intentions from actual behavior. Intervening variables are commonly used in behavioral psychology to explain the separation between these two items (Kuhl & Beckman, 1985).

discrimination hypothesis (Gramann, 1996) proposes some populations perceive they are discriminated against, or actually are discriminated against, in some leisure settings. This theory also deals with perceptions of leisure settings and thus also describes visitation constraints in the affective stages of the model. The marginality hypothesis (Washburne, 1978) suggests populations with limited access to socio-economic resources are constrained in their leisure participation by financial, time, and access issues. As such, this hypothesis describes intervening factors in the model that separates intentions to visit from actual visitation. In addition, this hypothesis describes information limitations, including not being aware that an educational leisure setting exists and not having information about what services that setting offers. These constraints explicitly refer the early, cognitive stages of the model.

In this exploratory study, we apply the hierarchy-of-effects model to understand constraints to educational leisure setting visitation. We apply past theory on leisure constraints to develop a list of possible visitation constraints and then test the influence of these constraints in community members living around 16 nature centers across the United States. We also test past theory on whether different groups are differentially constrained in leisure participation. We conclude with providing strategies oriented around overcoming the stages of our revised leisure constraints model.

Methods

Sampling

Our sample consisted of community members living around sixteen U.S. nature centers. We selected these centers by asking a panel of experts (senior staff members from the National Audubon Society and the Executive Director of the Association for Nature Center Administrators) to each identify twenty of the "most successful" nature centers in the U.S. incorporating five rural, five suburban, and five urban centers as well as five additional centers from any urbanity level but from geographic areas not already covered.[7] We targeted "successful" nature centers in hopes that community awareness levels for local centers would be greater and response rates in surveying efforts would be higher. We also hoped that these centers

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[7] We desired a range of urbanity levels, because past research suggests programming at nature center is conducted differently in urban vs. rural settings (Kostka, 1976).

would represent what most centers aspire toward: centers working toward and achieving diminished visitation constraints from diverse local populations.
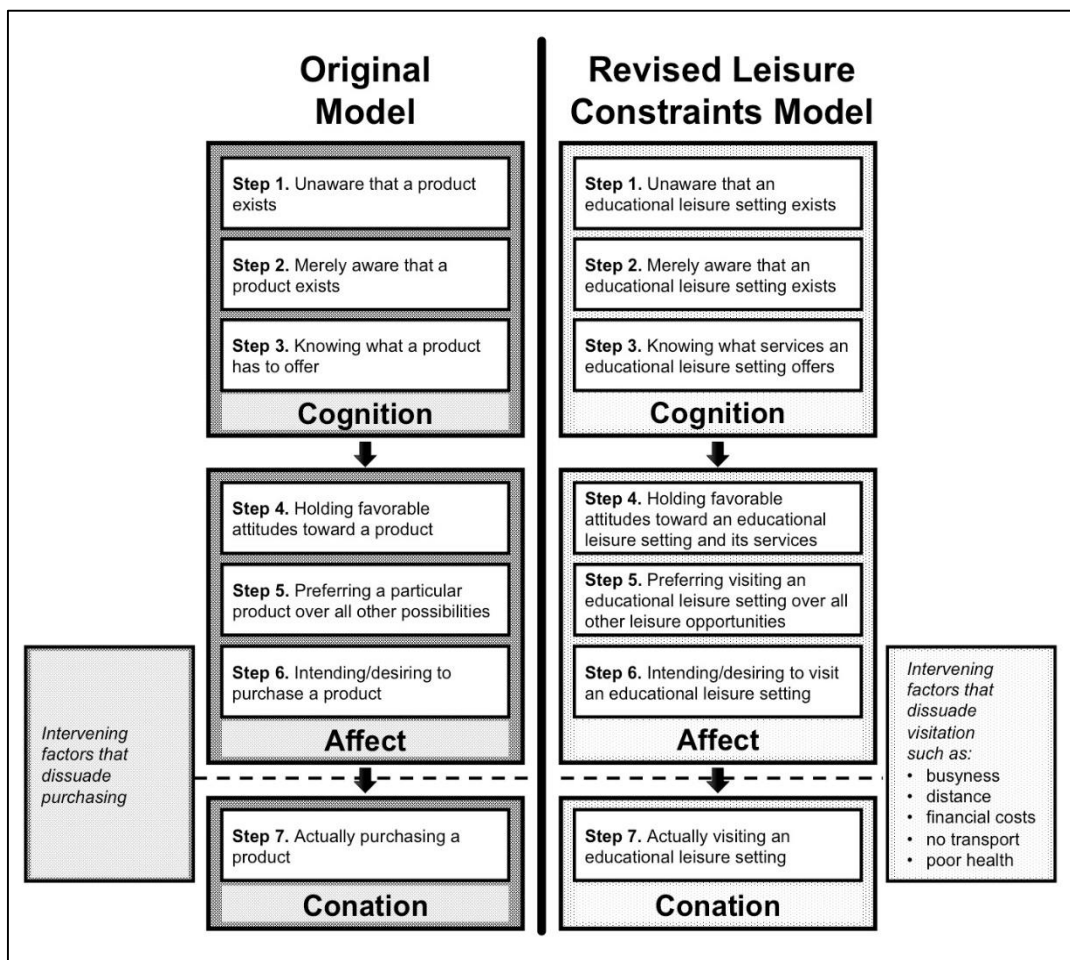
Figure 4.1. The Original Model of Purchase Behavior and a Revised Model of Leisure Constraints at Educational Leisure Settings
On the left is the original hierarchy-of-effects model from Lavidge & Steiner (1961) used to describe decision-making related to purchase behavior. On the right is our proposed leisure constraints model describing the seven stages through which people must pass before visiting an educational leisure setting, such as a nature center or museum.

The experts collectively identified 50 nature centers. We reduced their list to 40 by only including those centers nominated by more than one expert and associated with nearby natural areas.[8] We also excluded residential environmental education centers, because they offered

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[8] We assumed that some visitation constraints would be directed both toward nature center's interpretive facilities and natural areas. Consequently, we required all centers in our sample to have adjacent natural areas.

unique multiday experiences with different intended and measured outcomes than other nature center experiences (Ardoin et al., 2015; Stern et al., 2013). Our budget enabled us to study sixteen of the 40 potential centers, which we selected by choosing equal numbers from each urbanity level and simultaneously maximizing geographic spread throughout the lower 48 United States.

We hired a marketing firm (DirectMail, Frederick, MD) to develop random samples of community members living around each center. Samples were geographically limited to a circular area surrounding each center with radii determined by averaging community directors' estimations of what geographic areas encompassed what they felt to be their center's "local community" and by calculating the smallest radii that included adequate numbers of people from the marketing firm's mailing list (urban = four to five miles, suburban = six to twelve miles, and rural = twenty miles).

Instrument

We gathered awareness of centers' existence by asking, "Have you heard of [nature center name]?" This question separated our sample into those who indicated they were aware of their local center ("aware respondents") and those who indicated they were unaware ("unaware respondents"). Aware respondents were asked to complete a battery of survey items on additional possible visitation constraints from past research (Hong & Anderson, 2006; Rideout & Legg, 2000; Palacios, 2013). The survey battery prompt was: "We recognize that there may be issues or challenges that prevent some people from visiting [nature center name]. To what extent are the following issues that prevent you from visiting?" Ten items were presented in randomized order, and respondents were provided with four response categories: 1 = not an issue, 2 = a minor issue, 3 = a major issue, and 4 = I don't know. We classified these items according to the cognition, affect, and intervening factor categories present in the model (see Table 4.1). Because we recognized additional constraints not already captured in our ten survey items might be present, we included the open-ended survey item: "If there are any other issues or reasons that prevent you from going to [nature center name], please describe them here."

We also asked about racial/ethnic identification in the survey. Other socio-demographic data about respondents, including sex, age, level of education, and presence/absence of children in home, were provided by the marketing firm. These data were estimated from multiple sources

at 95% confidence (Experian, 2012). We assessed urbanity classifications with census tract data (population density and distance to nearest metropolitan area) and confirmed these classifications with a senior staff member at the National Audubon Society.

Procedure

The marketing firm (DirectMail, Frederick, MD) initially invited 4,000 people per center (64,000 in total) to our online survey with a postal letter and two email reminders between July 31st and August 13th, 2014. Half of the invitees received a $2 bill with their letter as a pre-paid incentive to take the survey. This survey invitation effort resulted in a lower than desired sample size (n = 1,819). We conducted a second round of survey invitations with 8,000 additional randomly selected people per center (128,000 total) using an initial email and two email reminders sent between November 13th and 25th, 2014. The sampling frame was again developed from the marketing firm's mailing lists to avoid re-contacting the same respondents. Both samples were geographically limited to a circular area surrounding each center with radii determined by averaging community directors' estimations of what geographic areas encompassed what they felt to be their center's "local community" and by calculating the smallest radii that included adequate numbers of people from the marketing firm's mailing list (urban = four to five miles, suburban = six to twelve miles, and rural = twenty miles).

The second round of invites resulted in 583 additional survey completions for a total of 2,402 responses and overall response rate of 1.7%.[9]

Data Analyses

SPSS Version 22 for Windows was used for all data screening and analyses except as noted below. Of the 2,402 community survey responses, thirty-six were removed for survey

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[9] We aimed for approximately 400 respondents per center and initially assumed a response rate of 10-13% using findings from general population web-based survey studies (Link & Mokdad, 2005 & 2006) and pre-paid incentive studies (Dillman et al., 2009; Göritz, 2006). We attempted to follow the Tailored Design Method (Dillman et al., 2009) and contact each person five times (pre-notice, invitation, and three reminders), but we were limited by our Institutional Review Board to contacting each person a maximum of only three times. Our calculated response rate is adjusted for the 51,072 unique email and letter bounce-backs we received. We had no way of counting how many emails were filtered by spam folders. As such, we don't know how many respondents actually received our email invitations.

completion times less than 2.5 to 3.5 minutes (thresholds required to read and thoughtfully respond to each item, as determined in pilot tests, for unaware and aware respondents, respectively), forty-six were removed for survey completion percentages of less than 25%, and 43 were removed for multivariate outlier status (Tabachnick & Fidell, 2007). The final number of community surveys was 2,276.

We tested for differences between populations with chi-square test statistics for each respondent subgroup. Constraints were recoded such that $0 =$ not an issue and $1 =$ a minor or major issue. Standardized residuals from expected vs. observed counts were examined to determine significant differences between groups (+/- 1.96 indicated significance at $p < .05$; +/- 2.58 at $p < .01$; +/- 3.29 at $p < .001$) (Field, 2009). Because the vast majority of our responses were from non-Hispanic whites, we re-coded race/ethnicity into a binary variable in analyses ($0 =$ non-White, $1 =$ White) for analyses.

Open-ended survey responses were coded in Microsoft Excel 365 for Windows. We looked for emergent themes and then refined them and classified them into categories that corresponded to cognitive and affective dimensions as well as intervening factors.

Table 4.1 Measured Constraints

Category	Item	Label	Response options
Cognition	Have you heard of [nature center name]?	*never heard of it*	0 = no, 1 = yes
Cognition	I don't know what there is to do there.	*don't know what to do*	1 = not an issue 2 = a minor issue 3 = a major issue 4 = I don't know
Affect	There's nothing I like to do there.	*nothing I like to do*	(same as above)
Affect	My friends/family prefer to go elsewhere.	*prefer other places*	(same as above)
Affect	I don't think I'm safe/welcome there.	*not welcome*	(same as above)
Affect	People like me are not treated as well as other people there.	*unfairly treated*	(same as above)
Intervening	I'm too busy with other commitments.	*too busy*	(same as above)
Intervening	I have poor health.	*poor health*	(same as above)
Intervening	It is far from where I live or work.	*too far away*	(same as above)
Intervening	I don't have a convenient way of getting there.	*inconvenient transportation*	(same as above)
Intervening	The entrance or program fees are too expensive.	*too expensive*	(same as above)

Results

Sample Descriptives

Sixty percent of our sample had visited, 19% had donated to, 8% knew someone who worked at, and 5% had volunteered at their center. Respondents' ages ranged from 19 to 97, with a mean age of 54. The majority of the sample was male (71%) and non-Hispanic White (79%). Other races/ethnicities represented were Hispanic/Latino (6%), black or African American (5%), Asian (4%), Native American or Alaskan Native (1%) and mixed (4%). Twenty-six percent had children eighteen years or younger living with them in their home. Five percent had less than a high school diploma while 19% had earned their diploma, 23% had attended some college, 25% had completed a bachelor's degree, and 21% had completed a graduate degree.

In comparison to census tracts in which the sixteen centers were located, our sample over-represented males, non-Hispanic Whites, people without children in their home, older people, and people with higher levels of education. Census populations contained 50% males, 29% people with children in their home, and 71% non-Hispanic Whites. Other races/ethnicities included Hispanic/Latino (19%), black or African American (9%), Asian (5%), and mixed race (3%). The average age of census populations was 38, and 14% percent had less than a high school diploma while 25% had earned their diploma, 26% had attended some college, 21% had completed a bachelor's degree, and 16% had completed a graduate degree.

Visitation Constraints

The greatest constraint was lack of awareness that the center existed. Only 1,399 respondents (61%) confirmed they had heard of their local nature center. The other cognitive factor (*don't know what to do*) was an important perceived constraint. Approximately one-third of aware respondents indicated this was a minor or major issue preventing them from visiting their local center (Table 4.2). When combined, these cognitive constraints affected 1,324 respondents or approximately 58% of our sample.

Items representing intervening variables (*too busy, too far away, poor health, inconvenient transportation,* and *too expensive*) were less influential than cognitive constraints

but more influential than affect constraints. Intervening factors affected 38% of the entire sample and 61% ($n = 857$) of aware respondents.

Constraints related to affect (*prefer other places, nothing I like to do, not welcome,* and *unfairly treated*) were perceived to be least influential. In total, these items affected only 17% of the full sample or 29% ($n = 399$) of aware respondents.

Visitation rates and visitation constraints differed by race and ethnicity. Sixty-one percent of non-Hispanic Whites had visited their local nature center while only fifty-two percent of people of a different race/ethnicity had visited. Two-sample T-tests suggested this difference was statistically significant but represented only a small effect size ($p = .038$, $d = .16$). Chi-squared tests revealed differences between non-Hispanic Whites and other populations in regards to which constraints were issues (Table 4.3). In particular, fewer numbers of non-Hispanic Whites indicated *never heard of it, not welcome, unfairly treated, inconvenient transportation,* and *too expensive* than people of other races/ethnicities.

The presence of constraints was different along other socio-demographic lines as well. Younger respondents (ages 18-39) indicated *don't know what to do* and *too expensive* more than older respondents. Older respondents (60+) indicated *poor health* more and *never heard of it* less than younger respondents. Rural audiences indicated *never heard of it* less than others, and *too far away* more than others. Urban audiences indicated *never heard of it* and *not welcome* more than others. Females indicated *inconvenient transportation* and *too expensive* items more than males. Non-visitors indicated *don't know what to do* more than visitors. People with children in their household identified *unfairly treated* more than people without children. People with graduate degrees indicated *too expensive* less than people with lower levels of education. There were no significant differences between groups for *too busy*, *prefer other places*, and *nothing I like to do* items.

Thirty percent of respondents described issues in open-ended survey textboxes. These responses included eight themes that fit within cognition and affect dimensions of the model or served as intervening factors (Table 4.4). All of these themes were more or less already captured in survey items. Lack of knowledge/awareness was the most common theme in responses and was mentioned by nearly one-quarter of respondents. Lack of interest and difficult transportation to the center were other common themes mentioned by one-fifth of respondents. Less common

themes included preferring other activities, being too busy, not feeling welcome/safe, and having poor health. One theme ("not prioritized") could have represented multiple stages of the hierarchy-of-effects model, including affective stages – specifically, preferring other places - or various intervening factors.

Discussion

The purpose of this article was to understand which types of visitor constraints might be of most concern to nature centers, and educational leisure settings generally, using the hierarchy-of-effects model (Lavidge & Steiner, 1961). By surveying random samples of people living around 16 diverse nature centers, we were able to begin to explore how different constraints appeared at different intensities throughout the visitation decision-making process. Our sample indicated that the most substantial constraints were present during the early cognitive stages of decision-making. These stages require people to know educational leisure settings exist and know what services these settings offer before advancing to later stages of intentions to visit. We found other substantial constraints during late stages of the model. These included intervening factors that interfered with people's intentions to visit. Our study supported the presence of several intervening factors from past research including limited time, financial resources, transportation to the center, and physical or other health issues. Constraints also appeared during affective decision-making stages. These involved people *not* believing educational leisure settings were safe and welcoming places, liking the services that these settings offer, and preferring these services over other leisure activities.

Table 4.2 Presence and Strength of Visitor Constraints

Category	Item	Percentage of entire sample (n = 2,276)	
		Unaware	**Aware**
Cognition	*never heard of it*	39%	61%

Category	Item	Percentage of aware sample (n = 1,399)		
		Not an issue	**Minor issue**	**Major issue**
Intervening	*too busy*	30%	32%	37%
Cognition	*don't know what to do*	61%	28%	4%
Affect	*prefer other places*	69%	22%	9%
Intervening	*too far away*	73%	21%	6%
Affect	*nothing I like to do*	87%	10%	3%
Intervening	*poor health*	90%	6%	3%
Intervening	*inconvenient transportation*	90%	7%	3%
Intervening	*too expensive*	92%	15%	3%
Affect	*not welcome*	97%	2%	1%
Affect	*unfairly treated*	98%	2%	1%

Table 4.3 Differences in Perceived Constraint Strength Across Subgroups[a]

Item	Level of Education[b] L	H	S	B	G	χ^f	Age 18-39	40-59	60+	χ^f	Urbanity[c] R	S	U	χ^f	Race[d] NW	W	χ^f	Sex[e] M	F	χ^f	Visited N	Y	χ^f	Children N	Y	χ^f
never heard of it[g]									-	25***	-		+	53***	+	-	58***									
don't know about it							+			16***											+	-	129***			
not welcome													+	15**	+		8**									
unfairly treated															+	-	27***								+	5*
poor health									+	12*																
too far away											+	-		124***												
inconvenient transport															+		3*	+		9**						
too expensive				-		10*	+			9*					+		6*	+		6**						

[a]significant differences were identified with chi-square tests and standardized residuals. Plus sign ("+") indicates subgroup had more people than expected who ranked this item as a minor or major issue, suggesting this item was more of a perceived constraint for this subgroup than for other subgroups. Minus sign ("-") indicates subgroup had fewer numbers of people than expected who ranked this item as a minor or major issue, suggesting item was less of a perceived constraint for this subgroup than for other subgroups. Only significant results are displayed, [b]L = less than high school diploma, H = high school diploma, S = some college, B = bachelor's degree, G = graduate degree, [c]R = rural, S = suburban, U = urban, [d]NW = race/ethnicity other than non-Hispanic White, W = non-Hispanic White, [e]M = male, F = female, [f]chi-square statistics calculated with four degrees of freedom in analyses between five groups, two degrees of freedom in analyses between three groups, and one degree of freedom in analyses between two groups, [g]comparing visitors and non-visitors was not possible, because unaware respondents could not have visited the center, $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 4.4 Open-Ended Responses to "What Other Issues Prevent You from Going?" (*n* = 334)

Factor	Theme	Examples	*n*	Percentage[a]
Cognition	*Lack of knowledge*	Don't know anything about center; Don't know what services center provides; Don't see enough marketing, publicity, or advertising about center.	81	24%
Affect	*Not interested*	Nature centers primarily offer activities for kids; I no longer need or want to learn about what they teach at nature centers; Center does not have enough of a catch or draw; Not interested in nature centers in general.	64	19%
Intervening	*Inconvenient transportation*	Center hours of operation are too limited; Finding or navigating to center is difficult; Signage around center is inadequate; Entrance fees are too high; Bicycling to center is difficult or unsafe; No public transportation options; Distance to center is too great.	65	19%
Affect	*Prefer other things*	Other activities are higher priorities for me; I prefer going to other parks; I prefer going to other museums or places like them. Other parks, centers, or informal education settings are closer to where I live. Parking is severely limited. Facilities are too crowded; There's nothing new to see after first visit; Educational programming is limited.	50	15%
Intervening	*Busyness*	Lack of time; Too many other commitments.	39	12%
Affect	*Not welcome, safe, or comfortable*	Frequent bad weather; Too many bugs; Poisonous plants and ticks; Homeless people linger in park; Being alone outdoors is unsafe; Neighborhood around center is unsafe; Personal issues with staff; Disagreement with center about political issues; Center generally isn't welcoming; Center facilities aren't kept up well.	31	9%
Intervening	*Poor health*	Asthma; Can't leave house; Other health problems prevent me from visiting.	16	5%
Multiple	*Not prioritized*	Haven't had the chance to visit yet; Haven't prioritized visiting yet; Meant to visit but forgot this intention.	60	18%

[a]percentage of aware respondents who answered this item

Subsample analyses demonstrated certain groups in our sample were affected by perceived visitation constraints differently. Most prominently, non-Hispanic Whites reported fewer perceived constraints than other races and ethnicities. This trend is well-established in leisure sciences and might be explained by both perceived and actual marginalization and discrimination effects as well as different cultural interests, values, and motivations (Floyd, 1999). Differences in urbanity reinforce that rural and urban residents use (or don't use) natural areas differently than one another regardless of factors such as size of the area or number of visitor amenities (Levine, 1988; Shores & West, 2010). Differences in sex, age, presence of children, and level of education were also present, which parallel findings of past research on visitation rates for different subgroups at other educational leisure settings (e.g. Falk, 1995; Yocco et al., 2009). More broadly, subsample analyses suggest nature centers might serve diverse groups of people for diverse reasons (Browning et al., in prep.) if they perform these groups' desired values well and help negotiate their visitation constraints effectively.

Limitations

Our findings were limited both by our site selection and by the non-representative sample of survey respondents in selected communities. First, we selected only nature centers believed by experts to be among the most successful in the United States. As such, we might expect awareness levels and other visitation constraints to be less significant than in a broader suite of sites. Second, our sample of respondents over-represented certain socio-demographic characteristics (male, non-Hispanic White, education level, and older people) while under-representing other characteristics (presence/absence of children in the home). As a result of these biases, the degree and type of visitation constraints cannot be interpreted as representative of any single community around any particular nature center, nor of people living around nature centers nationally. Thus, our study presents only a tentative understanding of issues that community members might face when deciding whether or not to visit local nature centers. The identification and relative rankings of these issues, as well as differences in rankings between community subgroups, are testable hypotheses for further investigation rather than fully validated theories.

Implications

Applying the hierarchy-of-effects model to visitation constraints at educational leisure setting allows developing strategies to help people negotiate through multiple visitor constraints simultaneously rather than individual constraints separately. For example, leisure setting managers could overcome cognitive constraints by increasing awareness of their setting's existence and services. Marketing strategies might include public announcements and classified ads (Lavidge & Steiner, 1961) as well as media teaser campaigns, during which short video clips "tease" local community members to want to know more about the center. Partnering with community groups that support programming for specific socio-demographic groups (e.g. Latino women's hiking clubs) would increase leisure setting awareness by sharing information about leisure setting services through sources that these groups already trust. Communication from trusting sources may affect these groups' attitudes and beliefs more than communication from other sources (Siegrist et al., 2008). Leisure setting websites can also serve as important sources of information about offered services. Research suggests informational websites are used by the vast majority of visitors to other protected natural areas, such as National Park Service sites (Papadogiannnaki et al., 2009), prior to arriving on site. Leisure settings might conduct focus groups to assess the extent to which their websites provide accessible information to make sure this source of information overcomes cognitive constraints.

To overcome affective constraints, leisure settings might attempt to change community members' evaluations of setting services and perceived normative beliefs. For instance, marketing literature suggests leisure settings directly or indirectly compare their services with other leisure opportunities ("competitive ads") or explain and defend the reasons why people should visit their particular leisure settings ("argumentative copy ads") (Lavidge & Steiner, 1961). Leisure constraint literature suggests leisure settings not just offer those services preferred by a majority of visitors but also those preferred by a range of minority groups that have different visitor motivations (Gobster, 2002). Social psychology literature promotes leisure settings describe the extent to which other community members are already visiting these places (e.g. "Sixty percent of local school children attend our summer camps every year. Are *your* children missing out on our summer learning opportunities?") in order to create social pressures for other members to participate (Stern et al., 1999). Additional social pressures could be created by increasing perceptions that other community members approve of leisure setting visitation as

opposed to feeling neutral or negative about it (Cialdini et al., 1990). This might be done, for example, by hosting festivals that particularly appeal to and attract certain demographics (e.g. beer tastings or adventure races for young adults). Settings could market pictures and quotes from these demographics enjoying visitation to enhance the perception that educational leisure settings are "cool places to go."

At the final stages of the model, leisure settings might focus on strategies that push people through intervening factors such as financial, time, or transportation constraints. Advertising strategies include price appeals in which leisure settings discuss their high "value-for-the-money" (which may be easily done given the free or low-cost of many leisure setting services) and regular deals and sales for new visitors (Lavidge & Steiner, 1961). Point-of-purchase signage with regularly updated activity and program offerings at highly visible spots (e.g. roadside signs) might entice people driving by the leisure setting to stop (Stern et al., 2011). Persuasive messaging theory (e.g. Cialdini, 2007) advocates that leisure settings push people to commit to visit, for example by pre-registering or RSVPing for a program, and creating a sense of urgency and scarcity about such registration opportunities by offering them for a limited amount of time. Leisure settings might also consider providing free transportation to their site and limiting their service area to a small region immediately surrounding their center to overcome transportation costs and times (Leinbach, 2008).

We posit that conceptualizing constraints within the hierarchy-of-effects model, as we have done here, will help other leisure setting practitioners and researchers understand how these constraints are linked together and brainstorm how to broadly overcome them. We encourage future researchers to use this framework to further examine which constraints are most powerful with representative samples of subpopulations. Such information could not only benefit individual educational leisure settings and their surrounding communities but also reveal meaningful broader patterns in the services provided (or not provided) by these settings to diverse populations.

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Chapter 5: Conclusion

The purpose of this dissertation was to explore the roles of nature centers in today's society. Specifically, we examined three types of connections between nature centers and their local communities. Drawing on quantitative and qualitative analyses of survey data, we explored the possible range of values communities held toward centers, what factors led community members to support centers, and what issues were perceived as constraints to visiting local centers. These findings extend several bodies of literature, including ecosystem services and educational leisure settings valuation, environmentally significant and charitable support behavior, and leisure constraints.

Chapter two revealed that communities believe nature centers provide four distinct value sets: *environmental connection*, *leisure provision*, *community resilience*, and *civic engagement*. This finding advances understandings of ecosystem services (Costanza et al., 1997) and protected natural areas (Harmon & Putney, 2003) by demonstrating people believe nature has both tangible benefits which can be measured with economic valuation measures as well as intangible benefits which might be more difficultly measured. Some authors (e.g. Chan et al., 2012) have argued such a division in the measurement of nature's value to people is inadequate, since many intangible measures overlap with tangible measures. For example, fishing has cultural values that are difficult to measure in economic terms (inspiration and identity), but fishing also provides cash-value through market goods (fish). Our study reinforces the false dichotomy between monetary and non-monetary values of nature. The four underlying values of nature centers mix services that have been previously measured through economic valuation with services that might be more difficult to measure. For example, the underlying value which community respondents believed to be most important for centers to provide and best performed by centers was *environmental connection*. This included "ecosystem services" which are typically measured in economic terms and associated with the provisioning, regulating, and supporting of human life (Millennial Ecosystem Assessment, 2005). However, this value also included "education for children," "access to nature," "encouraging environmental behavior," and "increasing environmental awareness" services. Our exploratory factor analysis suggested community respondents associated these items with "ecosystem services," suggesting the public may not differentiate between traditionally economic and traditionally "intangible" ecosystem

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services. Many of these items could be described as cultural, intangible values on one hand but also antecedents of pro-environmental behaviors on the other hand. Antecedents of pro-environmental behavior could be linked to land conservation and ecosystem service provision in the future, which further demonstrates the difficulty with determining whether these are ecosystem services or cultural values. The other three underlying values of nature centers further highlights the difficulty in separating tangible from intangible values of nature. Specifically, we discovered our sample associated other "intangible" benefits such as community aesthetics and community pride with the economic value of "contributing economically to the local community."

Our study identified a number of cultural values which are not regularly identified in the protected natural areas or ecosystem services literature. These included integrating different races/ethnicities, linking people to political action, providing a place for people in the local community to gather, and developing a sense of pride in the local community. This suggests how natural areas with explicit educational functions, such as nature centers, may have broader cultural values than those areas studied previously.

The second chapter of this dissertation also extends theory around the benefits of educational leisure settings, in particular, the three-factor solution of museum values suggested by Scott (2006). We found that economic value was incorporated within larger societal/cultural value sets rather than producing its own value set. We also found an alternative way to think about community valuation of educational leisure settings: rather than describe value based on the recipient of services (individual vs. societal), our study suggests value might be understood based on the type of services provided (leisure, engagement, or resilience).

Chapter three demonstrates that a wide range of factors influenced the likelihood that someone would support (or not) a local nature center. As hypothesized, nature center support can be predicted from a diverse suite of variables from different bodies of theory and research. In particular, it can be framed within environmental activism and non-profit commitment literature and predicted by variables typically related to nature centers and their missions (e.g. commitment to nature and environmental connection significance) as well as variables perhaps not typically associated with centers (e.g. normative beliefs and staff perceptions).

These findings promote the use of several theories in fields related to nature center support. For example, the relationship between behavioral intentions and normative assessments or other social influences promotes the applicability of theory of planned behavior (Ajzen, 1991) to environmental activism. Simultaneously, the influence of direct and indirect benefits on nature center support promotes the use of collective interest theory to non-profit donor commitment. Some people in our sample indicated they would support nature centers regardless of whether they were past visitors or not. These people seem to assess the collective value of nature centers when deciding whether or not to engage in costly behaviors (e.g. donating money or volunteering time).

Chapter four showed the most substantial issues with visiting nature centers are present during the early and late stages of decision-making regarding center visitation. These stages require people know nature centers exist, know what services centers offer, and overcome intervening factors like limited time, financial resources, and transportation to the center. These results suggest that sharing knowledge about nature centers and helping people find time and transportation to visit centers are particularly important when encouraging people to recreate outdoors or learning about environmental issues.

Consistent with leisure constraints theory, we found the quantity and types of visitation issues were generally greater with minority populations, although some items that we anticipated to be associated with races/ethnicities other than non-Hispanic Whites (e.g. centers being too far away and not knowing that the center exists) were not significantly different between these two groups. Also, we found that busyness was the greatest constraint to visitation for all groups of respondents, suggesting this constraint, which has only briefly been discussed in the literature, is possibly a significant concern to leisure setting managers. Our study also suggests leisure constraints can be understood using models from other bodies of literature, such as the hierarchy-of-effects model from advertising and marketing. Such alternative conceptualizations might provide researchers and practitioners with novel ways to measure constraints in different contexts.

A primary theme that permeates throughout these three chapters is that nature centers could play broader roles in society today than those roles typically associated with their mission statements (e.g. environmental education and access to nature). Although our respondents

believed these mission-centric services remain important for centers to provide, they also indicated that community-improvement services, normative beliefs, and staff perceptions played roles in the extent to which they valued, supported, and visited local nature centers. These results parallel scholars from other fields of study who advocate for addressing environmental issues by also examining the social frameworks around these issues (e.g. Machlis et al., 1997; Marris, 2011; Minteer & Miller, 2010; Stern, 2008). Environmental issues may be more effectively and realistically addressed when local people's well-being, culture, and heritage are incorporated into sustainability efforts. In the nature center context, we found that centers should consider their communities unique desired values and subgroup differences in order to obtain the financial, volunteering, political support, and visitation needed to increase their impact and ultimately achieve their missions, often which revolve around solving environmental issues. Our results also suggest that centers which are directly engaged in the social fabric of their communities (often through interactions that stretch beyond their mission statements) are more likely to generate greater local visitation and support than centers that limit their community engagement.

Nature centers may be well-served to embrace their increasingly-broad role in society by building stronger relationships with their diverse local communities. This might be done through enhanced outreach and programming, marketing and advertisement materials, community partnerships, and staff presence in communities outside of work (e.g. volunteering). These efforts would likely pull staff members away from their core job duties (providing educational programs or maintaining facilities). Given many nature centers' limited funding and staffing resources, we anticipate centers will have to carefully balance additional community engagement efforts with organizational survival. However, our findings suggest that centers could garner additional resources and support from their local communities, which might match or exceed the time and financial investments required of these efforts.

Another key insight from this research is that different community members seem to think about nature centers differently. Because our sample was not representative of the communities living around our studied centers – and our sample of centers was not representative of the estimated 1,200 centers across the U.S. – our findings are not generalizable to all nature centers or all communities. Rather, our findings demonstrate that differences likely

exist in communities, and our findings create testable hypotheses for future research. The differences we found included:

Race/ethnicity - non-White populations (e.g. Asians, blacks, African Americans, Hispanics, Latinos, and people of mixed race/ethnicity) placed greater importance on cultural values (civic engagement and community resilience) than Whites. Non-Whites were also less aware of center's existence, perceived less welcome and fairly treated at centers, and more challenged by transportation and financial constraints than Whites.

Age - younger audiences (18-39 years old) were less aware of center services and placed greater importance on cultural values than older audiences. Older audiences (60+ years) were more constrained by poor health than younger audiences.

Sex - females placed greater importance on center's environmental, leisure-based, and cultural values than males. Females were also more constrained by transportation and financial constraints than males.

Level of education – graduate degree holders placed less importance on leisure-based and some cultural values than other audiences. Graduate degree holders were also less constrained by financial limitations than other populations.

Children - families with children (18 years or younger) in their homes believed they were treated unfairly more than families without children in their homes.

Urbanity - urban populations placed greater importance on leisure and cultural values and were less aware of center's existence and perceived less welcome than other populations. Rural populations placed greater importance on leisure values and were more constrained by center's far-away distances than other populations.

Visitation - visitors placed greater importance on leisure value and knew more about center services than non-visitors.

By further investigating these differences, centers can better understand how to best connect with their diverse local communities.

In conclusion, this dissertation suggests that nature centers may serve broader roles in society today than they might be accustomed to serving. In particular, some local communities seem to think that centers should achieve, and already do achieve, both cultural and environmental goals. Furthermore, center support and visitation seem to be linked to the various cultural dimensions of centers' connections with their local communities as much as (or more so than) the extent to which centers provide high-quality educational and nature-based programming. Different nature center communities are different, and our study suggests some ways in which different socio-demographic and user groups may think about centers differently. Nature centers might consider further researching these topics with representative samples of community members in order to better understand the ways in which their communities think

about their center and staff members. Simultaneously, centers might invest in increased community engagement efforts in ways that are most appropriate for their particular populations. Such efforts might have stronger returns-on-investment than traditional understandings of nature centers and their roles in society suggest.

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Appendices

A. List of "Successful" Nature Centers from Experts

Center Name	Affiliation
Aullwood	Audubon
Baltimore Woods	ANCA
Beaver Meadow	Audubon
Beaver Meadow	Audubon
Beidler Forest	Audubon
Blair *	Audubon
Blandford	ANCA
Buena Vista	Audubon
Chatfield State Park	Audubon
Chippewa Nature Center	ANCA
Cibolo	ANCA
Cincinnati	ANCA
Debs Park *	Audubon
Delaware Nature Society	ANCA
Elachee Science Nature Center *	ANCA
Environmental Learning Center *	ANCA
Environmental Nature Center	ANCA
Gilsland Farm	Audubon
Grange *	Audubon
Green Mountain	Audubon
Greenwich *	Audubon
Hitchcock *	ANCA
Jamestown	Audubon
John James at Mill Grove	Audubon
Kalamazoo	ANCA
Lian Nicolson	Audubon
Mitchell Lake *	Audubon
Ogden Nature Center	ANCA
Pickering Creek	Audubon
Pilcher Park	ANCA
Plains Conservation *	ANCA
Portland *	Audubon
Prairie Ecology Bus	ANCA
Richardson Bay *	Audubon
Rio Salado	Audubon
Riverlands	Audubon

Sarett Nature Center	Audubon
Schlitz	Audubon
Seven Ponds [*]	ANCA
Seward Park [*]	Audubon
Sharon	Audubon
Silver Lake [*]	ANCA
Spring Creek Prairie	Audubon
Squam Lakes	ANCA
Strawberry plains	Audubon
Teton	ANCA
Trinity River	Audubon
Urban Ecology [*]	ANCA
Wildcat Glades	Audubon
Wilderness Center [*]	ANCA

[*]Centers included in this study

B. Map of Nature Centers in Study

C. Community Survey

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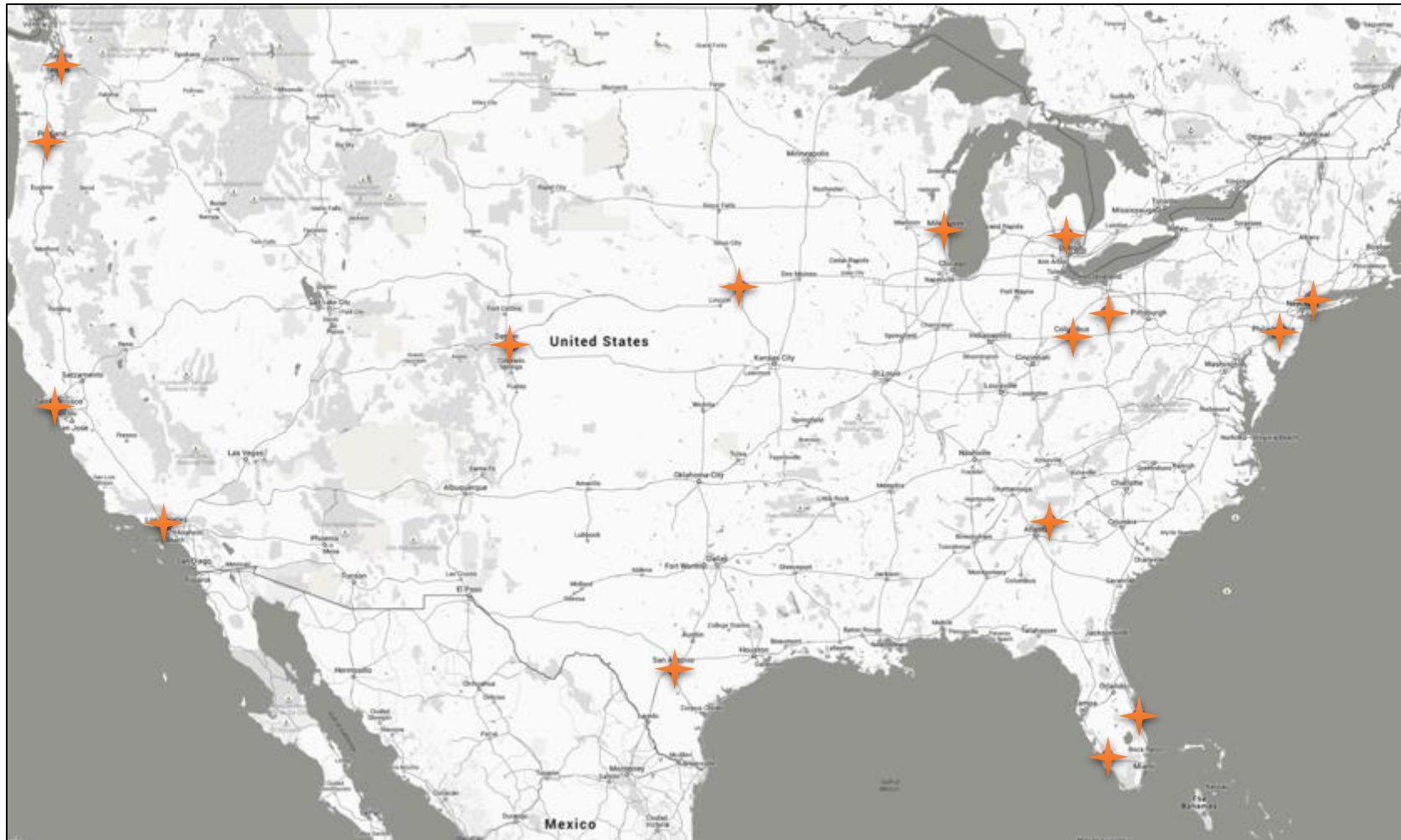
Thank you for taking the time to complete this survey on nature centers in the United States. Your responses will help us better understand how nature centers serve their communities.

As a reminder, this study is funded by a grant from the Institute of Museum and Library Services. It is administered by the National Audubon Society, not your local nature center.

The survey should take between 5 and 20 minutes to complete. Most people have completed it in less than 10 minutes.

All of your answers will be confidential. We will not associate your name with your responses, and the raw data will only be shared with the research team. We are contacting 12,000 people in your community and will report only summary results, not individual responses. You will not be solicited for any reason by taking this survey.

If you have any questions, please contact Virginia Tech PhD Candidate Matt Browning at 540-315-1397 or naturestudy@vt.edu

Once you start the survey, please **do not click the back button** on your web browser. Instead, use the following buttons to navigate through the survey:

- **Next** to continue to the next page
- **Previous** to return to the previous page

This study is conducted under the guidance of the Virginia Tech Institutional Review Board. If you have any concerns about the study's conduct or your rights as a research subject, you may contact the Virginia Tech Institutional Review Board at IRB@vt.edu

Next

Before you begin the survey, we'd like to know how you would define a "nature center." In other words, what type of place do you think a "nature center" is?

Previous   Next

Have you heard of [nature name center]?

○ No

◉ Yes

Previous

Next

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Have you visited [nature name center]?

○ No

○ Yes

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How many times have you visited the [nature center name] in the last year?

○ I've been there before, but not in the last year

○ 1 time in the last year

○ 2-5 times in the last year

○ Approximately 6-9 times in the last year

○ Approximately 10-14 times in the last year

○ Approximately 2 times per month - for most months in the last year

○ Approximately 1 time per week - for most weeks in the last year

◉ More than 1 time per week - for most weeks in the last year

Previous   Next

Why do you go to the [nature center name]?

	Not a reason	A minor reason	A major reason
To discover new things	○	○	○
To get away from everyday life	○	○	○
To spend time with friends/family	○	○	○
To enjoy myself	○	○	○
To expose my children/family to something new	○	○	○

If there are any other reasons why you go to the [nature center name], please describe them below.

[Previous]   [Next]

We recognize that there may be issues or challenges that prevent some people from visiting [nature center name]. **To what extent are the following issues that prevent you from visiting?**

	Not an issue	A minor issue	A major issue	I don't know
I'm too busy with other commitments.	○	○	○	○
It is far from where I live or work.	○	○	○	○
People like me are not treated as well as other people there.	○	○	○	○
The entrance or program fees are too expensive.	○	○	○	○
I don't have a convenient way of getting there.	○	○	○	○
I don't know what there is to do there.	○	○	○	○
My friends/family prefer to go elsewhere.	○	○	○	○
There's nothing I like to do there.	○	○	○	○
I don't think I'm welcome/safe there.	○	○	○	○
I have poor health.	○	○	○	○

Please add any comments below. In addition, if there are any other issues or reasons that prevent you from going to the [nature center name], please describe them here.

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To the best of your knowledge, do any [nature center name] staff members volunteer in the local community?

○ No, they definitely do not

○ I don't think they do

○ I have no idea about this

○ I think they do

○ Yes, I'm sure they do

To the best of your knowledge, do [nature center name] staff members have values similar to your own?

○ Definitely not

○ Probably not

○ Probably

○ Definitely

To what extent do you agree or disagree with the following statement? I trust [nature center name] staff members to do their jobs well.

○ Strongly disagree

○ Disagree

○ Neither agree or disagree

○ Agree

○ Strongly agree

Previous   Next

Do you know anyone who is currently employed at the [nature center name]?

○ No

○ Yes

Previous

Next

How well do you know him or her? If you know more than one person who is currently employed at the [nature center name], please answer this question for the person you know best.

○ Not well at all

○ Somewhat well

○ Well

○ Extremely well

Previous   Next

How important is it to you that the [nature center name] does each of the following? We'll ask you about how well you think it does at each of these things on the next page. On this page, we'd just like to know how important you think each item is.

	Not at all important	Slightly important	Somewhat important	Very important	Extremely important
Makes the community a more beautiful place	○	○	○	○	○
Provides a place for children to learn	○	○	○	○	○
Provides a place for physical exercise	○	○	○	○	○
Provides a safe place for outdoor recreation	○	○	○	○	○
Provides a place for retreat, restoration, or relaxation	○	○	○	○	○

	Not at all important	Slightly important	Somewhat important	Very important	Extremely important
Helps bring together people from different races/ethnicities	○	○	○	○	○
Links people to political action	○	○	○	○	○
Provides access to nature	○	○	○	○	○
Develops a sense of pride in the local community	○	○	○	○	○
Provides wildlife habitat or ecosystem services (for example, slowing storm water runoff)	○	○	○	○	○

	Not at all important	Slightly important	Somewhat important	Very important	Extremely important
Provides a place for people in the local community to gather	○	○	○	○	○
Contributes to the local economy (for example, increasing property values or attracting businesses)	○	○	○	○	○
Encourages environmental behavior (for example, recycling or saving electricity and water)	○	○	○	○	○
Increases environmental awareness (for example, introducing people to native wildlife or plants)	○	○	○	○	○

Is there anything else you think the [nature center name] should provide to the community? If so, please describe these things below.

[text box]

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To the best of your knowledge, how well does the [nature center name] actually accomplish each of the following?

	Not well	Slightly well	Somewhat well	Very well	Extremely well	I don't know
Encourages environmental behavior (for example, recycling or saving electricity and water)	○	○	○	○	○	○
Provides a safe place for outdoor recreation	○	○	○	○	○	○
Provides access to nature	○	○	○	○	○	○
Helps bring together people from different races/ethnicities	○	○	○	○	○	○
Contributes to the local economy (for example, increasing property values or attracting businesses)	○	○	○	○	○	○

	Not well	Slightly well	Somewhat well	Very well	Extremely well	I don't know
Increases environmental awareness (for example, introducing people to native wildlife or plants)	○	○	○	○	○	○
Makes the community a more beautiful place	○	○	○	○	○	○
Develops a sense of pride in the local community	○	○	○	○	○	○
Provides a place for physical exercise	○	○	○	○	○	○
Provides a place for children to learn	○	○	○	○	○	○

	Not well	Slightly well	Somewhat well	Very well	Extremely well	I don't know
Links people to political action	○	○	○	○	○	○
Provides a place for people in the local community to gather	○	○	○	○	○	○
Provides a place for retreat, restoration, or relaxation	○	○	○	○	○	○
Provides wildlife habitat or ecosystem services (for example, slowing storm water runoff)	○	○	○	○	○	○

Previous   Next

To the best of your knowledge, how likely is it that the [nature center name] does any of the following?

	Definitely not	Probably not	Probably yes	Definitely yes	I don't know
Participates in community events (e.g. street parades or farmers markets)	○	○	○	○	○
Provides educational programs for youth	○	○	○	○	○
Provides volunteer opportunities	○	○	○	○	○
Provides activities/services in a language other than English	○	○	○	○	○
Provides educational programs or trainings for adults	○	○	○	○	○
Offers rental facilities (e.g. picnic shelters or indoor meeting rooms)	○	○	○	○	○

Previous

Next

To what extent do you agree or disagree with the following statements about [nature name center]? Please select your choice in the columns on the left. In the far right column, check the ONE statement you agree with the most. Please do not check more than one statement in this column.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	Statement you agree with the most
It is important to me as a place I can visit and use directly.	○	○	○	○	○	☐
It has an important role in education within my community.	○	○	○	○	○	☐
It contributes to the economic vitality of the community.	○	○	○	○	○	☐
It plays an important role in environmental issues in my community.	○	○	○	○	○	☐
It serves people in my community in ways other than those listed above.	○	○	○	○	○	☐

If you agreed or strongly agreed with the final statement in the question above ("It serves people in my community in ways other than those listed above"), please describe the other ways that [nature center name] serves your community here.

[text box]

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How do you think the following groups feel about [nature center name]?

	They don't like it	They are neutral about it	They like it	They don't know about it	I don't know
Your friends	○	○	○	○	○
Your family	○	○	○	○	○
Other people in your community	○	○	○	○	○

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Have you ever volunteered at the [nature center name]?

○ No

◉ Yes

Have you ever donated money to the [nature center name]?

○ No

◉ Yes

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Approximately how much time have you volunteered at the [nature center name] compared with other organizations you support?

○ Much less than other organizations

○ Somewhat less than other organizations

○ About the same as other organizations

○ Somewhat more than other organizations

○ Much more than other organizations

○ I haven't volunteered at any other organizations

Approximately how much money have you donated to the [nature center name] compared with other organizations you support?

○ Much less than other organizations

○ Somewhat less than other organizations

○ About the same as other organizations

○ Somewhat more than other organizations

○ Much more than other organizations

○ I haven't donated to any other organizations

Previous   Next

If the [nature center name] were facing budgetary problems, what is the likelihood you would donate money to the ?

○ Very unlikely

○ Unlikely

○ Somewhat unlikely

○ Undecided

○ Somewhat likely

○ Likely

○ Very likely

If the [nature center name] asked you to volunteer your time, what is the likelihood you would do it?

○ Very unlikely

○ Unlikely

○ Somewhat unlikely

○ Undecided

○ Somewhat likely

○ Likely

○ Very likely

If [nature center name] were threatened (for example, with development or closure), what is the likelihood you would do something to protect it? You might do this, for example, by attending a public meeting or writing a letter to a political official.

○ Very unlikely

○ Unlikely

○ Somewhat unlikely

○ Undecided

○ Somewhat likely

○ Likely

○ Very likely

Previous

Next

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Spending time in the natural environment makes me happy.	○	○	○	○	○
I feel more content with my life when I spend time in the natural environment.	○	○	○	○	○
I find spending time in the natural environment to be rewarding.	○	○	○	○	○
The natural environment is a good place to spend time.	○	○	○	○	○
The natural environment does a good job of meeting my needs for activity, relaxation, or adventure.	○	○	○	○	○

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How long have you lived in the town where you currently live? Please round to the nearest year. Enter "0" if you've lived in that town for less than 6 months.

Number of years: [ ]

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Which of the following best represents your racial or ethnic heritage? Choose all that apply.

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Hispanic or Latino

☐ Native Hawaiian or other Pacific Islander

☐ White

☐ Other

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Next

You are at the end of the survey. Thank you very much for participating in the study!

Is there anything else you'd like to share with us about [nature center name]?

Don't forget to click the **Submit** button below, so your responses can be counted.

Previous   Submit

D. Approval Letters from Virginia Tech Institutional Review Board

VirginiaTech

MEMORANDUM

DATE: February 23, 2015

TO: Marc J Stern, Matthew Herbert Emerson Mutel Browning, Joe E Heimlich Ph.D., Nicole M Ardoin, Susan M Willis-Walton

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires April 25, 2018)

PROTOCOL TITLE: The Value of Nature Centers to Local Communities

IRB NUMBER: **14-205**

Effective February 23, 2015, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As:	**Expedited, under 45 CFR 46.110 category(ies) 5,7**
Protocol Approval Date:	**March 11, 2015**
Protocol Expiration Date:	**March 10, 2016**
Continuing Review Due Date*:	**February 25, 2016**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Date*	OSP Number	Sponsor	Grant Comparison Conducted?
02/26/2014	12160602	National Audubon Society	Compared on 03/11/2014

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

Institutional Review Board
Research Protocol

Section 1: General Information

1.1 DO ANY OF THE INVESTIGATORS OF THIS PROJECT HAVE A REPORTABLE CONFLICT OF INTEREST? (http://www.irb.vt.edu/pages/researchers.htm#conflict)

☒ **No**
☐ **Yes**, explain:

1.2 WILL THIS RESEARCH INVOLVE COLLABORATION WITH ANOTHER INSTITUTION?

☐ **No**, go to question 1.3
☒ **Yes**, answer questions within table ──────── ▼

IF YES
Provide the name of the institution [for institutions located overseas, please also provide name of country]: **The Ohio State University; Stanford University**
Indicate the status of this research project with the other institution's IRB: ☒ Pending approval ☐ Approved ☐ Other institution does not have a human subject protections review board ☒ Other, explain: **Ohio State intends to use VT IRB to cover all research activities. Stanford will do own review, following ours.**
Will the collaborating institution(s) be engaged in the research? (http://www.hhs.gov/ohrp/policy/engage08.html) ☐ No ☒ Yes
Will Virginia Tech's IRB review all human subject research activities involved with this project? ☐ No, provide the name of the primary institution: ☒ Yes *Note: primary institution = primary recipient of the grant or main coordinating center*

1.3 IS THIS RESEARCH FUNDED?

☐ **No**, go to question 1.4
☒ **Yes**, answer questions within table ──────── ▼

IF YES
Provide the name of the sponsor [if NIH, specify department]: Institute for Museum and Library Services
Is this project receiving federal funds? ☐ No ☒ Yes

If yes,

Does the grant application, OSP proposal, or "statement of work" related to this project include activities involving human subjects that are _not_ covered within this IRB application?
- ☐ No, all human subject activities are covered in this IRB application
- ☐ Yes, however these activities will be covered in future VT IRB applications, these activities include:
- ☒ Yes, however these activities have been covered in past VT IRB applications, the IRB number(s) are as follows: **12-108**
- ☐ Yes, however these activities have been or will be reviewed by another institution's IRB, the name of this institution is as follows:
- ☐ Other, explain:

Is Virginia Tech the primary awardee or the coordinating center of this grant?
- ☒ No, provide the name of the primary institution: **National Audubon Society**
- ☐ Yes

1.4 DOES THIS STUDY INVOLVE CONFIDENTIAL OR PROPRIETARY INFORMATION (OTHER THAN HUMAN SUBJECT CONFIDENTIAL INFORMATION), OR INFORMATION RESTRICTED FOR NATIONAL SECURITY OR OTHER REASONS BY A U.S. GOVERNMENT AGENCY?

For example – government / industry proprietary or confidential trade secret information

☒ No
☐ Yes, describe:

1.5 DOES THIS STUDY INVOLVE SHIPPING ANY TANGIBLE ITEM, BIOLOGICAL OR SELECT AGENT OUTSIDE THE U.S?

☒ No
☐ Yes

Section 2: Justification

2.1 DESCRIBE THE BACKGROUND, PURPOSE, AND ANTICIPATED FINDINGS OF THIS STUDY:

The study will explore how communities value their local nature centers. While studies about the values of museums to communities have taken place, the value of nature centers has yet to be explored. The results may begin to reveal the importance (or lack thereof) of these institutions to the communities in which they reside. It will also help to determine the degree to which local values are in line with the values of nature center directors and staff.

2.2 EXPLAIN WHAT THE RESEARCH TEAM PLANS TO DO WITH THE STUDY RESULTS:

For example - publish or use for dissertation

The findings will be presented at professional conferences and workshops, summarized in short summary reports for participating nature centers, and published in peer-reviewed journal articles. The research will also produce a PhD dissertation.

Section 3: Recruitment

2

3.1 DESCRIBE THE SUBJECT POOL, INCLUDING INCLUSION AND EXCLUSION CRITERIA AND NUMBER OF SUBJECTS:

Examples of inclusion/exclusion criteria - gender, age, health status, ethnicity

The subject pool is provided by directmail.com. We are drawing a random sample from their population of people living within specific radii of 16 nature centers. 4 urban centers: within 3 miles of the nature center address; 8 suburban centers: within 6 miule radius from nature center address; 4 rural centers: 20 mile radius.

3.2 WILL EXISTING RECORDS BE USED TO IDENTIFY AND CONTACT / RECRUIT SUBJECTS?

Examples of existing records - directories, class roster, university records, educational records

☐ No, go to question 3.3
☒ Yes, answer questions within table ────────

▼

IF YES
Are these records private or public? ☐ Public ☒ Private, describe the researcher's privilege to the records: **We are buying the sample from directmail.com. They have opt-in lists of people who have officially agreed to have their information share with third parties.**
Will student, faculty, and/or staff records or contact information be requested from the University? ☒ No ☐ Yes, visit the following link for further information: http://www.policies.vt.edu/index.php (policy no. 2010)

3.3 DESCRIBE RECRUITMENT METHODS, INCLUDING HOW THE STUDY WILL BE ADVERTISED OR INTRODUCED TO SUBJECTS:

64,000 individuals will be contacted via a mailed letter around each center (4,000 per center). 1/2 of these letters will contain a $2 bill. The other half of the letters will contain no incentive (we will test the efficacy of the incentive this way). 5 days after mailing the letters, we will send an email reminder to all letter recipients. Five days after the first email reminder, we will send a final email reminder to all recipients.

Some mailings will inevitably bounce back (bad addresses). The Virginia Tech Center for Survey Research will catalogue these returned letters, using a file with only name, addresses and sample names to track which respondents did not receive the invitation.

For our second round of sampling, we will expand the radii slightly around some centers to achieve our desired recruitment numbers. We will be sending an additional 132,000 email invitations. These will be following by two reminder emails rouhgly 7-10 apart.

3.4 PROVIDE AN EXPLANATION FOR CHOOSING THIS POPULATION:

Note: the IRB must ensure that the risks and benefits of participating in a study are distributed equitably among the general population and that a specific population is not targeted because of ease of recruitment.

These nature centers are considered to be some of the best nature centers in the United States. We are drawing a random sample of people who live within their "local communities." Prior interviews with center director confoirm the sampling radii as basically representative of who they consider to be their local communities.

Section 4: Consent Process

For more information about consent process and consent forms visit the following link: http://www.irb.vt.edu/pages/consent.htm

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If feasible, researchers are advised and may be required to obtain signed consent from each participant unless obtaining signatures leads to an increase of risk (e.g., the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting in a breach of confidentiality). Signed consent is typically not required for low risk questionnaires (consent is implied) unless audio/video recording or an in-person interview is involved. If researchers will not be obtaining signed consent, participants must, in most cases, be supplied with consent information in a different format (e.g., in recruitment document, at the beginning of survey instrument, read to participant over the phone, information sheet physically or verbally provided to participant).

4.1 CHECK ALL OF THE FOLLOWING THAT APPLY TO THIS STUDY'S CONSENT PROCESS:

☐ Verbal consent will be obtained from participants
☐ Written/signed consent will be obtained from participants
☒ Consent will be implied from the return of completed questionnaire. Note: The IRB recommends providing consent information in a recruitment document or at the beginning of the questionnaire (if the study only involves implied consent, skip to Section 5 below)
☐ Other, describe:

4.2 PROVIDE A GENERAL DESCRIPTION OF THE PROCESS THE RESEARCH TEAM WILL USE TO OBTAIN AND MAINTAIN INFORMED CONSENT:

4.3 WHO, FROM THE RESEARCH TEAM, WILL BE OVERSEEING THE PROCESS AND OBTAINING CONSENT FROM SUBJECTS?

4.4 WHERE WILL THE CONSENT PROCESS TAKE PLACE?

4.5 DURING WHAT POINT IN THE STUDY PROCESS WILL CONSENTING OCCUR?

Note: unless waived by the IRB, participants must be consented before completing any study procedure, including screening questionnaires.

4.6 IF APPLICABLE, DESCRIBE HOW THE RESEARCHERS WILL GIVE SUBJECTS AMPLE TIME TO REVIEW THE CONSENT DOCUMENT BEFORE SIGNING:

Note: typically applicable for complex studies, studies involving more than one session, or studies involving more of a risk to subjects.

☐ Not applicable

Section 5: Procedures

5.1 PROVIDE A STEP-BY-STEP THOROUGH EXPLANATION OF ALL STUDY PROCEDURES EXPECTED FROM STUDY PARTICIPANTS, INCLUDING TIME COMMITMENT & LOCATION:

Study participants are asked to go to a website to fill out on online survey. For people who are unaware of the specific nature center in question, the survey should take about 5 minutes. For those who are aware of the nature center, the survey should take about 20 minutes on average.

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5.2 DESCRIBE HOW DATA WILL BE COLLECTED AND RECORDED:

Qualtrics survey. Online.

5.3 DOES THE PROJECT INVOLVE ONLINE RESEARCH ACTIVITES (INCLUDES ENROLLMENT, RECRUITMENT, SURVEYS)?

View the "Policy for Online Research Data Collection Activities Involving Human Subjects" at
http://www.irb.vt.edu/documents/onlinepolicy.pdf

☐ **No,** go to question 6.1
☒ **Yes,** answer questions within table ——————————— ▼

IF YES

Identify the service / program that will be used:
☐ www.survey.vt.edu, go to question 6.1
☐ Blackboard, go to question 6.1
☐ Center for Survey Research, go to question 6.1
☒ Other
 	
IF OTHER:
Name of service / program: **Qualtrics**
URL: **https://virginiatech.qualtrics.com/**
This service is...
    ☒ Included on the list found at: http://www.irb.vt.edu/pages/validated.htm
    ☐ Approved by VT IT Security
    ☐ An external service with proper SSL or similar encryption (https://) on the login (if applicable) and all other data collection pages.
    ☐ None of the above (note: only permissible if this is a collaborative project in which VT individuals are only responsible for data analysis, consulting, or recruitment)

Section 6: Risks and Benefits

6.1 WHAT ARE THE POTENTIAL RISKS (E.G., EMOTIONAL, PHYSICAL, SOCIAL, LEGAL, ECONOMIC, OR DIGNITY) TO STUDY PARTICIPANTS?

There are no more than minimal risks from participating in the study. We are not asking about anything we can envision would be offensive or damaging to the respondent.

6.2 EXPLAIN THE STUDY'S EFFORTS TO REDUCE POTENTIAL RISKS TO SUBJECTS:

Confidentiality will be maintained. We have no interest in the names of respondents. All results will be reported in the aggregate.

6.3 WHAT ARE THE DIRECT OR INDIRECT ANTICIPATED BENEFITS TO STUDY PARTICIPANTS AND/OR SOCIETY?

The main hope is that the study will help nature centers to better understand how they can provide better services to their neigboring communities.

Section 7: Full Board Assessment

5

7.1 DOES THE RESEARCH INVOLVE MICROWAVES/X-RAYS, OR GENERAL ANESTHESIA OR SEDATION?

☒ No
☐ Yes

7.2 DO RESEARCH ACTIVITIES INVOLVE PRISONERS, PREGNANT WOMEN, FETUSES, HUMAN IN VITRO FERTILIZATION, OR MENTALLY DISABLED PERSONS?

☒ **No,** go to question 7.3
☐ **Yes,** answer questions within table ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ ▼

IF YES
This research involves: ☐ Prisoners ☐ Pregnant women   ☐ Fetuses   ☐ Human in vitro fertilization ☐ Mentally disabled persons

7.3 DOES THIS STUDY INVOLVE MORE THAN MINIMAL RISK TO STUDY PARTICIPANTS?

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily activities or during the performance of routine physical or psychological examinations or tests. Examples of research involving greater than minimal risk include collecting data about abuse or illegal activities. Note: if the project qualifies for Exempt review (http://www.irb.vt.edu/pages/categories.htm), it will not need to go to the Full Board.

☒ No
☐ Yes

IF YOU ANSWERED "YES" TO *ANY ONE* OF THE ABOVE QUESTIONS, 7.1, 7.2, OR 7.3, THE BOARD MAY REVIEW THE PROJECT'S APPLICATION MATERIALS AT ITS MONTHLY MEETING. VIEW THE FOLLOWING LINK FOR DEADLINES AND ADDITIONAL INFORMATION: http://www.irb.vt.edu/pages/deadlines.htm

Section 8: Confidentiality / Anonymity

For more information about confidentiality and anonymity visit the following link: http://www.irb.vt.edu/pages/confidentiality.htm

8.1 WILL PERSONALLY IDENTIFYING STUDY RESULTS OR DATA BE RELEASED TO ANYONE OUTSIDE OF THE RESEARCH TEAM?

For example – to the funding agency or outside data analyst, or participants identified in publications with individual consent

☒ No
☐ **Yes,** to whom will identifying data be released?

8.2 WILL ANY STUDY FILES CONTAIN PARTICIPANT IDENTIFYING INFORMATION (E.G., NAME, CONTACT INFORMATION, VIDEO/AUDIO RECORDINGS)?

Note: if collecting signatures on a consent form, select "Yes."

☐ **No,** go to question 8.3
☒ **Yes,** answer questions within table ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ ▼

IF YES
Describe if/how the study will utilize study codes: **Each respondent will be given a five-digit PIN code.**

6

The only potentially identifying information is the respondents' mailing address.

If applicable, where will the key [i.e., linked code and identifying information document (for instance, John Doe = study ID 001)] be stored and who will have access? Only the Virginia Tech research team will have access to the mailing addresses. They will be cleaned from the data otherwise. We intend to do spatial analyses on the awareness of the nature center, visitation, and response to the survey. Maps created will NOT identify specific addresses, but will be smoothed over larger areas (reported in aggregate). Otherwise, the addresses will be cleaned from the data.

Note: the key should be stored separately from subjects' completed data documents and accessibility should be limited.

The IRB strongly suggests and may require that all data documents (e.g., questionnaire responses, interview responses, etc.) do not include or request identifying information (e.g., name, contact information, etc.) from participants. If you need to link subjects' identifying information to subjects' data documents, use a study ID/code on all data documents.

8.3 WHERE WILL DATA BE STORED?

Examples of data - questionnaire, interview responses, downloaded online survey data, observation recordings, biological samples

On password protected computers of the principal investigators and VT team.

8.4 WHO WILL HAVE ACCESS TO STUDY DATA?

The principal investigators and VT team.

8.5 DESCRIBE THE PLANS FOR RETAINING OR DESTROYING THE STUDY DATA

We have no specific plans for destroying the data. Data will be retained by the Principal Invesitgators.

8.6 DOES THIS STUDY REQUEST INFORMATION FROM PARTICIPANTS REGARDING ILLEGAL BEHAVIOR?

☒ **No,** go to question 9.1
☐ **Yes,** answer questions within table ─────────── ▼

IF YES
Does the study plan to obtain a Certificate of Confidentiality?   ☐ No   ☐ Yes (Note: participants must be fully informed of the conditions of the Certificate of Confidentiality within the consent process and form)   *For more information about Certificates of Confidentiality, visit the following link:*   *http://www.irb.vt.edu/pages/coc.htm*

Section 9: Compensation

For more information about compensating subjects, visit the following link: http://www.irb.vt.edu/pages/compensation.htm

9.1 WILL SUBJECTS BE COMPENSATED FOR THEIR PARTICIPATION?

☐ **No,** go to question 10.1

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☒ **Yes,** answer questions within table ───────── ▼

IF YES
What is the amount of compensation? $2.00 to half of the sample.
Will compensation be prorated? ☐ Yes, please describe: ☒ No, explain why and clarify whether subjects will receive full compensation if they withdraw from the study? **They receive it whether they respond or not.** *Unless justified by the researcher, compensation should be prorated based on duration of study participation. Payment must <u>not</u> be contingent upon completion of study procedures. In other words, even if the subject decides to withdraw from the study, he/she should be compensated, at least partially, based on what study procedures he/she has completed.*

Section 10: Audio / Video Recording

For more information about audio/video recording participants, visit the following link: http://www.irb.vt.edu/pages/recordings.htm

10.1 WILL YOUR STUDY INVOLVE VIDEO AND/OR AUDIO RECORDING?

☒ **No,** go to question 11.1
☐ **Yes,** answer questions within table ───────── ▼

IF YES
This project involves: ☐ Audio recordings only ☐ Video recordings only ☐ Both video and audio recordings
Provide compelling justification for the use of audio/video recording:
How will data within the recordings be retrieved / transcribed?
How and where will recordings (e.g., tapes, digital data, data backups) be stored to ensure security?
Who will have access to the recordings?
Who will transcribe the recordings?
When will the recordings be erased / destroyed?

Section 11: Research Involving Students

11.1 DOES THIS PROJECT INCLUDE STUDENTS AS PARTICIPANTS?

☒ **No,** go to question 12.1
☐ **Yes,** answer questions within table ───────── ▼

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IF YES
Does this study involve conducting research with students of the researcher? ☐ No ☐ Yes, describe safeguards the study will implement to protect against coercion or undue influence for participation: *Note: if it is feasible to use students from a class of students not under the instruction of the researcher, the IRB recommends and may require doing so.*
Will the study need to access student records (e.g., SAT, GPA, or GRE scores)? ☐ No ☐ Yes

11.2 DOES THIS PROJECT INCLUDE <u>ELEMENTARY</u>, <u>JUNIOR</u>, OR <u>HIGH SCHOOL</u> STUDENTS?

☒ **No,** go to question 11.3
☐ **Yes,** answer questions within table ─────────
▼

IF YES

Will study procedures be completed during school hours?
☐ No
☐ Yes
 	
If yes,
 	
      Students not included in the study may view other students' involvement with the research during school time as unfair. Address this issue and how the study will reduce this outcome:
 	
      Missing out on regular class time or seeing other students participate may influence a student's decision to participate. Address how the study will reduce this outcome:

Is the school's approval letter(s) attached to this submission? ☐ Yes ☐ No, project involves Montgomery County Public Schools (MCPS) ☐ No, explain why: *You will need to obtain school approval (if involving MCPS, click here: http://www.irb.vt.edu/pages/mcps.htm). Approval is typically granted by the superintendent, principal, and classroom teacher (in that order). Approval by an individual teacher is insufficient. School approval, in the form of a letter or a memorandum should accompany the approval request to the IRB.*

11.3 DOES THIS PROJECT INCLUDE <u>COLLEGE</u> STUDENTS?

☒ **No,** go to question 12.1
☐ **Yes,** answer questions within table ─────────
▼

IF YES
Some college students might be minors. Indicate whether these minors will be included in the research or actively excluded: ☐ Included ☐ Actively excluded, describe how the study will ensure that minors will not be included:

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Will extra credit be offered to subjects?
☐ No
☐ Yes

If yes,

What will be offered to subjects as an equal alternative to receiving extra credit without participating in this study?

Include a description of the extra credit (e.g., amount) to be provided within question 9.1 ("IF YES" table)

Section 12: Research Involving Minors

12.1 DOES THIS PROJECT INVOLVE MINORS (UNDER THE AGE OF 18 IN VIRGINIA)?
Note: age constituting a minor may differ in other States.

☒ **No,** go to question 13.1
☐ **Yes,** answer questions within table ─────────── ▼

IF YES
Does the project reasonably pose a risk of reports of current threats of abuse and/or suicide? ☐ No ☐ Yes, thoroughly explain how the study will react to such reports: *Note: subjects and parents must be fully informed of the fact that researchers must report threats of suicide or suspected/reported abuse to the appropriate authorities within the Confidentiality section of the Consent, Assent, and/or Permission documents.*

Are you requesting a waiver of parental permission (i.e., parent uninformed of child's involvement)?
☐ No, **both** parents/guardians will provide their permission, if possible.
☐ No, **only one** parent/guardian will provide permission.
☐ Yes, describe below how your research meets **all** of the following criteria (A-D):
    Criteria A - The research involves no more than minimal risk to the subjects:
    Criteria B - The waiver will not adversely affect the rights and welfare of the subjects:
    Criteria C - The research could not practicably be carried out without the waiver:
    Criteria D - (Optional) Parents will be provided with additional pertinent information after
        participation:

Is it possible that minor research participants will reach the legal age of consent (18 in Virginia) while enrolled in this study? ☐ No ☐ Yes, will the investigators seek and obtain the legally effective informed consent (in place of the minors' previously provided assent and parents' permission) for the now-adult subjects for any ongoing interactions with the subjects, or analysis of subjects' data? If yes, explain how: *For more information about minors reaching legal age during enrollment, visit the following link:* *http://www.irb.vt.edu/pages/assent.htm*
The procedure for obtaining assent from minors and permission from the minor's guardian(s) must be described in Section 4 (Consent Process) of this form.

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Section 13: Research Involving Deception

For more information about involving deception in research and for assistance with developing your debriefing form, visit our website at http://www.irb.vt.edu/pages/deception.htm

13.1 DOES THIS PROJECT INVOLVE DECEPTION?

☒ **No,** go to question 14.1
☐ **Yes,** answer questions within table ——————— ▼

IF YES
Describe the deception:
Why is the use of deception necessary for this project?
Describe the debriefing process:

Provide an explanation of how the study meets <u>all</u> the following criteria (A-D) for an alteration of consent:
   Criteria A - The research involves no more than minimal risk to the subjects:
   Criteria B - The alteration will not adversely affect the rights and welfare of the subjects:
   Criteria C - The research could not practicably be carried out without the alteration:
   Criteria D - (Optional) Subjects will be provided with additional pertinent information after participation
      (i.e., debriefing for studies involving deception):
 	
By nature, studies involving deception cannot provide subjects with a complete description of the study during the consent process; therefore, the IRB must allow (by granting an alteration of consent) a consent process which does not include, or which alters, some or all of the elements of informed consent.

The IRB requests that the researcher use the title "Information Sheet" instead of "Consent Form" on the document used to obtain subjects' signatures to participate in the research. This will adequately reflect the fact that the subject cannot fully consent to the research without the researcher fully disclosing the true intent of the research.

Section 14: Research Involving Existing Data

14.1 WILL THIS PROJECT INVOLVE THE COLLECTION OR STUDY/ANALYSIS OF EXISTING DATA DOCUMENTS, RECORDS, PATHOLOGICAL SPECIMENS, OR DIAGNOSTIC SPECIMENS?

Please note: it is not considered existing data if a researcher transfers to Virginia Tech from another institution and will be conducting data analysis of an on-going study.

☐ **No,** you are finished with the application
☒ **Yes,** answer questions within table ——————— ▼

IF YES
From where does the existing data originate? directmail.com
Provide a detailed description of the existing data that will be collected or studied/analyzed: Directmail.com will provide demographic information (age, length of residence, education, estimated household income, family composition) along with mailing and email addresses. All respondents will have officially "opted in" to the panel sample. They have also had

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opportunities to opt out of directmail.com's program.

Is the source of the data public?
☒ No, continue with the next question
☐ Yes, you are finished with this application

Will any individual associated with this project (internal or external) have access to or be provided with existing data containing information which would enable the identification of subjects:
- **Directly** (e.g., by name, phone number, address, email address, social security number, student ID number), or
- **Indirectly through study codes** even if the researcher or research team does not have access to the master list linking study codes to identifiable information such as name, student ID number, etc or
- **Indirectly through the use of information that could reasonably be used in combination to identify an individual** (e.g., demographics)

☐ No, collected/analyzed data will be completely de-identified
☒ Yes,

If yes,

Research will not qualify for exempt review; therefore, if feasible, written consent must be obtained from individuals whose data will be collected / analyzed, unless this requirement is waived by the IRB.

Will written/signed or verbal consent be obtained from participants prior to the analysis of collected data? No, requesting waiver from IRB

This research protocol represents a contract between all research personnel associated with the project, the University, and federal government; therefore, must be followed accordingly and kept current.

Proposed modifications must be approved by the IRB prior to implementation except where necessary to eliminate apparent immediate hazards to the human subjects.

Do not begin human subjects activities until you receive an IRB approval letter via email.

It is the Principal Investigator's responsibility to ensure all members of the research team who interact with research subjects, or collect or handle human subjects data have completed human subjects protection training prior to interacting with subjects, or handling or collecting the data.

----------END----------

12

E. Community Survey Invitations

Round #1 Postal Letter Invite (Front)

Virginia Tech   STANFORD UNIVERSITY   THE OHIO STATE UNIVERSITY   Audubon

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Postal Window
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Date   *PARA ESPAÑOL, POR FAVOR VEA EL REVERSO*

Dear [first name],

We are collaborating on a national study about how people think about and value nature centers. Our primary goal is to understand how these places might better serve their neighboring communities.
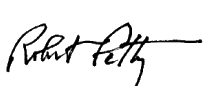
We invite you to take an online survey about your community and [center name in English]. Whether you've heard of this place or not, we hope you will consider taking the survey, because we'd like to understand your opinions about your community in general. We are asking just a sample of people in your area, so your response is particularly important to us.

To take the survey, please log on to the following website using this 5-digit code XXXXX:
[URL for center-specific survey in English]!

We will also be sending you an email with a direct link to this survey in the next week. The survey should take between 5 and 20 minutes to complete, depending on your knowledge of [center name in English]. All of your answers will be kept confidential. We will not associate your name with your responses, and the raw data will only be shared with the research team. We will report only a summary of the results from your community, not your individual responses.

We expect to complete this study by January, 2015. If you'd like to receive a copy of the results, or have any questions or concerns about the study, please contact us at naturecenterstudy@vt.edu

Thank you for considering this request,

Marc Stern, PhD   Nicole Ardoin, PhD   Joe Heimlich, PhD   Robert Petty
Virginia Tech   Stanford University   Ohio State University   National Audubon Society
Only for those who receive incentive: PS - Please accept the enclosed $2 bill as a small token of appreciation for your time and effort.

Estimado/a [first name],

Estamos colaborando en un estudio nacional sobre qué piensan y cómo valoran las personas los centros de naturaleza. Nuestra meta principal es entender cómo estos lugares pueden servir mejor a las comunidades en las que se encuentran.

Le invitamos a completar una encuesta en internet sobre su comunidad y el [center name in English] [center name in Spanish in parentheses]. Tanto si ha oído de este lugar como si no, esperamos que considere completar la encuesta porque nos gustaría entender sus opiniones sobre la comunidad en general. Se lo estamos pidiendo tan sólo a una muestra de personas en su zona, luego su respuesta es especialmente importante para nosotros.

Para completar la encuesta, por favor acceda a la siguiente página de Internet utilizando este código de cinco dígitos XXXXX:

[URL link for center-specific Spanish survey]

También le vamos a enviar un correo electrónico con un vínculo directo a la encuesta la próxima semana. Completar la encuesta debería llevarle de 5 a 20 minutos, dependiendo de su conocimiento del [center name in English]. Todas sus respuestas se mantendrán confidenciales. No asociaremos su nombre con las respuestas, y los datos sin procesar serán compartidos solamente con los miembros del equipo de investigación. Haremos un reporte con un resumen de los resultados de su comunidad sin respuestas individuales.

Esperamos que complete esta encuesta para enero de 2015. Si usted quisiera recibir una copia los resultados o tiene alguna pregunta o preocupación sobre este estudio, por favor contacte con nosotros naturecenterstudy@vt.edu

Gracias por considerar esta solicitud,

Marc Stern, PhD   Nicole Ardoin, PhD   Joe Heimlich, PhD   Robert Petty
Virginia Tech   Stanford University   Ohio State University   National Audubon Society
!
Only for those who receive incentive*:* PS - por favor, acepte el billete de dos dólares adjunto como una pequeña muestra de apreciación por su tiempo y esfuerzo.
$
$
Este estudio está financiado por el Instituto para los Servicios de Museos y Bibliotecas (Institute for Museum and Library Services). Para información adicional, por favor visite www.naturecenterstudy.org El estudio se está llevando a cabo bajo la orientación del Panel de Revisión Institucional de Virginia Tech. Si usted tiene alguna preocupación sobre el desarrollo del estudio o sus derechos como participante, puede ponerse en contacto con el presidente del Panel de Revisión Institucional de Virginia Tech, *Dr. David Moore en moored@vt.edu o en el (540) 231 4991.*!

Round #1 Email Invite #1

Dear [first name],

Para leer este correo electrónico en español, por favor vaya abajo en esta página.

We hope you received our recent letter regarding our national study about how people think about and value nature centers. As a reminder, our primary goal is to understand how these places might better serve their neighboring communities.

If you've already completed the survey, thank you! Your responses will greatly help us in this important study.

If you didn't receive the letter or complete the survey yet, that's OK. We invite you again to take an online survey about your community and [center name in English]. Whether you've heard of this place or not, we hope you will consider taking the survey, because we'd like to understand your opinions about your community in general. We are asking just a sample of people in your area, so your response is particularly important to us.

To take the survey, please log on to the following website using this 5-digit code XXXXX:

[URL for center-specific survey in English]

The survey should take between 5 and 20 minutes to complete, depending on your knowledge of [center name in English]. All of your answers will be kept confidential. We will not associate your name with your responses, and the raw data will only be shared with the research team. We will report only a summary of the results from your community, not your individual responses.

We expect to complete this study by January, 2015. If you'd like to receive a copy of the results, or have any questions or concerns about the study, please contact us at naturecenterstudy@vt.edu

Thank you for considering this request,

Marc Stern, PhD   Nicole Ardoin, PhD   Joe Heimlich, PhD   Robert Petty

Virginia Tech   Stanford University   Ohio State University   National Audubon Society

This study is funded by the Institute for Museum and Library Services. For additional information, please visit www.naturecenterstudy.org
The study is conducted under the guidance of the Virginia Tech Institutional Review Board. *If you have any concerns about the study's conduct or your rights as a research subject, you may contact the Virginia Tech Institutional Review Board chair Dr. David Moore at moored@vt.edu or*
(540) 231-4991.

Estimado/a [first name],

Esperamos que haya recibido nuestra reciente carta en relación a nuestro estudio nacional sobre qué piensan y cómo valoran las personas los centros de naturaleza. Como recordatorio, nuestra meta principal es entender cómo estos lugares pueden servir mejor a las comunidades en las que se encuentran.

Si usted ya ha completado la encuesta ¡gracias! Sus respuestas nos serán de gran ayuda en este importante estudio.

Si usted no ha recibido la carta o completado la encuesta todavía, está bien. Le invitamos de nuevo a participar en la encuesta en Internet sobre su comunidad y el [center name in Engilsh] [center name in Spanish in parentheses]. Tanto si usted ha oído de este lugar como si no, esperamos que considere completar la encuesta, porque nos gustaría entender sus opiniones acerca de la comunidad en general. Se lo estamos pidiendo tan sólo a una muestra de personas en su zona, luego su respuesta es particularmente importante para nosotros

Para completar la encuesta, por favor acceda a la siguiente página de Internet utilizando este código de cinco dígitos XXXXX:

[URL link for center-specific Spanish survey]

Completar la encuesta debería llevarle de 5 a 20 minutos, dependiendo de su conocimiento del [center name in English]. Todas sus respuestas se mantendrán confidenciales. No asociaremos su nombre con las respuestas, y los datos sin procesar serán compartidos solamente con los miembros del equipo de investigación. Haremos un reporte con un resumen de los resultados de su comunidad sin respuestas individuales.

Esperamos que complete esta encuesta para enero de 2015. Si usted quisiera recibir una copia los resultados o tiene alguna pregunta o preocupación sobre este estudio, por favor contacte con nosotros naturecenterstudy@vt.edu

Gracias por considerar esta solicitud,

Marc Stern, PhD   Nicole Ardoin, PhD   Joe Heimlich, PhD   Robert Petty

Virginia Tech   Stanford University   Ohio State University   National Audubon Society

Round #1 Email Invite #2

Dear [first name],

Para leer este correo electrónico en español, por favor vaya abajo en esta página.

We hope you received our recent letter and email regarding our national study about how people think about and value nature centers. As a reminder, our primary goal is to understand how these places might better serve their neighboring communities.

If you've already completed the survey, please accept our sincere thanks. If not, please consider doing so right away. This is the final notice you will receive from us, so you may not have another chance to help with this important study.

To take the survey, please log on to the following website using this 5-digit code XXXXX:

[URL for center-specific survey in English]

The survey should take between 5 and 20 minutes to complete. All of your answers will be kept confidential. We will not associate your name with your responses, and the raw data will only be shared with the research team. We will report only a summary of the results from your community, not your individual responses.

We expect to complete this study by January, 2015. If you'd like to receive a copy of the results, or have any questions or concerns about the study, please contact us at naturecenterstudy@vt.edu

Thank you for considering this request,

Marc Stern, PhD	Nicole Ardoin, PhD	Joe Heimlich, PhD	Robert Petty
Virginia Tech	Stanford University	Ohio State University	National Audubon Society

Estimado/a [first name],

Esperamos que haya recibido nuestra reciente carta en relación a nuestro estudio nacional sobre qué piensan y cómo valoran las personas los centros de naturaleza. Como recordatorio, nuestra meta principal es entender cómo estos lugares pueden servir mejor a las comunidades en las que se encuentran.

Si usted ha completado la encuesta, por favor acepte nuestro sincero agradecimiento. Si no, por favor considere hacerlo ahora mismo. Esta es la última notificación que recibirá de nosotros luego puede que usted no tenga otra oportunidad de ayudarnos con este importante estudio.

Para completar la encuesta, por favor acceda a la siguiente página de Internet utilizando este código de cinco dígitos XXXXX:

[URL link for center-specific Spanish survey]

Completar la encuesta debería llevarle de 5 a 20 minutos. Todas sus respuestas se mantendrán confidenciales. No asociaremos su nombre con las respuestas, y los datos sin procesar serán compartidos solamente con los miembros del equipo de investigación. Haremos un reporte con un resumen de los resultados de su comunidad sin respuestas individuales.

Esperamos que complete entre esta encuesta para enero de 2015. Si usted quisiera recibir una copia los resultados o tiene alguna pregunta o preocupación sobre este estudio, por favor contacte con nosotros naturecenterstudy@vt.edu

Gracias por considerar esta solicitud,

Marc Stern, PhD   Nicole Ardoin, PhD   Joe Heimlich, PhD   Robert Petty

Virginia Tech   Stanford University   Ohio State University   National Audubon Society

Round #2 Email Invite #1

Dear [Name],

We are writing to ask for your participation in a survey we are conducting in partnership with Virginia Tech, Stanford University, the Ohio State University, and the National Audubon Society. The goal of the study is to learn how nature centers can be of greater value to their communities. Your name has been chosen at random from a larger database of people who live in your area. ***We are not trying to sell you anything and we are not asking for donations***.

Most people who have completed the survey already have completed it in less than 10 minutes. Please click on the link below (or copy and paste the survey link into your internet browser's address line) and enter the personal access code to begin:

URL

Personal access code:

If you have any questions or concerns about the study, please contact researcher Matt Browning at naturecenterstudy@vt.edu or (540)315-1397.

Your participation in this survey is entirely voluntary and all of your responses will kept confidential. No personally identifiable information will be associated with your responses in any reports of the data.

We appreciate your time and consideration in completing the survey. Thank you participating in this important study!

Kind regards,

Dr. Nicole Ardoin, Stanford University, *https://people.stanford.edu/nmardoin/*

Dr. Joe Heimlich, The Ohio State University, *http://comdev.osu.edu/people/joe-heimlich*

Dr. Marc Stern, Virginia Tech, *http://frec.vt.edu/people/faculty/faculty_folder/stern.html*

Matt Browning, Virginia Tech, *http://frec.vt.edu/people/grad_students/profles/browning.html*

Robert Petty, National Audubon Society

Para completar la encuesta en español, por favor acceda a la siguiente página de Internet utilizando este código de cinco dígitos [XXXXX]: [URL link for center-specific Spanish survey]

Dear [first name],

We recently sent you an email inviting you to take a short online survey. If you have not yet participated, we encourage you to join others in your community who have completed the survey. Your responses will help to contribute to a better understanding of how nature centers can best serve their neighboring communities. If you have already responded, we thank you.

To access the online survey, please click on the link below. Alternatively, you can copy and paste this link into your web browser's address bar:

[URL for center-specific survey in English]

When asked to log in, please enter the following code:

[XXXXX]

The survey should take between 5 and 20 minutes to complete. Most people so far have completed it in **less than 10 minutes**.

All of your responses will be kept confidential. We will report only a summary of our results, not your individual responses.

As a reminder, this is a study conducted by researchers from Stanford University, the Ohio State University, and Virginia Tech, in partnership with the National Audubon Society. The study's goal is to understand how nature centers can better serve their communities. For more information, visit http://naturecenterstudy.org

If you have any questions or concerns about the study, please contact researcher Matt Browning at naturecenterstudy@vt.edu or (540) 315-1397.

Thank you for your help in this important study.

Sincerely,

Dr. Nicole Ardoin, Stanford University, *https://people.stanford.edu/nmardoin/*

Dr. Joe Heimlich, The Ohio State University, *http://comdev.osu.edu/people/joe-heimlich*

Dr. Marc Stern, Virginia Tech, *http://frec.vt.edu/people/faculty/faculty_folder/stern.html*

Matt Browning, Virginia Tech, *http://frec.vt.edu/people/grad_students/profles/browning.html*

Robert Petty, National Audubon Society

Para completar la encuesta en español, por favor acceda a la siguiente página de Internet utilizando este código de cinco dígitos [XXXXX]: [URL link for center-specific Spanish survey]

Dear [first name],

We recently sent you an email inviting you to take a short online survey. If you have not yet participated, we encourage you to join others in your community who have completed the survey. Your responses will help to contribute to a better understanding of how nature centers can best serve their neighboring communities. If you have already responded, we thank you.

To access the online survey, please click on the link below. Alternatively, you can copy and paste this link into your web browser's address bar:

[URL for center-specific survey in English]

When asked to log in, please enter the following code:

[XXXXX]

Most people so far have completed the survey in less than 10 minutes, though some have taken longer.

All of your responses will be kept confidential. We will report only a summary of our results, not your individual responses.

As a reminder, this is a study conducted by researchers from Stanford University, the Ohio State University, and Virginia Tech, in partnership with the National Audubon Society. The study's goal is to understand how nature centers can better serve their communities. For more information, visit http://naturecenterstudy.org

If you have any questions or concerns about the study, please contact researcher Matt Browning at naturecenterstudy@vt.edu or (540) 315-1397.

Thank you for your help in this important study. The survey will remain open until XX (date). We will then close the survey.

Sincerely,

Dr. Nicole Ardoin, Stanford University, *https://people.stanford.edu/nmardoin/*

Dr. Joe Heimlich, The Ohio State University, *http://comdev.osu.edu/people/joe-heimlich*

Dr. Marc Stern, Virginia Tech, *http://frec.vt.edu/people/faculty/faculty_folder/stern.html*

Matt Browning, Virginia Tech, *http://frec.vt.edu/people/grad_students/profles/browning.html*

Robert Petty, National Audubon Society

Para completar la encuesta en español, por favor acceda a la siguiente página de Internet utilizando este código de cinco dígitos [XXXXX]: [URL link for center-specific Spanish survey]

This study is funded by a grant from the Institute for Museum and Library Services. The study is conducted under the guidance of the Virginia Tech Institutional Review Board. If you have any concerns about the study's conduct or your rights as a research subject, you may contact the Virginia Tech Institutional Review Board chair Dr. David Moore at IRB@vt.edu

Dear [first name],

My name is Matthew Browning, and I'm a doctoral student at Virginia Tech. I'm working with a group of researchers on a national study about the value of nature centers in their local communities. Last year, we invited you to take a survey to participate in this research. You were part of a random sample of people living in your area who were invited to participate.

I'm contacting you again to invite you to a much shorter survey. It contains only five questions about your opinions and should take only 2 minutes to complete.

The survey will help the research team to better interpret the results of our earlier study. We hope you can help us in this effort. You will not be asked for any personal information.

To begin the survey, simply click on this link:

[LINK]

And then type in the following access code when prompted:

[CODE]

This survey is confidential. Your participation is voluntary, and if you come to a question you prefer not to answer, please skip it and go on to the next. Should you have any questions or comments, please contact us at naturecenterstudy@vt.edu or me, Matthew, at 540-315-1397.

We really appreciate you considering our request.

Many thanks,

Matthew Browning, PhD Candidate, Virginia Tech Department of Forest Resources & Environmental Conservation

Dr. Marc Stern, Associate Professor, Virginia Tech Department of Forest Resources & Environmental Conservation

Dr. Nicole Ardoin, Assistant Professor, Stanford University Graduate School of Education

Dr. Joe Heimlich, Professor Emeritus, The Ohio State University; Principal Researcher, Lifelong Learning Group/COSI

Robert Petty, Director of Bird-Friendly Communities, National Audubon Society

Non-Response Bias Test Email Invite #2

Hello [first name],

This is Matthew Browning again. I'm the doctoral student at Virginia Tech working with a group of researchers on a national study about the value of nature centers in their local communities.

Earlier this week, I invited you to a 2-minute online survey about nature centers. We hope you can help us in this effort. You will not be asked for any personal information.

If you have already completed the survey, thank you very much!

If you have not, I hope that providing you with a link to the survey website makes it easy for you to respond. To complete the survey, simply click on this link:

[URL]

And then type in the following access code when prompted:

[CODE]

This survey is confidential, and your participation is voluntary. Should you have any questions or comments, please contact the research team at naturecenterstudy@vt.edu or me, Matthew, at 540-315-1397.

I appreciate you considering my request!

Sincerely,

Matthew Browning, PhD Candidate, Virginia Tech Department of Forest Resources & Environmental Conservation

Dr. Marc Stern, Associate Professor, Virginia Tech Department of Forest Resources & Environmental Conservation

Dr. Nicole Ardoin, Assistant Professor, Stanford University Graduate School of Education

Dr. Joe Heimlich, Professor Emeritus, The Ohio State University; Principal Researcher, Lifelong Learning Group/COSI

Robert Petty, Director of Bird-Friendly Communities, National Audubon Society

Non-Response Bias Test Email Invite #3

Dear [first name],

This is Virginia Tech doctoral student, Matthew Browning.

I'm writing to follow up on the messages I sent last week asking you to participate in a short online survey. The goal of this survey is to help me and other researchers better interpret the results of an earlier study on the value of nature centers in their local communities.

The survey contains only 5 questions about you opinions and should take less than 2-minutes to complete.

If you have already participated, I thank you! If you have not, here is the URL and your personal access code to provide an easy way to access the survey website.

[URL]

[access code]

The last chance for you to take the survey is [date]. After that, the survey will close and your chance to participate will end.

I also wanted to let you know that if you are interested in seeing a summary of our results, I encourage you to contact us at naturecenterstudy@vt.edu or me, Matthew, at 540-315-1397. In the meantime, I hope you have an enjoyable winter season.

Sincerely,

Matthew Browning, PhD Candidate, Virginia Tech Department of Forest Resources & Environmental Conservation

Dr. Marc Stern, Associate Professor, Virginia Tech Department of Forest Resources & Environmental Conservation

Dr. Nicole Ardoin, Assistant Professor, Stanford University Graduate School of Education

Dr. Joe Heimlich, Professor Emeritus, The Ohio State University; Principal Researcher, Lifelong Learning Group/COSI

Robert Petty, Director of Bird-Friendly Communities, National Audubon Society