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REVISITING AN INVESTIGATION OF GREENWAY USERS AND THEIR RESPONSE TO LITTER

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Introduction

As Vaske and Kobrin (2001) have noted, "efforts to understand and predict why individuals act in an environmentally appropriate manner have generated a considerable body of literature. Beginning decades ago with the work of Van Liere and Dunalp (1980), much research has examined environmental concern (attitudes towards the natural environment), pro-environmental behavior (e.g., Hines, Hungerford, & Tomera, 1987), and the social and demographic correlates of each. Today, while it is generally recognized that US citizens are more environmentally educated than in previous decades due to a variety of pro-environment efforts (e.g., recycle, reduce, reuse, refuse) there is still limited evidence that people act on their concern or attitudes. Barefoot, Jenkins, Redhage and Frauman (2010) found that rural greenway users did not pick up a recyclable, clean plastic bottle, even when a trash receptacle was within 15 feet of the bottle.

Following up on Barefoot et al.'s work, this study sought to understand whether users of a rural greenway engage in pro-environmental behavior by observing how they responded to a

piece of recyclable litter both when a recycling bin was present next to a trash receptacle and when it was not.

Methods

The study site is a popular greenway in a rural mountain community in the southeastern US. The paved greenway abuts a series of open playing fields as well as meanders along a narrow corridor of a fork of the New River. While the greenway is nicely landscaped, and well maintained, with benches and trash receptacles along popular stretches there are no recycling bins or signs encouraging people to use the receptacles or pack out trash. Furthermore, it is evident that a fair amount of debris (e.g., litter or properly disposed trash) finds its way into the river. Appearing to be reading, investigators nearby the study area, used a checklist to document user response to a empty recyclable water bottle strategically placed on the trail within 15 feet of a trash receptacle, noting also gender, type of activity engaged in (e.g., walking, biking), group size, and perceived age. Part of study also included placing a recycling bin next to the trash receptacle to see if greenway users would react differently to the trash. Data collection occurred during fall 2010. A total of 74 user groups were observed with a recycling bin present, while 66 were observed when no bin was available.

Results

Of the total 140 user groups observed (ranged in size from one [70%] to five) the majority (87.9%) did not pick up or place the water bottle in the trash receptacle or recycle bin regardless of gender, perceived age, type of use, or group size. On the other hand, user groups who picked up the bottle (n=17; 12.1%) did recycle the item if given a bin to place the item in. Users most likely to pick up the bottle (n=9; 12.0%) were using the greenway for walking

purposes (Note: represented 53.6% of the full sample that included bikers, runners, rollerbladers, users with dogs, or users with strollers), although a greater percentage of bikers picked up the bottle (20.0%) (Figure 1). Users on the greenway alone (n=98; 70.0%) were most likely to pick up the bottle (n=10; 10.2%). Over half of the users (59.0%) who picked up the item were between the ages of 18-30, while males (14.6%) were more likely to pick up the bottle versus women (8.0%) (Figure 2).

In observations when there was not a recycling bin (n=66), 7.6% of the sample picked up the bottle with all placing it in the trash receptacle (Figure 3). As with the overall sample, users on the greenway alone were most likely to pick up the bottle (n=4), representing 80.0% of those who picked it up. Walkers and users with dogs were most likely to pick up the bottle representing four of the five who disposed of it. Four of the five who picked up the item were between the ages of 18-30, while females were slightly more likely to pick up the bottle versus men.

In observations where there was a bin (n=74), 16.2% picked up the bottle with 100% placing it in the recycling bin (Figure 3). Users on the greenway alone were most likely to pick up the bottle (n=6), representing 50.0% of those who picked it up. Walkers and bikers were most likely to pick up the bottle representing four of the five (83.3%) who disposed of it. Seven of the 12 who picked up the item (58.3%) were between the ages of 18-30 representing 20.0% of the age group. Males were slightly more likely to pick up and recycle the bottle versus women.

Conclusions and Recommendations

This study primarily sought to understand whether users of a rural greenway engage in pro-environmental behavior by observing how they respond to a piece of recyclable litter

strategically placed on the trail. From our analysis a very small percentage of users picked up the litter. The results were similar to Barefoot et al. (2010). That said users who picked up the item would recycle it if given the opportunity to recycle with a greater percentage picking up the item when a recycle bin was present. Type of activity, age, gender, and size of group didn't make much of a difference between study groups, although people alone, walking, and relatively young were most likely to pick up trash. Managers should be aware that having recycling bins may encourage proactive environmental behavior with more than double the number of users in this study removing the item when the recycling bin was added. Given no recycling information currently exists on the greenway, it seems appropriate for managers to put up informational and educational signs reminding users about proper disposal of waste and recyclable products. If people's behaviors change because a recycling bin is placed next to a trash can, then managers may need to consider additions to their greenway. Depending on the type of bin (size, shape, color, signage/slogan), people may be more likely to recycle and remove litter from a greenway. Further research should be used at other strategic sites (e.g., entry/exit points, high use areas) along the greenway to see if recycling bins and types of bins affect pro-environmental behavior.

Figure 1

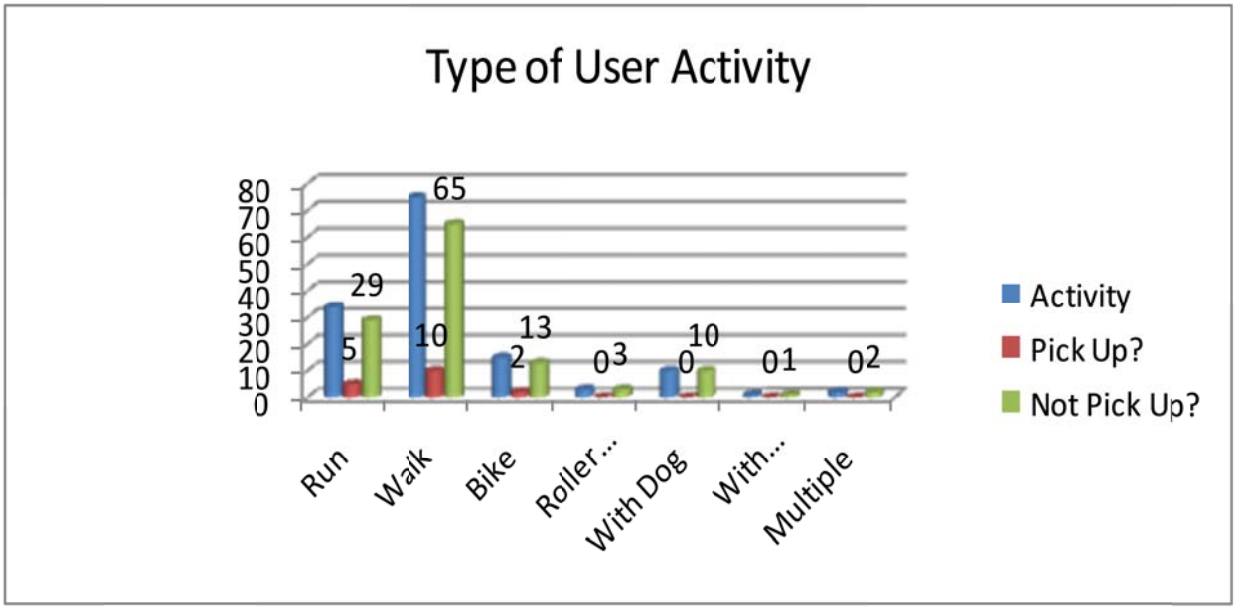


Figure 2

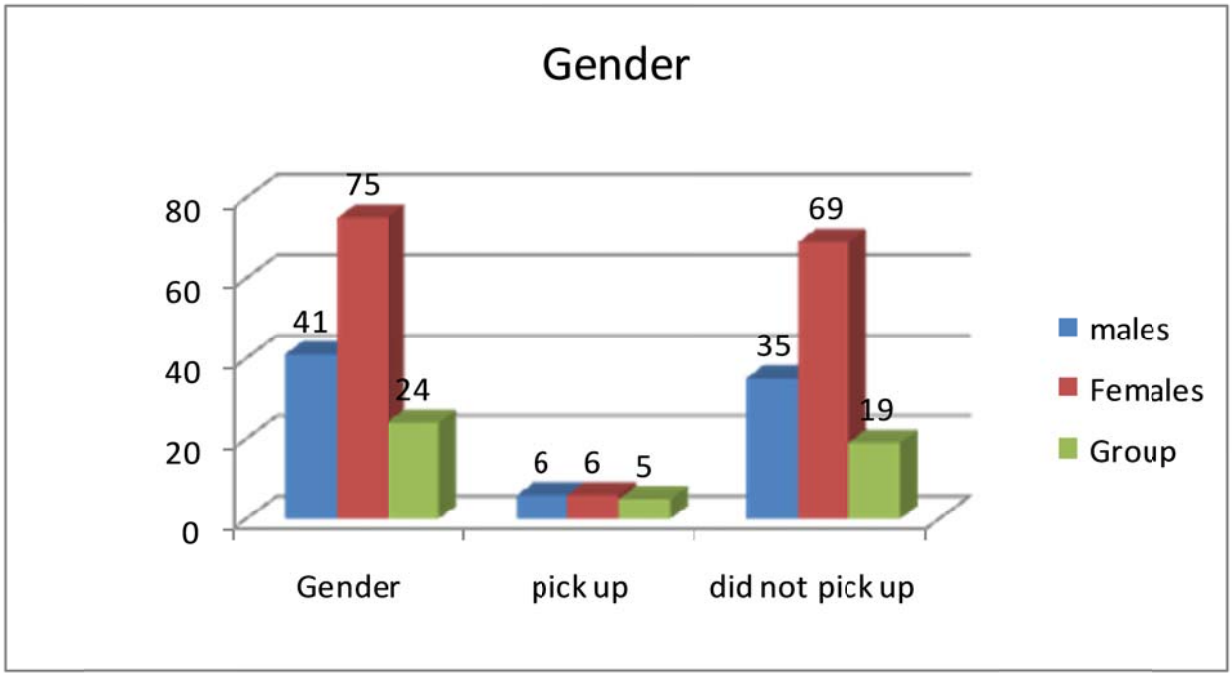
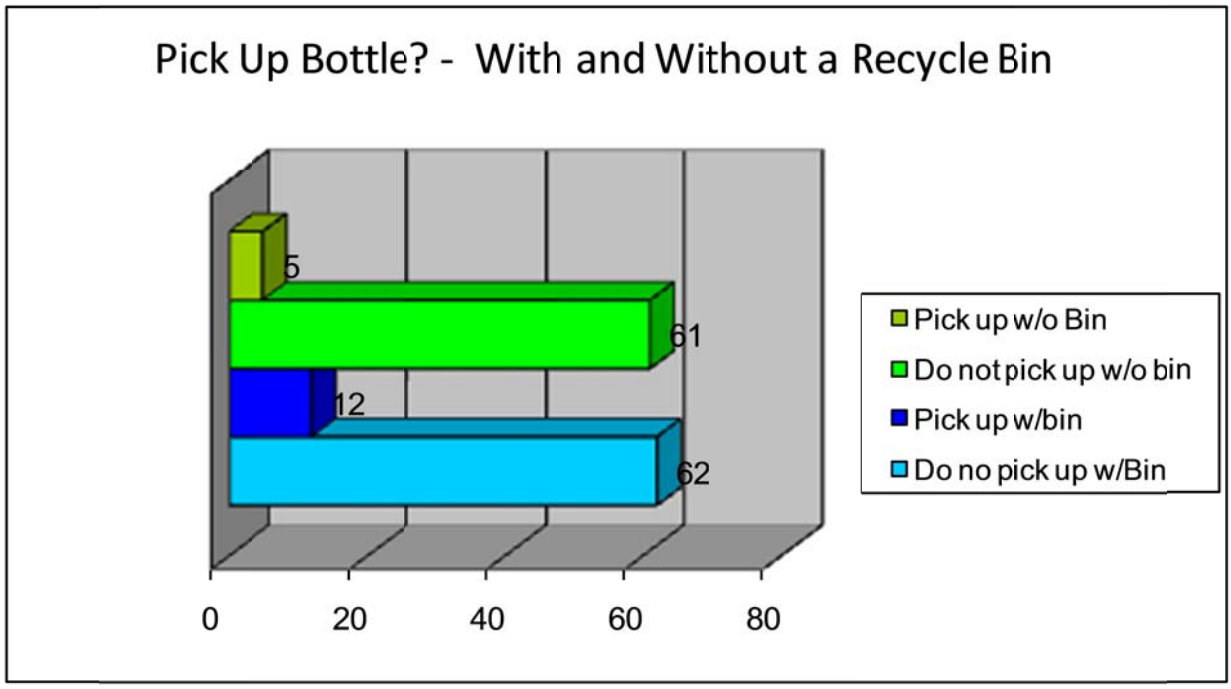

Gender
80
60
40
20
0
75
41
24
6
6
5
69
35
19
Gender
pick up
did not pick up
males
Females
Group

Figure 3


Pick Up Bottle? - With and Without a Recycle Bin
5
61
12
62
0
20
40
60
80
Pick up w/o Bin
Do not pick up w/o bin
Pick up w/bin
Do no pick up w/Bin

PHYSICAL ACTIVITY IN GEORGIA STATE PARKS

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Problem Statement

The negative health effects associated with physical inactivity have become an increasingly disturbing burden on the U. S. population, especially for children and low-income minority groups (Ogden et al., 2006; Pratt, 2008). By supplying a variety of outdoor recreation opportunities, public parks may provide strategies for increasing physical activity (Mowen et al., 2008). The purpose of this study was to assess the physical activity levels of Georgia state parks visitors and identify specific park features that may help encourage activity across diverse populations.

Methods

This project, part of a larger effort to examine diversity in Georgia state parks, focused on three state parks in north Georgia. Data were collected during the summer of 2010 via visitor observations and intercept surveys focused on recreation hotspots such as multi-use zones (i.e.,

swimming beaches, picnic areas, and campgrounds) and trailheads within each park.

Observations of visitor activity at beaches (N=16,464) and at or around trailheads (N=2,061 individual observations) were conducted using the System for Observing Play and Recreation in Communities (SOPARC), a reliable strategy for assessing physical activity in community settings (McKenzie et al., 2006). During each SOPARC session, a researcher began at one end of a target area and slowly walked across the zone, documenting the age, gender, ethnicity, and physical activity level of recreation participants at the moment they were observed. Brief (5 to 10-minute), bilingual (English & Spanish), self-administered intercept surveys of state park users (N=5,356 total - 2,112 focused specifically on physical activity) were also conducted in and around the recreation hotspots. Physical activity questions administered at beaches, picnic areas, and campgrounds distinguished between moderate and vigorous activity, reflecting terminology used in lifestyle surveys such as the Behavioral Risk Factor Surveillance System (CDC, 2009). Respondents were also asked to rate the value of specific features and facilities in promoting physical activity. An additional open-ended item allowed visitors to offer suggestions for increasing park-based physical activity.

Data were analyzed using SPSS Version 18.0. Inter-rater reliability of the SOPARC scale was assessed using bivariate and intra-class correlations. Pearson's chi-square tests were used to examine associations between physical activity observations and demographic variables in respective locations (multi-use zones and trailheads). Descriptive statistics describing physical activity levels and location preferences were obtained for the overall population of state park visitors and specific demographic groups.

Results

The SOPARC sampling showed that, overall, a majority of observed visitors were active (45.9% of park visitors were sedentary, 51.3% were engaged in moderate activity, and 2.8% were engaged in vigorous activity). Activity levels for adults in multi-use zones differed by race/ethnicity ($X^2_{6,N=7629} = 41.0$, $p<0.001$), with African Americans and Latinos as the most active groups. Swimming was the most popular beach activity, especially among ethnic minorities. Activity levels for adults at trailheads also differed by race/ethnicity ($X^2_{6,N=1271} = 88.2$, $p<0.001$), with whites as the most vigorously active groups. Hiking was the most popular activity at or near trailheads.

About 80 % of adult visitors reported some physical activity during their state park visit, and 69.1 % of adult visitors reported that they engaged in at least one hour of moderate or vigorous physical activity during their visit. After excluding missing cases (26.0%) and erroneous responses (i.e. total time during daily visit exceeded 24 hours – 9.2%), mean levels of moderate (79.8 min.) and vigorous (25.8 min.) physical activity still exceeded average recommended daily values for adults. In general, self reported activity levels within the park did not differ by race/ethnicity [$F(5,715)=1.23$, $p=0.294$]. Swimming areas (used by 72.5 % of all visitors) and picnic areas (62.1%) were the most commonly used physical activity locations across all groups. White visitors used dirt/gravel hiking trails more often than other visitors, while Hispanic/Latinos and African-Americans used open green space and sport fields more often than whites. A safe outdoor activity environment was the top priority for all state park users. Social physical activities were more important among racial/ethnic minority visitors than whites [$F(5,936)=5.75$, $p<0.001$].

Discussion

This study emphasized the increasing importance of health-related issues in outdoor recreation management and addressed a growing need to identify and inventory physical activity offerings in public parks (Wilhelm-Stanis et al., 2008). Results indicated that state parks generally support substantial levels of physical activity, particularly for racial/ethnic minorities. However, some areas of state parks such as hiking trails are under-used by racial/ethnic minorities. Suggestions offered by participants highlight potential improvements that could encourage physical activity in state parks including improved restroom facilities, more organized events and activities (and increased publicity to market them), an expansion of open green space, and the construction of family-friendly biking and hiking trails. Although this analysis focused exclusively on adults, future papers will examine data regarding children's physical activity in state parks. Results should provide Georgia state park managers with insightful strategies for promoting and sustaining park-based physical activity across diverse populations.

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EXPLORING THE INFLUENCE OF OUTDOOR RECREATION PARTICIPATION ON PRO-ENVIRONMENTAL BEHAVIOR

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Problem Statement

Environmental problems are frequently attributed to the public's reluctance to engage in pro-environmental behaviors (PEB) or other actions that encourage natural resource protection. Consequently, attempts to support and promote environmental initiatives often focus on factors influencing the development of PEB (Turaga *et al.,* 2010). Traditional models of PEB have focused on the causal relationships among values, attitudes, and behaviors (e.g. Stern *et al.*, 1995), but a growing body of research suggests that other factors including socio-demographic variables and outdoor recreation participation may contribute to a pro-environmental ethos (Kareiva, 2008; Tarrant & Green, 1999). This study accounts for outdoor recreation participation across increasingly diverse communities, building upon existing models to identify potential

factors influencing PEB as the "green" movement gains momentum and pro-environmental behaviors become a critical outcome associated with policy interventions.

Methods

Many factors contribute to an individual's participation in pro-environmental behavior. This study used a structural equation modeling approach to examine the relationships of three specific correlates (environmental value orientations, socio-demographics, and outdoor recreation participation) and PEB, testing the relative fit and path values of several different models (see Figure 1 for example). Value orientations represent a fundamental cognitive construct that form a foundation for action; hence, environmental value orientations are included in most PEB models. In general, biocentric values are associated with higher levels of PEB, whereas anthropocentric values and PEB are negatively related (Nordlund & Garvill 2002; Vaske & Donnelly, 1999). Socio-demographic characteristics are another important factor to consider. For example, studies have shown that income (Arcury & Christianson, 1993), education (Cordell *et al.,* 2002), gender (Vaske *et al.,* 2001), and race/ethnicity (Johnson *et al.,* 2004) influence environmental attitudes and PEB in different ways. Growing evidence indicates that outdoor recreation participation could also be incorporated into PEB models. Positive exposure to the natural environment is often correlated with pro-environmental attitudes and support for conservation, and may be linked to more general PEB (Tarrant and Green 1999, Kareiva 2008).

To examine relationships among these factors and PEB, visitors to three north Georgia State parks participated in bilingual (English and Spanish) self-administered intercept surveys during the summer of 2009. A total of 497 visitors were approached with a response rate of 83% (414 of 497). Deletion of cases with missing data on at least one survey item resulted in an

effective sample size of 319 (Table 1).

Results

The reliability and validity of the various survey constructs was assessed and confirmed prior to analysis of the hypothesized structural model in LISREL Version 8.71. Although the Satorra-Bentler Scaled χ^2 value of the most parsimonious model did not indicate a good fit [$X^2(99, N=319) = 195.2, p < 0.001$], other goodness-of-fit indexes (SRMR = 0.07, RMSEA = 0.06, NNFI = 0.93 and CFI = 0.95) were within acceptable ranges (Hu and Bentler 1999). Most of the hypothesized paths in this model were statistically significant (Table 2). Both biocentric and anthropocentric value orientations showed a direct positive relationship with PEB. The most parsimonious model did not contain direct paths between socio-demographic variables and PEB, and all of the links between these variables and PEB appeared to be mediated by environmental value orientations. Income, education, and gender were not significant indirect predictors of PEB. Racial/ethnic minorities displayed significantly higher levels of PEB than whites, likely mediated by the significant relationship between race/ethnicity and biocentric value orientations. Outdoor recreation participation in adulthood was a significant positive predictor of PEB. Outdoor recreation participation was also significantly related to high levels of biocentric value orientations. Childhood outdoor recreation participation was also a significant indirect predictor of PEB, presumably through its relationship with adult outdoor recreation participation.

Discussion/Implications

Results of this exploratory study provided important insight into the complex factors influencing PEB, including the emphasis of two relatively novel variables: race/ethnicity and outdoor recreation participation. The best-fitting model showed that ethnic minorities displayed higher levels of biocentric value orientations and PEB than whites, supporting recent evidence

that environmental issues and actions are an important concern in minority communities (Floyd, 2007; Whittaker *et al.,* 2005). Results also demonstrated a strong relationship between outdoor recreation participation and PEB. Although theoretical support for this relationship is widespread in the literature, empirical evidence has been lacking. Regular interaction with natural environments provides individuals with opportunities to learn the values of conservation, stewardship, and responsible behavior, and may be even more beneficial when initiated at an early age (Louv 2008). This study suggests that decreased participation in outdoor recreation could precipitate a decline in public willingness to engage in PEB, adversely impacting conservation efforts. To combat this problem and support the growth and development of an environmentally responsible population, managers and policy-makers could emphasize strategies for promoting positive interactions between people and the natural environment.

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Table 1

Sample distribution by socio-demographic group with variable names and levels (N=319)

Variable[a]	N	Percentage
Gender (GENDER)		
Female (0)	185	58%
Male (1)	134	42%
Ethnicity (ETHNIC)		
Other (0) (includes Hispanics and African Americans)	86	27%
White (1)	233	73%
Education (EDUC)		
Some high school (1)	25	8%
Graduated from high school or GED (2)	107	34%
Graduated from college or technical school (3)	141	44%
Postgraduate degree (4)	46	14%
Income (INCOME)		
$19,999 or less (1)	45	14%
$20,000 to $34,999 (2)	52	16%
$35,000 to $49,999 (3)	44	14%
$50,000 to $74,999 (4)	55	17%
$75,000 to $99,999 (5)	57	18%
$100,000 or more (6)	66	21%

[a]Variable names for the full model and the numerical values of the ordinal levels are in parentheses.

Table 2

Standardized direct and indirect path coefficients (PC), standard errors (SE), t values (t) and R2 values for latent variables in full structural model (N=319)

	Direct			Indirect			R2
Path	PC	SE	t	PC	SE	t	
To PEB from:							0.40
Bio EVO	**0.17**	**0.09**	**1.99**				
Anthro EVO	**0.19**	**0.08**	**2.56**				
AdultOut	**0.54**	**0.12**	**5.70**	0.04	0.04	1.47	
KidOut				**0.24**	**0.03**	**3.81**	
Gender				-0.01	0.03	-0.34	
Ethnicity				**-0.06**	**0.03**	**-2.15**	
Education				-0.04	0.04	-1.09	
Income				-0.05	0.02	-1.48	
To Bio EVO from:							0.16
AdultOut	**0.27**	**0.13**	**2.63**				
KidOut	-0.10	0.04	-1.51	**0.12**	**0.03**	**2.21**	
Gender	**-0.19**	**0.06**	**-3.19**				
Ethnic	**-0.22**	**0.06**	**-3.78**				
Education	0.01	0.11	0.13				
Income	-0.02	0.05	-0.24				
To Anthro EVO from:	-0.02	0.14	-0.21				0.22
AdultOut	0.06	0.05	0.67	-0.01	0.02	-0.21	
KidOut	0.13	0.08	1.56				
Gender	-0.14	0.09	-1.58				
Ethnicity	-0.21	0.16	-1.62				
Education	**-0.23**	**0.06**	**-2.14**				
Income							
To AdultOut from:							
KidOut	**0.43**	**0.03**	**5.31**				0.18

Note. Significant *t* values are in bold; because of the directional nature of the hypotheses, all tests are one-tailed at $\alpha = 0.05$ [critical $t(319) = 1.64$]

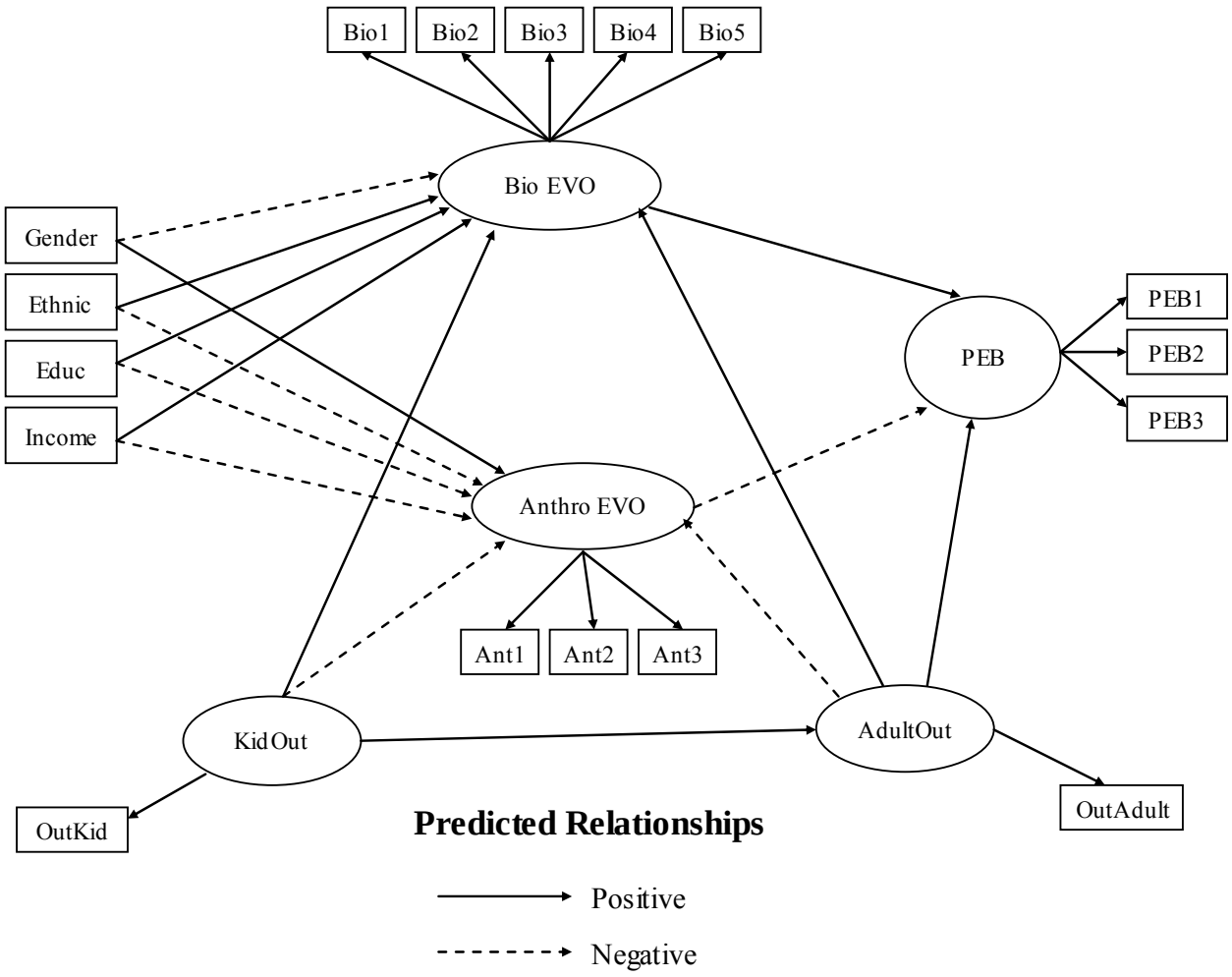

Figure 1. Hypothesized paths in pro-environmental behavior (PEB) predictive model (BioEVO, AnthroEVO, and AdultOut have direct effects on PEB, with indirect effects of AdultOut, KidOut, and socio-demographics on PEB mediated by EVO).

ACCOUNTING FOR CONSTRAINTS TO VISITATION: A STUDY OF GEORGIA STATE PARKS

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Introduction

Dramatic changes in the U.S. population are forecasted in the near future. Census data indicates that the growth rates of ethnically diverse groups will exceed the overall growth rate of the U.S. population over the next forty years. The current and estimated changes in the population composition of the U.S. are of concern for natural resource managers that are charged with meeting the needs of the public. Managers are somewhat aware that underrepresented minority groups in outdoor settings will present certain future challenges for resource-based management. Because of this, managers are interested in understanding the recreational needs of the racial and ethnic minority groups. Driver, Dustin, Baltic, Elsner, and Peterson (1996) stated that "if public land managers are to be responsive to the changing needs and values of an increasingly multicultural citizenry…they must work toward a fuller understanding of those needs and values" (p. 5). In seeking this understanding researchers have identified several constraints that are experienced specifically by different racial and ethnic groups.

Problem Statement

Previous research has not fully addressed the important issues of constraints among state park visitors, but particularly those pertaining to racial and ethnic minority groups. Hence, this study sought to examine the constraints relevant to state park visitors from different ethnic, gender, age, education, and income groups.

Methods

This research was part of a large study examining outdoor recreation participation and ethnic diversity issues in Georgia State Parks. Data were collected during the summer of 2010 using intercept surveys in three state parks in northern Georgia. The parks were selected after a pilot study and several site visits, which included discussions involving park managers during the summer of 2009. Data collection was conducted in recreation hotspots, or areas of high demand (i.e., picnic areas, swimming beaches, and campgrounds) within each park (Cordell & Green, 2001). Brief (five minute) self-administered intercept surveys of state park visitors (N=1,077) were conducted according to a randomized sampling schedule at each park (i.e., every third person). Surveys were available in Spanish and English. The survey instrument included items designed to address the research objective of examining recreational constraints of racial and ethnic minority groups to state parks in Georgia.

Results

The constraints of park visitors (N=1,077) were assessed using scales developed in previous studies (Chick & Dong, 2005; Crawford & Godbey, 1987; Crawford, Jackson, & Godbey, 1991; Jackson, Crawford, & Godbey, 1993; Jackson & Rucks, 1993). Constraints were measured using 21 items to inadequate whether they encountered constraints that affected their state park visitation. All items were rated on a five-point Likert scale ranging from one (not a reason) to five (major reason). Items were expected to load on three latent constraints factors identified as intrapersonal,

interpersonal, and structural constraints.

An exploratory factor analysis (EFA) was used to assess the dimensionality of the constraint items. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were conducted to determine if factor analysis of the data was appropriate. Construct and content validity were then assessed using Catell's scree test and principal axis factoring. Principal axis factoring with an oblique rotation was used to account for anticipated inter-dimensional correlations among the two factors (Widaman, 1993).

Bartlett's test of sphericity [χ^2(df=210) = 6007.2, p < .000)] and the Kaiser-Meyer-Olkin measure of sampling adequacy (0.919) indicated EFA was appropriate. Catell's scree test and principal components analysis revealed the presence of five components with Eigenvalues exceeding 1, explaining 32.4%, 7.3%, 5.9%, 5.4% and 4.9% of the variance respectively. An inspection of the scree plot revealed a break after the third component. Using this information, it was decided to retain three components for further investigation (Table 1). Considering the item content of the EFA, three factors were evident (i.e., intrapersonal, interpersonal, and structural constraints). Hence, a one-way between-groups analysis of variance was conducted to explore the impact of visitors' racial ethnic group (i.e., Caucasian, Latino, African American, Asia, Other, and Multi-racial) on the three constraints subcategories. There was a statistically significant difference at $p < .05$ in the racial ethnic groups for the three constraints: Intrapersonal F (5, 992) = 5.11, $p <$ .05; Interpersonal F (5, 999) = 10.84, $p < .05$; Structural F (5, 1005) = 14.745, $p < .05$ (Figure 1).

Discussion

The EFA of the 21-item scale revealed three distinct components of constraints (i.e., intrapersonal, interpersonal, structural) that had emerged in previous studies. An examination of these constraints as they were experienced by different racial and ethnic groups showed statistical

differences in the types of constraints experienced by each group. In particular, racial and ethnic minority groups reported being affected by structural and interpersonal constraints more so than other visitors. This finding may be particularly useful for Georgia state park managers as they often can affect structural and interpersonal factors of visitors' experiences. Hence, additional research could emphasize the influence of constraints on the relationship between ethnically diverse visitors and public lands in Georgia.

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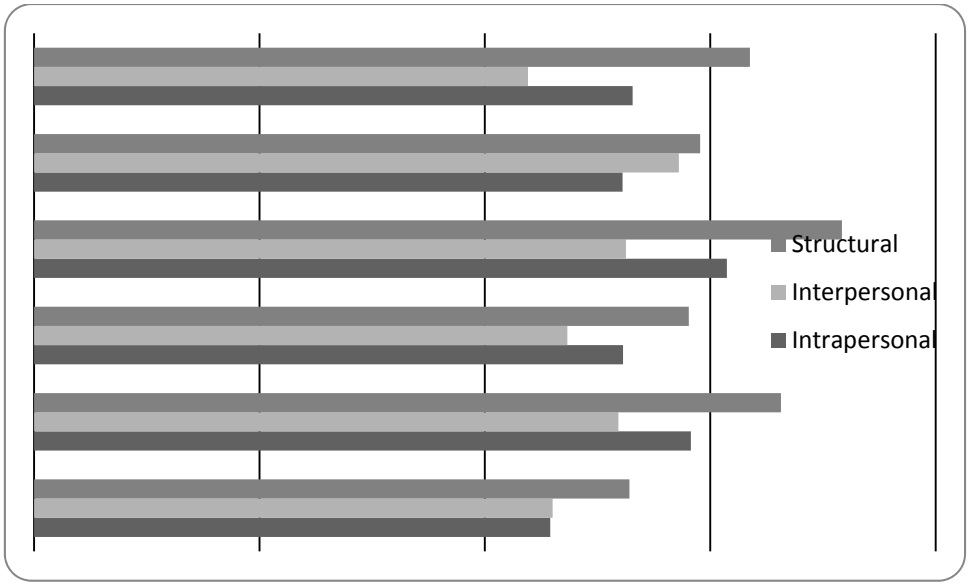
Table 1

Rotated Component Matrix for Principal Axis Factoring with Oblimin Rotation of Three-Factor Solution (Factor 1=Intrapersonal Constraints, Factor 2=Interpersonal Constraints, Factor 3=Structural Constraints) for Constraints Scale Data Obtained via Intercept Surveys of State Park Visitors in Georgia During Summer 2010 (N=1,077)

Item			Pattern Coefficient		
	Mean	SD	Factor 1	Factor 2	Factor 3
My family or I have health problems	1.22	0.74	**.666**	.200	.037
I have no one to do activities with	1.29	0.85	**.662**	.047	.150
I am afraid of perceived crime in park	1.19	0.61	**.659**	.290	.183
I am not interested in outdoor recreation	1.30	0.83	**.651**	.103	.202
I am afraid of wild animals and pests	1.26	0.78	**.636**	.117	.223
I have no way to get to the park	1.37	0.97	**.521**	.157	.078
Info about the park is not in my language	1.22	0.73	**.383**	.340	.380
Cost is too high	1.72	1.22	**.248**	.102	.227
Park is too far from home	2.24	1.44	**.210**	.078	.134
My racial group does not feel welcome	1.14	0.56	.198	**.788**	.115
I feel uncomfortable around other races	1.16	0.62	.177	**.782**	-.037
My racial group often has conflicts with other visitors	1.14	0.54	.223	**.765**	.102
I feel uncomfortable due to my race	1.15	0.59	.412	**.708**	.184
I feel uncomfortable due to my gender	1.11	0.50	.526	**.567**	.154
I prefer to recreate elsewhere	1.27	0.78	-.152	**.436**	.298
I don't approve of other visitors' activities	1.27	0.73	.333	**.414**	.223
Lack of info about recreation opportunities	1.60	1.09	.124	.233	**.725**
Park does not provide enough fun things to do	1.57	1.08	.309	.119	**.678**
Park facilities are in poor condition	1.67	1.16	.172	.202	**.661**
Park employees are not friendly	1.29	0.76	.335	.430	**.520**
Not enough free time	2.78	1.45	.053	-.061	**.258**

Figure 1. Chart Showing Effects of Racial and Ethnic Diversity (White, Latino, African American, Asian, Other, and Multi-cultural) on Constraints (Intrapersonal, Interpersonal, Structural).



USING A GIS APPROACH TO DETERMINE RECREATION STAKEHOLDER GROUP USE OF A POPULAR WATERSHED IN WESTERN NORTH CAROLINA

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Introduction

In 2001 Congress designated Wilson Creek as a National Wild and Scenic River. The Wilson Creek watershed is located within the Grandfather Ranger District of the Pisgah National Forest and is a popular destination for a variety of land and water-based recreation user groups. The United State Forest Service (USFS) is responsible for implementing the river management plan for Wilson Creek. While the plan was designed to provide direction for dispersed and developed recreation management, among other things (e.g., vegetation, timber production, roads), there were no definitive protocols in place to seek input from stakeholder groups (e.g., recreation users) to help guide future forest planning decision-making. To gather place-specific information from local and regional communities affected by forest plans, Brown (2005) developed a participatory survey methodology that utilizes geographic information systems (GIS). GIS mapping technology provides

a new medium to record and understand public sentiments about public lands, providing a unique opportunity for collaborative planning. With a spatial understanding of how the public uses forest resources, public land managers are better equipped to effectively plan and protect the resource. GIS analysis provides forest planners and tourism development officials with information concerning distribution and intensity of use and specific areas of potential conflict within existing plans or between user groups.

The purpose of this study was two-fold: 1) to understand various recreation stakeholder groups use of the Wilson Creek watershed via the participatory GIS process, and 2) use the results to assist future forest management and tourism development planning in the Wilson Creek area.

Methodology

The mapping survey was developed in early 2010 and included a detailed map of the Wilson Creek watershed and a list of 15 recreation activities relevant to the area. Select demographic questions including gender, age, experience use history, perceived familiarity of the area, and place of permanent residence were also included. Participants were instructed to draw polygons that identify where they engage in recreation activities. Subsequently, the participant marks each polygon with an activity code that represents the user's recreation activity within the marked location. Participants also marked with a "TA" and an activity code identifying that an activity is "taking away" and conflicting with their recreation experience. The researchers provided respondents with a sample marked survey indicating desired marking styles. The colored map outlines clear instructions and includes details concerning land ownership, road and trail location, and generally known recreational locations and access points.

The surveys were distributed throughout the Boone, NC area. A number of recreation stakeholder organizations (e.g., Blue Ridge Horseman Association, Trout Unlimited, and Boone

Climbers' Coalition) were identified and provided with surveys. Researchers also placed survey stations at three outdoor recreation retail locations and the Wilson Creek Visitor Center. Survey collection primarily occurred during the spring and early summer. Although 200 completed surveys were sought, researchers obtained only 76 usable surveys.

Analysis of survey responses included: 1) description of the frequency and types of activities engaged in, 2) "hotspot" maps indicating relative density of use in aggregate as well as by stakeholder group, and 3) compatibility assessment of stakeholders use in relation to other usage types as well as proposed management actions. Survey responses were digitized to enable visualization and analysis with ESRI's ArcGIS platform. After converting the digitized polygons into raster-based data, spatial analysis techniques were employed to identify hotspots of areas of high use and potential contentious areas.

Results

Over 235 polygons were digitized and geo-referenced. Figure 1 displays the overall density of use within the watershed. The hotspots demonstrate that user activities are central to Mortimer Campground and the Harper Creek Wilderness Study Area. The Wilson Creek Visitor Center, however, was not revealed as a focal area. Figure 2 shows the hotspots of mountain bikers with a point overlay identifying the center of equestrian activity. The purpose of this analysis is to understand whether these two user groups are active within the same areas. The map indicates that these users are essentially utilizing the same trails systems. However, equestrian and mountain biking survey participants did not identify any conflicts with each other. Figure 3 outlines both equestrian and mountain biking activities that are taking place within two Wilderness Study Areas included in the watershed. These activities are not permissible according to USFS policy. Note: In the event of acceptance at the conference, additional analysis will include demographic information

as it relates to type of use and where it occurs.

Conclusions and Management Implications

While the findings are limited due to the small sample size, they may be used to better inform the decision making process of the USFS and local governments and provide additional insight into participatory GIS methods as a means of assessing stakeholder use of recreational resources. The results reveal there are no apparent conflict issues among user groups, such as equestrian users and mountain bikersor hikers. Equestrian users and mountain bikers, counter to USFS policy, useWilderness Study Areas for recreation.

GIS mapping technology provides new opportunities for collaborative planning on public lands. In addition, easy to interpret maps are generated that can be used to: 1) see if alternative forest, community, and tourism development plans and alternatives are consistent with recreational use, and 2) provide the larger public a visual aid that depicts how a place is used and where.

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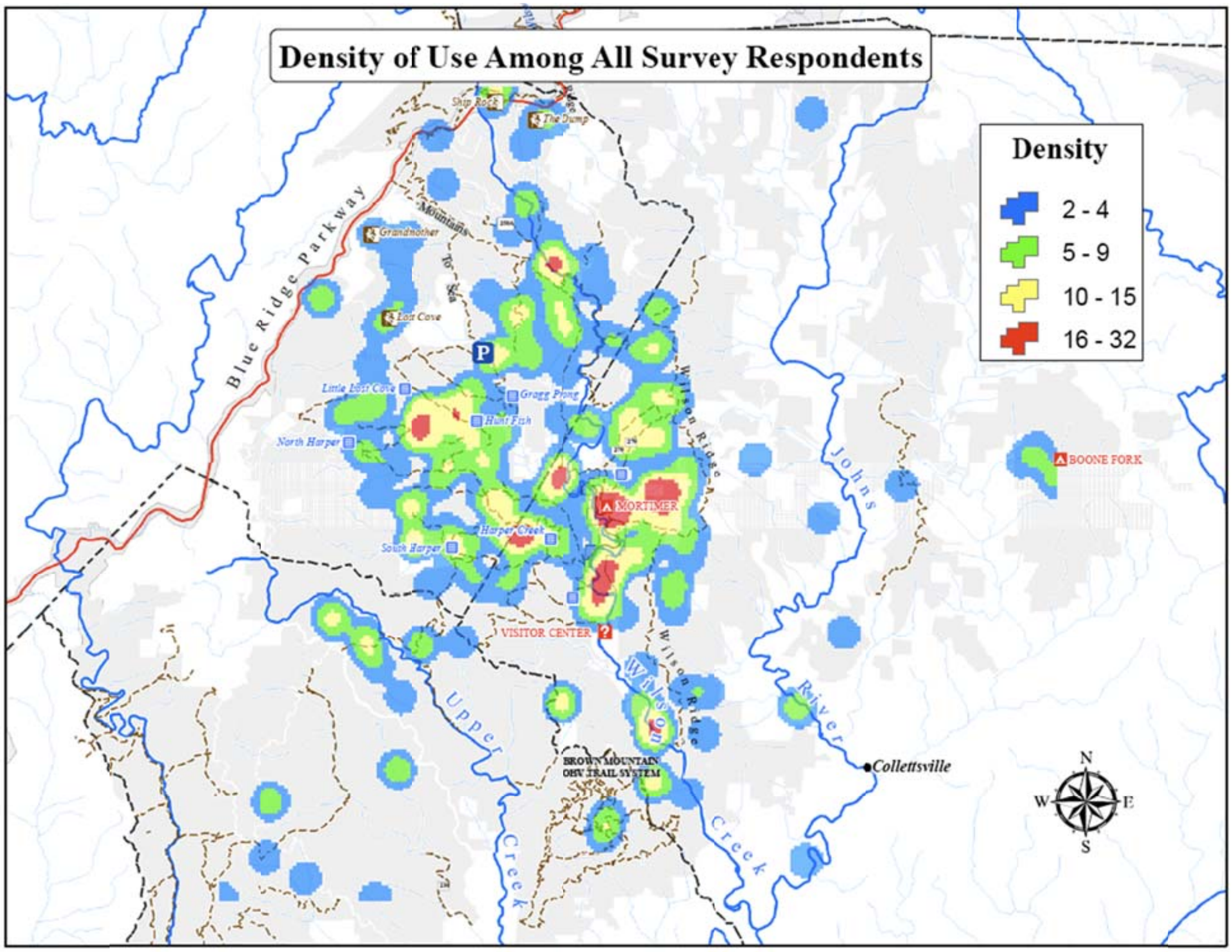
Figure 1



Density of Use Among All Survey Respondents
Density
2 - 4
5 - 9
10 - 15
16 - 32
Blue Ridge Parkway
Grandmother
Lost Cove
Little Lost Cove
North Harper
Gragg Prong
Hunt Fish
Harper Creek
South Harper
MORTIMER
BOONE FORK
VISITOR CENTER
Wilson Ridge
Wilson Creek
Upper Creek
Johns River
BROWN MOUNTAIN OHV TRAIL SYSTEM
Collettsville
N
S
E
W

Figure 2

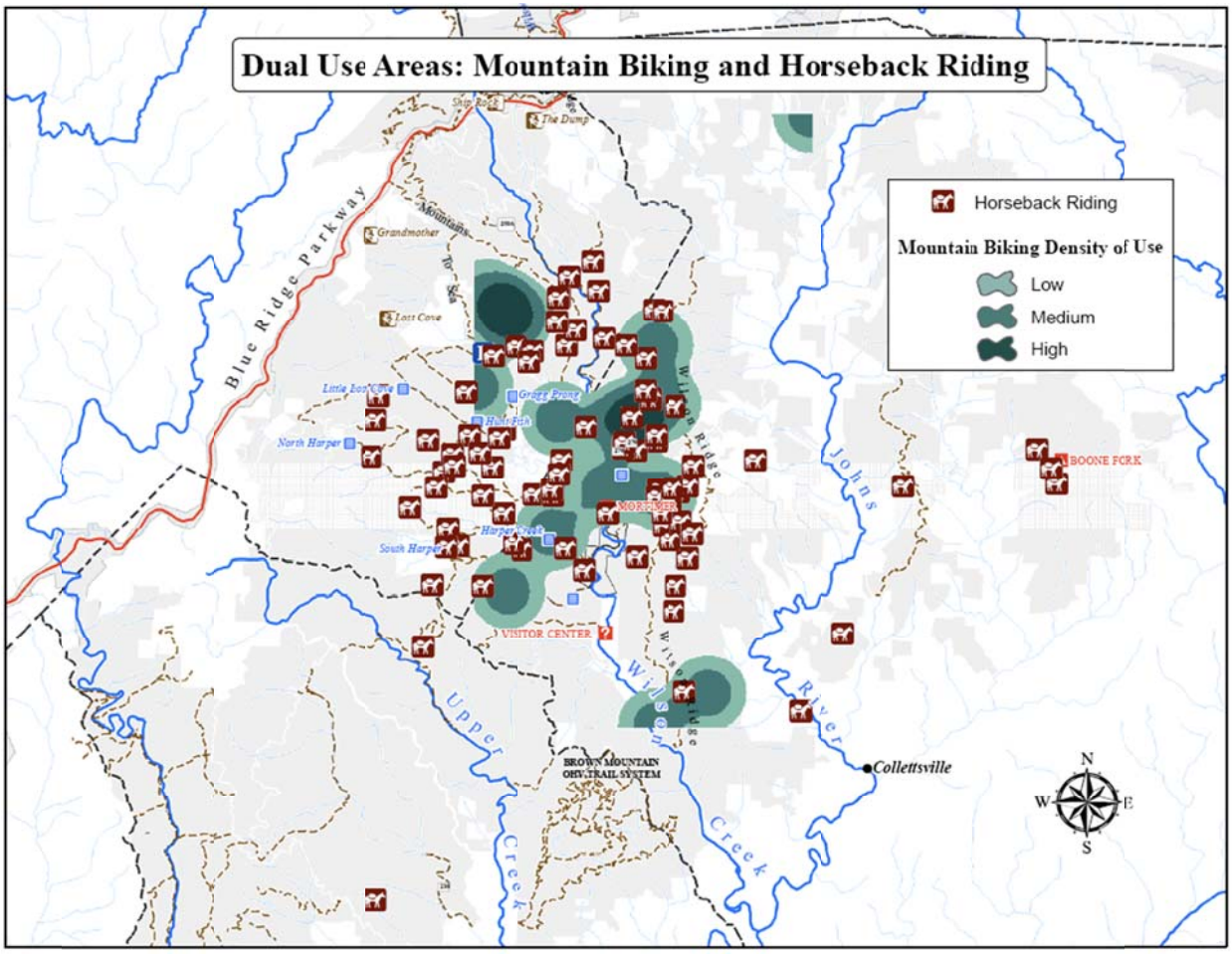
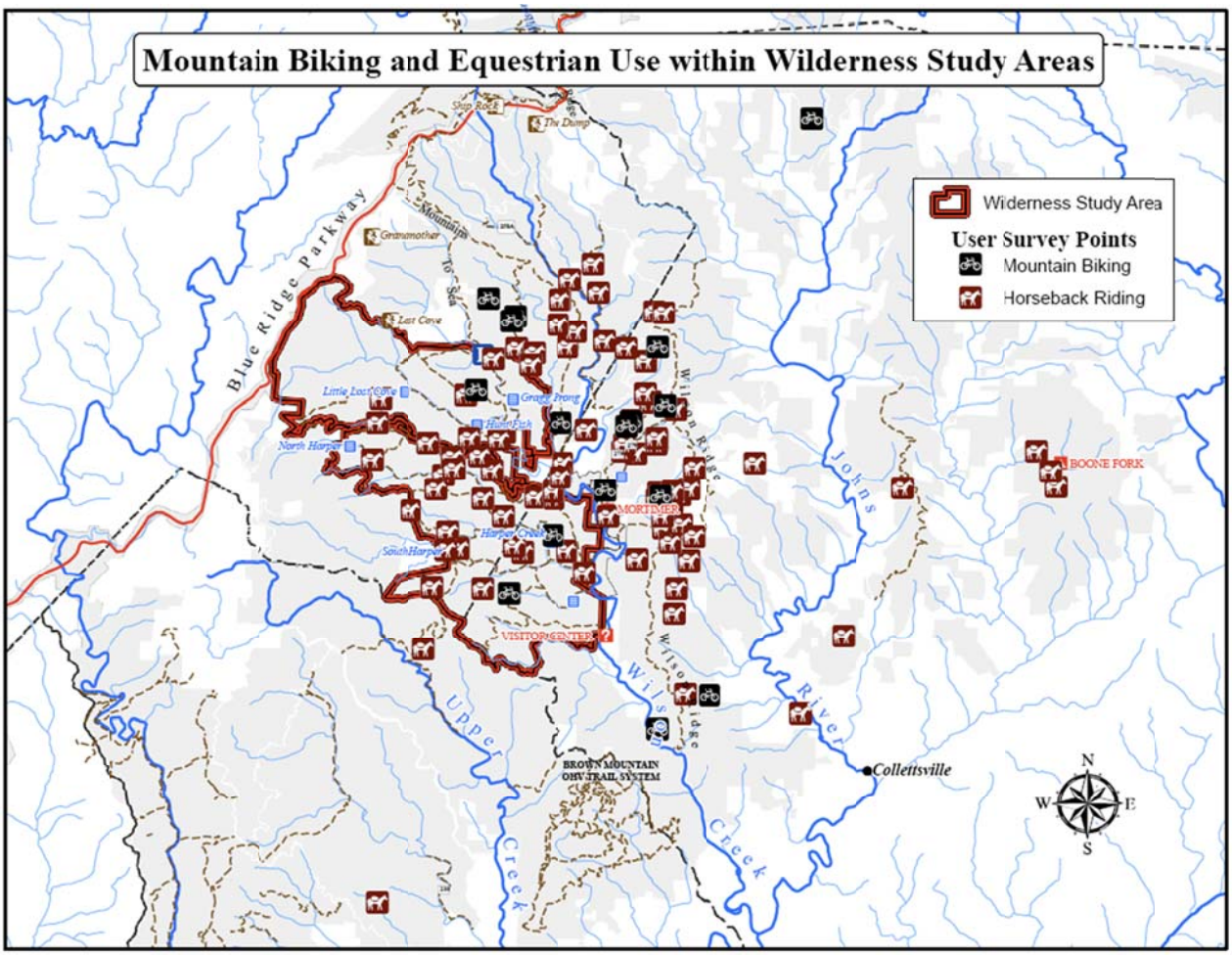

Dual Use Areas: Mountain Biking and Horseback Riding
Horseback Riding
Mountain Biking Density of Use
Low
Medium
High
Blue Ridge Parkway
Grandmother Mountain
Ship Rock
The Dump
Lost Cove
Little Lost Cove
Green Prong
Holt Fork
North Harper
South Harper
Harper Creek
MORTIMER
VISITOR CENTER
BROWN MOUNTAIN OHV TRAIL SYSTEM
Wilson Ridge
Upper Wilson Creek
Johns River
BOONE FORK
Collettsville
N
W
E
S

Figure 3


Mountain Biking and Equestrian Use within Wilderness Study Areas
Wilderness Study Area
User Survey Points
Mountain Biking
Horseback Riding
Blue Ridge Parkway
Grandmother
Little Lost Cove
North Harper
South Harper
Harper Creek
Gragg Prong
MORTIMER
VISITOR CENTER
BOONE FORK
Collettsville
Upper Wilson Creek
Lower Wilson Creek
Johns River
BROWN MOUNTAIN OHV TRAIL SYSTEM
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CAMPER SUPPORT FOR A RESERVATION SYSTEM AND WILLINGNESS TO PAY AT A NEWLY ESTABLISHED WILDLAND STATE PARK

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Introduction

This study examined camper practices and perceptions of a newly established wildland state park in the southeastern United States. Grandfather Mountain State Park, located in Linville, North Carolina, was created in 2009. It is one of the newest additions to the North Carolina State Parks system formerly part of a for-profit nature-based tourism destination. The park houses the highest point in the Blue Ridge Mountains, Calloway Peak towering 5,946 feet. The wildland park contains 2,456 acres of backcountry with 13 primitive campsites and 12 miles of hiking trails. Entry into the park is currently free, as is camping with a voluntary permit station used to monitor use. As the park becomes more popular, park officials have expressed concern that the resources they are charged with protecting need closer monitoring. While camping is currently available on a first-come first-serve basis park officials have noted a number of instances of stealth or illegal camping due to sites being filled when others arrive. With sites requiring a minimum of a mile walk in, many campers may feel they have little choice other than to make their own campsite. With Grandfather Mountain recognized as an International Biosphere Reserve, park officials are concerned about the dozens of endangered species of plants and animals that inhabit the park. As such, they are considering a number of management changes that prompted this study.

The primary purpose of this study, and of greatest importance to park officials, was to

better understand the level of user support to begin using the existing North Carolina state park reservation system. Surrounding states have implemented user fees for their existing backcountry sites (SCSP, 2012, GASP&HS, 2012, VASP., 2012), with the exceptions for some sites in Tennessee (TNSP, 2012). One recent report showed that around 42% of state parks' operating budget came from user fees (Walls, 2009). Furthermore, Grandfather Mountain park officials sought to better understand how much campers would be willing to pay for a reserved site. Other areas of interest included the use of park provided tent platforms that are in place to protect sensitive surrounding habitat, as well as determining how campers dispose of human waste, and the level of support for a park provided human waste disposal system.

Methods

Data collection was conducted onsite using a two page self-administered survey at park trailheads during weekends in October 2011. The survey consisted of 27 questions including Likert-scaled questions, yes/no questions, and demographic questions. The survey took an average of 8-10 minutes to complete. With weather being a confounding issue at this high elevation park, camper permits from the year were used to conduct a postcard mailing whereby campers were guided to an online survey link and asked to participate in the study. Just over 300 postcards were mailed. Data collection is ongoing with an additional link to the survey recently placed on the state park's website. There are 91 responses to date.

Results

The majority of respondents (58.9%) were first time campers at the park (visitation ranged from 1 to 100 and mean of 3.5 visits). Over 80% of the respondents were male, while the

average age of campers was 34.7 with a standard deviation of 12.8 and a range from 18 to 67 years of age. Pertinent to the interests of park officials, 83.3% of respondents said they would support a reservation system, with 49.0% saying they would support the reservation system as long as there were a few sites that were available on a first come, first serve basis (Figure 1). Nearly half of the respondents (47.9%) were willing to pay $10 or more to reserve a campsite, the mean was $7.88 and the standard deviation $6.37 with 20.5% saying they were not willing to pay anything. A statistically significant positive correlation (p=.008; r=.325) was found between age and willingness to pay for a reserved campsite. An analysis of gender and willingness to pay did not reveal any statistically significant differences (females=$7.44; males=$7.63). Over eight in ten respondents (85.7%) dig a cat hole and bury their human waste while 5.7% cover it up with a rock or leaves away from the campsite. A third of respondents (33.8%) were in favor of a free waste bag disposal system in the park, while 39.2% of the respondents were not in favor and remaining respondents did not know whether or not they would like to have such a system due to among other things the potential for odors at the trailhead. First time campers at the park expressed similar responses to more experienced campers, while supporters of the camper reservation system were less likely to support the waste disposal system (31.7%) than non-supporters (46.2%). Lastly, 53.2% of campers used provided tent platforms, with more experienced campers less likely to use them primarily due to hardness and air draft beneath them. Overall, 52.8% of respondents were quite satisfied with their experience at the park (Figure 2).

Figure 1 - Would you support an online campsite reservation system so that you could reserve a site(s) ahead of time?

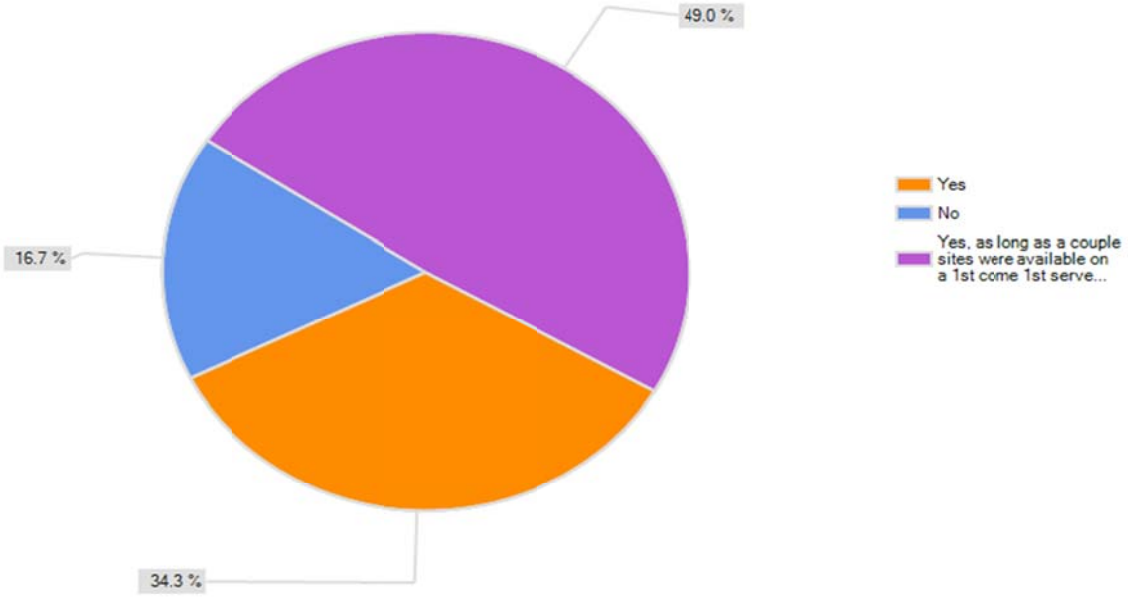
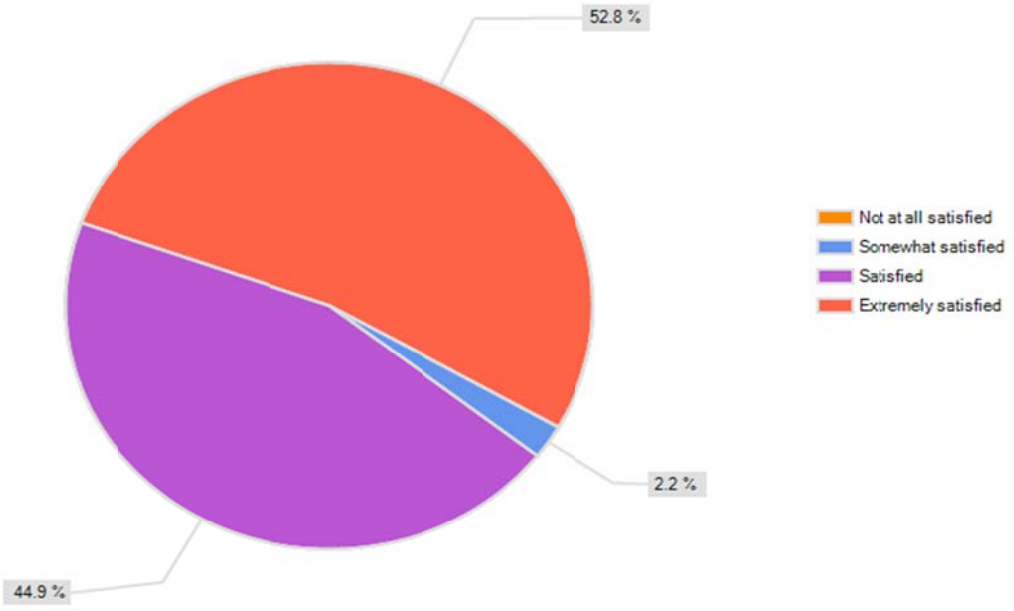


Figure 2 - Overall, how satisfied were you during your most recent visit?



Discussion and Implications

With data collection ongoing it is difficult to make recommendations for the park although given the findings thus far park officials should consider implementing a reservation system while charging a nominal fee. Possibly the campsites that are most popular should be placed within the reservation system with some set aside for first-come first-serve. This would be in line with what other parks in the state and surrounding region are already currently doing (SCSP, 2012, GASP&HS, 2012, VASP., 2012, TNSP, 2012). It also appears campers are being responsible in disposing of human waste but are mixed concerning implementing a park waste disposal system. More information at the trailheads may create awareness and encourage support for a waste bag disposal system given the sensitive habitats in and about the campsites and park official concerns about increasing park visitation over time. Further data collection will allow for greater discussion and examination of implications for the park and larger North Carolina park system.

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An Examination of Environmental Practices and Beliefs among Recreation Professionals at North Carolina Universities and Colleges

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Introduction

Recent studies have found a connection between college students majoring in recreation and pro-environmental concern and behavior (Arnocky & Stroink, 2011; Ewert & Baker, 2001). Both studies aimed to investigate the trend of "increased environmental concern and self-reported behaviors among students in natural resource oriented majors" (Arnocky & Stroink, 2011; Ewert & Baker, 2001). Building off of previous studies that found a strong, positive relationship between higher education and environmentalism, Arnocky and Stroink found Outdoor Recreation, Parks, and Tourism programs were "more likely to contain students high in environmentalism than others" (Arnocky & Stroink, 2011; Ewert & Baker, 2001).

While connections have been found between students and pro-environmental concern and behavior, little is known about whether recreation professionals who work in university and college settings have beliefs and engage in behaviors that are generally perceived as environmentally friendly. As such, the primary purpose of this study was to examine some of the environmental beliefs and practices of recreation professionals (i.e., faculty and staff) who either: 1) teach in recreation management (RM) or related (e.g., parks, leisure services) programs/departments, or 2) are employed by university/campus recreation outdoor programs

(OP) at North Carolina colleges and universities.

Specifically investigators wanted to know:

1) What are the personal behaviors and beliefs of RM and OP faculty and staff as it relates to energy use, food purchases, transportation, and recycling?

2) Do underlying factors (e.g., gender, age) of RM and OP faculty and staff play a potential role in behaviors and beliefs?

3) Do behaviors and beliefs relate to each other?

Methods

During October 2011, a search was conducted via the Internet to determine a purposive sample of North Carolina colleges and universities with recreation related academic departments and/or campus outdoor recreation programs. A list of 19 schools was determined. Email requests to participate in an online survey were sent to RM faculty and OP staff (i.e., full-time staff and graduate assistants) identified through online directories of each institution's website. The survey consisted of 30 questions with the majority linked to lifestyle practices and beliefs associated recycling, transportation, energy, and food. Many of the survey questions were created based off of several online carbon footprint calculators ("Ecological footprint quiz," 2011; "Global stewards: Welcome," 2011; "Household emissions calculator," 2011; "The Nature Conservancy," 2011). A few were to satisfy the investigators curiosity. Questions varied from being open ended to Likert scale to multiple choice and fill in the blank. The survey questions were be categorized into six groups: (1) three questions pertaining to recycling, (2) five questions pertaining to food, (3) four questions pertaining to transportation, (4) four questions pertaining to energy, (5) four attitudinal questions, (6) four demographic questions, and (7) six questions

related to general behaviors. Just over 60% (62 of the 100, n= 62) faculty, staff, and graduate students sampled responded to the survey representing 16 of 19 institutions.

Results

Nearly 60% of the respondents were male (59.7%) with 75.8% of respondents serving in faculty positions. The average age of respondents was 47.3 (*s.d.* = 10.9). Of the 93.5% who recycle the average number of years doing such was 15.1 (*s.d*. = 8.3). Six of ten respondents (61.3%) were members of "organizations whose mission includes the conservation or preservation of natural resources (water, land, wildlife, plants, air)."

Respondents recycled nine of the fifteen items 75% or more of the time given a scale where 1 = "I don't recycle the item" to 5 = "100% of the time" (Figure 1). Items recycled most frequently included plastic bottles, newspaper, aluminum cans, and glass, while used oil and household appliances were recycled less frequently with lack of availability cited by 10% and 12% of respondents respectively. Accounting for the time of year (e.g., summer versus winter), weather (e.g., raining versus sunny), and availability of alternative methods of travel, respondents primarily relied on personal automobiles for transportation to and from work with most "never" using alternative forms of transportation: public transit = 81.5%, bike = 71.0%, carpool = 72.4%, walk = 79.0%. (Note: respondents chose from six categories ranging from 1 = "never" to 6 = "daily").

The average number of miles respondents lived from work was 15.4 with a median of 8.0 (*s.d*. = 18.8). When asked about percentage of organic foods (produce, dairy, meats, packaged foods) purchased versus conventional foods, given a scale where 1 = "Never" to 5 = "100% of the time", nearly half of respondents "never" purchase organic dairy (48.3%), meats (47.5%), or packaged foods (41.7%) with 27.4% never purchasing organic produce (Figure 2). Concerning

conservation of energy there was great variation in the seven practices examined using a scale where 1 = “I don’t practice it” to 5 = “100% of the time” (Figure 3). Most respondents regularly turn off lights when not using a room (88.7% checked 75% or 100% of the time) but are much less likely to power down electronic devices when not in use (32.3% checked 75% or 100% of the time) or hang clothes out to dry versus using an electric dryer (17.2% checked 75% or 100% of the time).

Regarding environmental beliefs, respondents were asked to evaluate four statements linked to food, transportation, energy, and recycling (e.g., My actions linked to recycling don't really make a difference in conserving natural resources) using a 5-point Likert scale where 1 = “strongly disagree” and 5 = “strongly agree.” Over 80% of respondents “somewhat” to “strongly” disagreed with the statements concerning transportation, recycling, and energy use with mean scores ranging from 1.66 to 1.89,while food had a mean score of 2.16 suggesting respondents believe there is a link between personal actions and conservation of natural resources (Figure 4).

Bivariate correlation examining age and the various practices (energy use, transportation, and food purchases) found negative correlations for all four types of food purchases with correlation values ranging from -.195 to -.357. Statistically significant relationships ($p < .05$) were found for dairy, meat, and packaged food purchases, suggesting, as age increased there was less likelihood of purchasing organic foods. Age did not significantly correlate with any of the energy saving practices, although age negatively correlated significantly with using a bike (-.391) and carpooling (-.347) to/from work. (Note: Recycling behavior wasn’t correlated with age given the general high percentages of participation in comprehensive recycling). Lastly, there was a statistically significant negative correlation between age and one of the four belief

statements “My actions linked to recycling don't really make a difference in conserving natural resources” (-.359); as age increases respondents were more likely to disagree with the statement.

Additional analysis examining differences based on gender or membership in a conservation-based organization and each of the practices and belief statements were also run. No statistically significant ($p < .05$) relationships were found concerning gender and being a member of a conservation-based organization as it related energy saving practices or food purchases. Although not significant, generally being female and holding membership in a conservation-based organization did show greater participation in the energy practices and purchase of organic foods.

Gender did not reveal statistically significant differences as related to alternative transportation usage. Members of a conservation-based organization or not did reveal two statistically significant differences regarding alternative transportation with members statistically more likely to use public transit ($p = .027$) and carpool ($p = .016$) than non-members. However, average participation in all forms of transportation was low. Concerning the four belief statements, no statistically significant differences were found although males and members of conservation-based organizations tended to more strongly believe that their actions associated with recycling, food purchase behavior, transportation, and energy, do make a difference in conserving natural resources.

An examination of the relationships between the practices of food consumption, energy use, alternative transportation, or recycling behavior and the four belief statements associated with each category of practice found statistically significant correlations for food only: organic produce ($r = -.295$, $p = .021$) and organic packaged foods ($r = -.299$, $p = .021$). As perception that food purchases impact natural resources increased, the likelihood of purchasing organic

produce and packaged foods increased.

Discussion

Recreation faculty, staff, and graduate students in this study appear to recycle and believe there is a link between their actions and conserving natural resources, yet their participation in energy reduction, alternative transportation, and organic food consumption is modest at best. While the sample size (n=62) is small and not generalizable, pro-environmental practice related to food purchases, alternative transportation, and energy use is moderate at best (note: comprehensive recycling participation is strong), yet respondents believe their actions pertaining to each practice category does make a difference in conserving natural resources. Gender, university/college position, and membership in a conservation-based organization did not seem to be related to behaviors concerning food, energy, transportation, recycling beliefs and varied energy saving practices. However, there was a relationship between age and organic food purchases and alternative transportation. Practices and associated beliefs did not correlate well overall which may point to moderating factors such as age, gender, and membership in a conservation-based organization.

While previous studies have found a positive correlation between students majoring in recreation, pro-environmental concern, and behavior (Arnocky & Stroink, 2011; Ewert & Baker, 2001), future research should investigate the following questions: (1) does it matter whether the faculty/staff that instruct in these same recreation-related college programs may not fully practice what they believe? (2) Might there be other confounding variables that inhibit participating more fully in creating a "sustainable place"? (3) Could pro-environmental actions be based more on convenience and cost over actual beliefs? (4) Should recreation faculty, staff, and graduate students be role models for their students given the nature of their work, often with a link to

protecting and conserving natural resources (e.g., land, water, air)? (5) Is cultivating students' existing pro-environmental concern and behavior necessary to continue the longevity of the world's natural resources and the recreation field? These research questions of recreation faculty, staff, and graduate assistants would more fully examine the link between practices and beliefs associated with natural resource consumption and conservation.

With greater emphasis being placed on sustainable environmental practices in the recreation profession (Cachelin, Paisley, & Dustin, 2009; "Learning outcomes standards," 2011) an expansion of this study might consider examining whether faculty/staff environmental beliefs and practices do matter to students majoring in recreation and related disciplines.

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Figure 1 - How often do you recycle or donate the following?

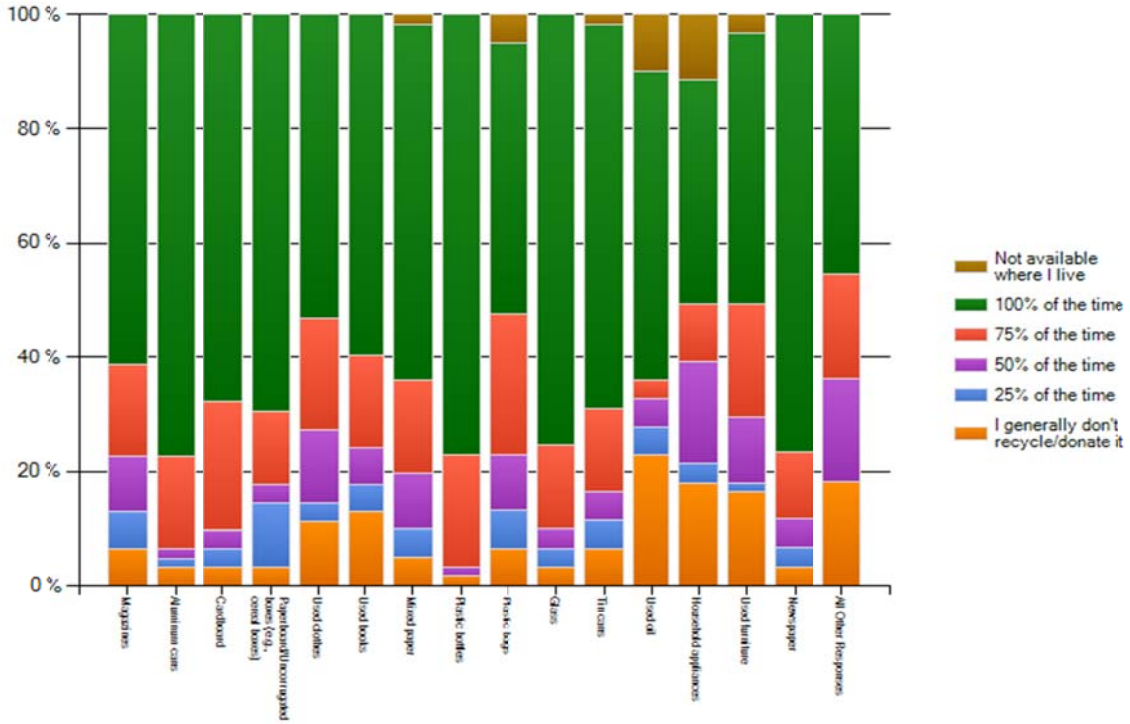


Figure 2 - How often do you purchase the following?

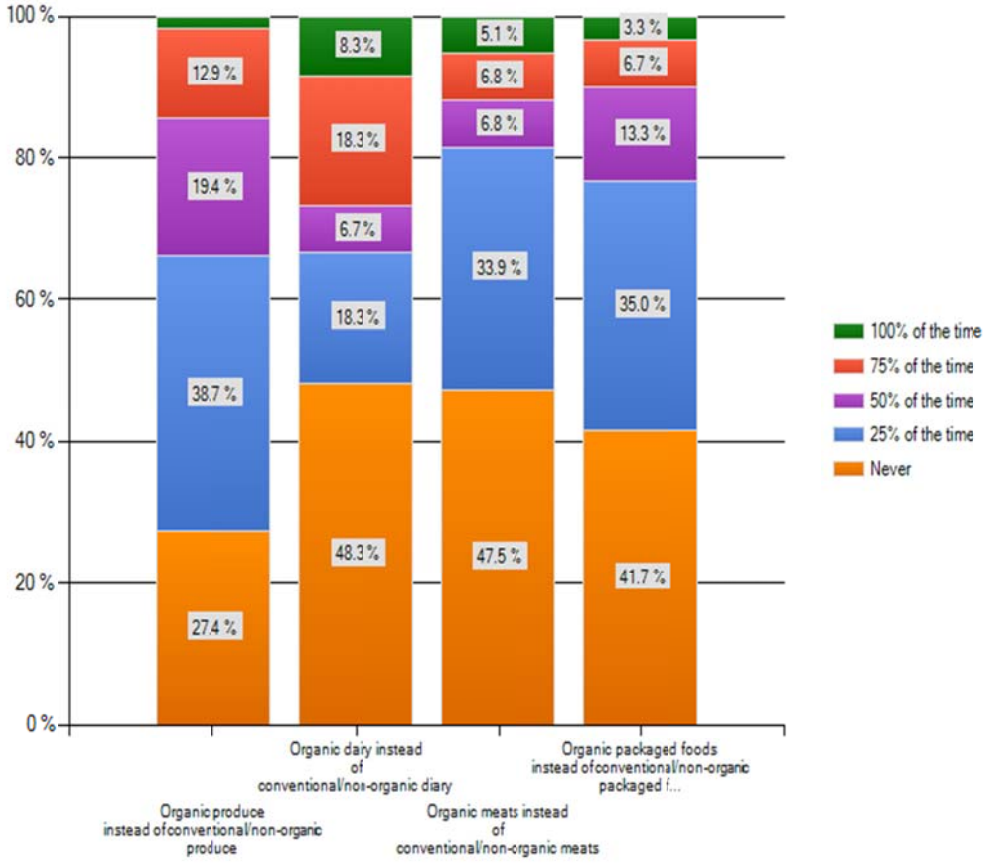


Figure 3 - How often do you practice the following?

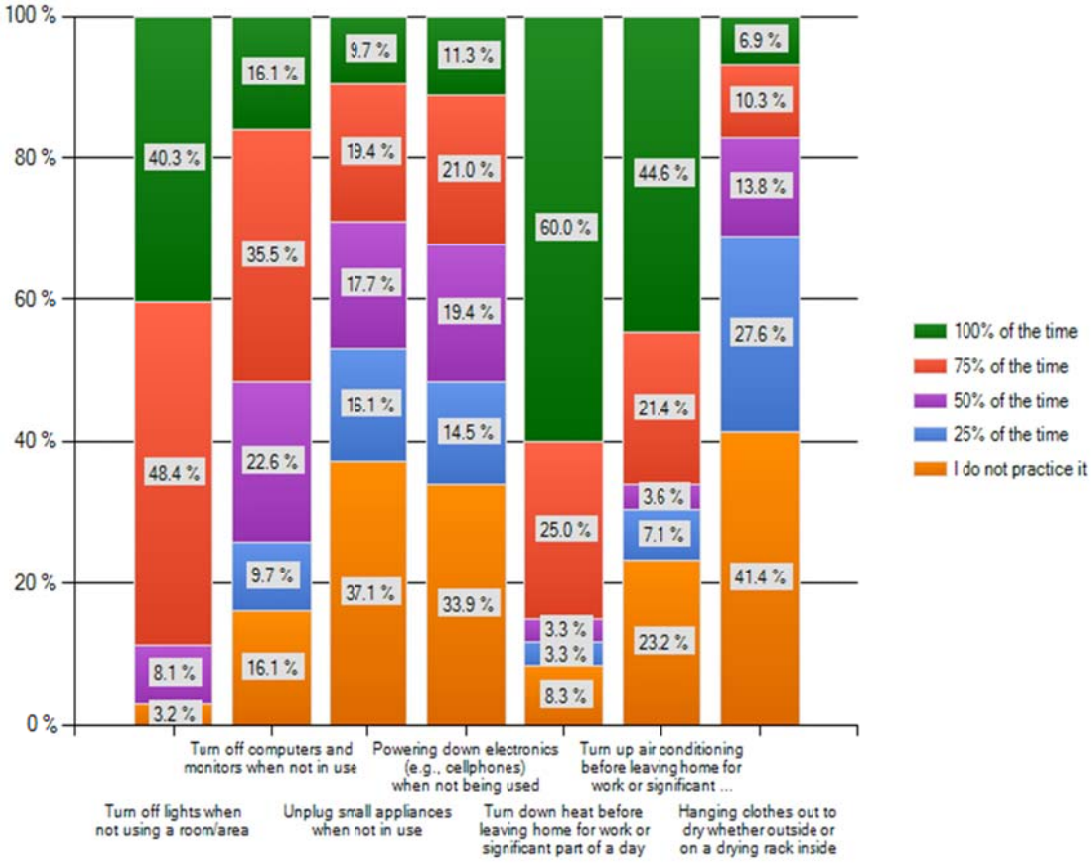
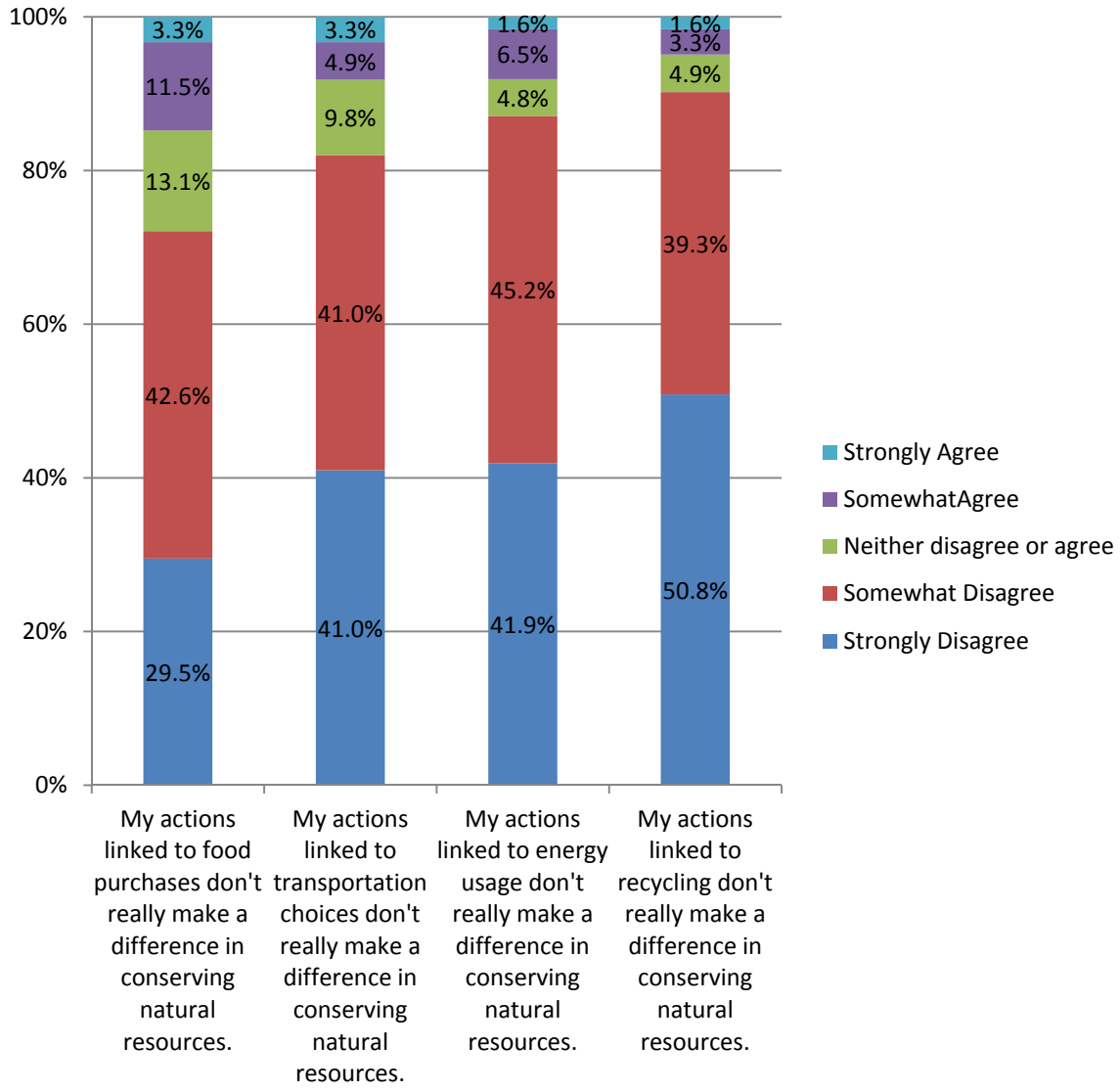


Figure 4: How strongly do you feel about the following statements?



Intercept Survey Response Rates and Non-response Reasons in Demographically Diverse Populations

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Problem Statement

Public land management agencies are under increasing pressure to use evidence-based decision-making strategies that meet the needs of diverse stakeholders – an approach that requires substantial information about park visitation patterns and preferences. However, in an era characterized by reduced budgets and limited staff, efforts to collect this type of data can be difficult. To help managers identify optimal strategies for assessing visitor behaviors and preferences across diverse populations, this study used various on-site and off-site data collection strategies to explore the efficacy of a common tool in recreation research: intercept surveys. Specific research questions to be addressed included: 1) Do intercept survey response rates differ by survey administration strategy (e.g, instrument length, survey location)?; and 2) Do intercept survey response rates and reasons for non-responses by demographic group?

Methods

Self-administered intercept survey methods were tested in three phases. The first phase, a pilot study in several Georgia state parks (summer 2009, n = 1170 people approached), helped researchers refine and adapt the survey instrument and administration protocol. This initial phase involved a four-page questionnaire that took 10-15 minutes to complete. The second phase was part of a comprehensive assessment of outdoor recreation patterns and preferences in three diverse north Georgia state parks (summer 2010, n = 5621 people approached). Data collection in parks centered on recreation hotspots (popular day use areas and campgrounds), where each visitor was given a two-page questionnaire that took approximately 5-10 minutes to complete. The third project phase, off-site data collection (summer 2011, n = 1784 people approached), was conducted at flea markets in communities near the focal parks. Flea market participants were given a two-page questionnaire almost identical to the on-site instrument.

During each on-site intercept survey session, researchers approached every visitor age 18 or older and ask if he/she would be willing to participate in a brief survey (in English or Spanish) about state park use. After a questionnaire was distributed, researchers remained in the area and responded to questions as necessary, allowing ample time for completion. Researchers used an administration approach similar to the on-site protocol to survey flea market vendors; however, an incentive-based approach was used to encourage participation from flea market customers. Randomly selected customers passing a designated table were approached and asked if they would be willing to complete a brief questionnaire in exchange for a candy bar. Refusal rates and reasons were recorded for each survey location (onsite or offsite), survey strategy (two-page or four-page, campground or day use, customer or vendor), and demographic group (gender, age, ethnicity). These numbers were then used to calculate response rates and identify potential

sampling bias among different participant groups.

Results

Despite a high response rate during phase one (86.5%), many of the four-page questionnaires collected in the pilot study contained skipped questions or illegible data. The data collection effort in this phase included 73 researcher hours with an average total of 13.8 completed surveys per hour. On-site response rates were exceptionally high (91.5%) during administration of the two-page questionnaire, and were similar in both campgrounds (93.2%) and day use areas (90.9%) across demographic groups (Table 1). This phase consisted of 206 researcher hours, resulting in a collection rate of 24.9 surveys per hour. In phase three, off-site response rates were lower than on-site rates (73.7%) and similar for both customers (72.0%) and vendors (74.4%). This phase included 69 researcher hours, resulting in a collection rate of 19.0 surveys per hour. Response rates across demographic groups were similar during on-site survey administration and significantly different during the off-site phase (Table 1).

The most common on-site reasons for not responding were lack of interest (39.1% of non-respondents), departure before survey completion (36.6%), and lack of time (13.3%). On-site refusal reasons differed significantly by racial/ethnic, $\chi^2(12,479) = 20.4$, $p = 0.060$, and age group, $\chi^2(8,483) = 24.5$, $p = 0.002$ (Table 2). The most common off-site reasons for not responding were lack of interest (51.0% of non-respondents), departure before survey completion (17.1%), and language or literacy issues (16.8%). Off-site refusal rates differed significantly by racial/ethnic, $\chi^2(12,469) = 103.7$, $p < 0.001$, and age group, $\chi^2(8,469) = 33.7$, $p < 0.001$ (Table 2). Gender differences in non-response reasons were not evident.

Discussion

Results confirmed that intercept surveys were an effective approach for gathering data

related to park visitation patterns and preferences. As a simple rule, shorter surveys were better. Although the shift from a four-page to a two-page instrument did not dramatically improve response rates, it did improve the quality of data collected and nearly doubled the researchers' collection rate. Results also suggested that a one-size-fits-all survey approach could result in excluded populations and biased results when considering implementation strategies in diverse areas. For example, off-site response rates in this study were especially low for males and older participants. Additionally, non-response reasons suggest that recreation issues salient to on-site visitors may not be important to non-users. This new knowledge of refusal rates and reasons should help recreation managers to develop and implement more efficient, culturally relevant survey strategies for obtaining information from diverse stakeholders.

Table 1

Intercept Survey Response Rates by Survey Location and Demographic Group

	ONSITE (%)		OFFSITE (%)	
Survey Strategy	**Camp-grounds**	**Day Use Areas**	**Market Customers**	**Market Vendors**
Race/Ethnicity				
White/Caucasian	93.9	91.5***	70.6	73.0
Hispanic/Latino	93.0	91.2	67.8	80.4***
Black/African American	100.0	88.0	87.5*	76.0
Asian/Other	94.7	85.6	73.7	63.1
Gender				
Female	94.3	92.4***	78.7***	78.7***
Male	93.1	88.0	63.5	71.2
Age				
18-30 years	92.1	93.6***	87.5***	86.4***
31-59 years	92.3	85.7	56.3	67.7
60+ years	92.2	84.8	34.7	43.8

Group differences significant for χ^2 at $\alpha = 0.10$ (*), 0.05 (**), 0.01 (***)

Table 2

Non-response Reasons by Intercept Survey Location (with Significant Group Differences)

	ONSITE			OFFSITE		
Reason	Total (%)	Ethnic Diff.*	Age Diff.***	Total (%)	Ethnic Diff.***	Age Diff.***
Lack of interest	39.1	^B		51.0	^W	^O
Left w/out completing survey	36.6		^M	17.1	^B, H	^Y
Lack of time	13.3	^W, H	^Y	16.8	^H, A	
Language/literacy issues	7.5	^H, A	^O	12.2	^H, A	
Other reason	3.5	^B	^O	3.0		

Group differences significant for χ^2 at $\alpha = 0.10$ (*), 0.05 (**), 0.01 (***); Gender not significant
Demographic Codes: (^) = more; Race (W = White, H = Hispanic/Latino, B = African American, A = Asian/Other); Age (Y = Younger - 18-30 years, M = Middle-aged – 31-59 years, O = Older – 60+ years)

Comparing the Effects of Two Invasive Species Education Strategies at Cumberland Island, Georgia

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Problem Statement

Control of invasive species, a major threat to global biodiversity, has become a management priority for many of America's public land agencies (NPS, 2006). Invasive species are particularly visible and destructive at Cumberland Island National Seashore (CUIS), GA, where feral horses, feral pigs, and exotic plants have caused substantial damage to the native landscape (Dilsaver, 2004). Managers are currently considering several options for invasive species control on the Island, and the efficacy of these strategies may ultimately depend on the social acceptability of invasive species management policies and practices (Brooks et al., 1999). Education programs designed to increase public understanding and appreciation of important environmental issues at places like CUIS can provide critical support for management actions (Powell & Ham, 2008). However, the relative influence of different educational strategies on public awareness and attitudes has not been adequately explored (Hughes et al., 2009).

Methods

This study assessed the effects of two education programs (i.e., a flyer and a ranger-led talk) on CUIS visitors' knowledge of, attitudes toward, and preferences for invasive species management relative to a control group. The visual method (hereafter "flyer") consisted of an 8.5" x 11" tri-fold flyer that was immediately distributed to visitors upon arrival to CUIS. The audio method (hereafter "talk") consisted of a brief five to seven minute ranger talk that was conducted at the ferry unloading zones on the Island. Both methods focused on the invasive species issue in a global, national, and local context, including current challenges at CUIS. Visitors in the control group did not receive either form of educational treatment when they reached the Island. A quasi-experimental approach was used to evaluate the effects of these distinct strategies. Visitors arriving on predetermined days were randomly assigned to one of three groups receiving distinct educational treatments: the flyer (n=363), the talk (n=320), and the control (n=410). Only one treatment was provided on each research day. At the conclusion of their visit, every 3rd CUIS visitor over age 18 was asked to complete a 10-15 minute intercept survey (response rate = 93%). Effects of the educational treatments were examined using: 1) analysis of variance contrasts comparing visitors in both treatment groups (talk and flyer) to visitors in the control group; and 2) pair-wise tests with Bonferonni adjustments comparing the specific effects of each treatment independently.

Results

Results indicated that the three treatment groups were essentially random, unbiased, and homogenous in terms of demographics and experience use history. Therefore, it was assumed that a large portion of any observed differences in visitor knowledge, attitudes, and preference would be due to the various educational treatments. Visitors exposed to the talk (50.3%) and

flyer (40.5%) interventions chose the correct definition of invasive species more often than visitors in the control group (39.8%), $\chi^2(df = 8) = 19.1$, $p = 0.014$, although the difference between the flyer and the control group was minimal. Although contrasts did not reveal significant differences between treatment and control groups in general and site-specific invasive species knowledge, $t(1075) \leq 1.50$, $p \geq 0.133$, visitors who experienced the talk generally scored higher on these scales. Visitors in the treatment groups displayed significantly greater awareness of invasive species including feral horses and hogs, $t(1060) \geq 2.30$, $p \leq 0.022$, as well as the threats posed by these mammals, $t(1065) = 2.08$, $p = 0.038$. The talk was generally more effective than the flyer at generating awareness on these scales. Significant differences between the educational treatment and control groups were not evident for any of the attitude items, $t(1059) \geq 1.78$, $p \geq 0.075$. Treatment effects on the visitor management preference categories varied. Significant differences between the treatment and control groups were not observed for leaving invasives alone, $t(1052) = 0.13$, $p = 0.900$, or managing invasives on-site, $t(1070) = -0.47$, $p = 0.638$. However, contrary to expectations, visitors exposed to the talk and particularly the flyer were less likely to support complete eradication of CUIS invasive species than visitors in the control group, $t(1057) = -2.33$, $p = 0.020$. Pairwise comparisons showed that visitors who listened to the talk were more likely to support on-site management and eradication than visitors who received the flyer, who were more likely to prefer leaving invasive species alone.

Discussion

Overall, visitor responses to the two strategies revealed mixed impacts of the educational treatments. Treatments had minimal effects on invasive species knowledge, awareness and attitudes. The talk was generally more effective than the flyer when effects were present, supporting previous research highlighting the value of inter-personal communication (Henker &

Brown, 2011). Surprisingly, visitors exposed to the educational treatments (particularly the flyer) were actually *less* likely to support invasive species management than visitors in the control group – an outcome seemingly counterproductive to management objectives. Because individuals learn and react to material in different ways (Ballantyne et al., 1998), a combination of multiple media and educational messages are likely needed to help managers convey important messages and communicate with diverse visitors. Hence, an integrated educational approach targeting the invasive species issue might yield better results. Future research could build upon this preliminary investigation to examine the effects of various educational strategies on public support for other controversial land management decisions.

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A Long-term State Park Operations Database for Academic Research: Examples and Suggestions

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Introduction

State parks are an integral component of America's outdoor recreation provision system, with over 6400 operating units and 44,000 miles of trails spanning all 50 states (ASP, 2011). In 2009-2010, 740 million visits were recorded for state park units across the United States (NASPD, 2011), generating an estimated economic impact of over $20 billion on communities (ASP, 2011).

Effective management of state parks requires timely information such as facility inventory, attendance, expenditures, revenues and personnel. To facilitate information collection and exchange among state park systems, an annual survey of state park operations, referred to as the "Annual Information Exchange" (AIX), was conceived in

the mid 1970s by the National Association of State Park Directors (NASPD) (Landrum, 2004). The AIX survey was not implemented systematically until the early 1990s when the types of data collected were expanded and better defined. Since 2006 this survey has been administered by North Carolina State University.

The AIX reports and associated database are designed and intended primarily for use by the state park directors and their staff for various purposes, such as identifying program, facility and personnel needs, formulating budget requests for state legislatures, and comparing their programs with those of the other states. Over the years, the AIX database has been increasingly requested by academic/research entities, other governmental agencies, and business and industry, but published research using this long-term database is still very limited.

This presentation aims at encouraging a greater utilization of the AIX survey database for academic research in parks, recreation and tourism fields. To do so we will provide an overview of the database and summarize examples of published research. We will also offer some suggestions on research questions that may benefit from this resource.

The AIX Survey Database

The AIX Survey is conducted every Fall and participated by all 50 states. This web-based survey comprises seven sections on various aspects of state park operations. Data collected include amount and types of state park units, land areas, facilities, attendance, finances and fees, personnel and salaries, and friends group. Only aggregate data are reported at the state level so no information is available at finer administrative/spatial scales such as individual park units. Survey data are checked for errors and corrections are made by individual states before the final report and dataset are released. The annual AIX report provides a basic statistical summary of collected data (e.g., NASPD, 2011) while the actual dataset is produced as an EXCEL spreadsheet. Additional analyses may be provided as an addendum to the AIX report based on current issues and needs (Siderelis et al., 2011). Besides serving the NASPD, the AIX database also contributes state park-related information to the annual edition of

Statistical Abstract of the United States (USCB, 2011).

Published Research Using the AIX Database

We perform periodic keyword searches on multiple reference databases to identify publications that utilized the AIX survey data. A small number of studies have been identified though the searches are an ongoing effort. We found that researchers had utilized the AIX database in several different ways. The first type of research incorporated the state parks/AIX data into national assessments of outdoor recreation supply and demand (Cordell, 1999). The second type of research performed trend analyses on various aspects of state park operations, with fiscal and attendance being the most common variables (McLean et al., 2000; Siderelis et al., *in press*). The third type of research examined differences in state park management between groups of parks which were classified through policy analysis (Davis, 2008) or multivariate statistics (Caneday et al., 2009). For example, Caneday et al. (2009) identified 7 clusters of state park systems based on the types of land resources and facilities. They found these clusters useful in formulating marketing campaigns. Davis (2008) demonstrated that state park facilities and operations are strongly associated with land management orientations, such as preservation, recreation and resource extraction.

Suggestions for Future Research

Future academic research using the AIX database is strongly encouraged. Nationwide or regional trend analysis and comparative studies are particularly useful. While the types of research analysis are inherently limited by the level of data aggregation, this database does afford various analyses due to its completeness and long-term data availability. Examples of research questions that may benefit from the AIX database include:

1) What are the spatial and temporal trends in state park attendance, expenditure, revenues and personnel?
2) How are trends in state park operations associated with changes in important economic, social and environmental indicators?

3) How do state park facilities, attendance and expenditures vary in different types of state park systems or broader ecosystems?
4) What are the most meaningful metrics to characterize state park operations?

These and other questions can be examined using the AIX database, contributing to a better understanding of state park operations. This is one of the most effective ways to articulate the social relevance of state parks and support their sustainable management.

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Towards Development of a Sustainable Recreation Strategy for University Forests: A Southeastern U.S. Example

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Introduction

University-owned forests are common to U.S. academic institutions that have a natural resource program. These forests are typically managed to support teaching and research through direct academic use onsite or indirectly through revenues generated from the sale of forest products. Although statistics are unavailable, a substantial number of university forests also provide for outdoor recreation opportunities, especially the ones located near residential neighborhoods or urbanized regions. Policies governing public use in university forests are highly variable. In this

presentation we illustrate some ideas generated and research conducted to support the development of a sustainable recreation strategy for the Lake Raleigh Woods (LRW), an urban-proximite forest owned by North Carolina State University (NCSU).

This study builds on previous planning efforts of LRW (Blank *et al.*, 2010) and served as a graduate class project in the fall of 2011. LRW, located in the southwestern corner on the NCSU Centennial Campus (Figure 1), presented a unique opportunity for students to gain hands-on experiences of literature and site evaluation on a locally important natural area. As the university is developing an overall management plan for LRW, this study is intended to offer timely input in the deliberation process.

Research to Support a Sustainable Recreation Strategy

Research activities to support the development of LRW sustainable recreation strategy included a literature review of existing sustainable recreation frameworks and strategies, a review of public use policy of university forests, and an evaluation of indicators that may be suitable for sustainable use monitoring of the LRW over time.

To justify the management objectives and policies, a policy review was conducted on other university forests across the country. A small group of 6 peer universities were identified: Clemson University, the University of Maine, Virginia Tech, Michigan State University, Duke University, and the University of North Carolina at Chapel Hill. These institutions are primarily land-grant universities that have natural resource programs and associated forested properties. Two neighboring non-land grant universities, Duke and UNC-Chapel Hill, were also chosen for comparative purposes. Internet searches and personal contacts were performed to gather policy and rules information about allowable public use of these university forests.

To continue to provide a quality recreation area for the local community, the recreational infrastructure within LRW must be formally monitored and maintained. Additionally, problems such as erosion, soil compaction, steep trail slopes, root exposure, stream crossings, and trail technical features need to be examined through a recreation impact

monitoring program, which is considered as an integral part of the proposed sustainable recreation strategy. Indicators developed for recreation resource impacts in the published literature were reviewed and evaluated for their potential applicability to LRW.

Results and Discussion

Based on the draft management plan of LRW (Blank *et al.*, 2010) coupled with our literature review on sustainable recreation frameworks (Eagles et al., 2002; Parks Canada, 1994; QED 2009; USFS, 2010), we identified four key objectives for sustainable recreation that would be consistent with or supportive of the overall management goals and objectives of LRW. They include:

1. Lessen current visible human impact in LRW,
2. Minimize future per capita recreational impact,
3. Enhance the LRW user experience, and
4. Educate users on the LRW sustainable recreation management plan and its intentions

Our policy review reveals that despite a variety of forest sizes (716 to 17,000 acres) and variations in recreational uses and traffic, all 6 universities share purposes having primarily to do with providing teaching and research tools. Although monitoring strategies differ greatly, each of the universities allocates the responsibility of management to a department within the university system. There seems to be a direct relationship between monitoring strategy and public use traffic. When there are fewer recreational users, there is a corresponding lack of necessity for demarcation and maintenance. Because the primary focus of these forest areas is to serve the educational needs of the university, recreational needs are largely secondary. But given that the land is open to the general public, even at Duke which is a private university, prohibited activities are generally those that might put the area or its inhabitants at risk. These activities; hunting, use of motorized vehicles, and camping, could negatively impact or otherwise disturb research areas and the overall natural environment.

Recreational allowances and prohibitions are outlined in Table 1.

Sustainable recreation indicators were primarily derived from the trail network which is the primary infrastructure for recreation activities (Figure 2). Currently, the trail network is made up of informal trails; therefore, a primary objective of the sustainable recreation plan is to form a sustainable formal trail network. With this objective and previous observations, the LRW draft management plan (Blank *et al.,* 2010) identified areas of concern including stream crossings, root exposure, trail erosion, technical trail features, and gradients beyond 10%. To address these areas of concern, we have grouped monitoring indicators into two categories: trail network metrics and trail condition metrics. Recommended indicators are based on those described by Leung *et al.* (2011) and Jewell & Hammitt (2000). Descriptions of recommended indicators and methods of measurement are listed in Table 2. To maximize the efficiency of resources spent on this monitoring program, we recommend establishing priority areas within Lake Raleigh Woods. These areas would be designated by specialists as areas of high ecological importance, as well as areas that have high potential for or previously established educational and recreational use. We recommend performing trail network metric monitoring annually in priority areas, and biannually in the entire LRW property.

As outdoor recreation demand increases in other university forests and many of them are considering sustainable management of their properties, the ideas, insights and information presented in this case study may be of value to our peer institutions.

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Figure 1. The Lake Raleigh Woods Natural Area at NC State University.

Figure 2. The existing informal trail network in Lake Raleigh Woods (Source: *Blank et al.*, 2010).

Table 1. A list of allowable and prohibited recreational activities in forests that are owned by six universities.

University Forest	Hiking	Biking	Horseback Riding	Motorized Vehicles	Picnicking	Hunting	Fishing	Canoeiing/ Kayaking	Camping
Clemson University	√ *	√	√	X	√	√	√	NM	X
University of Maine	√	√	√	X	√	√	√	√	X
Virginia Tech	√	X	NM	X	√	X	NM	NM	X
Michigan State University	√	√	√	X	√	√	√	NM	X
Duke University	√	√	√	X	√	X	√	NM	X
UNC-Chapel Hill	√	√	NM	X	√	X	NM	NM	X

*** Key**

Allowed	Prohibited	Not Mentioned
√	X	NM

Table 2. Potential monitoring indicators to support sustainable recreation management in LRW.

	Indicator	Description	Method of measurement	Schedule	Personnel
Trail Network Metrics	Total length of trails	Sum of length of trail segments	Mapping using GPS	Priority areas: Annual; Entire LRW: Biannual	NCSU student(s)
	Total "trailed" area/area of disturbance	Sum of length of trails multiplied by average width	Mapping using GPS	Priority areas: Annual; Entire LRW: Biannual	NCSU student(s)
	Number of informal trails "off-shoot" points	Status of recently closed trails: presence or absence of trails in these areas.	Mapping using GPS or census using printed map highlighting closed trail areas	Six months after trail closure	NCSU student or community member
	Density of informal trails	Length or number of informal trails per unit area	Mapping using GPS	Priority areas: Annual; Entire LRW: Biannual	NCSU student(s)
	Visitor Count	Number of visitors entering the area	Counter installed at most popular trailhead	Data collected annually or more often	NCSU student or trained community member
Trail Condition Metrics	Condition class	Length of informal trails in different condition classes	Condition class assessment, trail map.	Biannual	NCSU student or trained community member
	Erosion	Locations of erosion events; areas with high concentration of erosion events	Census of erosion events, trail map.	Biannual	NCSU student or trained community member
	Trail width	Periodic measurement of trail width	Measure trail width at 100-foot intervals.	Biannual	NCSU student or trained community member
	Length of trails with gradient > 10%	Total length of trails that have slope greater than 10%	GIS calculation using topographical map and trail map	Biannual	NCSU student or trained community member
	Evidence of unsanctioned use	Trail technical features, type of trash, vandalism, ATV tracks, and	Census of evidence of unsanctioned use	N/A	Any user can make a report by filling out a card at trailhead suggestion boxes.

		other evidence of unsanctioned use			
	Sign condition	Presence, absence and vandalism of signs	Census of installed signs and record of condition	N/A	Any user can make a report by filling out a card at trailhead suggestion boxes.

Assessing the Sustainability of Nature-based Tourism and Recreation Areas in Marion County, Florida

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Problem Statement. Municipal and regional planners in rural and wildland urban interface areas continuously look to nature-based tourism as a potential economic development tool due to the plethora of natural attributes available in their areas. However, changing or increasing access to these natural areas will alter the environmental and social quality of the areas, and might make them unappealing for future visitors and current residents. Butler's Tourism Area Life Cycle is a commonly used concept to track the evolution of tourism sites as visitation to areas changes (Butler, 1980). However, contemporary tourism researchers are calling for tourism areas to be analyzed using an Adaptive Cycle – moving through exploitation, conservation, release, and reorganization stages or phases (Holling, 2001, Figure 1).

Natural areas draw multitudes of visitors, which often results in negative ecological impacts to the resources. Consequently, recreation use of these areas will continue to increase while the ecological quality will likely decrease – especially if managers are not actively managing for recreation impacts. Recent research on sustainability and systems thinking shows that these unmanaged systems will move through the Adaptive Cycle and potentially fall into a "release" stage, which means their social and ecological characteristics are forever changed,

resulting in the loss of benefits people initially valued these areas for. In order to sustain the benefits from nature-based tourism/recreation, decision makers need straightforward planning tools to improve their ability to track and foresee the visitation changes to destinations – helping them make appropriate decisions on planning and management actions.

In Marion County, located in north central Florida, the Ocala National Forest composes nearly half the land and hosts over one million visitors a year. Hiking, canoeing, mountain biking, horse riding and OHV riding are popular and growing activities. Often high use activities happen in ecologically sensitive areas; therefore, public land managers are reliant upon much needed tourism/recreation use pattern information to plan tourism and recreation with accurate consideration of the ecological and social constraints of the area. The purpose of this study is to effectively and efficiently use spatial and social data to better understand how ecological and social indicators have changed over time at nature-based tourism/recreation sites.

Methods. A simple ecological fragility model was used to define the development phase of a tourism/recreation site life in the framework of the Adaptive Cycle. Based on the statement that fragility (Fr) of an ecosystem at a specific time depends on the sensitivity of the system (α) and the stresses (U) on that system, a linear model can be used to quantify fragility (Zurlini et al., 1999): $Fr = K + \alpha (U)$ (K stands for constant background fragility). For a tourism/recreation site, the peak recreation visitation was used as a surrogate for the systems stresses (U). Omitting K, the model of fragility for a tourism/recreation site became: $Fr^* = A^* U^*$, where Fr* was ranked fragility score; A* was the score of ecological and social sensitivity; and U* was the tourism/recreation stress.

Using GIS analysis, four physical variables were used as ecological criteria to estimate the ecological sensitivity for tourism/recreation pressure: slope, soil texture, vegetation cover, and proximity to outstanding water body, based on past research on ecological sensitivity to recreation and tourism development (Boers & Cottrell, 2005; Olafsdottir & Runnstrom, 2009). The perceptions of areas' attractiveness were used to estimate social sensitivity. An expert panel was asked to define the importance of ten nature-based tourism/recreation attraction features, ranging from tourism/recreation facilities and services to outdoor recreation opportunities, and rate the areas' ability to offer these attraction features. Visitor counters at each of the recreation sites provided data on number of visitors hiking at each of the recreation sites. The peak visitor use data for each recreation site were used to estimate recreation pressure.

Results and Discussion. Results show that the presence of water bodies, peak visitation and site characteristics were good predictors of site sensitivity and fragility. Almost all recreation sites within the county had a similar recreation pattern with peak visitation in spring or winter. Among the five study sites, the highest peak use appeared at a popular mountain biking area (Santos) that hosts 435 visitors while the lowest at primitive camping area in a remote area of the Ocala NF (Lake Delancy) that hosts 47 visitors (Table 1). The sensitivity ranged from the lowest score of 0.31 at a trailhead in the Ocala NF (SR 19) to the highest of 0.71 at a popular recreation site near a spring and wilderness area in the Ocala (Juniper) (Table 2).

The application of the fragility model allowed us to identify three different fragility groups among five sites. The highest fragility level was found for a heavily visited area that also had sensitive ecological and social attributes (Table 3, Figure 2). Results for each site provided important information to identify the specific phases the nature-based tourism sites fell on the

Adaptive Cycle. All areas fell within the exploitation and conservation stages (Figure 3), and none of the sites had progressed into their release stages, which would indicate the sites are no longer resilient and will need to be "re-organized" to create a new state. In terms of management implications, these results show that managers must focus efforts on these sites nearing their release stages. For instance, one site had high fragility, which caused it to fall into the conservation stage. Based on its high use and high impact trend, managers must quickly implement management actions in order to ensure the site does not fall into the release stage. For instance, topography is a big issue at the site; therefore, managers should likely focus their efforts on the resilience of heavily used trails on slopes.

Table 1. Visitor use level at five nature recreation sites along FNST (peak use in bold).

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Juniper	259	266	**301**	109	89	70	36	39	142	121	148	221
Lake Delancy	41	**47**	40	13	10	11	6	9	7	25	21	34
Landbridge	402	339	**412**	354	276	154	200	101	143	308	313	213
Santos	268	317	**435**	426	368	223	207	31	251	333	338	369
SR 19	**157**	139	146	76	61	29	65	45	81	80	144	86

Table 2. Ecological and social sensitivities among five nature recreation sites along FNST.

Site	Converted eco. sensitivity	Converted social sensitivity	Total sensitivity
Juniper	0.335	0.375	0.71
Lake Delancy	0.165	0.25	0.42
Landbridge	0.165	0.25	0.42
Santos	0.165	0.375	0.54
SR 19	0.165	0.14	0.31

Table 3. Fragility levels among five nature recreation sites along FNST.

Site	Fragility Score	Fragility Level	Site Characteristic
Juniper	214	Medium	High use; low impact.
Lake Delancy	19	Very low	Low use; low impact
Landbridge	171	Medium	High use; low impact.
Santos	235	High	High use; high impact.
SR 19	48	Low	Medium use; low impact.

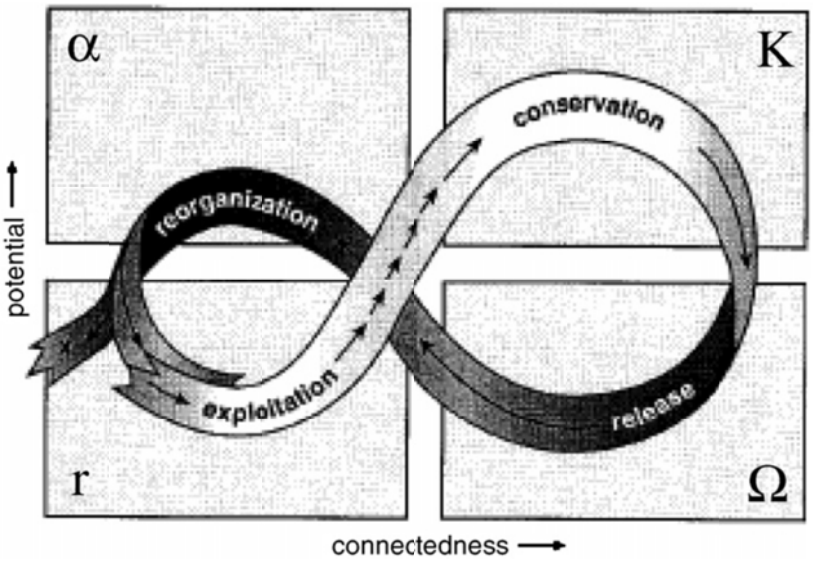

Figure 1. The Adaptive Cycle proposed and illustrated by Holling (2000), as in Patterson et al. (2008).

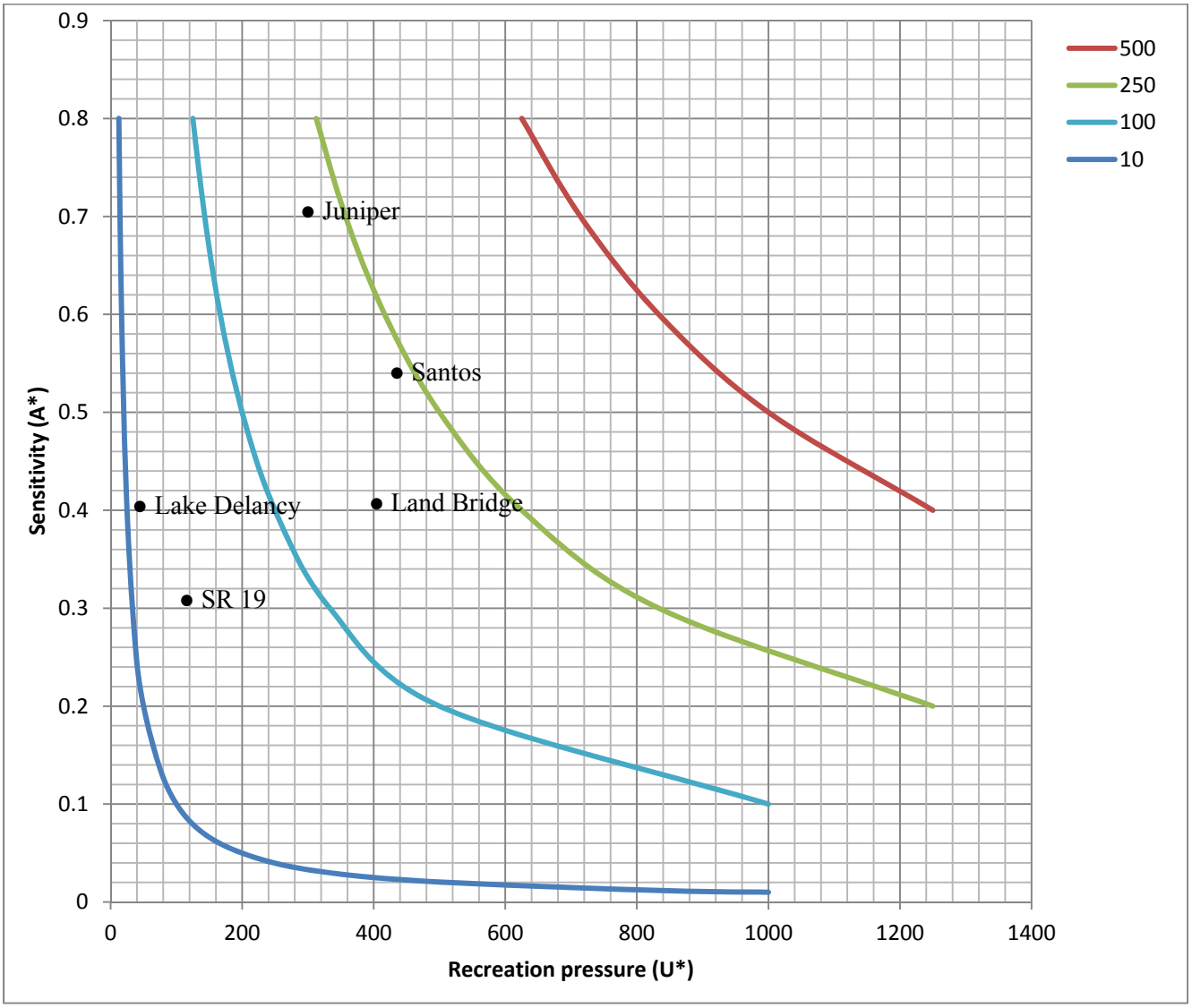

Figure 2. Relationship between sensitivity (A*, sum of ecological and social sensitivities) and recreation pressure (U*, peak recreation visitor use) and representation of Fragility level.

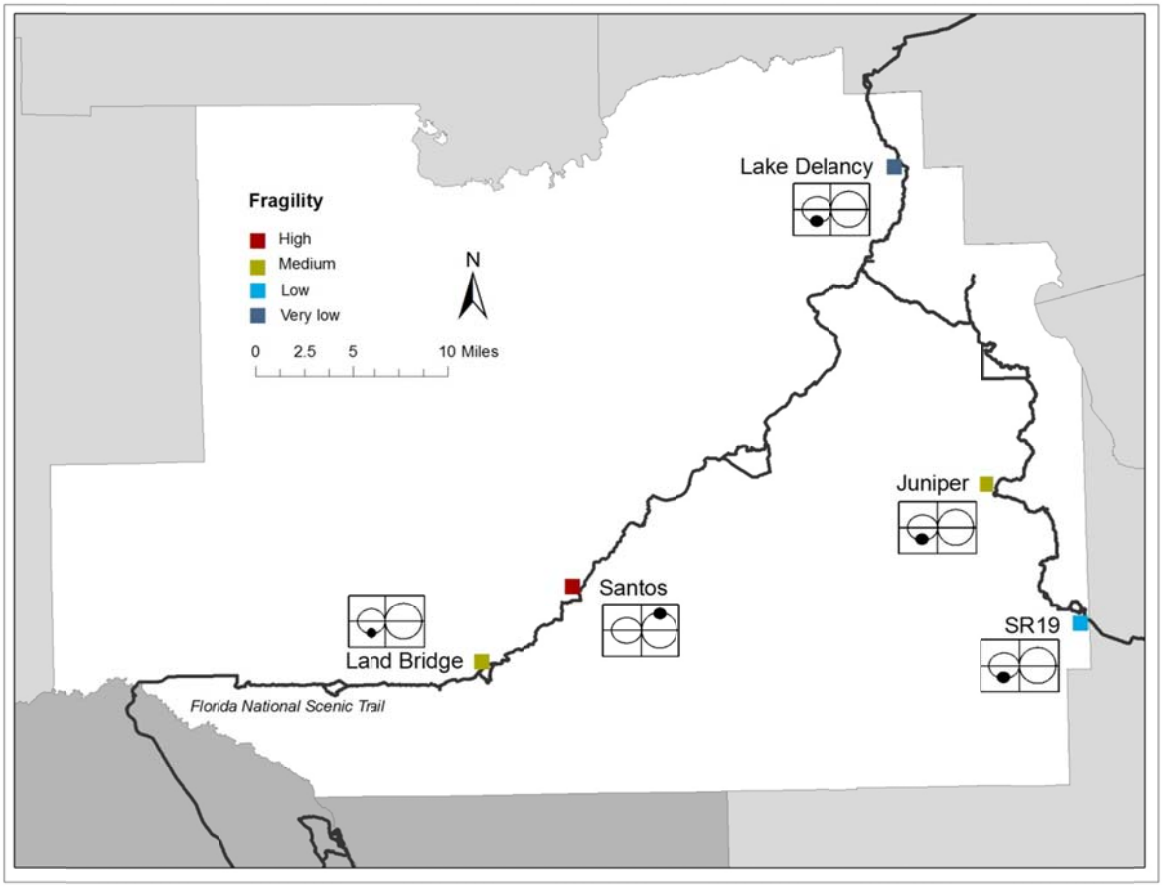

Figure 3. Spatial distribution of fragility estimates of nature recreation sites along Florida National Scenic Trail in Marion County, Florida, and representation of the phase state of each site as indicated by the position of a black mark along the Adaptive Cycle.

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COMPARISON OF USERS AND NON-USERS CONSTRAINTS TO VISITATION TO THE CHATTAHOOCHEE-OCONEE NATIONAL FOREST

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Introduction

Early research into why certain groups of people did not visit or use natural resources focused on constraints or barriers to using public lands and to participating in recreation activities (Backman & Crompton, 1990; Jackson, 1988; Shaw, Bonen, & McCabe, 1991). In much of this previous research, time and lack of knowledge of public lands were listed as the main constraints to recreation (Kerstetter, Zinn, Graefe, & Chen, 2002). However, most of the constraint research focusing on ethnic and minority groups suggested that these groups primarily reported barriers including cost and lack of transportation (Washburne, 1978). Additionally, Wright and Goodale (1991) reported that constraints to recreation activities may be different for people who are not interested in participation. Subsequently, despite some research on ethnic and minority groups use of and preferences for our natural resources such as National Forests, more research is still needed. Additionally, more off-site research of potential users is needed to examine why Blacks, Latinos and women do not visit our National Forests as often as traditional groups despite their often close proximity to these natural resources.

Problem Statement

Research indicates ethnic and minority groups and women are substantially under-represented in terms of their visitation and use of national forests such as the Chattahoochee-Oconee National Forest. Research also indicates that this apparent lack of visitation and use by these groups is due, in some part, to their encountering certain perceived recreational constraints or barriers. However, limited research has explored the relationship between visitation and use of national forests by ethnic and minority groups and women, both on and off-site, in terms of their perceived recreational constraints. Hence, this study will examine perceived constraints of users and non-users of the Chattahoochee-Oconee National Forest. In particular, this study will

examine and compare users and non-users in regards to their race, ethnicity, and gender.

Methods

Questions regarding outdoor recreation constraints were examined by surveying both users and non-users of the CONF using a brief (five to ten minute) self-administered survey. Surveys were available in Spanish and English. Two separate samples were collected by surveying both on-site users and off-site users. The on-site data collection consisted of surveys conducted at three exit points of recreational areas in the CONF. Surveying visitors exiting a site is a preferred survey strategy because it allows visitors to provide more detailed information about their length of stay and activity choices (N=1045). The off-site data collection consisted of sites selected within zero to seventy-five miles of the CONF boarder. Data collection was based upon a stratified sample of zip codes, days of the week, special events, and site types. Lastly, surveys were conducted at county parks, libraries, and flea markets that attract African American, Latino, and white sub-populations. To obtain a randomized sample, every third person was surveyed during the on-site and off-site data collections (N=1005).

Results

Cronbach's Alpha and Factor Analysis were used to examine the reliability and validity of the survey. Differences within and between the two sample groups were examined using T-tests and Analysis of Covariance. Preliminary data were analyzed using descriptive statistics and frequencies. On-site data reveal that the majority of visitors to the CONF are Caucasian at 61.3%, while Asians, Latinos, and African Americans represent 13.8%, 10.3% and 10.0% respectively. Off-site data show that the majority of visitors are also Caucasian, but at a lower percentage of 41.4%, while African Americans represent a larger percentage at 27.6%. Latinos and Asians represent 21.8%, and 5.3% respectively.

Discussion

The preliminary results of this study suggest that time and lack of knowledge of public lands was the main constraint to recreation for all ethnic groups and genders both on and off-site. The off-site respondents noted that their free time was spent attending family and youth sporting events. While cost and lack of transportation were constraints for visiting the CONF, they were no significant differences between ethnic groups. The most noted cost constraint was the price of gas. Possibly due to the hour plus drive needed to reach the CONF from metro Atlanta. Lack of knowledge of activities available was a concern for both on and off-site respondents in all ethnic groups and genders. Additionally, off-site respondents cited the lack of entertainment options as a major reason for not visiting the CONF. These two areas suggest that varying and more localized marketing could possibly increase visitation to the CONF. While not a major constraint, fear of wild pests (bugs, snake, etc.) was a concern for women of ethnic groups. Lastly, the one constraint noted most by on-site users was the condition of the facilities (especially restrooms). This issue could possibly be related to the aging facilities and may warrant a review of needed upgrades by the Forest Service personnel when budgets allow them.

Potential Implications

Potential implications of this study include a better understanding of ethnic and minority groups' and women's constraints related to the use of the CONF. Furthermore, a better understanding of these issues will assist public land managers in their efforts to meet the needs of all their constituents. This knowledge could suggest future directions for Forest Service managers to take, including areas of focus and marketing, especially in the time of lean budgets.

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ASSESSING THE RELIABILITY AND VALIDITY OF THE SYSTEM FOR OBSERVING PLAY AND RECREATION IN COMMUNITIES (SOPARC) IN STATE PARKS

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Problem Statement

Park use patterns are changing as racial/ethnic groups increase in size and the U.S. population continues to diversify. Managers are seeking new ways to effectively monitor changes to state park visitation. However, many state park systems are experiencing severe financial constraints that limit their ability to monitor visitation patterns efficiently. Hence, research is needed to identify strategies that could help managers assess park use and adapt their services to meet the needs of a diversifying clientele. Therefore, the purpose of this study was to examine the reliability and validity of the System of Observing Play and Recreation in Communities (SOPARC) as a management tool for state park managers.

Methods

Following a pilot study in 2009, data were collected at three state parks in northern Georgia during the summer of 2010. These focal parks were selected due to annual visitation rates and elevated racial/ethnic diversity among park visitors. Primary data were collected using

the SOPARC, and intercept and exit surveys were used for cross-validation purposes. The SOPARC was administered by trained observers in day use areas within each park during four daily time intervals. Researchers documented 18,525 park visitors during 217 observational sessions in day use areas across the focal parks. Self-administered intercept surveys (*N*=5,192 surveys collected during 116 survey sessions) were also distributed in day use and campground areas. Brief, one-minute exit surveys (*N*=1113 vehicles surveyed during 139 sessions) were conducted in each park at focal exit points.

Results

Reliability.

Data for assessing SOPARC reliability were collected by two researchers simultaneously performing independent observations in the same target areas during the 2009 pilot study and the 2010 study. The correlation analyses were conducted at four different levels by assessing agreements of paired observations of visitors by: 1) total number; 2) race/ethnicity; 3) age group; and 4) number of males and females in the target area (Table 1). Significant correlations were found in inter-observer agreement scores across the assessed categories using Pearson's correlation ($\geq .90$) and single/average measures interclass correlations.

Validity.

Data from the intercept and exit surveys were used to cross-validate observations from SOPARC tool. Comparisons revealed several strong relationships between results obtained using each of the different sampling strategies in day use areas. Percentage of park visitors in day use areas at one focal park (selected as an example) were primarily Whites (51.8%, 47.4%, 54.7%) followed by Hispanics (36.2%, 35.6%, 26.7%), African Americans (8.7%, 9.3%, 9.4%), and

visitors of “Other” racial/ethnic groups (3.3%, 5.6%, 9.0%) (Figure 1). Comparing these data also supported similarities in percentages of male (45.0%, 43.0%, 48.9%) and female (55.0%, 57.0%, 51%) visitors (Figure 2). Exit survey data showed comparable percentages of children (50.8%, 45.2%) and adults (49.2%, 54.7%) as SOPARC observations (Figure 3).

Discussion

Obtaining current data on visitor trends has been difficult for state park managers whose visitor populations continue to grow and diversify. Hence, this study implemented SOPARC in three Georgia state parks to examine the reliability and validity of this strategy as a management tool. Data were cross-validated and showed strong correlations between the use of SOPARC and intercept and exit surveys suggesting SOPARC can be an effective data collection strategy for state park managers.

The administration of SOPARC presents several benefits to park managers. While other data collection methods (intercept and exit surveys) can be intrusive and time intensive, SOPARC, as an observation strategy, limits interaction with visitors over short observational periods, has minimal costs, and can be applied to a variety of outdoor settings. One disadvantage of SOPARC, however, is the limited amount of categorical data available. Despite this drawback, SOPARC can be considered a valid, stand-alone option that can produce reliable data for managers seeking baseline data on visitor patterns in parks.

Table 1

Summary of Pearson Correlation Coefficients, Single Measure Intra-Class Correlations, and Average Measures Intra-Class Correlations During 2009 and 2010 Data Collection Periods.

	2009 SOPARC Reliability Measures[A]			2010 SOPARC Reliability Measures[B]		
	r	**Single Measures ICC**	**Average Measures ICC**	***r***	**Single Measures ICC**	**Average Measures ICC**
Total Visitors	0.997	0.989	0.995	0.99	0.99	0.99
Race						
White	0.992	0.985	0.993	0.995	0.998	0.998
African American	0.992	0.992	0.966	0.986	0.992	0.992
Latino	0.982	0.968	0.984	0.988	0.988	0.988
Others	0.998	0.993	0.997	0.979	0.962	0.962
Age						
Child	0.96	0.939	0.968	0.969	0.985	0.985
Teen	0.912	0.908	0.952	0.888	0.942	0.942
Adult	0.964	0.963	0.981	0.995	0.997	0.997
Senior	0.388	0.225	0.371	0.927	0.97	0.97
Gender						
Male	0.987	0.981	0.99	0.992	0.996	0.996
Female	0.999	0.992	0.996	0.996	0.998	0.998

A-Regularly paired observation sessions (*N*=11) accounted for 2192 individuals during the 2009 pilot study

B- Regularly paired observation sessions (*N*=13) accounted for 2827 individuals during the 2010 study

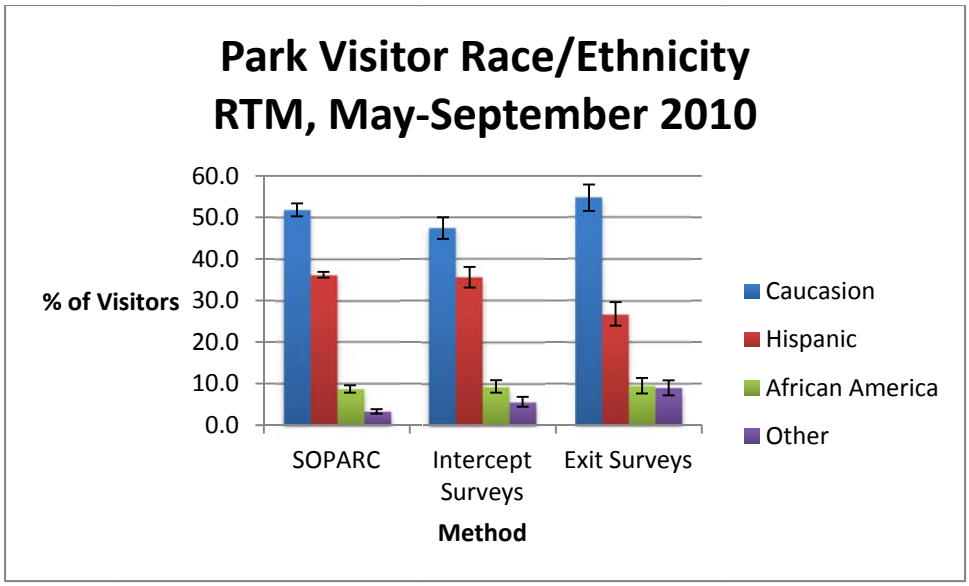

Figure 1. A comparison of park visitor race/ethnicity data by SOPARC, intercept surveys, and exit surveys at Red Top Mountain State Park.

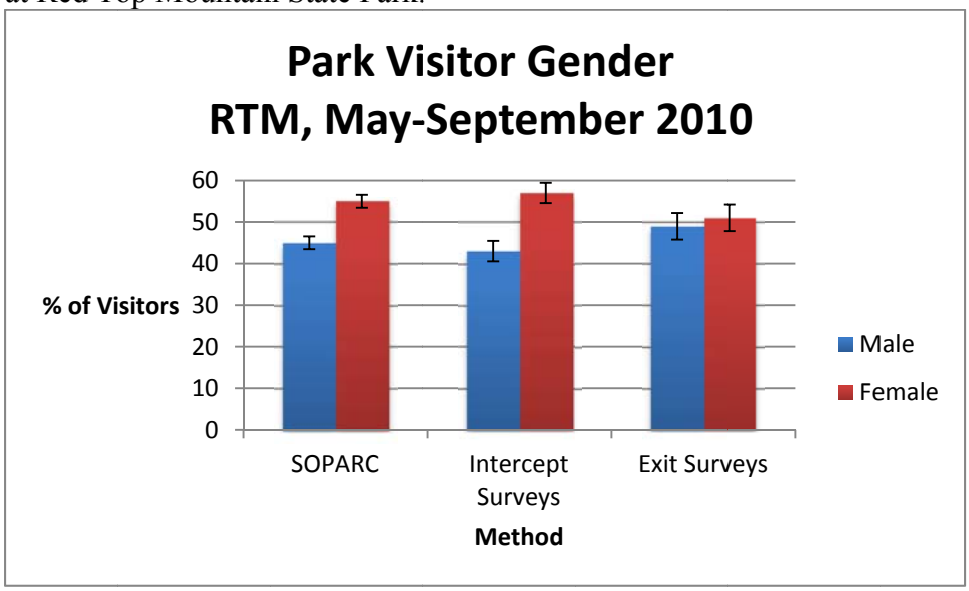

Figure 2. A comparison of park visitor gender data by SOPARC, intercept surveys, and exit surveys at Red Top Mountain State Park.

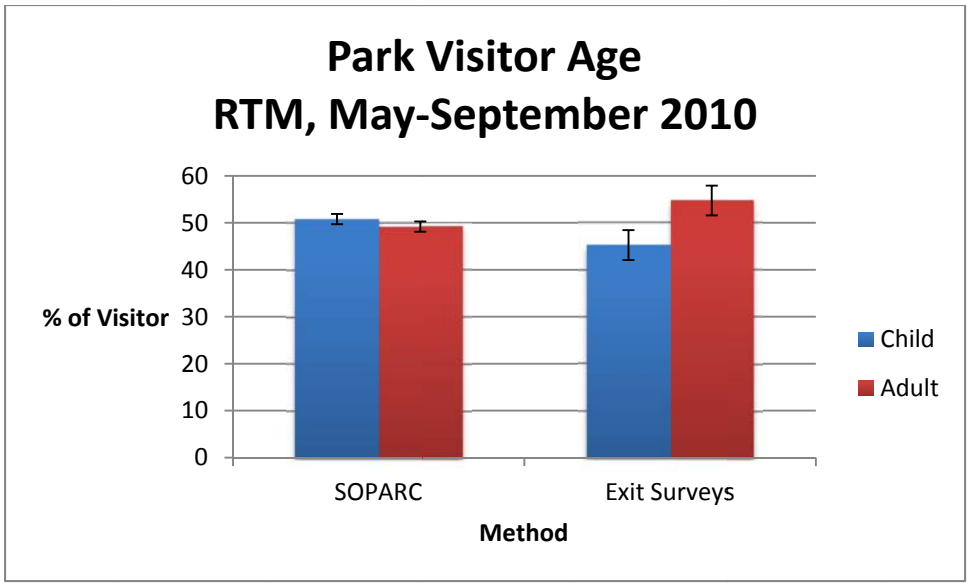

Figure 3. A comparison of park visitor age data by SOPARC and exit surveys at Red Top Mountain State Park (intercept surveys were only completed by adult park visitors).