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A study of values, environmental behaviors, and GPS visitor tracking in Denali National Park and Preserve

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A study of values, environmental behavior and GPS visitor tracking in Denali National Park and Preserve

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Executive Summary

- This study evaluated the values, behaviors, and on-ground travel patterns of visitors to Denali in the high use season of 2016. Survey and participatory mapping data were collected from the general population of visitors (N=667, 90.6% response rate) and GPS tracks were collected from backcountry users in the park (N=313).
- The survey respondents included in this sample tended to travel in small groups, were with friends and/or family, and stayed in the region for several nights. Most were first-time visitors and approximately one in ten was part of a cruise.
- Activity engagement varied. The most frequently cited activities were viewing wildlife, taking photographs, hiking, and participating in bus tours. Visitors reported limited knowledge of physical resources, cultural resources, and management practices.
- Survey respondents were asked to rank the importance of wildlife viewings in the park. Grizzly bears were most important to the quality of the visitor experience, followed by moose, wolves, caribou, and Dall sheep.
- Individual values, defined as guiding principles in life, shaped "environmental" behavior (i.e., actions that benefited the environment). Most visitors reported strong *Altruistic* and *Biospheric* values indicating they were most concerned about the well-being of other people and non-human species. *Hedonic* values centered on interests in short-term gratification (e.g., leisure) were also important, while *Egoistic* values (i.e., self-centered concerns) were the least important guiding principles in life.
    - Values were examined in relation to behavior. Biospheric and egoistic values strongly predicted behavioral engagement, indicating that park communications should highlight environmentalism and individual achievements to appeal to visitor interests.
    - Hedonic values negatively influenced environmental behavior. Given that respondents with interests in short-term gratification are more likely to impact the environment, outreach should target this subgroup to activate norms and feelings of moral obligations, and in turn, stimulate environmental behavior. In general, visitors were less compelled by altruism when deciding whether to engage in pro-environmental activity.
- Cultural values (i.e., guiding worldviews that define societies), were important predictors of individual values and, in turn, behavior. The predominant worldview of Denali visitors was individualist and egalitarian.
    - In light of correlations among cultural values, individual values, and behavior, messages that emphasize how individuals secure their own well-being (e.g., early expeditions) and pave the way toward collective welfare will be most likely to resonate with park visitors.
    - Managers should de-emphasize government intervention and hierarchical social roles. Instead, pointing out how agencies have reduced differences in the fixed characteristics of people (e.g., engagement with indigenous groups) will be most likely to stimulate environmentalism.

- Assigned values that reflected the perceived importance of places were evaluated and then mapped by survey respondents, indicating that Denali was valued for a multitude of reasons.
    - Results showed an uneven spatial distribution and point density of 13 values assigned to places. Denali was valued for a variety of reasons, though primarily for its *Wilderness*, *Aesthetic, Ecological Integrity,* and *Future* qualities.
    - Differences emerged in a comparison between front and backcountry users, in that frontcountry visitors associated values with a broader array of places, whereas backcountry users valued fewer places more intensely.
- Environmental behaviors were examined and place-based measures developed to assess *Conservation Lifestyles, Social Stewardship*, and *Environmental Citizenship.*
    - Conservation lifestyles and social environmentalism were most frequently adopted, indicating that managers should maintain and/or develop forums for discussions about the environment, as well as maintain opportunities for recycling and conserving water. Visitors could be encouraged to participate in scientific research and volunteer, given that these activity were pursued less frequently by park visitors.
    - Behavior was positively predicted by biospheric and egoistic individual values, as well as individualist and egalitarian cultural values. Behavior was negatively predicted by hedonic values.
    - Given that altruism would play less of a role in behavior change managers should de-emphasize issues of justice and equality in their quest to encourage environmental activities.
- Backcountry use patterns were tracked using GPS units. Data were evaluated for the pooled sample and three subgroups, including independent travelers, NPS-led day hikers, and guided educational tourists.
    - The amount of time spent and distance traveled in the backcountry varied, though respondents spent an average of two days in the backcountry and traveled about six miles. The 'level of remoteness' achieved was also variable, though most groups traveled a straight-line distance of 1.6 miles from the park road. Unguided travelers ventured farthest from the road.
    - Most backcountry use was concentrated toward the middle portion of the park road. Use of backcountry units varied, though some were used more often. Units 11 (Stony Dome) and 13 (Mount Eielson) experienced the highest concentration of use given over 3.7 miles hiked per square mile. During the study period, an average of 50 miles were covered in each unit.
    - For visitors who camped in the backcountry, campsite locations were recorded. Campsites were generally over two miles, but several were under one half mile from the park road. Also, the majority of campsites were found to be within the viewshed of the park road.
- There was an equal number of males and females. The average age was 44 years and respondents were well educated. Nearly half earned greater than $100,000 annually and the majority was White. Backcountry users, specifically, included more males than females and had an average age of 38 years.

Acknowledgments

The authors would like to acknowledge Drs. Matthew Brownlee and Jeff Rose for their contributions throughout all phases of this research project. Dr. Rose Keller and Dave Schirokauer with the US National Park Service provided helpful guidance in preparation for this study. Jessica Toubman provided spatial data that were analyzed in this report and greatly enhanced the study findings. This project was funded by the University of Illinois Campus Research Board Grant Number: RB16092.

Introduction

Mounting evidence suggests that human behavior is a primary driver of changes to the fundamental structures and functions of ecosystems. In Denali National Park and Preserve (Denali), visitors experience an extraordinary diversity of wildlife and ecosystems that are susceptible to human impacts (see Figure 1). This context provides a valuable opportunity to better understand how sources of inspiration from the environment can stimulate conservation activities relevant for protected area management. **This study examined how places valued by a diversity of visitors affected their environmental behaviors.**

Three objectives guided this research: (1) examine how individual and cultural values influence the behaviors of visitors to Denali; (2) determine the spatial distribution and density of assigned values mapped by front and backcountry visitors to Denali; and (3) analyze travel patterns by tracking visitors throughout the park. To address these objectives, researchers drew on psychological theories to measure values and behavior, expertise in social science survey methods, and experience with both Public Participation GIS and GPS Visitor Tracking. Researchers also engaged in conversations with NPS managers to develop a plan for survey administration and aid in interpretation of the findings. This study was designed to foster mutual learning about the Denali visitor experience and explore ways that agencies can adapt to changes in public opinion while meeting conservation goals.

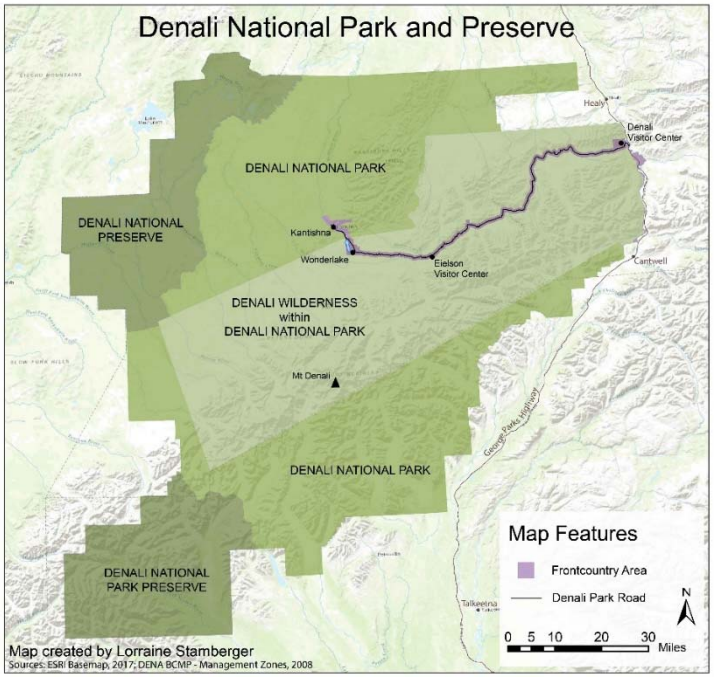

Figure 1. Study context

Methods

Data Collection

On-site self-administered surveys were distributed to visitors during the high use season (June-August, 2016). Individuals over the age of 18 were approached by trained survey administrators and asked to participate in the study. Survey administrators wore university attire (University of Illinois polo shirt and baseball cap) and approached every "nth" visitor to ask for their voluntary participation. For groups, the individual with the most recent birthday completed the survey to minimize potential group leader bias (Battaglia et al., 2008). The survey schedule was stratified by day of the week and time of the day; data were collected in the mornings and afternoons of 28 weekdays and 14 weekend days using Insignia tablets (Model: MS-P10A6100) and Qualtrics software for

data collection. Paper copies of the survey were also made available to select respondents. Surveys were administered at five sampling sites: 1) Denali Visitor Center trailhead, 2) Alaska Railroad Train Depot, 3) Wilderness Access Center, 4) Backcountry Information Center (BIC), and 5) Riley Creek Campground. The on-site survey examined a variety of issues and took approximately 20 minutes to complete (see Appendix A). Contact logs were used to monitor response rates and calculate potential non-response bias, none of which were detected on the basis on gender ($\chi^2 = 0.759$) and group size ($t = 1.967$, $df = 710$). Decisions about data collection and the sampling design were informed by preliminary site visits in May and June, 2016. After data were cleaned, the **final sample size was 667.** A total of 67 people refused to participate in the study, yielding a **90.6% response rate.**

Figure 2. Survey administration at the Backcountry Information Center

During survey administration, respondents were engaged in a two-step participatory mapping exercise to collect information about assigned values, defined as the perceived qualities of places. First, respondents allocated 100 preference points across 13 categories of assigned value (e.g., aesthetics, recreation, ecological integrity) that reflected why Denali could be considered important. The categories used in this study were drawn from past research (Brown & Reed, 2000) and modified in response to knowledge gained from NPS staff and preliminary visits to the park. The second step in this mapping exercise required respondents to identify places on a 34”X13” map of the protected area that they felt embodied value. Respondents were asked to identify multiple locations that reflected the categories identified in the first step of the mapping exercise. The map displayed at the study station was created by the National Geographic Society and mounted on foam poster board to be displayed at the survey stations (see Figure 2).

During the survey process, survey administrators remained sensitive to respondent burden and did not pressure potential respondents to participate. The administrators maintained a positive attitude and approached interactions with park visitors as an educational opportunity to reflect and offer feedback on the park experience. These methods were developed in accordance with the team’s experience conducting social science research at diverse units throughout the national park system.

In addition to collecting survey data and engaging respondents in a participatory mapping exercise, survey administrators distributed small GPS units (i.e., data loggers; 1” x 2”; Canmore GT-740 FL-S) to track backcountry use in Denali (see Figure 3).

Survey respondents were asked to carry the GPS units throughout the park and return them to the location where the survey was administered. The units were small, non-invasive, made no noise, and had no display. All GPS data were collected throughout the field season and sampling primarily occurred at the BIC. During the sampling periods (survey schedule was stratified by time of day and day of the week), all backpacking groups that passed through the BIC to receive a permit and training for their visit were intercepted and asked to participate in the study. Upon agreement, a GPS unit was administered to one person per group. That person was responsible for returning the unit at the conclusion of the visit. In line with previous literature, the GPS units were set to mark waypoints at 15 second intervals (Beeco, et al., 2013, 2014; D'Antonio, et al, 2010). If the group was leaving for the backcountry that day, the unit was turned on for them, which reduced burden and forgetfulness. When the groups returned from the backcountry, the survey was administered to gather more in-depth information. On a weekly basis, survey data were uploaded and spatial data were extracted and converted into .csv and .gpx files using Canway software.

Figure 3. GPS unit used to collect on-ground spatial data from respondents

On-ground spatial data collected using GPS trackers were derived from three sources. First, tracking data were collected from independent travelers visiting the backcountry during the survey administration process described above (n=113). Independent travelers had almost complete control over their travel within the backcountry. These groups were only limited by restrictions on overnight use within each unit. There was a predetermined number of people allowed to camp in each backcountry unit to reduce ecological impacts and maintain solitude. These use limits varied by backcountry unit, ranging from two to twelve (special guide groups) people that were issued permits to camp in a unit for any given night. Second, 200 tracks were collected by NPS staff, including spatial data from ranger-led day hikes called 'Discovery Hikes' (n=178). Park staff were asked to carry these units to inform a pilot project focused on backcountry use in the park. The Discovery Hikes, also referred to as "Disco Tours" offered off-trail experiences for visitors who were "hesitant to strike out into Denali's trail-less wilderness on their own" (Abbe & Burrows, 2014, p.44). In 2016, Disco Tours were offered twice a day, one on the eastern side and the other on the western side of the park road. Finally, tracking data were collected from park-sponsored educational guided trips (n=22). Two non-profit partners working with the NPS, the Denali Education Center and Alaska Geographic, led these day and overnight field seminars for educational purposes. Few guided tours were offered over the course of the 2016 peak season. Through these three sources, 313 GPS tracks were collected from backcountry users during the 2016 peak season.

Data Analysis

Completed and usable survey and spatial data were coded and entered into databases for analysis using Statistical Package for the Social Sciences Version 24. For various response categories, frequency distributions and valid percentages (i.e., percentages excluding missing values) were estimated. Descriptive statistics were also calculated to illustrate mean values (i.e., averages) and standard deviations. To analyze various predictors of behavior (e.g., cultural values), structural equation modeling was used to examine the measurement properties of scaled survey items and test the study hypotheses in Mplus version 7. This study was reviewed by the University of Illinois Institutional Review Board and approved under exempt status (IRB Protocol Number 16849).

Data collected during the participatory mapping exercise were analyzed using ArcGIS version 10.4. From the first step in the mapping exercise, preference points allocated across the 13 categories of assigned values were analyzed in SPSS to determine their relative importance. From the second step in the mapping exercise, all points assigned to places by survey respondents were digitized and entered into a Geographic Information System (GIS) geodatabase. Surveys and their corresponding maps were linked using a six-digit survey ID.

Respondents were segmented into two subgroups defined by their engagement in front and backcountry activities. Given that visitors were not asked to self-identify as front or backcountry users, a set of criteria were developed to guide the segmentation analysis. Distribution of backcountry use permits occurred at the BIC so respondents surveyed at the BIC received backcountry user status. Also, respondents surveyed at the other sampling sites were classified as backcountry users if they marked any combination of “camping”, “hunting”, or “mountaineering” in their response to the survey question “which of the following activities have you participated in during your visit?” There was one exception in the outlined process; respondents surveyed at Riley Creek Campground who marked “camping” (n=60) were not classified as backcountry users given the site’s proximity to the park entrance and main park road. Using ArcGIS, kernel density analyses were performed to show the location and spatial distribution of values assigned by front and backcountry visitors. Additionally, independent samples t-tests were used to compare value allocations between the two subgroups.

GPS tracking data were analyzed for the pooled sample and three subgroups of respondents defined as backcountry users: 1) Unguided independent groups, 2) Ranger-led day hikers, and 3) Guided educational tourists. Following the field season, all .csv files generated from the trackers were uploaded into Arc GIS 10.4 software. First, GPS data were converted from the WGS 1984 to the NAD 1983 Alaska Albers coordinate system. After data were visually cleaned, the length, distance, destination, level of remoteness, and density of Denali backcountry trips were examined using ArcGIS 10.4 (Table 1). Data collected from the GPS units resulted in aggregate maps that provided sufficient detail to determine where visitors traveled, how long they spent in specific locations, and who (demographically and in terms of recreation characteristics) used resources differently within the park.

Table 1. Spatial analyses performed using GPS tracking data

Variable	Research Question	Spatial Analyst Tools	Description of Analysis
Length	How much time did visitors spend in the Denali backcountry? (Beeco & Brown, 2013)	Spatial Statistics	For each user group, spatial statistics were used to determine how long (days and hours) visitors spent in the backcountry. Date and time from GPS tracks were analyzed.
Distance	What was the total distance traveled? (Edwards & Griffin, 2013)	Point to Line Conversion, Trace Tool, Spatial Statistics	Point data were converted to line files. To account for distance overestimation, data were cleaned using the trace tool. Total distance traveled and distance statistics for each day were calculated.
Destination and Path	Where did visitors go? (Beeco & Hallo, 2014)	Intersect, Dissolve by Group, Join Units & Routes	Intersected routes were analyzed within designated backcountry units. The distance traveled in each unit was mapped and totaled.
Level of Remoteness	How far did visitors deviate from the park road?	Near Tool, Dissolve by Group	The Near tool measured distance from the park road and entrance area. The GPS points furthest away from the features determined level of remoteness.
Density	Where were low density and/or high density areas located to indicate hot spots? (Beeco & Brown, 2013)	Line Density, and Kernel Density	Spatial diffusion by line density and kernel was analyzed. Line density was used to create raster cells with counts of route lines intersecting the cells. Kernel density analysis identified high density campsite areas.

Results: Values of Denali National Park

This section of the report presents results from on-site survey data that examined trip characteristics and self-reported knowledge, values (individual, cultural, and assigned), and behavior.

SECTION A: Background information

As described in Table 2, the average group size of visitors included in the sample was nearly seven people (*M*=6.68, *SD*=11.75). However, these data were positively skewed (see Figure 4) so categories of group size were examined. One in ten respondents (9.9%) visited the park alone, just over half (55.5%) reported traveling with only one other person, and 24.9% were in groups of three to five people including themselves. The remaining portion of visitors were in groups larger than six. Respondents were also asked to describe their personal groups. The two largest self-identified group types were Family (54.1%) and Friends (26.5%). A total of 11.7% of visitors identified as travelling alone and 7.6% were in a group including family and friends. The majority of visitors (95.4%) were overnight users in the Denali region. The average number of nights spent in the park or the surrounding areas (i.e., lodging just outside the park, Healy, Talkeetna) was 3.23 days.

Table 2. Description of groups that visited Denali

Group Composition	Mean (SD)	N (%)
Group size	6.68 (11.75)	
1		65 (9.9)
2		364 (55.5)
3-5		163 (24.9)
6-10		54 (8.2)
11-46		10 (1.9)
Description of personal group		
Traveling alone		78 (11.7)
Family		361 (54.1)
Friends		177 (26.5)
Family and friends		51 (7.6)
Day users		25 (4.6)
Overnight users		516 (95.4)
Total number of nights spent in the park	3.23 (5.23)	

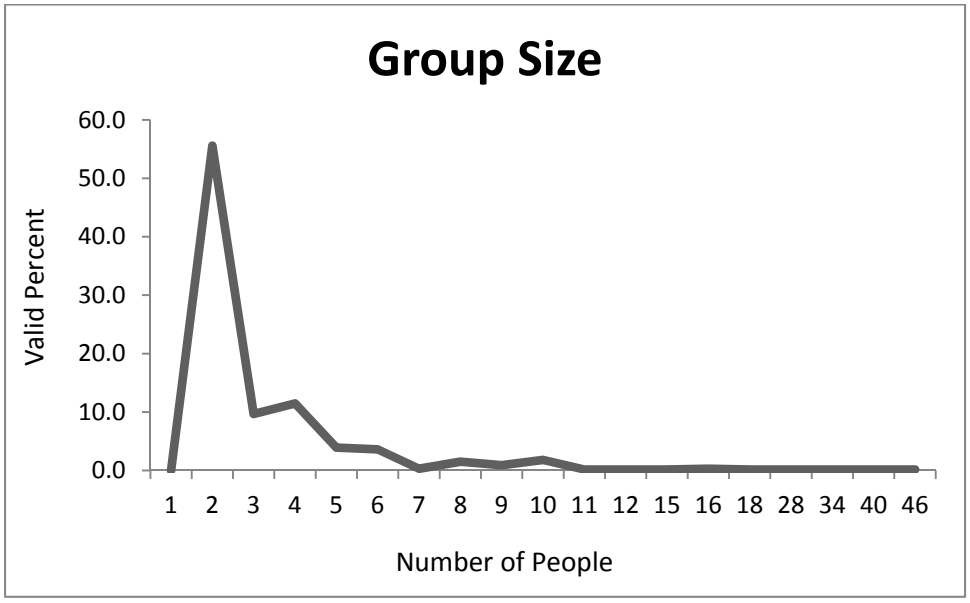

Figure 4. Size of survey respondents' personal groups

To better understand visitors' previous experiences at Denali, respondents were asked about the number of nights they stayed in the area (*M*=3.24), number of visits made in the previous year (*M*=1.0), and total number of times visiting the park (*M*=5.14) (see Table 3). Given that the data reflecting the total number of previous visits were right skewed (see Figure 5), sub-categories were created to better understand respondents' experience use histories. On average, the majority (79.9%) was visiting the park for the first time, nearly one in ten (8.9%) had visited on one previous occasion, one in ten (8.9%) had visited between three and ten times, and few (3.2%) had previously visited on more than three occasions.

Table 3. Experience use history among visitors to Denali

History of Participation	Mean (SD)	N (%)
Total number of nights in the area	3.24 (5.24)	
Number of visits in the last 12 months	1.00 (1.79)	
Total number of previous visits	5.14 (47.05)	
1		436 (79.9)
2		49 (8.9)
3-10		47 (8.6)
More than 10		17 (3.2)
Visit part of a cruise ship		
Yes		71 (10.6)
No		599 (89.4)

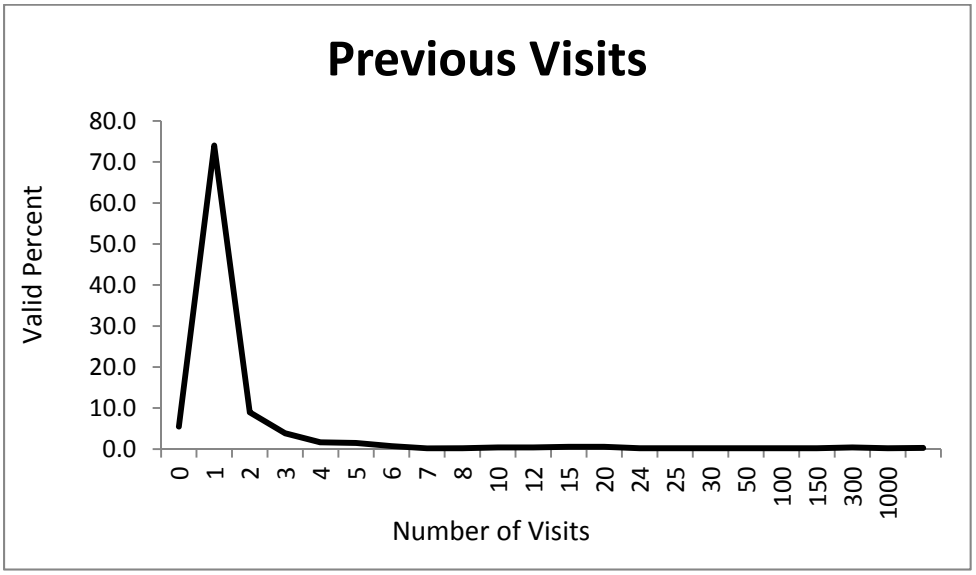

Figure 5. Respondents reported experience histories visiting Denali

The majority of visitors included in the study (89.4%) were not part of a cruise ship tour. Although many visitors to the park were part of a cruise, this segment of the survey population was underrepresented due to the sampling methods adopted for this study. Most visitors to the park are picked up and dropped off at lodges outside of the park, and due to limited time and resources, data collection occurred primarily within the protected area to ensure a robust and complete sample of day users in the park. In a similar vein, it is worth noting that a number of visitors explained their trip was reserved through a cruise line (e.g., Princess), but they considered their visit to be the "land-portion" of the cruise. Therefore, they did not identify as being part of a cruise ship group. As displayed in Table 4, the most common recreational activities were hiking (65.5%), taking bus trips (63.0%), photography (73.0%) and viewing wildlife (69.4%). Other common activities reported were staying in lodges (27.0%), camping (42.2%), and listening to natural sounds (43.0%).

Table 4. Activities that survey respondents participated in during their trip to Denali

Activity engagement	N (%)
Hiking	487 (65.5)
Bus Trips	469 (63.0)
Scenic Air Tour	70 (9.4)
Hunting	2 (0.3)
Taking Photographs	543 (73.0)
Cycling	38 (5.1)
Staying at Lodges	201 (27.0)
Mountaineering	41 (5.5)
Viewing Wildlife	516 (69.4)
Birding	58 (7.8)
Citizen Science	23 (3.1)
Fishing	31 (4.2)
Camping	314 (42.2)
Listening to Natural Sounds	320 (43.0)
Rafting	66 (8.9)
Taking Jeep of ATV Tours	28 (3.8)
Ranger Led Tours	73 (9.8)

Note. Respondents could check all that applied so column totals may not equal 100%.

Table 5 shows the primary activities of survey respondents. Results indicated the majority of visitors identified their primary recreation activities to be hiking (35.8%), taking bus trips (18.1%), viewing wildlife (14.1%), and camping (15.4%).

Table 5. Primary activities reported by survey respondents

Primary activities	N (%)
Hiking	225 (35.8)
Bus trips	114 (18.1)
Scenic air tours	8 (1.3)
Taking photographs	56 (8.9)
Cycling	1 (0.2)
Staying at lodges	14 (2.2)
Viewing wildlife	89 (14.1)
Birding	1 (0.2)
Citizen science	9 (1.4)
Fishing	2 (0.3)
Camping	97 (15.4)
Listening to natural sounds	2 (0.3)
Taking jeep or ATV tours	2 (0.3)
Ranger led tours	1 (0.2)

This study examined visitors' views about wildlife sightings and asked respondents to rank the perceived importance of the "Big Five" animals found in Denali. Table 6 shows the frequency of sightings and ranked importance of each animal. Most visitors (80.2%)

saw moose during their visit. This was followed by caribou (73.5%), grizzly bears (68.4%), Dall sheep (54.5), and wolves (9.1%). When asked to rank each of the animals in a way that expressed their relative importance, visitors reported the following: 1) grizzly bear, 2) moose, 3) wolf, 4) caribou, and 5) Dall sheep. The survey did not specify that respondents had to see an animal to rank it; however, anecdotally, respondents ranked wildlife more favorably if they were viewed in the park by the visitor. This may account for the large standard deviation and fewer respondents that highly ranked the importance of wolves in Denali (see Figure 6).

Table 6. Evaluations of wildlife sightings and their relative perceived importance

Wildlife Sighting and Ranking	N (%)	Mean (SD)
Grizzly Bear	467 (68.4)	1.68 (1.02)
Moose	548 (80.2)	2.73 (1.21)
Wolf	62 (9.1)	3.31 (1.49)
Caribou	502 (73.5)	3.39 (1.10)
Dall Sheep	372 (54.5)	3.89 (1.09)

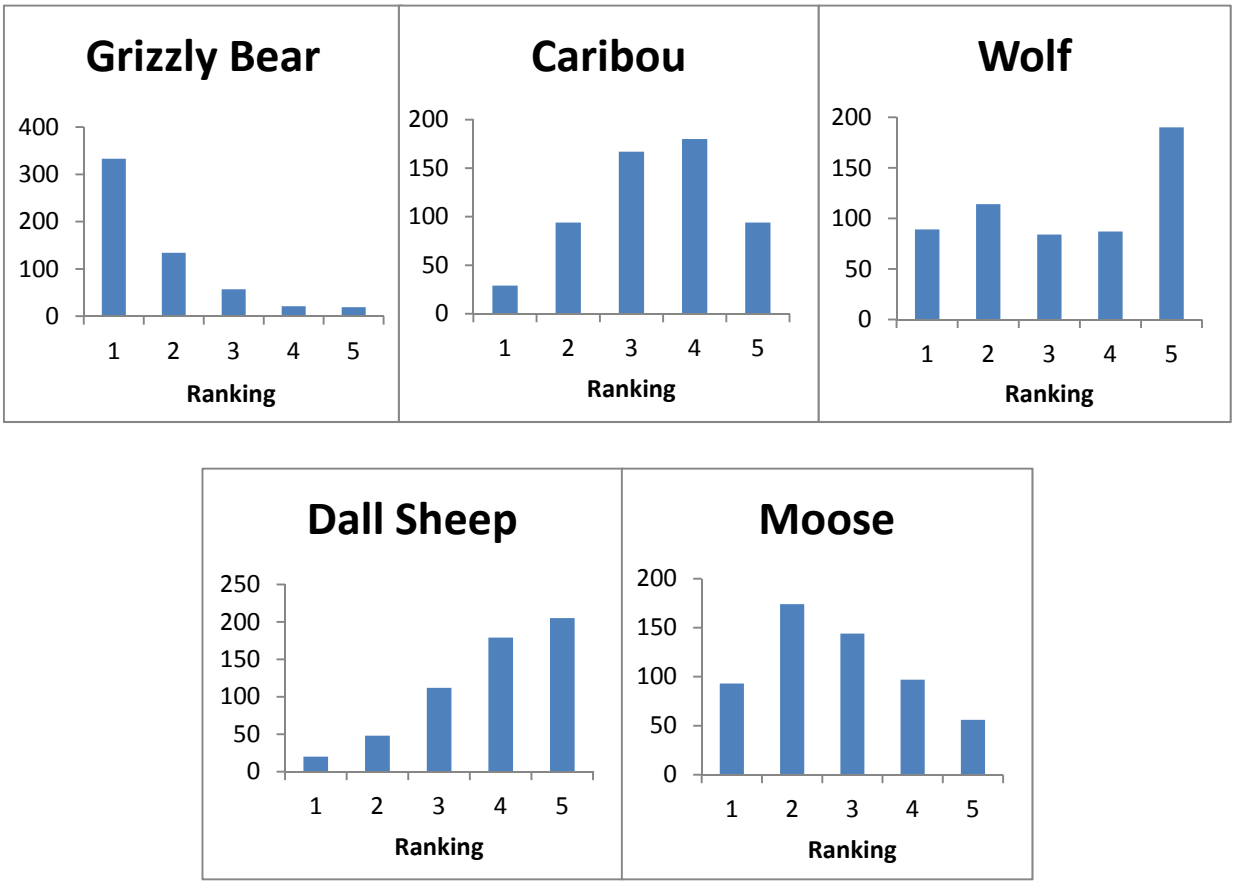

Figure 6. Frequency distributions of the relative perceived importance of wildlife in Denali on a scale of 1 being “Most Important” and 5 being “Least Important”

Self-reported knowledge

Self-reported knowledge was examined across three dimensions drawn from past research (see Table 7). Survey items were tailored to the study context and all scales were reliable (α = .842-.902). Results indicated respondents did not consider themselves to have extensive knowledge of Denali of physical resources (*M* = 2.73), management practices (*M* = 2.62), and cultural resources (*M* = 2.17).

Table 7. Self-reported knowledge among park visitors

Self-reported knowledge[1]	**Mean (SD)**
Physical resources (α = .842)	**2.73 (0.70)**
Wildlife	3.37 (0.81)
Plant life	2.66 (0.90)
Insects	2.23 (0.92)
Water	2.97 (0.96)
Geology	2.70 (0.95)
Alpine ecology	2.47 (1.03)
Cultural resources (α = .902)	**2.17 (0.83)**
Archeological resources	1.90 (0.90)
Cultural landscapes	2.24 (0.96)
Historic and prehistoric structures	2.13 (0.96)
Museum objects	2.16 (1.00)
Human history and prehistory	2.46 (1.03)
Management practices and issues (α = .896)	**2.62 (0.88)**
Wildlife management	2.91 (0.99)
Vegetation management	2.44 (1.06)
Fire management	2.56 (1.12)
Water quality issues	2.61 (1.13)
Visitor experiences	2.78 (1.06)

[1] Measured on Likert scale where 1 = “No knowledge” to 5 = “Proficient knowledge.”

SECTION B: Individual values

Four types of individual values, defined as guiding principles in life, were evaluated including *Biospheric* and *Altruistic* values that reflected concern for other organisms and people, respectively (see Figure 7). These two types of values tend to positively correlate with environmental behavior (Stern, 2000). *Egoistic* and *Hedonic* values reflecting self-interest and short-term gratification were also measured. These value orientations are thought to negatively correlate with environmental behavior (Steg et al., 2014). A graphical representation of these four types of individual values is displayed in a value wheel that shows *Biospheric* and *Altruistic* values situated on opposite poles as *Egoistic* and *Hedonic* values. As indicated by the red outline, results suggested *Altruistic* value (i.e., concern for human welfare) (*M* = 7.56) and *Biospheric* value centered on non-human species (*M* = 7.44) were the most important guiding principles in life for the by survey respondents included in this study.

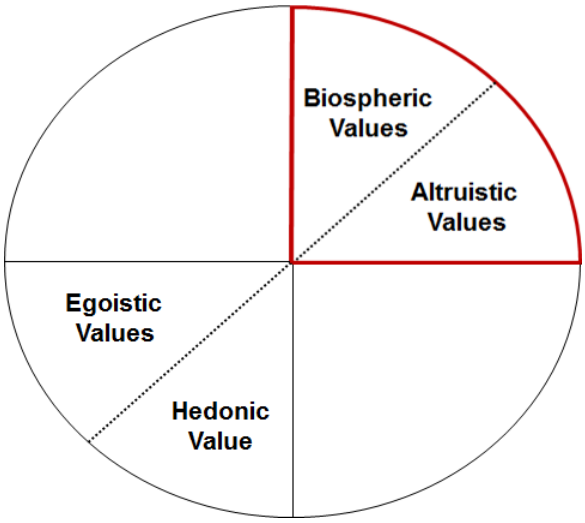

Figure 7. Four types of individual values situated as polar opposites in a "value wheel." The red outline indicates respondents were primarily driven by *Biospheric* and *Altruistic* values.

As shown in Table 8, *Hedonic* values, reflecting short-term gratification were the third most important (*M*=6.47), while *Egoistic* values (*M*=4.75) were rated least important. It is worth noting that a fifth type of value was measured to evaluate "*Eudaimonia*," defined as individual interests in long-term wellbeing and gratification (*M*=7.35, *SD*=1.29). However, this dimension was dropped from the analysis due to low factor loading scores. All survey scales were reliable (Chronbach's alpha (α) scores = .678 - .880).

Table 8. Average individual values scores reported by survey respondents

Held values	**Mean (SD)**
Altruistic values (α = .879)	**7.56 (1.51)**
A world at peace: free of war and conflict	7.33 (1.90)
Equality: equal opportunity for all	7.76 (1.61)
Social justice: correcting injustice, care for others	7.51 (1.72)
Biospheric values (α = .880)	**7.44 (1.43)**
Unity with nature: fitting into nature	7.24 (1.67)
Protecting the environment: preserving nature	7.66 (1.48)
A world of beauty: beauty of nature and the arts	7.44 (1.59)
Hedonic values *(α = .819)*	**6.47 (7.35)**
Pleasure: gratification of desires	5.84 (1.79)
Enjoying life: enjoying food, sex, leisure. etc.	6.97 (1.62)
Seeking fun: lighthearted pleasure and amusement	6.68 (1.67)
Egoistic values (α = .678)	**4.86 (1.41)**
Authority: the right to lead or command	5.15 (1.90)
Social power: control over others, dominance	3.61 (1.86)
Influential: having an impact on people and events	5.50 (1.67)

Note: Mean values were rated on a Likert scale where 1 = "Opposed to my Values" and 9 = "Of Supreme Importance."

SECTION C: Cultural values

This study examined cultural values (i.e., guiding worldviews that define societies often in geographical terms) (Kahan, 2011). Cultural values were organized into two categories that existed along a spectrum, similar to individual values. On one hand, respondents could align with a culture that ranged from *Hierarchical* (i.e., people who cared about class distinctions) to *Egalitarian* (i.e., people who cared about class fluidity). On the other hand, they could align with a culture characterized by *Individualist* (i.e., people who preferred limited government intervention) or *Communitarian* (i.e., people who defined themselves in terms of their community) ideals (see Figure 8). Results showed that respondents agreed with most *Individualist* survey items that indicated priorities for individual achievement rather than collective welfare (M=3.09, SD=0.88) and disagreed with survey items measuring *Hierarchical* worldviews that emphasized the importance of distinct social roles (M=2.33, SD=1.05). Figure 9 shows the distribution and density of the mean scores of individual respondents for the two cultural value scales. These results showed that most *Egalitarians* were *Communitarians* and most *Individualists* were *Hierarchical.* Given these diametrically opposed measures, the overall mean score for cultural values fell within Quadrant IV.

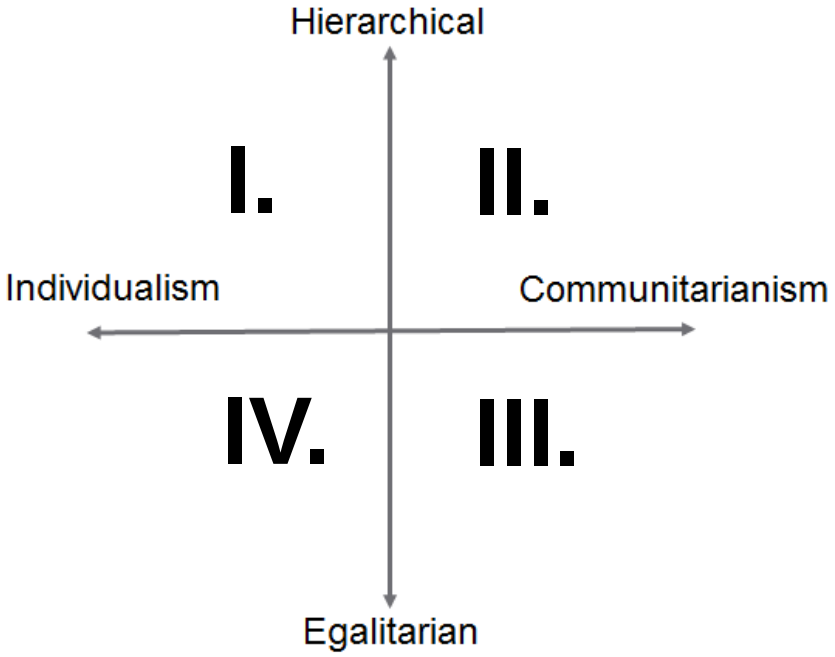

Figure 8. The four types of cultural values evaluated in this study, indicating respondents could situate themselves along a spectrum ranging from hierarchical to egalitarian and individualism to communitarianism.

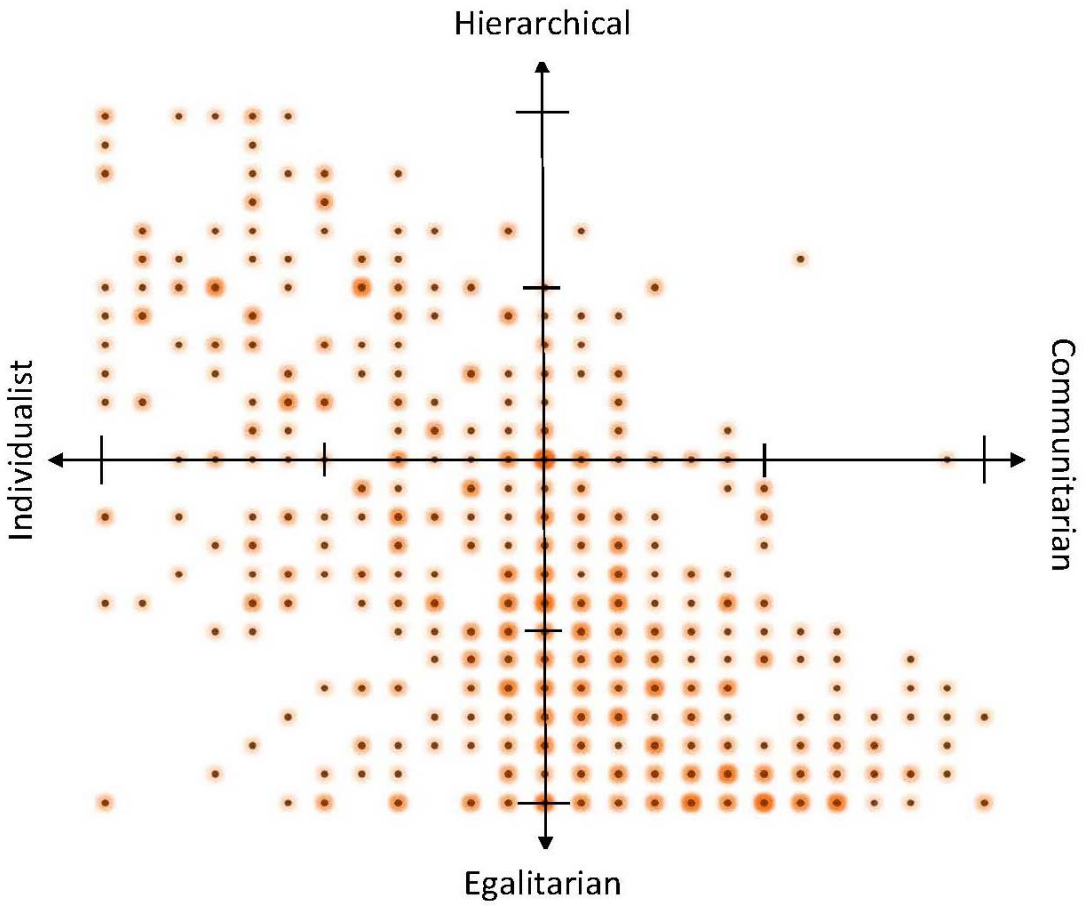

Figure 9. Distribution and density of cultural value scores. The darker the spot

Respondents visiting Denali from countries other than the United States were instructed by the field technicians to respond to items with their own country of residence in mind. Given the number of visitors from outside of the United States, having respondents answer on behalf of their current country of residence was important to maintain internal validity. The survey scales were reliable (α = .732 - .921).

Table 9. Agreement or disagreement with survey items measuring cultural values.

Cultural Worldviews[1]	**Mean (SD)**
Individualism (α = .820)	**3.09 (0.88)**
The government interferes far too much in our everyday lives	3.29 (1.21)
*Sometimes government needs to make laws that keep people from hurting themselves**	2.38 (1.14)
It's not the governments business to try to protect people from themselves	2.92 (1.21)
The government should stop telling people how to live their lives	3.31 (1.21)
*The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals**	3.23 (1.25)
*Government should put limits on the choices individuals can make so they don't get in the way of what's good for society**	3.41 (1.22)

Hierarchical (α = .875)	**2.33 (1.05)**
We have gone too far in pushing equal rights in this country	2.30 (1.32)
*Our society would be better off if the distribution of wealth was more equal**	2.58 (1.39)
*We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women**	2.29 (1.32)
*Discrimination against minorities is still a very serious problem in our society**	2.08 (1.17)
It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them	2.33 (1.39)
Society as a whole has become too soft and feminine	2.39 (1.40)

[1]Measured along a Likert scale where 1 = "Strongly Disagree" and 5 = "Strongly Agree."
*Reverse coded survey items; average scores presented were recoded to reflect the opposite sign

SECTION D: Assigned values

Relative importance of assigned values

This study measured a third kind of value referred to as an "assigned value" defined as the perceived qualities of places. The relative importance of 13 assigned values was evaluated in the first step of a participatory mapping exercise. A total of 13 assigned values were drawn from past research (Sherrouse et al., 2011; van Riper et al., 2012) and tailored to the study context (see Table 10). Several notable departures from past work reflected in the typology used for this study include the addition of *Wilderness* and *Soundscape* values, and use of *Ecological Integrity* in place of *Biodiversity* value.

Table 10. Definitions of 13 assigned values.

Assigned Value	Description
Aesthetic	I value Denali National Park for the attractive scenery, sights, sounds, or smells
Ecological Integrity	I value Denali National Park for its intact ecosystem where predators (e.g., wolves) and prey (e.g., Dall sheep) are in balance.
Cultural	I value Denali National Park because it preserves historic places and archaeological sites that reflect human history of the island
Economic	I value Denali National Park because it provides economic benefits from recreation and tourism opportunities.
Future	I value Denali National Park because it allows future generations to experience this place
Intrinsic	I value Denali National Park in and of itself for its existence
Learning	I value Denali National Park because I can learn about natural and cultural resources
Wilderness	I value Denali National Park because it represents minimal human impact and/or intrusion into natural environment.
Spiritual	I value Denali National Park because it is spiritually significant to me
Recreation	I value Denali National Park because it provides a place for my favorite outdoor recreation activities.
Therapeutic	I value Denali National Park because it makes me feel better, physically and/or mentally
Scientific	I value Denali National Park because it provides an opportunity for scientific observation or experimentation
Soundscape	I value Denali National Park because I can hear natural sounds

Results suggested the most important assigned values were *Wilderness* (*M*=17.11), *Aesthetic* (*M*=15.72), *Ecological Integrity* (*M*=12.44), and *Future* (*M*=10.26) (Table 11), suggesting that Denali was viewed as most important for these reasons. The least important values were *Economic* (*M* = 2.57)*, Spiritual* (*M* = 3.04) and *Soundscape* (*M* = 3.20).

Table 11. Preferences points given to each assigned value

Assigned Values[1]	Mean (SD)
Wilderness. *I value Denali because it represents minimal human impact and/or intrusion into natural environment.*	17.16 (17.46)
Aesthetic. *I value Denali for the attractive scenery, sights, sounds, or smells.*	15.77 (15.62)
Ecological Integrity. *I value Denali for its intact ecosystem where predators (e.g., wolves) and prey (e.g., Dall sheep) are in balance.*	12.38 (12.55)
Future. *I value Denali because it allows future generations to experience this place.*	10.28 (10.86)
Recreation. *I value Denali because it provides a place for my favorite outdoor activities.*	7.95 (9.70)
Scientific. *I value Denali because it provides an opportunity for scientific observation or experimentation.*	6.91 (8.27)
Intrinsic. *I value Denali in and of itself for its existence.*	6.23 (9.80)
Learning. *I value Denali because I can learn about natural and cultural resources.*	5.42 (6.98)
Therapeutic. *I value Denali because it makes me feel better physically, emotionally and/or mentally.*	5.02 (7.01)
Cultural. *I value Denali because it preserves historic places and archaeological sites that reflect human history.*	4.33 (6.39)
Soundscape. *I value Denali I can hear natural sounds.*	3.06 (6.11)
Spiritual. *I value Denali because it is spiritually significant to me.*	3.04 (6.46)
Economic. *I value Denali because it provides economic benefits from recreation and tourism opportunities.*	2.57 (5.12)

[1]Note. Respondents were given 100 points to divide among the available categories of assigned value.

Spatial location of assigned values

The second step in the mapping exercise involved respondents locating assigned values on a physical map of the Denali region. Respondents indicated the areas that embodied the categories they identified in the previous step by physically marking a point on the map and labeling it with the corresponding value. For example, many respondents associated the peak of Denali with *Aesthetic* value by drawing a point in the area and labeling it with an "A." This interface facilitated dialogue and a relatively in-depth interpretation of the study findings. Often, visitors shared stories of places visited and sought assistance with the mapping exercise. In this sense, many of these values were co-constructed by the dialogue between the field technicians and visitors. The dialogue also provided a rich source of qualitative data for broader understanding of the study context. Results indicated that a total of 3,727 points were assigned to places. The total number of points mapped by survey respondents is shown in Figure 10.

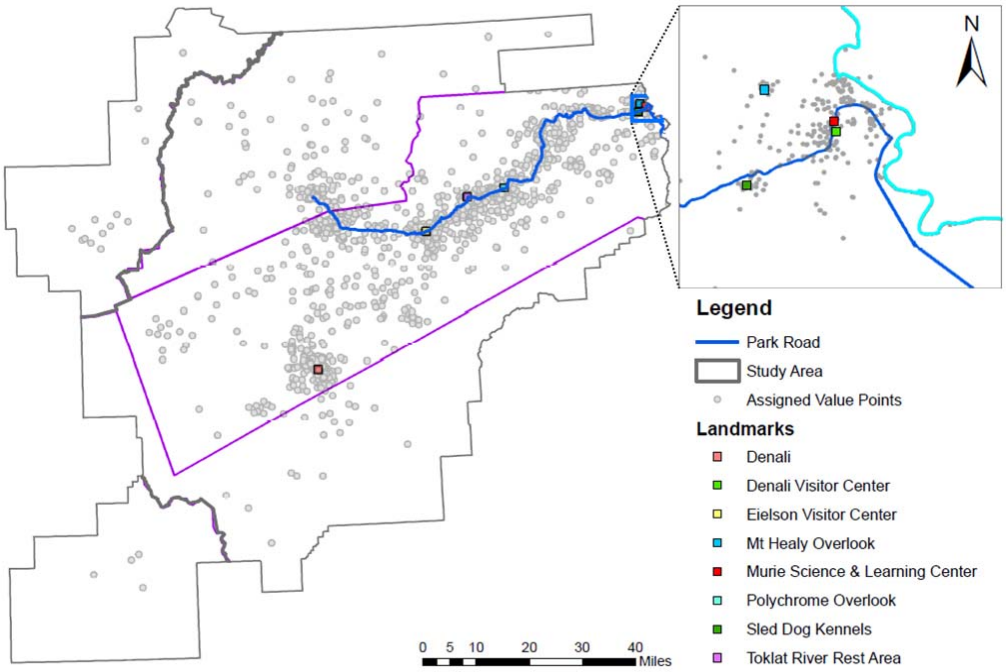

Figure 10. Digitized points that respondents assigned to places

A kernel-density surface map was created to illustrate the distribution and point density of all values assigned to places by the pooled sample of respondents (see Figure 11).

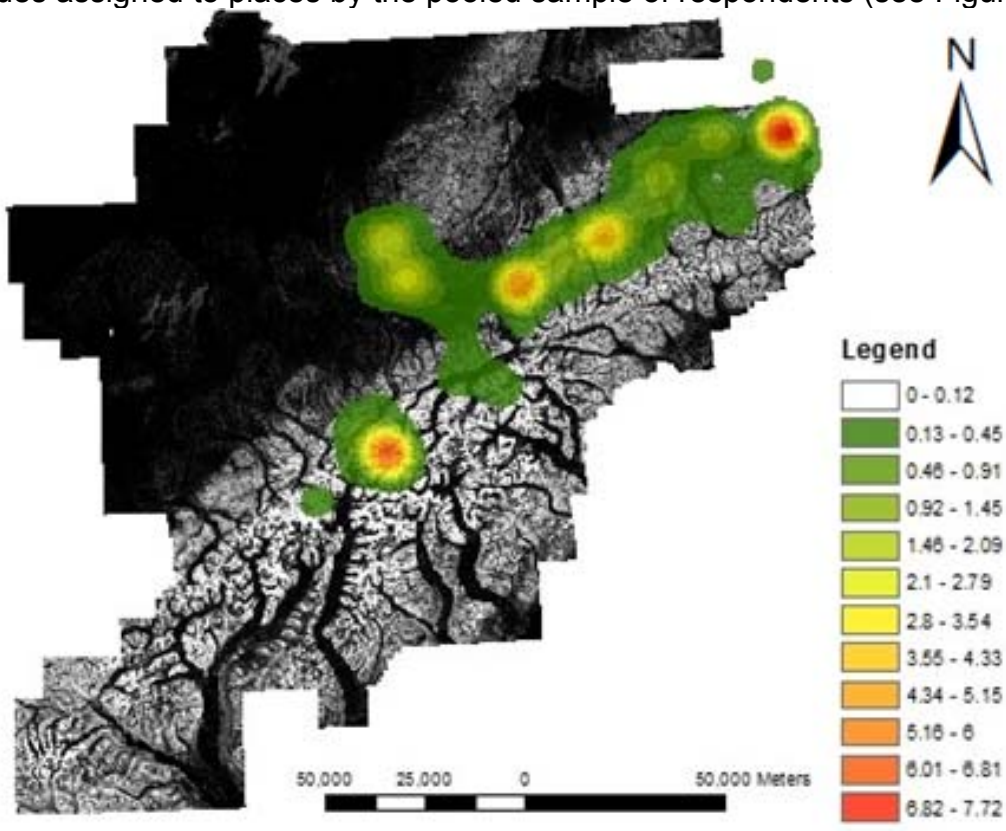

Figure 11. Results from a kernel density analysis of all assigned value points

Results showed a general concentration of value points around the park road and major landmarks. Areas of value abundance in the study area were identified on the basis of spatial clustering, including Denali, Polychrome Overlook, Eielson Visitor Center, and the Denali Visitor Center. Value clustering coincided with where visitors spent time off a bus (the overlook and the visitor centers), and, not insignificantly, the symbolic value of the Park.

Comparison assigned value points

Independent samples t-tests were used to determine significant differences between value allocations of front and backcountry visitors (see Table 12). Further analyses were conducted to better understand the spatial distribution of four assigned values that were evaluated differently: 1) *Aesthetic*, 2) W*ilderness*, 3) *Recreation*, and 4) *Learning.*

Table 12. Results from independent samples t-test indicating mean weights assigned to 13 assigned values for front and backcountry visitors

Value Type	**Backcountry Users** (n=276)		**Frontcountry Users** (n=370)		**t-stat**
	M	*SD*	*M*	*SD*	
Aesthetic	13.59	12.18	17.72	-3.27*	-3.27*
Ecological Integrity	12.14	10.58	13.83	-0.43	-0.43
Cultural	3.56	5.73	6.83	-1.26	-1.26
Economic	2.20	4.98	5.21	-1.58	-1.58
Future	9.35	8.67	12.20	-2.00*	-2.00*
Intrinsic	7.21	9.44	10.00	2.22*	2.22*
Learning	4.49	5.06	8.01	-3.12*	-3.12*
Recreation	9.67	10.78	8.60	3.79*	3.79*
Spiritual	3.56	6.45	6.45	1.76	1.76
Therapeutic	6.70	7.44	6.40	5.23*	5.23*
Scientific	7.04	8.03	8.45	0.38	0.38
Wilderness	16.69	15.34	18.87	-0.61	-0.61
Soundscape	3.43	4.58	7.04	1.45	1.45

*statistically significant at p=0.05

Visual comparisons were used to evaluate the value distributions of both backcountry and frontcountry users (see Figure 12). Values were unevenly distributed across the landscape indicating that the perceived benefits of nature varied for a diversity of reasons.

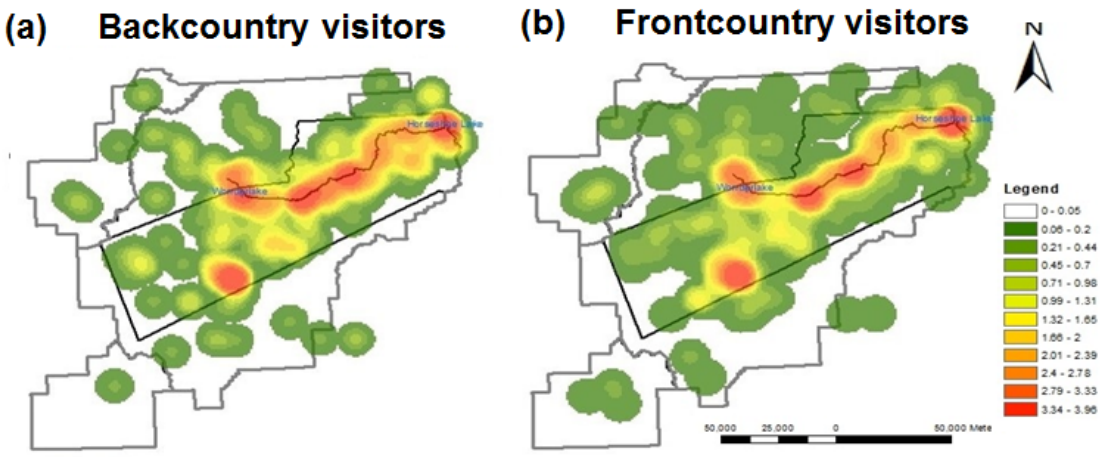

Figure 12. Results from a kernel density analysis of all assigned values mapped by (a) backcountry and (b) frontcountry visitors to Denali

In comparing the distribution of four select values, *Wilderness, Aesthetic, Recreation,* and *Learning,* frontcountry visitors' points were associated with a broader array of places, while backcountry users valued places more intensely (see Figure 13). Also, backcountry visitors allocated preference points to *Recreation*, *Wilderness*, and *Aesthetic* values at a significantly higher rate.

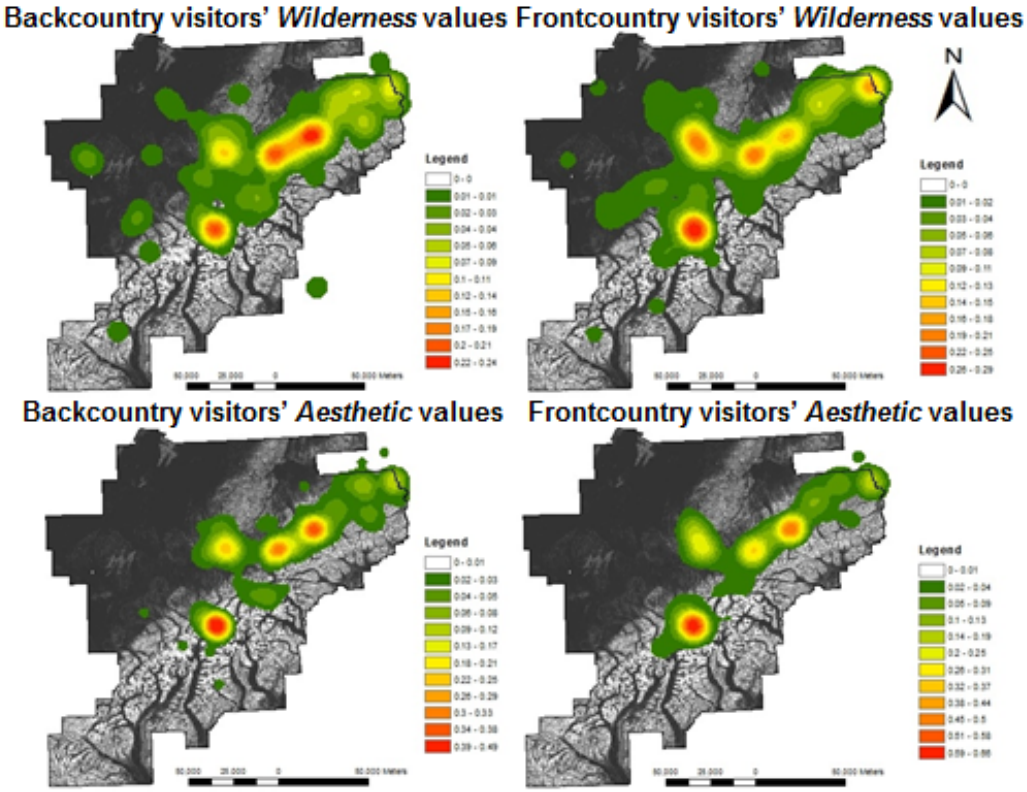

Figure 13. Results from a kernel density analysis of 13 assigned values mapped by front and backcountry visitors to Denali

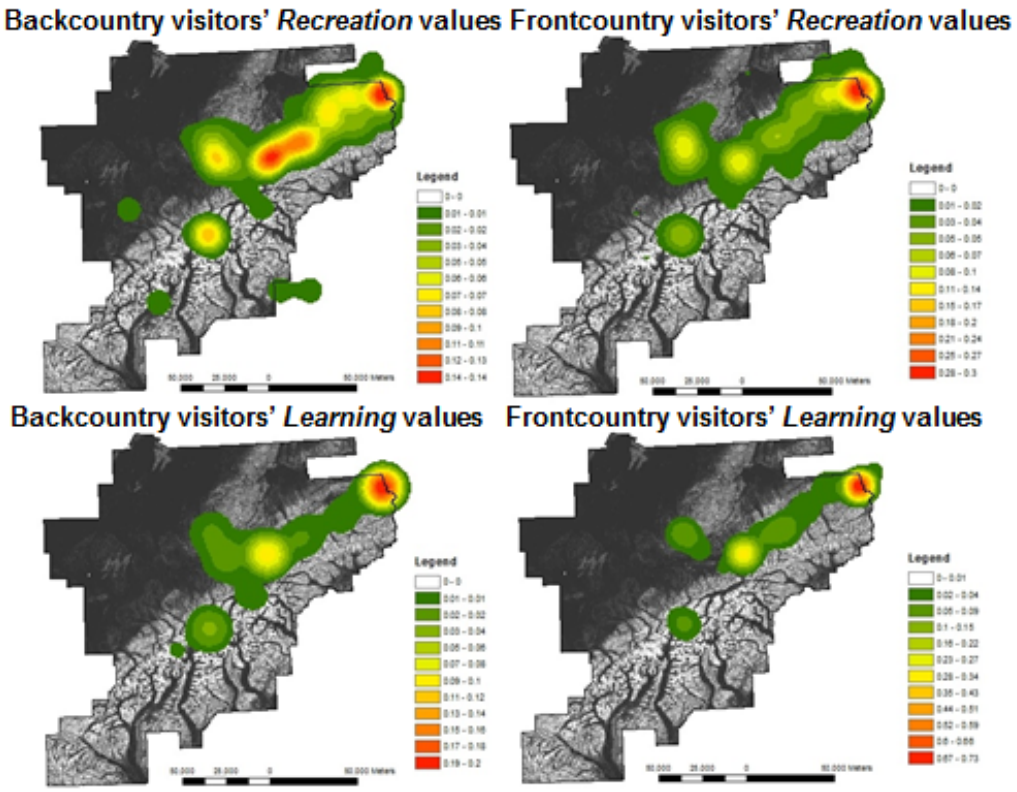

Figure 13 (continued). Results from a kernel density analysis of 13 assigned values mapped by front and backcountry visitors to Denali

Results: Environmental behavior

SECTION E: Reported Behavior

This study examined the frequency of environmental behaviors (i.e., actions that benefit the environment) reported during visits to the park (see Table 13) and behaviors intended by respondents after returning home (see Table 14). Behaviors in both contexts were measured in terms of three dimensions identified in past research that included multiple survey items tailored to the study context (van Riper & Kyle, 2014; Larson et al.2015). Results suggested visitors were twice as likely to engage in behaviors that indicated they led a *Conservation Lifestyle* while visiting the park (*M*=4.18, *SD*= 0.82) as compared to the other two types of behavior measured in this study. Respondents occasionally engaged in *Social Environmentalism,* which involved interacting with other people in a public atmosphere to show support for conservation (*M*=2.11, *SD*= 1.03). Actions that reflected *Environmental Citizenship* (*M*=2.05, *SD*= 1.08) were also reported, though to a less frequent degree. All of the survey scales were reliable (α =.764 - .842) after dropping three survey items from the analysis that measured the extent to which visitors avoided feeding wildlife (*M*=4.79), hiked in areas that were more durable and less likely to be impacted by human use (*M*=3.50), and spoke with other people about the environment (*M*=3.25).

Table 13. Environmental behavior performed while at Denali

Environmental behavior	Mean (SD)
Conservation lifestyle (α = .764)	**4.18 (0.82)**
Recycle paper, plastic or metal	4.36 (0.98)
Conserve water or energy	4.35 (0.84)
Buy environmentally friendly and/or energy efficient products	3.83 (1.13)
Social environmentalism (α = .842)	**2.11 (1.03)**
Participate as an active member of a discussion about the environment	2.40 (1.33)
Participate in a scientific research related to the environment	1.91 (1.24)
Volunteer for environmental causes (e.g., restore native or remove exotic species)	1.90 (1.17)
Work with other people to address an environmental problem	2.29 (1.31)
Environmental citizenship (α = .764)	**2.05 (1.08)**
Donate money to support environmental protection	2.23 (1.24)
Write a letter or leave a comment about an environmental issue	1.87 (1.17)

Note. Measured on a Likert scale where 1 = "Never" and 5 = "Very Often."

SECTION F: Intended Behavior

In addition to measuring pro-environmental activity in Denali, respondents were asked to report their intended actions after returning home. Similar to reported behaviors, visitors intended to adopt a strong *Conservation Lifestyle* (*M*=0.39, *SD*=0.71) and occasionally engage in *Social Stewardship* (*M*=2.65, *SD*=1.10) and *Environmental Citizenship* (*M*=2.53, *SD*=1.11) after returning home. All of the survey scales were reliable (α scores ranged from .774 to .883). Similar to the analysis of reported behavior items, three survey items were dropped from the analysis, including intended behaviors to avoid feeding wildlife (*M*=4.60), hike in areas that are more durable and less likely to be impacted by human use (*M*=3.65), and talk with other people about the environment (*M*=3.42).

Table 14. Behaviors intended after returning home from Denali

Intended behaviors at home	Mean (SD)
Conservation lifestyle (α = .805)	**4.39 (0.71)**
Recycle paper, plastic or metal	4.61 (0.77)
Conserve water or energy	4.46 (0.76)
Buy environmentally friendly and/or energy efficient products	4.11 (0.98)
Social environmentalism (α = .883)	**2.65 (1.10)**
Participate as an active member of a discussion about the environment	2.86 (1.31)
Participate in a scientific research related to the environment	2.32 (1.31)
Volunteer for environmental causes (e.g., restore native or remove exotic species)	2.55 (1.22)
Work with other people to address an environmental problem	2.84 (1.31)
Environmental citizenship (α = .774)	**2.53 (1.11)**
Donate money to support environmental protection	2.77 (1.21)
Write a letter or leave a comment about an environmental issue	2.29 (1.25)

Note. Measured on a Likert scale where 1="Never" and 5="Very Often."

A comparison between reported and intended behaviors was performed using paired samples t-tests to determine whether visitors to Denali would adopt environmental practices to a greater degree after returning home (see Table 15). Significant differences were detected, in that visitors intended to engage in more environmental activity after returning home across all measures of behavior evaluated in this study.

Table 15. Comparison between reported and intended behaviors of survey respondents

	Reported Behavior	Intended Behavior	
Type of action	**M(SD)**	**M(SD)**	**t-stat (df)**
Conservation lifestyle	4.18 (0.82)	4.39 (0.71)	6.79* (608)
Social environmentalism	2.11 (1.03)	2.53 (1.11)	13.02* (585)
Environmental citizenship	2.05 (1.08)	2.53 (1.11)	12.52* (596)

*$p \leq .05$.

SECTION G: Multi-level value-behavior model

The relationship between values and behaviors was examined using two-step structural regression modeling, which is a technique used to test multiple dependent variables (Anderson & Gerbing, 1998). Specifically, a series of hypotheses were tested to better understand the effects of cultural (H_1-H_8), assigned values (H_9-H_{15}) and individual (H_{16}-H_{27}) values on reported behavior that benefited the protected area. The 27 hypotheses tested in this model are reflected in Figure 14. Each of the variables shown inside of a circle was represented by multiple survey items.

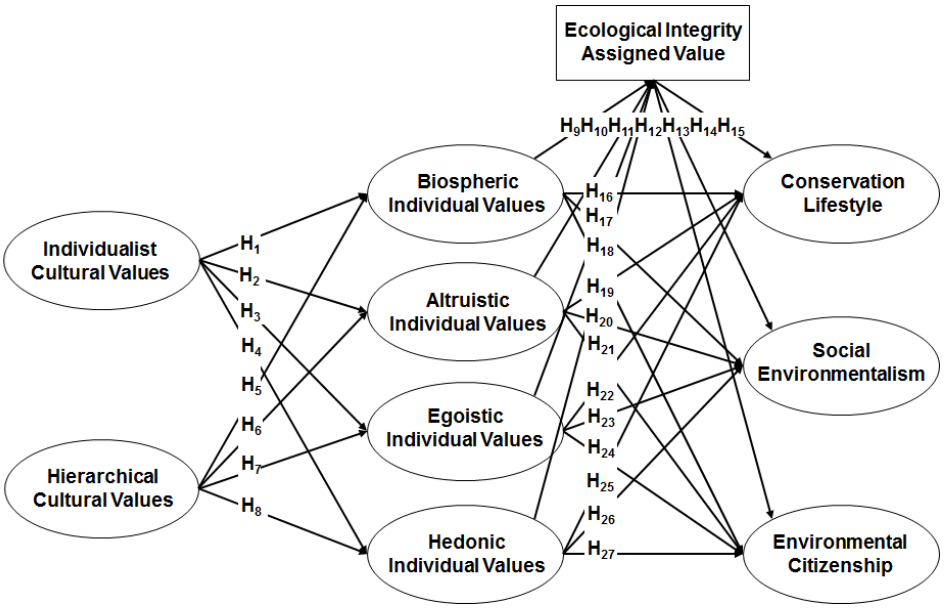

Figure 14. Hypothesized model of the relationships among multiple values and behavior

The hypothesized relationships were partially supported by the study findings (see Table 16). Results were consistent with H_1, H_3, and H_4, indicating *Individualist* cultural values positively predicted *Biospheric* (γ = 1.24, t = 6.45), *Altruistic* (γ = 1.01, t = 6.79), and *Hedonic* values (γ = 0.89, t = 6.18). Also in line with H_5, H_7, and H_8, negative relationships were found between *Hierarchical* cultural values and *Biospheric* (γ = -1.62,

t = -8.87), *Altruistic* (γ = -1.53, *t* = -11.17), and *Hedonic* values (γ = -0.95, *t* = -6.91) indicating that respondents who adopted an *Egalitarian* worldview were likely to hold these three types of individual value orientation. Two hypotheses, H_2 and H_6, were dropped from the final model given non-significant effects between cultural and individual values, and in turn, pro-environmental activity in Denali.

The assigned value category of *Ecological Integrity* value was regressed on the four dimensions of individual values. In support of H_9, as *Biospheric* values increased (β = .18, *t* = 4.05) so too did the perceived importance of Ecological Integrity qualities in the Denali landscape. Also, as hypothesized in H_{12}, respondents with stronger *Hedonic* value orientations (β = -.17, *t* = -3.53) were less likely to value Denali for its *Ecological Integrity* assigned values. The other six hypotheses concerning *Ecological Integrity* assigned value were non-significant.

The relationships between three types of environmental behaviors and individual values were evaluated (H_{16}- H_{27}). Results showed that *Social Stewardship* behavior was positively predicted by *Biospheric* (β = -.35, *t* = 7.32) and *Egoistic* values (β = .21, *t* = 4.17) but negatively predicted by *Hedonic* values (β = -.12, *t* = -2.41). Similarly, *Environmental Citizenship* behaviors were positively predicted by *Biospheric* (β = .30, *t* = 5.95) and *Egoistic* values (β = .18, *t* = 3.31) but negatively predicted by *Hedonic* values (β = -.14, *t* = -2.60). All paths leading to *Conservation Lifestyle* behaviors were dropped from the final model. A graphical representation of the final regression model is show in Figure 15, including the regression coefficients overlaid on the paths among variables and the R^2 values.

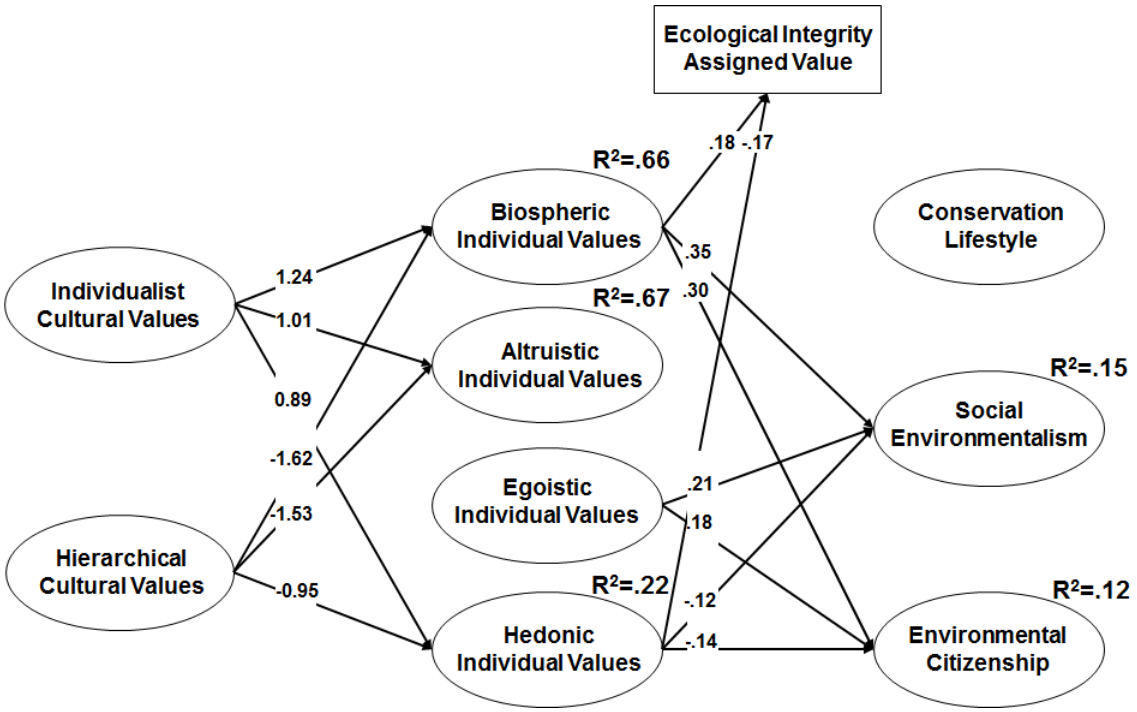

Figure 15. Final structural equation model showing the effects of cultural, individual, and an assigned value on environmental behaviors reported by visitors to Denali

Table 16. Results from two-step structural regression modeling procedure

Dependent variables	*Predictors*	γ	β	SE	t-value	R^2
Conservation Lifestyle	Biospheric	-	-	-	-	-
Social Stewardship	Biospheric	-	.35	.05	7.32	.15
Environmental citizenship	Biospheric	-	.30	.05	5.95	.12
Ecological integrity	Biospheric	-	.18	.05	4.05	-
Conservation Lifestyle	Egoistic	-	-	-	-	-
Social Stewardship	Egoistic	-	.21	.05	4.17	-
Environmental citizenship	Egoistic	-	.18	.05	3.31	-
Ecological integrity	Egoistic	-	-	-	-	-
Conservation Lifestyle	Altruistic	-	-	-	-	
Social Stewardship	Altruistic	-	-	-	-	-
Environmental citizenship	Altruistic	-	-	-	-	-
Ecological integrity	Altruistic	-	-	-	-	-
Conservation Lifestyle	Hedonic	-	-	-	-	
Social Stewardship	Hedonic	-	-.12	.05	-2.41	-
Environmental citizenship	Hedonic	-	-.14	.05	-2.60	-
Ecological integrity	Hedonic	-	-.17	.05	-3.53	-
Biospheric	Individualism	1.24	-	.19	6.45	.66
Biospheric	Hierarchical	-1.62	-	.18	-8.87	-
Egoistic	Individualism	-	-	-	-	-
Egoistic	Hierarchical	-	-	-	-	-
Altruistic	Individualism	1.01	-	.15	6.79	.67
Altruistic	Hierarchical	-1.53	-	.14	-11.17	-
Hedonic	Individualism	0.89	-	.14	6.18	.22
Hedonic	Hierarchical	-0.95	-	.14	-6.91	-

Results: GPS visitor tracking

In line with the third objective of this study, the following section of the report conveys results from tracking backcountry users with GPS units. Results are first presented for the pooled sample, followed by findings specific to the three subgroups: 1) Unguided Independent Travelers (n=113), 2) NPS-led day hikers (n=178), and 3) Guided educational tourists (n=22). Figure 16 shows all trips taken by respondents with GPS trackers collected during the 2016 field season.

SECTION H: Backcountry use patterns for pooled sample

Time, distance, level of remoteness, destination, and density of all GPS tracks were calculated to understand space-time patterns of backcountry users.

- Time: On average, backcountry groups spent 1.77 days (*SD*=1.26) in the backcountry with the longest continuous trip lasting 10 days.
- Distance: Distance varied among backcountry users. On average, visitors traveled nearly six miles (*M*=5.94, *SD*=6.37), though mileage was right-skewed

given that the majority of trips were under 3.5 miles (Median=3.31). The range of backcountry trips extended from 0.39 to 37.34 miles (10 days).

- Level of remoteness: The level of remoteness from the park road (i.e., the furthest straight-line distance from the park road) also showed variable patterns of use. The furthest any group hiked from the park road was 11.32 miles, but on average, groups ventured a straight-line distance of 1.63 miles (*SD*=1.73). From the entrance area where groups received permits and boarded the shuttle bus, groups traveled a mean distance of 36.0 miles (*SD*=14.51). The most remote group, relative to the entrance area, traveled 68.70 miles from the entrance while the closest backcountry group was only 2.61 miles from the entrance area at the furthest point.
- Destination: Of Denali's 87 backcountry units, the GPS tracks from this study were located in 43 of the units (see Figure 17). Visitors traveled an average of nearly 50 miles in each unit (*M*=49.65 miles, *SD*=55.99). Standardized by unit area, Units 11 (Stony Dome) and 13 (Mount Eielson) experienced the highest concentration of use at over 3.7 miles hiked per square mile.
- Density of tracks: In general, backcountry destinations were sought out in the units adjacent to the middle section of the park road with the exception of some concentrated use in Unit 1 along Triple Lakes Trail on the east end of the park (Figure 18).

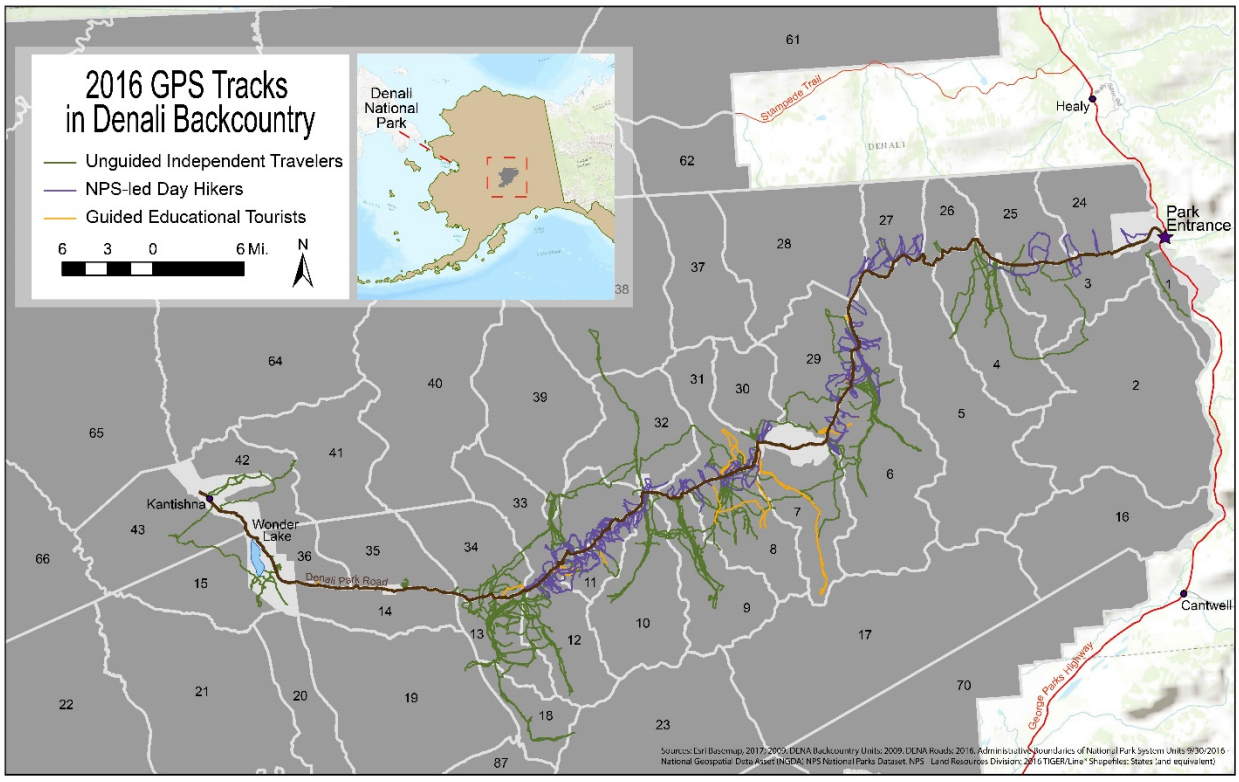

Figure 16. GPS tracks of use patterns for all visitors to the Denali Backcountry

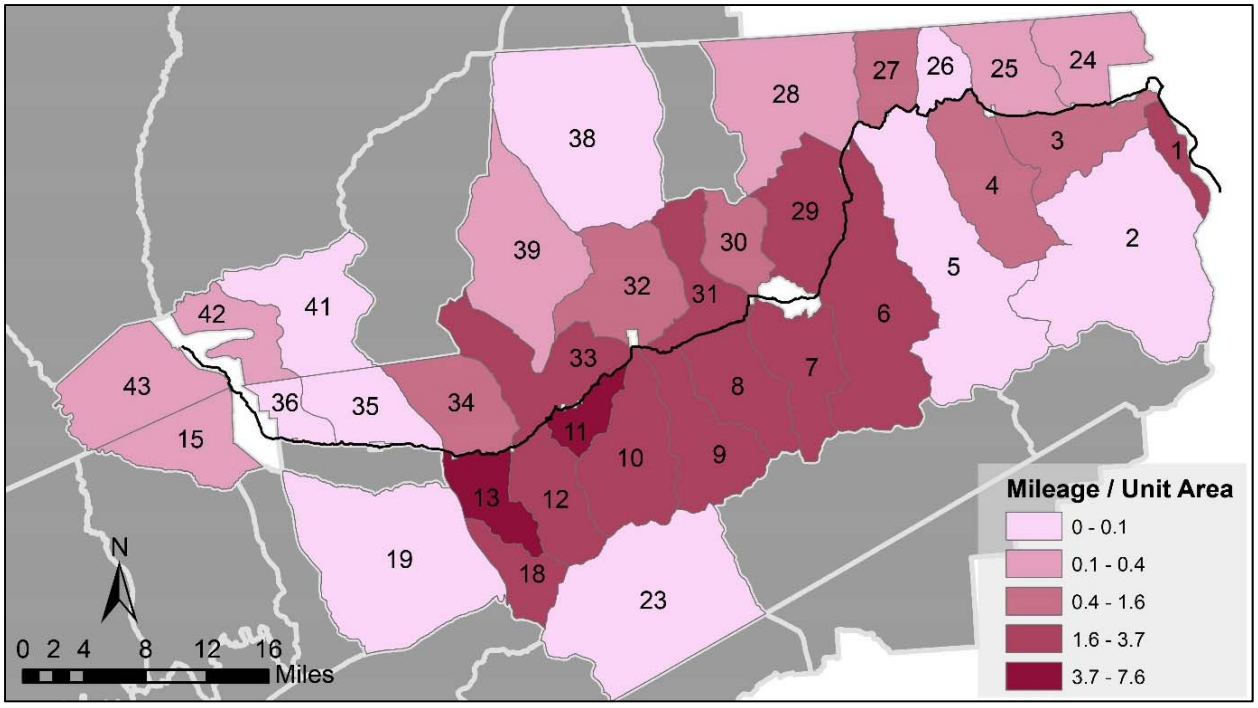

Figure 17. Backcountry units sought by respondents who carried GPS tracks

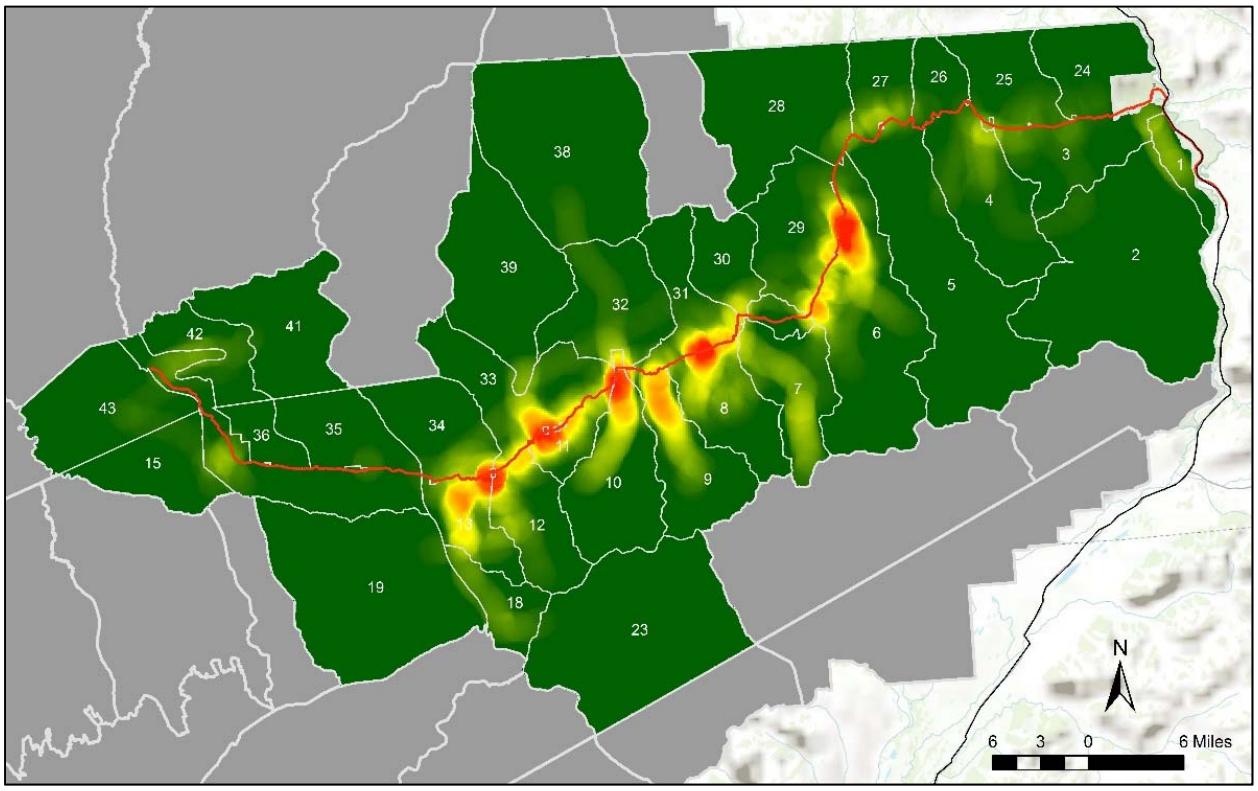

Figure 18. Line density of the pooled sample of respondents who carried GPS tracks

SECTION I: Backcountry use patterns for subgroups of backcountry users

Travel patterns were compared across the three subgroups of backcountry users, including, unguided independent travelers, NPS-led day hikers, and guided educational tourists. Similar to the pooled sample, each subgroup was evaluated in terms of length of travel, distance traveled, destination and path, level of remoteness, and use density.

- Time: Unguided independent travelers spent the most days in the backcountry (*M*=2.89, *SD*=1.37). For this subgroup, two-day trips were most common. The NPS-led day hikes lasted only one day while guided educational tours averaged 2.30 days (*SD*=1.36). For the educational trips, two-day trips were also most common, followed by one-day trips with the longest trip lasting six days.
- Distance: Total mileage traveled for each trip taken by respondents who carried a GPS tracker was estimated (see Table 17). Unguided independent travelers not only spent the most time in the backcountry but also traveled the furthest, averaging 11.08 miles. However, mileage was highly variable with the minimum being 0.39 miles and the maximum distance a group traveled being 37.34 miles. NPS-led day hikes averaged 2.67 miles (*SD*=1.09), and guided educational tours averaged 5.97 miles (*SD*=7.07).

Table 17. Distance (in miles) hiked in the backcountry

	Mean (SD)	***Min***	***Max***
Unguided Independent travelers			
Entire Trip	11.08 (7.62)	0.39	37.34
Average Day	4.07 (2.19)	0.19	12.98
Shortest Day	2.69 (2.01)	0.19	10.85
Longest Day	5.47 (3.01)	0.20	15.10
Guided ranger-led day hikers			
Entire Trip	2.67 (1.09)	0.55	8.71
Guided educational overnight trips			
Entire Trip	5.97 (7.07)	0.59	31.66
Average Day	2.01 (1.58)	0.59	7.91
Shortest Day	1.59 (1.15)	0.59	5.74
Longest Day	2.70 (2.04)	0.60	10.14

- Level of remoteness: Figure 19 illustrates levels of remoteness obtained by respondents in the three backcountry subgroups. Unguided groups traveled furthest from the park road (*M*=2.90, *SD*=2.15). Of the three subgroups, the NPS-led hikes generally stayed closest to the road corridor, averaging 0.83 miles (*SD*=2.04). Over 70% of NPS guided hikes stayed within a one mile buffer of the park road. Educational trips ventured farther, averaging 1.50 miles (*SD*=2.04). Data on the campsite locations of independent trips were also recorded (see Figure 20). On average, campsites were located 2.32 miles (*SD*=1.83). Over 11% of those campsites were located less than one half mile from the road (n=203). Campsite remoteness was also calculated by analyzing if campsites were within the 'viewshed' of the park road (see Figure 21). Just over 50% (103 out of 203) of campsites were within view. These campsites were on average 272 meters from being out of the viewshed (*SD*=282, n=103).

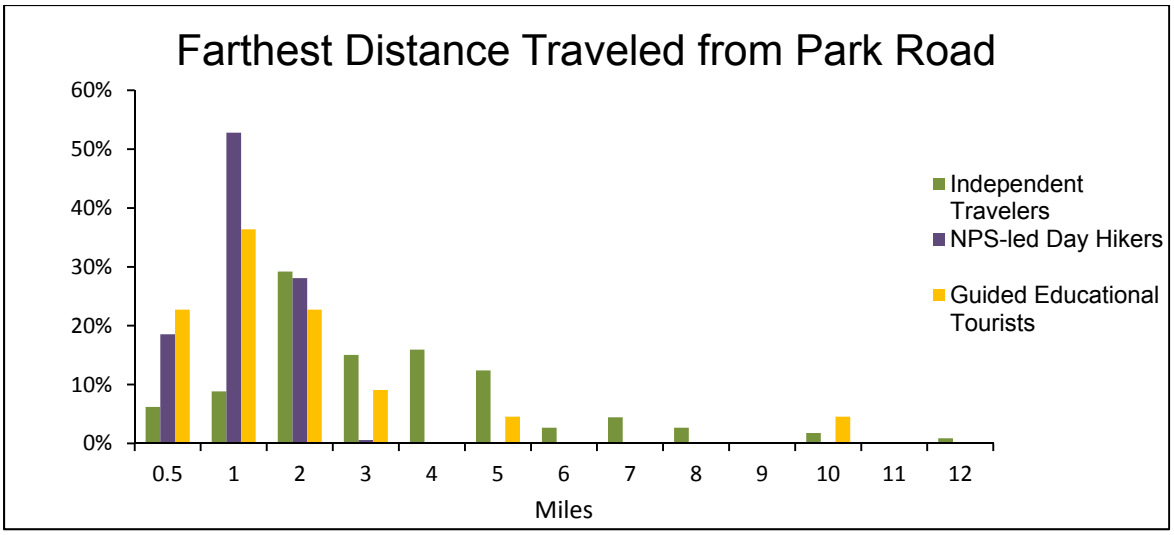

Figure 19. Farthest distance (in miles) groups traveled from the Denali Park Road

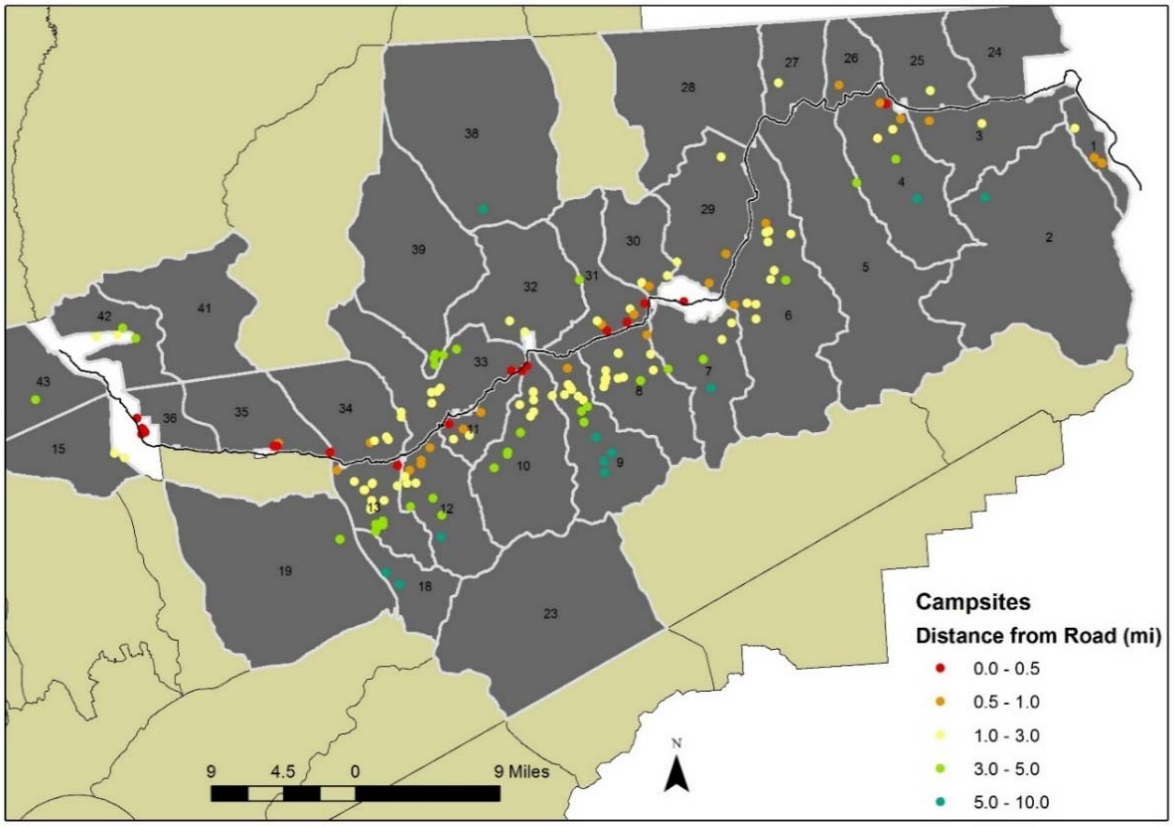

Figure 20. Distribution and distance of campsites for Unguided Independent Travelers (n=203)

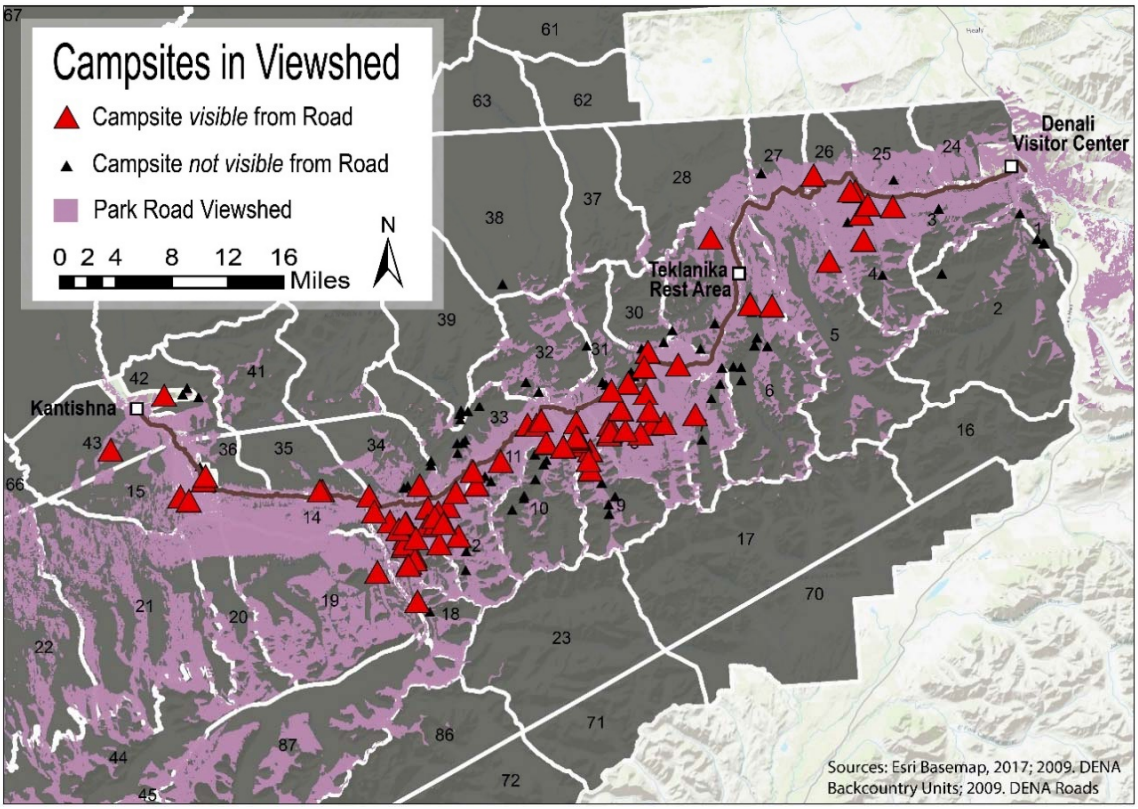

Figure 21. Campsites within the viewshed of the Denali Park Road (n=203)

- Destination: Total mileage traveled for each backcountry unit was estimated. Results suggested Unit 6 (Upper Teklanika) was the most popular destination for backcountry users, totaling 225.60 miles traveled in this unit (see Table 18). However, unit mileage varied among subgroups. Units 13, 9, and 10 were most traveled by unguided independent groups while other units were more popular destinations for the two guided groups. The NPS-led day hikes traveled the most miles in Units 6, 11, and 33, while the most popular units for educational guided tours were 6, 7, and 31. Most campsites were recorded in Unit 13 (Mount Eielson).

Table 18. Backcountry use by Backcountry Unit (top eight highlighted)

Unit Name	Unguided Trips	Disco Hikes	Guided Ed Trips	Totals	Campsites
		Miles			*Count*
Unit 1 - Triple Lakes	37.90	-	-	37.90	7
Unit 2 - Riley Creek	5.69	-	-	5.69	1
Unit 3 - Jenny Creek	19.48	11.94	-	31.43	2
Unit 4 - Upper Savage	50.17	0.89	-	51.06	8
Unit 5 - Upper Sanctuary	1.17	1.07	-	2.24	1
Unit 6 - Upper Teklanika	106.43	87.66	31.51	225.60	17
Unit 7 - Upper East Fork	57.40	0.77	42.33	100.50	7

Unit 8 - Polychrome Glaciers	93.18	23.06	16.57	132.81	17
Unit 9 - East Branch Upper Toklat	126.16	0.04	-	126.20	18
Unit 10 - West Branch Upper Toklat	117.61	13.00	-	130.62	14
Unit 11 - Stony Dome	19.75	74.65	9.25	103.65	9
Unit 12 - Sunset/Sunrise Glaciers	63.79	23.27	1.72	88.78	14
Unit 13 - Mount Eielson	149.91	-	-	149.91	23
Unit 15 - McKinley Bar West	6.34	-	-	6.34	1
Unit 18 - Upper Glacier Creek	39.18	-	-	39.18	6
Unit 19 - Pirate Creek	2.83	-	-	2.83	2
Unit 23 - West Fork Glacier	0.87	-	-	0.87	0
Unit 24 - Mount Healy	-	6.68	-	6.68	0
Unit 25 - Healy Ridge	3.29	8.58	-	11.88	1
Unit 26 - Primrose Ridge	1.99	-	-	1.99	1
Unit 27 - Mount Wright	5.30	28.58	1.47	35.35	1
Unit 28 - Sushana River	-	14.61	-	14.61	0
Unit 29 - Igloo Mountain	33.86	44.94	11.21	90.01	4
Unit 30 - Tributary Creek	13.33	7.90	0.00	21.22	4
Unit 31 - Polychrome Mountain	32.34	39.59	18.24	90.16	8
Unit 32 - Middle Toklat	32.28	5.71	-	37.99	3
Unit 33 - Stony Hill	53.76	54.81	-	108.58	8
Unit 34 - Mount Galen	36.05	0.03	2.38	38.46	5
Unit 35 - Moose Creek	4.21	-	-	4.21	4
Unit 36 - Jumbo Creek	-	-	0.53	0.53	0
Unit 38 - Lower Toklat	7.60	-	-	7.60	1
Unit 39 - Stony Creek	13.78	-	-	13.78	3
Unit 41 - Spruce Peak	0.54	-	-	0.54	0
Unit 42 - Eureka Creek	9.86	-	-	9.86	2
Unit 43 - Eldorado Creek	8.66	-	-	8.66	1
No Unit	129.34	4.12	-	133.46	10
TOTALS	**1284.08**	**451.92**	**135.21**	**1871.21**	**203**

- Density of tracks: Figure 22 shows the line density of GPS tracks for each subgroup. Results illustrated unique spatial patterns for each subgroup. Backcountry use was generally concentrated in the middle section and in the units adjacent to the park road, particularly on the south side toward the Alaskan Range. The density patterns for unguided trips revealed linear travel patterns that tended to follow river bars. Also, use of unguided independent travelers was concentrated at 'destination' stops such as Toklat Rest Area and Eielson Visitor Center. The NPS-led day hikes were more evenly distributed and more tightly clustered along the park road than other subgroups. For this group, use did not extend west past Units 13 and 34. Density of the guided educational tours clustered further east along the road than the other subgroups. Across all subgroups, Unit 5 was not used often, because access was prohibited during the 2016 peak season due to a wildlife closure.

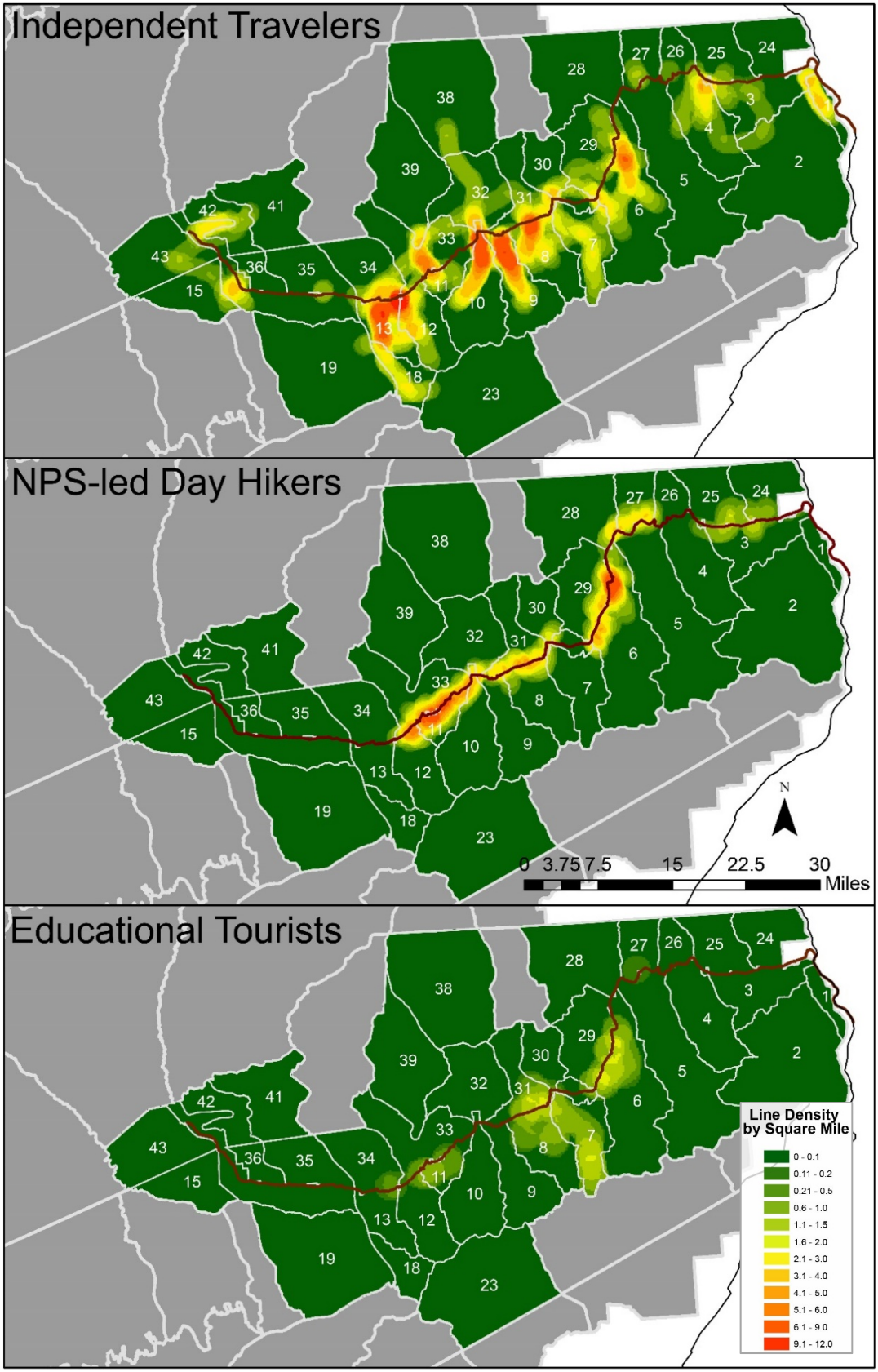

Figure 22. Line density of GPS tracks for each subgroup

- Density of campsites: Campsite density was analyzed from the GPS tracks of the Unguided Independent Travelers (see Figure 23). Campsite density in Figure 23 coincided with the line density for this subgroup, and illustrated particularly high use near Eielson Visitor Center (B & D) and the Toklat River Rest Area (C). Other relatively high density areas included the Wonderlake Campground area (A), just south of Teklanika Rest Area, and along the Triple Lakes Trail (E). These high density areas are shown at a zoomed scale in Figure 24. Only campsites that were 150 meters or less from one another were mapped at this scale. Generally, only two campsites were recorded within less than 150 meters from one another. However, one location in map E included four (4) campsites that were closer than 15 meters to one another during the high use season. That is, four separate groups were camped at this location along the Triple Lakes Trail.

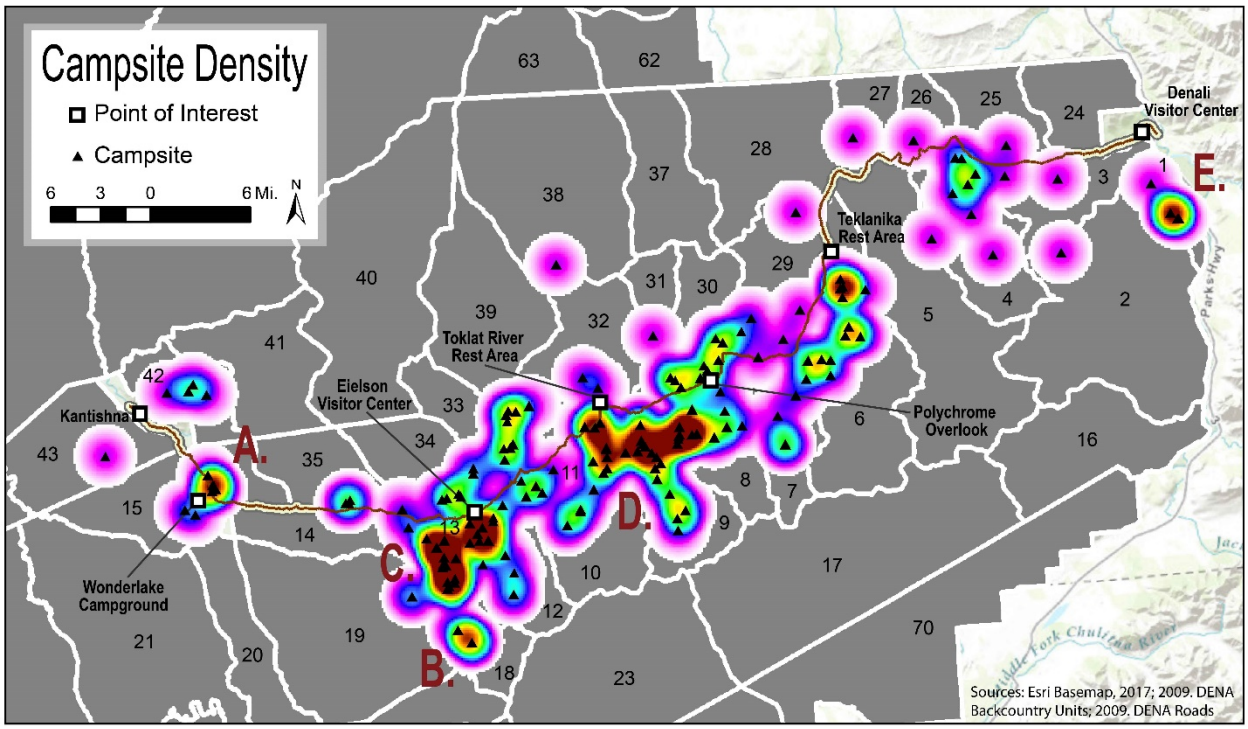

Figure 23. Campsite density for Unguided Trips (n=203)

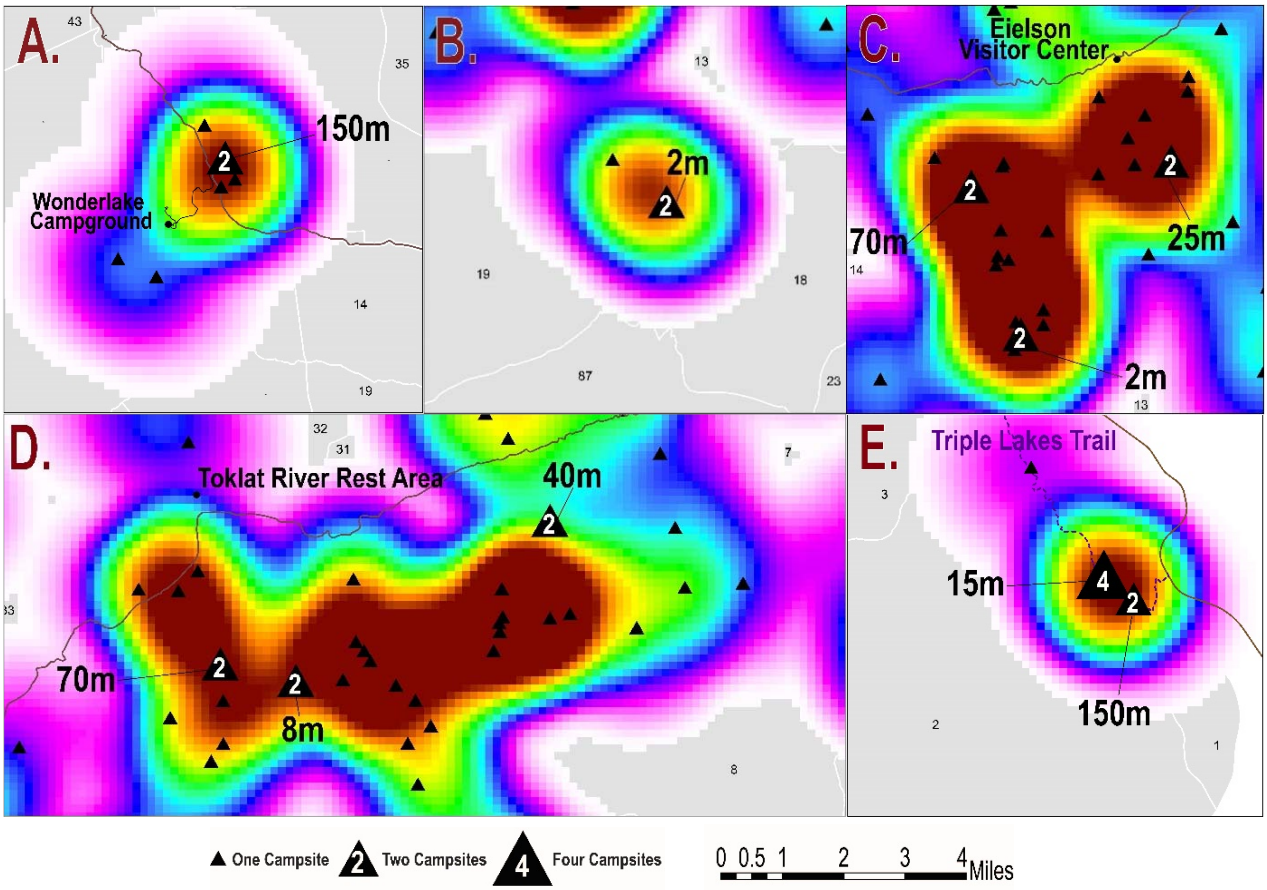

Figure 24. High use areas including campsites that were less than 150 meters from one another (n=203)

Results: Visitor characteristics

SECTION J. Visitors' Recommendations for Management

At the end of the on-site survey, respondents were asked to provide any additional information they felt was necessary. Most comments are provided in Table 19. Several comments were excluded from this table (e.g., "Field technician was very friendly!", "Go Illini!") given a lack of direct connection to the study findings.

Table 19. Open-ended responses from visitors after their visit to the park.

Need better handicap accessibility. Need to educate visitors not to approach wildlife.
Signage could be better. Need more nature trails for elderly or people with limited mobility.
Great place to get away from the typical 9-5.
It was a great experience and the staff was very knowledgeable and caring. We skipped the touristic spots and did back country. One of the things we loved the most was the chance to experience the wilderness for 3 days; no people around and just nature and wildlife. We value that the park can offer this option and that there is a control of how many people per park unit per night are allowed to camp. This will preserve the park and will not disrupt wild animals. The discovery hikes are also amazing and the chance to learn more about the park with a ranger leading the hike. Visiting Denali was one of the best experiences we had :)

The visit and experience to Denali made me realize how conservation and climate change can have such a dramatic impact. I now feel a responsibility to do my part to help the environment. No level of help is too small. I now believe can make an impact.
I hope people will contribute to the environment by taking care of it in all aspects.
I am sure Denali is far more commercialized than it was. So sad.
I think it's awesome that you're surveying people's opinions about this beautiful place!
A good place to reflect on our values.
Locals told us they don't recycle here. The recycling bins are a sham.
Very much enjoyed section 9 in the back country. Hope to be back someday!!
Preserve areas like Denali and keep nature natural. Minimal human intervention. Educate people of importance of not interfering with nature and the environment. Keep wilderness accessible for everyone
I am from China and have been living in Singapore for 10 years, and this is the first time I have been to a national park in the US. I am impressed how the park here is different from the parks I've visited in Asia, in a way it's far better preserved and educational. I enjoyed the experience and hope to visit more national parks like this in the future!
Not enough of the park can be explored, and the parts that you can are too regimented (time schedules prevent you from viewing wildlife for a good amount of time). Too many buses in one area.
The backcountry experience is valuable and managed well here. The ranger talks on birds and beavers were excellent. Denali seems to be a well-managed park and we hope future visitors will have the same wilderness experience.
Conservation of land and environment that that provides wildlife habitat is critical to our future and is difficult if not impossible to recover once it is lost. One reason I love Alaska.
The place is wild and beautiful and fully appreciated. But if you are to welcome also tourism I would strongly suggest to not offer 8-12-hour bus rides. The buses are not comfortable and it is too long and hard, mainly for kids. You are to s cared to get off the bus and lose your place, especially big groups. Wendy, the driver was amazing! We left one day earlier than we planned due to weather and the hard day on the bus. The park is amazing, but we think there might be few more ways to explore it with till respecting all the important values. Thank you
It is very nice place to visit and will recommend this place for our friends to visit in the future.

SECTION K. Sociodemographic Information

The gender distribution survey respondents was close to equal with 50.6% male and 49% female (see Table 20). The majority (88.6%) of visitors were White and highly educated with 75.4% reporting undergraduate or graduate degrees. Almost half (47%) earned more the $100,000 by household annually. The average age was 44.17 years (*SD*=17.36) and the average number of people per household was 2.54 (*SD*=2.49). Figures 24 and 25 illustrate the place of residence for all survey respondents and people within the United States.

Table 20. Socio-demographic profile of the pooled sample of survey respondents

	Mean (SD)	**N (%)**
Gender		
Male		330 (50.60)
Female		322 (49.40)
Age	44.17 17.36)	
Household size	2.54 (2.49)	
Education		
Less than high school		2 (0.30)
High school graduate		88 (13.70)
Vocational/trade school certificate		24 (3.70)

Two-year college degree	44 (6.80)
Four-year college degree	222 (34.50)
Graduate degree	263 (40.90)
Income	
Less than $49,999	113 (19.30)
$50,000 to $99,999	197 (33.70)
$100,000 to $199,999	201 (34.40)
Greater than $200,000	74 (12.60)
Ethnicity	
Hispanic or Latino	28 (4.30)
Not Hispanic or Latino	622 (95.70)
Race[1]	
American Indian or Alaska Native	9 (1.40)
Asian	47 (6.30)
Black or African American	6 (0.90)
Native Hawaiian or other Pacific Islander	4 (0.60)
White	575 (88.60)

[1]Respondents could check all that applied so column totals may not equal 100%.

Table 21. Socio-demographic characteristics of backcountry users

	N (%)
Gender	
Male	123 (64.70)
Female	67 (35.30)
Age	*Mean*=31.48
Education	
Less than high school	1 (0.50)
High school graduate	28 (14.90)
Vocational/trade school certificate	4 (2.10)
Two-year college degree	9 (4.80)
Four-year college degree	72 (38.30)
Graduate degree	74 (39.40)
Income	
Less than $49,999	49 (27.20)
$50,000 to $99,999	66 (36.70)
$100,000 to $149,999	56 (31.10)
$200,000 or more	9 (5.00)
Country of Residence	
United States of America	160 (85.60)
Canada	4 (2.10)
Western Europe	14 (7.50)
Central Europe	3 (1.60)
Middle East	1 (0.50)
Australia	3 (1.60)
Asia	2 (1.10)
Ethnicity	
Hispanic or Latino	6 (3.10)
Not Hispanic or Latino	185 (96.90)
Race	
American Indian or Alaska Native	2 (1.10)
Asian	8 (4.30)
Black or African American	0
Native Hawaiian or other Pacific Islander	1 (0.50)
White	175 (93.10)
Other	2 (1.10)

Figure 25. Place of residence of all survey respondents

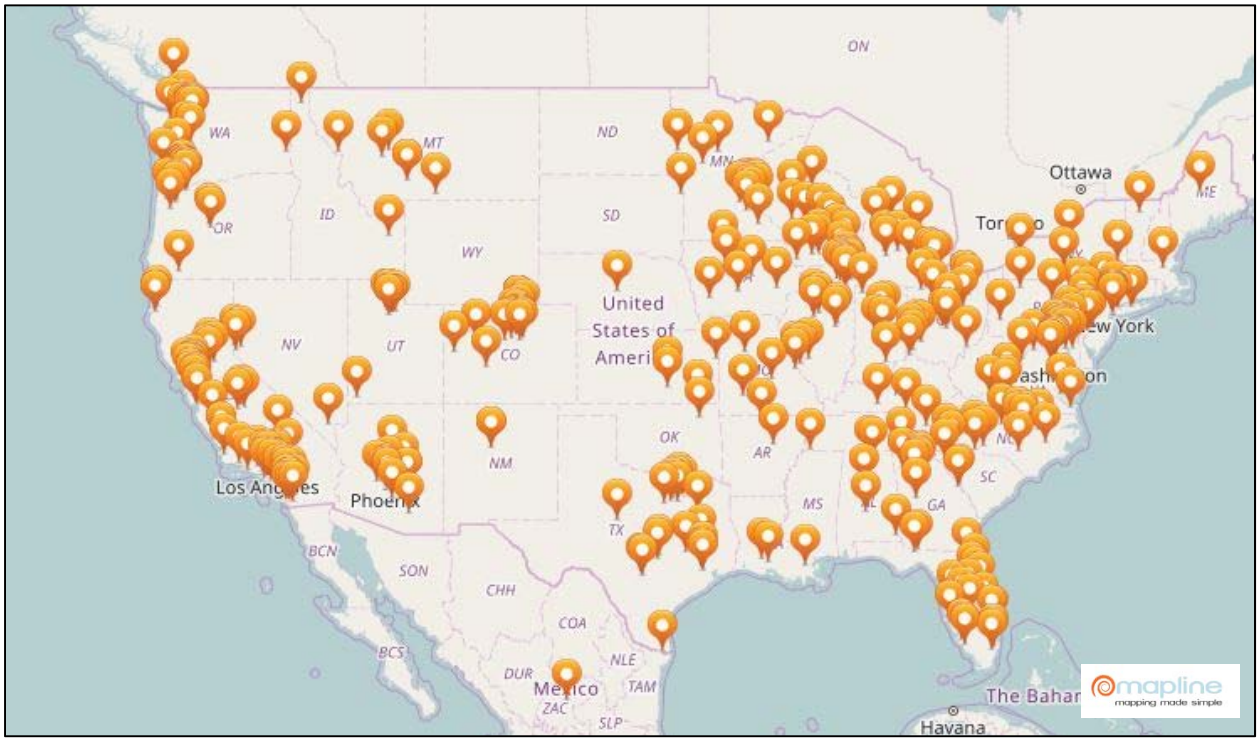

Figure 26. Place of residence of survey respondents in the United States

Discussion and Management Options

Knowledge of the relationship between values and behaviors is essential for more informed and effective decision-making. In particular, **consideration of multi-level values will provide a roadmap for resource management agencies to develop intervention strategies and frame information in a way that will appeal to stakeholder groups**. A greater understanding of cultural, individual, and assigned values helps close the so-called "value-action" gap and provides insights into the decisions and judgements of visitors.

The "average" respondent included in this study reported **low knowledge of physical resources, cultural resources, and management practices** in the park. These results can guide management decisions to ensure high quality visitor experiences, because self-reported knowledge is related to how visitors perceive resource impacts. Given that **knowledge positively correlates with perceptions of impacts,** visitors will not likely be perceptive of environmental degradation in the park without outreach or education that calls attention to select issues. However, results indicated knowledge of *Wildlife* was significantly higher than knowledge of other issues. Therefore, visitors will likely be most critical about wildlife management. Moreover, previous research indicates visitors tend to prefer some degree of environmental impacts given the necessity of impacting the environment for access to natural resources (e.g., trail systems, campsites, etc.) (White et al., 2008). Preferences for impacts versus priorities for resource protection should be balanced, especially in light of the importance to maintain ecological integrity and intact ecosystems within the park.

Individual and cultural values were important predictors of environmentally-friendly behavior that benefited the park. Visitors were most concerned about other people and non-human species rather than individual achievements and short-term gratification. Also, respondents identified as individualists and egalitarians. Given that **environmental behavior was positively influenced by concerns about non-human species and individual achievements**, messages that emphasize environmentalism, stories about how individuals secure their own well-being (e.g., early expeditions) and ways in which the government has reduced differences among social groups will be most likely to align with visitors' value orientations. Outreach that emphasizes hierarchies and the importance of community relationships to define the individual will be less likely to resonate given reported forms of cultural and individual value orientations. These findings can be applied to frame communication that will, in turn, enhance resource and recreation management decisions within the park.

Denali was considered important for many reasons, particularly due to its ***Wilderness*, *Aesthetic, Ecological Integrity,* and *Future* qualities**. Frontcountry and backcountry users associated different values with places in the park. In particular, **frontcountry visitors' points were associated with a broader array of places, while backcountry users valued places more intensely**. Also, backcountry visitors allocated preference points to *Recreation*, *Wilderness*, and *Aesthetic* values at a significantly higher rate. Additionally, multiple "hotspots" and "coldspots" were identified indicating the landscape of Denali was valued unevenly. The maps presented throughout this report will help to

direct managerial attention to areas of value abundance along the park road, near Denali and in other locations. Managers can target the two smaller, more homogenous subgroups of visitors examined along with the pooled sample in the future. If a **range of value positions** and the qualities of places perceived by these stakeholder groups are considered in decision-making, there will be a greater likelihood of public acceptance of and compliance with policy outcomes, as well as reduced potential for conflicts over competing forms of human use (Ban et al., 2013).

Conservation lifestyles and social environmentalism were the most frequently adopted types of behaviors, indicating that managers could continue and/or develop **forums for discussions about the environment**, as well as provide opportunities for everyday actions such as recycling and water conservation to maintain high levels of environmentalism within the park. Visitors could also be encouraged to **participate in scientific research and volunteer**, given that these activities were pursued less frequently. Along similar lines, there was a significant **difference between reported and intended behaviors**. It could be that the on-site experience positively influenced visitors and stimulated pro-environmental activity. Although these findings indicate environmental behavior increases after people return home from visiting Denali, the duration of these activities remains unknown. Further research in this area could track behavioral engagement over time would help to determine whether the on-site experiences in protected areas sustain environmentalism.

The amount of time spent and distance traveled in the backcountry varied, though respondents spent an **average of two days in the backcountry and traveled about six miles**. The 'level of remoteness' achieved was also variable, though most groups **traveled a straight-line distance of 1.6 miles from the park road**. Unguided travelers ventured farthest from the road. Most backcountry use was concentrated toward the middle portion of the park road. Use of backcountry units varied, though some were used more often. Units 11 (Stony Dome) and 13 (Mount Eielson) experienced the highest concentration of use with over 3.7 miles hiked per square mile. During the study period, an **average of 50 miles were covered in each unit**. For visitors who camped in the backcountry, campsite locations were recorded. Campsites were generally over two miles, but **several sites were under one half mile from the park road.** Also, over half of campsites were visible from the road, which may warrant managerial attention.

Three additional areas for future research emerged from this study. First, this survey was administered during the peak use season (June-August, 2016). With information about public interests and views of Denali in the winter, managers would be better equipped to **optimize visitor experiences** year round and **identify new markets** for building broad public support. Secondly, this sample did not focus on visitors who participated in **cruise ship tours**. Given the proportion of visitation involved in cruises and difficulty of capturing these perspectives (e.g., surveying on private land or in hotels) this subgroup would be a useful focus for a future investigation. Finally, there would be value in **engaging with gateway communities** to sustain environmental stewardship into the 21st century. Many protected areas have a limited understanding of the factors that shape residents' decisions to engage with governing authorities and

collectively manage natural resources across protected area borders. This is problematic, because the **dynamics of individual decisions cannot be inferred from national level assessments** – that is, community perspectives vary dramatically across geographic regions and are based on unique socio-cultural orientations. This is particularly alarming for protected areas such Denali, because the values and behavioral patterns of stakeholders adjacent to this protected area have never been systematically examined. Moreover, there are **data gaps comparing visitor and resident perceptions** that would otherwise help to establish commonly shared visions for future growth - visions that need to be shared by both the tourists and local populations.

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Appendix A: Survey Questionnaire

Parks and Environmental Behavior Research Group
University of Illinois at Urbana-Champaign

Outdoor Recreation, Education, & Tourism Lab
COLLEGE OF HEALTH | THE UNIVERSITY OF UTAH

Denali National Park and Preserve Visitor Survey, 2016

SURVEY INSTRUCTIONS: The Parks and Environmental Behavior Research Group at the University of Illinois at Urbana-Champaign and the University of Utah are conducting a survey to learn more about recreationists at Denali National Park and Preserve. This information will be used to better serve the public. You are one of a small number of people chosen for this study, so your opinions are important to us. All information will be kept strictly confidential and your response is voluntary. No action may be taken against you for refusing to supply the information requested. Please read each question carefully and save any additional comments for the final page. This survey will take 15 minutes to complete.

ID_____

SECTION 1 OF 5: TRIP CHARACTERISTICS

1. How many people (including you) are in your personal group today?

   Total number of people: _____ Adults: _____ Children (under 18): _____

2. How would you describe your personal group? (*please ✓ one*)

   ○ Traveling alone ○ Family ○ Family and friends ○ Friends

3. Are you part of a group from a cruise ship?

   ○ Yes ○ No

4. How long are you staying in the park area during your visit? *(please ✓ one box & fill in blank)*

   ○ Day use only → How many hours are you visiting today? _____

   ○ Overnight use → How many nights are you staying in total? _____

5. Did you participate in a ranger led Discovery Tour?

   ○ Yes ➲ *please skip to 5b* ○ No

b. If yes, please provide the name of the ranger who led the hike (or any other identifying information you can recall): _____

6. How many times have you visited Denali National Park and Preserve? _____

b. How many days outside of this trip have you visited in the last 12 months? _____

7. Which of the following activities have you participated in during your visit? (*please ✓ all that apply)*

○ Hiking	○ Camping	○ Mountaineering
○ Ranger led hike	○ Listening to natural sounds	○ Cycling
○ Fishing	○ Hunting	○ Birding
○ Taking bus trips	○ Taking photographs	○ Rafting
○ Viewing wildflowers	○ Citizen science	○ Taking jeep tours
○ Scenic air tour	○ Staying at lodges	○ Taking ATV tours
○ Glacier landing tour	○ Viewing wildlife	○ Other:_____

b. Which of these was your primary activity? _____

8. Please indicate which of the following animals you saw during your visit to the park. We would also like to know how each animal contributed to the quality of your experience. Please rank each of these animals in a way that expresses their importance to you.

	Did you see this animal?		Ranked importance
1. Grizzly bear	○ Yes	○ No	_____
2. Caribou	○ Yes	○ No	_____
3. Wolf	○ Yes	○ No	_____
4. Dall sheep	○ Yes	○ No	_____
5. Moose	○ Yes	○ No	_____

9. We'd like to better understand how you perceive your understanding of Denali National Park and Preserve. How would you rate your knowledge about the topics listed below?

Topics in Denali National Park	No Knowledge		Some Knowledge		Proficient Knowledge
a. Wildlife	○	○	○	○	○
b. Plant life	○	○	○	○	○
c. Insects	○	○	○	○	○
d. Water	○	○	○	○	○
e. Geology	○	○	○	○	○
f. Alpine ecology	○	○	○	○	○
g. Archeological resources	○	○	○	○	○
h. Cultural landscapes	○	○	○	○	○
i. Historic and prehistoric structures	○	○	○	○	○
j. Museum objects	○	○	○	○	○
k. Human history and pre-history	○	○	○	○	○
l. Wildlife management	○	○	○	○	○
m. Vegetation management	○	○	○	○	○
n. Fire management	○	○	○	○	○
o. Air quality issues	○	○	○	○	○
p. Water quality issues	○	○	○	○	○
q. Visitor experiences	○	○	○	○	○

10. There are many ways you can act in a way that is environmentally responsible. In this section, we would like to know how you intend to act towards the environment in your **everyday life at home after visiting** and also **while you are here at Denali**. How frequently do you participate in each of the following activities?

	Everyday life at home after visiting Denali						While at Denali					
Activities	Never	Rarely	Occasionally	Very Often	Often		Never	Rarely	Occasionally	Very Often	Often	
a. Recycle paper, plastic or metal	○	○	○	○	○		○	○	○	○	○	
b. Conserve water or energy	○	○	○	○	○		○	○	○	○	○	
c. Buy environmentally friendly and/or energy efficient products	○	○	○	○	○		○	○	○	○	○	
d. Avoid feeding wildlife	○	○	○	○	○		○	○	○	○	○	

e. Volunteer for environmental causes (e.g., restore native or remove exotic species)	○	○	○	○	○		○	○	○	○	○
f. Hike in areas that are more durable and less likely to be impacted by use	○	○	○	○	○		○	○	○	○	○
g. Talk to other people about the environment	○	○	○	○	○		○	○	○	○	○
h. Work with other people to address an environmental problem	○	○	○	○	○		○	○	○	○	○
Participate as an active member of a discussion about the environment	○	○	○	○	○		○	○	○	○	○
j. Participate in a scientific research related to the environment	○	○	○	○	○		○	○	○	○	○
k. Donate money to support environmental protection	○	○	○	○	○		○	○	○	○	○
l. Write a letter or leave a comment about an environmental issue	○	○	○	○	○		○	○	○	○	○

SECTION 3 OF 5: VALUES

11. We would like to better understand the things you value most. Please rate the extent to which these general ideas are considered important as guiding principles in your life.

Guiding Principles	Opposed to my values		Not at all important		Important		Very important		Of supreme importance	
a. Authority: the right to lead or command	○	○	○	○	○	○	○	○	○	○
b. Social power: control over others, dominance	○	○	○	○	○	○	○	○	○	○
c. Influential: having an impact on people and events	○	○	○	○	○	○	○	○	○	○
d. A world at peace: free of war and conflict	○	○	○	○	○	○	○	○	○	○
e. Equality: equal opportunity for all	○	○	○	○	○	○	○	○	○	○
f. Social justice: correcting injustice, care for others	○	○	○	○	○	○	○	○	○	○
g. Unity with nature: fitting into nature	○	○	○	○	○	○	○	○	○	○
h. Protecting the environment: preserving nature	○	○	○	○	○	○	○	○	○	○
i. A world of beauty: beauty of nature and the arts	○	○	○	○	○	○	○	○	○	○
j. Pleasure: gratification of desires	○	○	○	○	○	○	○	○	○	○
k. Enjoying life: enjoying food, sex, leisure, etc.	○	○	○	○	○	○	○	○	○	○

l. Gratification for oneself: fulfilling a personal desire	○	○	○	○	○	○	○	○	○
m. Personal development: develop a skill, learn, and gain insight into something	○	○	○	○	○	○	○	○	○
n. Contribution to whole: contributing to the surrounding world	○	○	○	○	○	○	○	○	○
o. Excellence: pursuit of excellence or personal ideal	○	○	○	○	○	○	○	○	○
p. Personal best: seeking to use the best in yourself	○	○	○	○	○	○	○	○	○

12. People in our society often disagree about how far to let individuals go in making decisions for themselves. How strongly you agree or disagree with each of these statements?

Cultural worldviews	Strongly Disagree		Neutral		Strongly Agree
a. The government interferes far too much in our everyday lives	○	○	○	○	○
b. Sometimes government needs to make laws that keep people from hurting themselves	○	○	○	○	○
c. It's not the government's business to try to protect people from themselves	○	○	○	○	○
d. The government should stop telling people how to live their lives	○	○	○	○	○
e. The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals	○	○	○	○	○
f. Government should put limits on the choices individuals can make so they don't get in the way of what's good for society	○	○	○	○	○

13. People in our society often disagree about issues of equality and discrimination. How strongly you agree or disagree with each of these statements?

Cultural worldviews	Strongly Disagree		Neutral		Strongly Agree
a. We have gone too far in pushing equal rights in this country	○	○	○	○	○
b. Our society would be better off if the distribution of wealth was more equal	○	○	○	○	○
c. We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women	○	○	○	○	○
d. Discrimination against minorities is still a very serious problem in our society	○	○	○	○	○
e. It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them	○	○	○	○	○
f. Society as a whole has become too soft and feminine	○	○	○	○	○

SECTION 4 OF 5: MAPPING EXERCISE

Now for something different! This section examines the values you associate with Denali National Park and Preserve. Imagine you could distribute 100 preference points to ensure the park area kept its existing value. Please allocate 100 points among the 13 values listed on this page in a way that expresses why you think this place is important.

_____ **Aesthetic Value.** I value Denali for the attractive scenery, sights, sounds, or smells.

_____ **Ecological Integrity Value.** I value Denali for its intact ecosystem where predators (e.g., wolves) and prey (e.g., Dall Sheep) are in balance.

_____ **Cultural Value (C).** I value Denali because it preserves historic places and archaeological sites that reflect human history.

_____ **Economic Value (Econ).** I value Denali because it provides economic benefits from recreation and tourism opportunities.

_____ **Future Value (F).** I value Denali because it allows future generations to experience this place.

_____ **Intrinsic Value (I).** I value Denali in and of itself for its existence.

_____ **Learning Value (L).** I value Denali because I can learn about natural and cultural resources.

_____ **Recreation Value (R).** I value Denali because it provides a place for my favorite outdoor recreation activities.

_____ **Spiritual Value (S).** I value Denali because it is spiritually significant to me.

_____ **Therapeutic Value (T).** I value Denali because it makes me feel better, physically, emotionally and/or mentally.

_____ **Scientific Value (Sci).** I value Denali because it provides an opportunity for scientific observation or experimentation.

_____ **Wilderness Value (W).** I value Denali because it represents minimal human impact and/or intrusion into natural environment.

_____ **Soundscape Value (SS).** I value Denali because I can hear natural sounds.

__100__ **Preference Point Allocation**

The final step in this mapping exercise involves you showing us specific places on the map that reflect the values you selected in the previous exercise. Please review the instructions on the map at the survey station.

SECTION 5 OF 5: SOCIO-DEMOGRAPHICS

14. Are you …?

○ Male ○ Female

15. In what year were you born? _____

16. What state or country do you reside in? _____

17a. Do you consider yourself to be Hispanic, Latino or Latina?

○ Yes ○ No

b. With which racial group(s) do you identify? (*please ✓ one or more*)

○ American Indian or Alaska Native
○ Asian
○ White
○ Black or African American
○ Native Hawaiian or other Pacific Islander
○ Other _____

18. What is the highest level of formal education you have completed? (*please ✓ one*)

○ Less than high school
○ High school graduate
○ Vocational/trade school certificate
○ Two-year college degree
○ Four-year college degree
○ Graduate degree

19. How many people live in your household (including you)? _____

20. Would you mind telling us your household's TOTAL approximate annual income from all sources before taxes? (*please ✓ one*)

○ Less than $20,000
○ $20,000 - $49,999
○ $50,000 - $99,999
○ $100,000 - $149,999
○ $150,000 - $199,999
○ Greater than $200,000

Thank you for helping us with this important survey!

Questions or comments?

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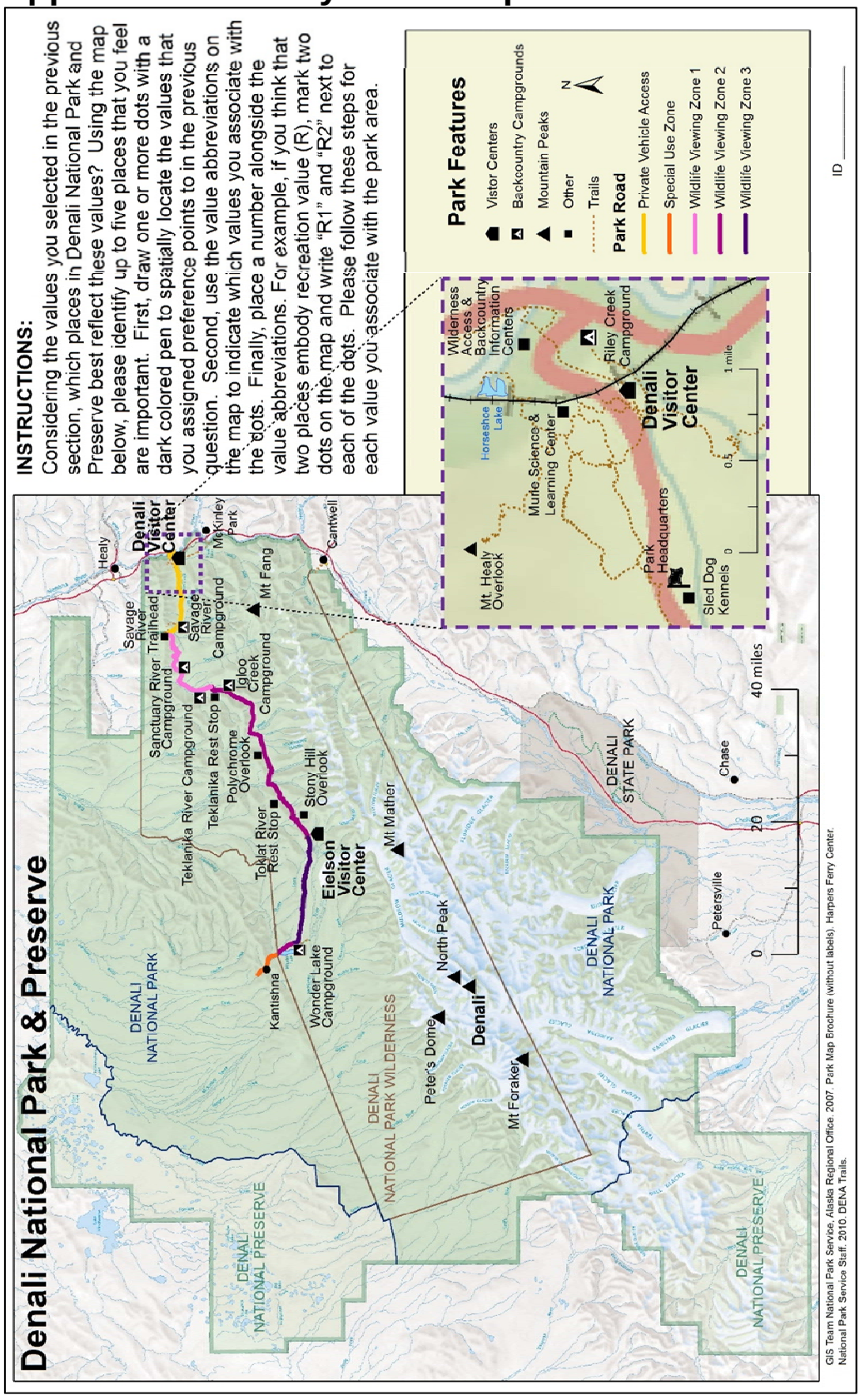
Expiration Date: May 26th, 2018

Appendix B: Survey Value Map



Appendix C: GPS Unit Checkout Form

GPS Unit Check-Out

	Permit	Unit Number	ID Number	Name	Phone Number	Leave Time/Date	Return Time/Date
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