El Yunque National Forest, Puerto Rico

Visitor Carrying Capacity Study

Technical Report

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Executive Summary

This executive summary is based on responses from 972 surveys collected in summer (August and July) 2013 and winter (January) 2014. Of this total, 532 surveys were completed in summer and 440 were completed in winter.

1. During summer 2013, data were collected at five different recreation sites in the forest. The results include the responses from surveys collected at Palo Colorado (28.8%), Big Tree Trail (25.8%), Sierra Palm (19.6%), Mt. Britton (17.3%) and Angelito and Puente Roto (8.5%).

2. Similarly, in winter 2013 data were collected at the same recreation sites in the forest. The results include the responses from surveys collected at Sierra Palm (28.4%), Big Tree Trail (27.0%), Palo Colorado (23.2%), Mt. Britton (18.0%) and Angelito and Puente Roto (2.7%).

3. The summer 2013 sample included: 58.6% female and 41.1% male respondents; the average age of the respondents was 41 years; the majority of the participants (68.6%) were Hispanic or Latino; 52.1% of the respondents identified themselves as white; 62.6% reported they were married/partnered; 39.1% reported they had a college degree, followed by a graduate degree or higher (20.2%); almost half of the participants (49.1%) reported being from Puerto Rico, while the other half reported being from United States (48.7%).

4. The winter 2014 sample included: 60.0% female and 40.0% male respondents; the average age of the respondents was 42.47 years; the majority of the participants (66.0%) were not Hispanic or Latino; 82.6% identified themselves as white; 57.5% reported they were married/partnered; 33.9% reported they had a college degree, followed by a graduate degree or higher (28.5%); 69.3% reported being from United States, while the other reported being from Puerto Rico (22.0%).

5. In summer 2013, 53.8% of the participants responded that this was their first visit to EL Yunque. The majority of the respondents (53.0%) spent between 3 to 4 hours at the forest. The most visited site was La Mina/Palo Colorado (28.7%). Respondents visited on average 2 to 3 sites while at the forest (68.0%). The majority of the respondents (55.6%) reported that their group size was between 1 to 4 people.

6. In winter 2014, 68.3% of the participants responded that this was their first visit to El Yunque. The majority of the respondents (57.0%) spent between 3 to 4 hours at the forest. The most visited site was La Mina/Palo Colorado (27.5%). Participants visited on average 2 to 3 sites while at the forest (70.6%). The majority of the respondents (68.5%) reported that their group size was between 1 to 4 people.

7. The most selected reasons for visiting the forest in both summer and winter were: nature viewing, hiking/walking, photography, scenic driving, and waterplay. The results showed significant differences in reasons for visiting the site between local visitors (from Puerto Rico), visitors coming from United States and those coming from other countries.

8. Data on recreation motivations were collected in summer 2013 only. The strongest motivations for participation (the cumulative responses of 4=important and 5=very important) were: to enjoy scenery (95.9%); to experience nature (93.5%); to explore the area (92.2%); and to do something with my family (90.1%).

9. Both in summer 2013 (81.5%) and winter 2014 (83.4%), the majority of participants rated the quality of their experience at the most recently visited site at 8 or higher on a 1 to 10 scale. However based on the importance-performance analysis conducted, several site conditions were identified as critical for visitor satisfaction and the forest should consider them a management priority. In summer 2013 the following site conditions were identified for the agency to concentrate on: adequate number of restroom facilities; clean restrooms and in proper working order; adequate parking; availability of trash containers; general information available; no signs of vandalism at the site; availability of information services away from the visitor center; adequate ranger/visitor assistance patrols; enough directional signage; current and accurate information; and availability of safety information. In winter 2014, the site conditions identified as areas for the agency to concentrate on were: opportunity to encounter wildlife; clean restrooms and in proper working order; general information available; enough directional signage; and nature/historical information about the site.

10. In summer 2013, the majority of the respondents (60.9%) encountered 31 other visitors or more at the site most recently visited. Similarly, in January 2014 the majority of the respondents (56.3%) encountered 31 other visitors or more.

11. In summer 2013, almost half of the respondents (47.9%) reported their encounter with other visitors as having no influence on their experience, followed by having a positive influence on the experience (46.4%). Similarly, in winter 2014 respondents reported the encounter with other visitors as having no influence on their experience (56.2%), followed by a positive influence on their experience (33.5%). In both cases, local visitors tended to report a positive influence of encounters on their experience as compared with visitors from United States who tended to report no influence or a negative influence of other visitors on their experience. The Hispanic or Latino population was more inclined to see the number of encounters as having a positive influence on their experience.

12. Overall, the majority of the respondents reported not feeling crowded at the site most recently visited (63.2% in summer 2013 and 76.1% in winter 2014). In summer, visitors felt more crowded at Big Tree Trailhead and less crowded at Mt. Britton.

During winter, no significant differences were observed between sites in terms of crowding perceptions.

13. In summer 2013, the mean response for level of perceived crowdedness was 5.54 on a scale from 1 to 9 where 1= Not crowded and 9= Extremely crowded. In winter 2014, the mean response for level of perceived crowdedness was 4.05.

14. In summer 2013, a third of the respondents found the number of visitors they encountered at the recreation site acceptable (33.2%), followed by more than acceptable (13.0%) and very acceptable (26.7%). Visitors from the United States were less likely to find the number of encounters very acceptable to them. The Hispanic or Latino visitors were more likely to find the number of encounters as acceptable and very acceptable. Similarly, in winter 2014 almost a third of the respondents found the number of visitors they encountered acceptable (31.4%), followed by more than acceptable (10.4%) and very acceptable (27.9%). However, no significant differences were observed between visitors based on their primary residence and ethnicity in the winter sample.

15. More than a quarter of the respondents (26.0%) in summer said that 50 or more people will be acceptable to encounter at the recreation site. Visitors from United States were more inclined to select as acceptable a lower number of visitor encounters at the recreation site. Hispanic or Latino visitors were more likely to report as adequate to encounter 50 visitors or more at the recreation site. Respondents were willing to encounter more visitors at Palo Colorado and Angelito and Puente Roto. Less than a quarter of the respondents (22.6%) in winter said that 21 to 30 people will be acceptable to encounter at the recreation site. Similarly, less than a quarter of the respondents (22.3%) reported that seeing 50 people or more at the site will be acceptable. In winter, no significant differences were observed between visitors based on their primary residence and ethnicity.

16. The summer data show that more than a third of the respondents would prefer to participate in recreation at the site recently visited with a medium group size (6 to 15 people) (39.7%), while almost a quarter of the respondents would prefer a small group size (5 people or less) (24.4%). The Hispanic or Latino respondents were more inclined to prefer a medium or large group size for recreation. In winter more than a third of the respondents selected the small group size (5 people or less) (39.0%), followed by the medium group size (6 to 15 people) (38.5%). Respondents from United States and other countries were more inclined to report preference for traveling with a small group. The not Hispanic or Latino respondents were more inclined to report preference for traveling with a small group.

17. In summer 2013, the respondents identified the following site conditions as impacting their experience: availability of parking (44.9%); seeing/ encountering other recreationists (36.7%); available space to participate in my recreation activities

(36.0%); traffic congestion (33.1%); and crowding/ congestion from tourists (32.4%). In winter 2014 the site conditions with the highest scores (a cumulative of agree and strongly agree) were: availability of parking (26.5%); crowding/congestion from tourists (22.2%); litter or trash (22.0%); traffic congestion (21.6%) and available space to participate in my recreation activities (21.5%).

18. In summer 2013, the respondents tended to view more positively (i.e., said they agree or strongly agree) the following management actions: establish a fine for not following forest recreation use and regulations (62.3%); provide low impact recreation educational programs to visitors (55.0%); increase number of facilities (add trails, picnic areas, etc.) (53.2%); and provide signage and information to change behavior (51.1%). The least favored actions (a sum of strongly disagree and disagree) were: require an entrance fee for all sites (56.8%); require an entrance fee for only some sites (49.0%); followed by establishing a maximum number of visitors to the site and close the site after the limit is reached (34.8%) and limit the size of groups (31.4%).

19. In winter 2014, the following management actions had the highest scores: establish a fine for not following forest recreation use rules and regulations (67.0%); provide low impact recreation educational programs to visitors (53.3%); provide signage and information to change behavior (46.5%); increase number of facilities (add trails, picnic areas, etc.) (45.4%); regulate car access at specific areas (43.2%); and regulate where visitors can go at specific recreation sites (e.g. closure of heavily impacted picnic areas) (41.5%). The least favored actions (a sum of strongly disagree and disagree) were: require an entrance fee for all sites (60.8%); require an entrance fee for only some sites (52.0%); followed by establishing a maximum number of visitors to the site and close the site after the limit is reached (38.3%); close areas that have high impact due to visitation (31.6%, n=120) and limit the size of groups (31.3%).

20. The analysis examined the total number of visitors acceptable in the forest based on the average time visitors spend at the sites and the average acceptable number of encounters reported at each site. Based on this assessment, it was determined that the social carrying capacity of the forest is around 1,485 visits per day. Therefore, it can be stated that the forest visitation should be kept below 1,500 people in order to provide a quality experience for the majority of the visitors in terms of the number of encounters at the forest.

21. High-use trails were found to more likely have excessive side slopes and graffiti, and longer trails (which are not paved) more often had soil erosion, wet soil on the trail, and root exposure. The assessment of picnic areas revealed that of primary concern is the graffiti found at multiple locations, screening not maintained at various sites, user created trails, water standing at various sites, and maintenance of informational signage.

22. The respondents provided a series of additional comments at the end of the survey when asked to provide any information they think might help better understand their experience at the forest. Both in the summer and winter sample, the respondents made comments in regard to the water fountains not working, cleanliness and maintenance of bathrooms, trails maintenance, lack of markers on the trails, signs of vandalism (e.g. graffiti), services for people with disabilities, need for more parking spaces, better trash removal and better directional and interpretive signage, the availability of maps, crowding, better information regarding weather conditions, and comments about the entrance fee and the roads.

23. In-depth interviews were conducted with 12 outfitters. The respondents identified a series of problems at the forest. Some of the problems frequently mentioned were: parking, traffic, roads, crowding, safety (primarily at Angelito), lack of law enforcement, bathrooms, lack of training for tour guides, the forest being understaffed, trails maintenance and signage, emergency communication, and the limited total recreation at the forest.

Introduction

El Yunque National Forest (EYNF) is the only tropical national forest in the national forest system. Although the forest is relatively small in comparison with other national forest, (28,000 acres or roughly 11,300 hectares), it is an area very rich in biological diversity. The EYNF contains over 240 species of native trees, 50 species of native orchids and over 150 species of ferns. In addition, the forest also supports 127 species of terrestrial vertebrate and 10 species of aquatic invertebrates. EYNF receives over one million visits a year, including visitors from Puerto Rico and all over the world.

Although forest managers enact a variety of recreation management actions to ensure recreation use of the forest is sustainable, little research has been conducted to specifically measure the ecological impacts of visitation to El Yunque's recreation sites and the attitudes and perceptions of El Yunque visitors related to the quality of recreation experience and the quality of facilities and services at the forest. Thus, this study was initiated in order to assess carrying capacity (i.e., social and environmental) of EYNF developed sites for recreation visitation and special uses. To attain this goal, the ecological impacts and visitors' attitudes and perceptions regarding crowding at the forest and the quality of recreation facilities and services were assessed. The results of this study come to directly benefit the revision of the Land and Resource Management Plan for the forest.

Purpose of the Study

The purpose of this study was to examine the visitor carrying capacity of EYNF, focusing on environmental carrying capacity (bio-physical impacts on the resource) and social carrying capacity (perceptions of crowing and conflict). Research was conducted to address the following overall goals:

1. Understand visitors' perceptions of crowding and the quality of recreation facilities and services at El Yunque National Forests' major recreation sites.
2. Identify key ecological impacts related to recreation use at El Yunque's major recreation sites.

Methods

Methods employed for this research are discussed under the following headings: Participants, Instrumentation (Survey Questionnaire), and Data Collection.

Participants

Participants of this study included individuals visiting El Yunque National Forest in July/August 2013 and January 2014. A systematic random sampling technique was used to sample participants. Data was collected at six different sites in the forest: Palo Colorado, Big Tree Trail, Mt. Britton, Sierra Palm, Angelito and Puento Roto.

Instrumentation

A questionnaire was constructed to address the visitors' perceptions of crowding and the quality of recreation facilities and services at El Yunque National Forests' major recreation sites (see Appendix A & B). The questionnaire was in English and in Spanish. The questionnaire consisted of fixed choice and partially open-ended questions within six sections (i.e., Demographic Information, Recreation Participation, Recreation Motivations and Satisfaction, Social Encounters, Perceptions of Conflict and Preferred Management Actions). Furthermore, to assess the key ecological impacts related to recreation use at El Yunque's major recreation sites two instruments were developed: the Campsite and Picnic Site Rapid Monitoring Estimation Worksheet and the Recreation Trails Visitor-caused Resource Impact Monitoring Form (see Appendix C). Due to being unable to collect data from visitors coming to the forest as part of on organized tour, twelve in-depth semi-structured interviews were conducted with outfitters that have permits to bring visitors to the forest. The interview included five open ended questions (see Appendix D) focusing on the services they provide, tour operators' satisfaction with site conditions at the forest, crowding perceptions, and perceived problems at the forest and possible management actions. All interviews were conducted in January 2014.

Data Collection

The questionnaire was administered on-site, visitors being asked at the end of their recreation experience to participate in the study. Every 3rd person exiting a site was invited to participate in the study. Participants were asked to manually record their responses on a paper copy of the questionnaire (this was a self-administered questionnaire). The questionnaire took approximately 15-20 minutes for participants to complete. Data was collected during 21 days in July and August 2013 and during 16 days in January 2014. The data collection in summer started on July 12 and ended on August 1. In winter, the data collection started on January 8 and ended on January 23. A total of 972 surveys were completed, 532 surveys were completed in summer and 440 were completed in winter. Thus, the response rate for the data collected in summer was 74.3% and for the data collected in winter the response rate was 82.55%.

During summer 2013, data was collected at five different recreation sites in the forest. The results reported include the responses from surveys collected at Palo Colorado (28.8%, *n*=153), Big Tree Trail (25.8%, *n*=137), Sierra Palm (19.6%, *n*=105), Mt. Britton (17.3%, *n*=92) and Angelito and Puente Roto (8.5%, *n*=45). Table 1 demonstrates these results.

Table 1. Summer 2013: Data Collection Sites

	Frequency	Percent
Palo Colorado	153	28.8
Big Tree Trailhead	137	25.8
Sierra Palm	105	19.6
Mt. Britton	92	17.3
Angelito & Puente Roto	45	8.5
Total	**532**	**100.0**

The level of recreation use in summer 2013 as reported by the surveyors was predominantly medium (40.1%, *n*=165 cases), followed by a high level of use (21.9%, *n*=90) and a low level of use (20.7%, *n*=85). Seventy one of the surveys (17.3%) were completed during a very high level of use. These results are presented in Table 2.

Table 2. Summer 2013: Level of Recreation Use

	Frequency	Percent
Low	85	20.7
Medium	**165**	**40.1**
High	90	21.9
Very high	71	17.3
Total	**411**	**100.0**

During winter 2014, data was collected at five different recreation sites in the forest. The results reported include the responses from surveys collected at Sierra Palm (28.4%, *n*=125), Big Tree Trail (27.0%, *n*=119), Palo Colorado (23.2%, *n*=102), Mt. Britton (18.0%, *n*=79) and Angelito and Puente Roto (2.7%, *n*=12). These results are presented in Table 3.

Table 3. Winter 2014: Data Collection Sites

	Frequency	Percent
Sierra Palm	125	28.4
Big Tree Trailhead	119	27.0
Palo Colorado	102	23.2
Mt. Britton	79	18.0
Angelito & Puente Roto	12	2.7
Missing	3	.7
Total	**440**	**100.0**

The level of use in winter 2014 as reported by the surveyors was predominantly low (51.5%, *n*=218 cases), followed by a medium level of use (33.6%, *n*=142) and high level of use (13.7%, *n*=58). Only five surveys (1.2%) were completed during a very high level of use. Table 4 presents these results.

Table 4. Winter 2014: Level of Recreation Use

	Frequency	Percent
Low	**218**	**51.5**
Medium	142	33.6
High	58	13.7
Very high	5	1.2
Total	**423**	**100.0**

To measure ecological impacts related to recreation use at El Yunque's major recreation sites, 11 distinctly separate trails in El Yunque and 32 picnic areas were assessed by a park volunteer, who recorded number of occurrences of certain impacts as well as installed mitigation devices. The environmental assessment surveys were completed on Sundays between August 11, 2013, and January 26, 2014, with multiple trails or picnic areas surveyed in a single day.

Results Summer (July and August) 2013

The following section provides a descriptive overview of the results from the data collected in summer 2013. Data obtained from this study were analyzed using descriptive statistics and content analyses. In particular, the fixed choice questions were analyzed using frequency counts and percentages while open-ended questions were categorized into dimensions with each response assigned a code. The results are organized in the following sections:

- SECTION I: Demographic Information
- SECTION II: Recreation Participation
- SECTION III: Recreation Motivations and Satisfaction
- SECTION IV: Social Encounters
- SECTION V: Perceptions of Conflict and Preferred Management Actions

SECTION I: Demographic Information

This section describes the demographic profile of the respondents and helps to provide the context for the results that follow. The following demographic variables were measured: gender, age, ethnicity, race, relationship status, household composition, education level, employment status, income, and residence.

More than half of the respondents (58.6%, *n*=279) were female and 41.1%, *n*=197 of the respondents were male. Table 5 depicts this result.

Table 5. Summer 2013: Gender of Participants

	Frequency	Percent
Male	197	41.4
Female	**279**	**58.6**
Total	**476**	**100.0**

Of the participants, a quarter of the respondents (25.2%, *n*=114) were between 36 and 45 years of age and less than one quarter (24.3%, *n*=110) were between 26 and 35 years followed by those between 46 and 55 years (22.7%, *n*=103). A small number of the participants were between 18 and 25 years (13.7%, *n*=62), with even fewer participants being over 65 years (4.9%, *n*=22). The average age of the respondents was 41 years, with a standard deviation of 13.308. These findings are presented in Table 6.

Table 6. Summer 2013: Age of Study Participants

	Frequency	Percent
18 to 25 years	62	13.7
26 to 35 years	**110**	**24.3**
36 to 45 years	**114**	**25.2**
46 to 55 years	**103**	**22.7**
56 to 65 years	42	9.2
Over 65 years	22	4.9
Total	**453**	**100.0**

The ethnic background of the participants reveals the majority of the participants (68.6%, *n*=323) were Hispanic or Latino. These results are presented in Table 7.

Table 7. Summer 2013: Ethnicity of Study Participants

	Frequency	Percent
Hispanic or Latino	**323**	**68.6**
Not Hispanic or Latino	148	31.4
Total	**471**	**100.0**

When asked to report their race, the majority of the respondents (52.1%, *n*=277) identified themselves as white, followed by respondents who identified themselves as Black or African American (14.2, *n*=54). Only a small percentage of the respondents identified themselves as American Indian or Alaska Native (5.8%, *n*=22), Asian (4.2%, *n*=16), or Native Hawaiian or other Pacific Islander (3.1%, *n*=12). These results are presented in Table 8.

Table 8. Summer 2013: Race of Study Participants

	Frequency	Percent
American Indian or Alaska Native	22	5.8
Asian	16	4.2
Black or African American	54	14.2
Native Hawaiian or other Pacific Islander	12	3.1
White	**277**	**72.7**
Total	**381**	**100.0**

When the participants were asked to specify their current relationship status, the majority of participants (62.6%, *n*=295) reported they were married/partnered, whereas almost a third of the participants (30.6%, *n*=144) indicated they were single. A small number of the participants (5.3%, *n*=25) answered they were divorced/separated, followed by widowed (1.5%, *n*=7). Table 9 shows the current relationship status of the study participants.

Table 9. Summer 2013: Relationship Status of Study Participants

	Frequency	Percent
Single	144	30.6
Married/partnered	**295**	**62.6**
Divorced/separated	25	5.3
Widowed	7	1.5
Total	**471**	**100.0**

When asked to provide information on the household composition, the majority of the respondents (51.2%, *n*=231) listed two adults living in the household, including themselves. This was followed by those with 3 adults in the household (15.5%, *n*=50) and those with only one adult in the household (14.9%, *n*=67). Table 10 presents these results.

Table 10. Summer 2013: Number of Adults Including Yourself in the Household

	Frequency	Percent
1 adult	67	14.9
2 adults	**231**	**51.2**
3 adults	70	15.5
4 adults	50	11.1
5 adults	19	4.2
6 adults	9	2.0
7 adults	1	.2
8 adults	3	.7
9 adults	1	.2
Total	**451**	**100.0**

The respondents were asked to report how many children less than 18 years old live in the household. The majority (52.5%, *n*=238) reported they had no children in the household followed by those who had two children (22.3%, *n*=101) and one child (14.6%, *n*=66). These results are presented in Table 11.

Table 11. Summer 2013: Number of Children Under 18 in the Household

	Frequency	Percent
No children in the household	**238**	**52.5**
1 child	66	14.6
2 children	**101**	**22.3**
3 children	33	7.4
4 children	9	2.1
5 children	1	.2
6 children	4	.9
7 children	1	.2
Total	**452**	**100.0**

More than a third of the participants (39.1%, *n*=184) reported they had a college degree, followed by a graduate degree or higher (20.2%, *n*=95), and some college (16.8%, *n*=79). The educational level of the study participants is presented in Table 12.

Table 12. Summer 2013: Education Level of Study Participants

	Frequency	Percent
Eighth Grade or Less	5	1.1
Some High School	30	6.4
High School Graduate or GED	32	6.8
Some College	79	16.8
College Graduate	**184**	**39.1**
Some Graduate School	45	9.6
Graduate Degree or Higher	**95**	**20.2**
Total	**470**	**100.0**

When asked their current employment status, the majority of the participants (63.9%, *n*=297) reported being employed full time followed by those currently employed part time (9.7%, *n*=45). Only a small percentage of the respondents were retired (6.5%, *n*=30), working at home (6.2%, *n*=29), students (6.0%, *n*=28), or unemployed (3.4%, *n*=16). These results are presented in Table 13.

Table 13. Summer 2013: Current Employment Status of Study Participants

	Frequency	Percent
Employed Full Time	**297**	**63.9**
Employed Part Time	45	9.7
Unemployed	16	3.4
Full Time Homemaker	29	6.2
Retired	30	6.5
Full Time Student	28	6.0
Part Time Student	7	1.5
Other	13	2.8
Total	**465**	**100.0**

When asked to identify the range that best describes participants total annual household income, almost a quarter of the participants (22.7%, *n*=96) indicated their income was between $25,000 and $49,999, and nearly one quarter of the participants (21.7%, *n*=92) reported their income between $50,000 and $74,999. A smaller percentage (15.8%, *n*=67) indicated their income between $10,000 and $24,999, fewer (10.2%, *n*=43) reported $75,000 to $99,999. Table 14 displays the annual household income of study participants.

Table 14. Summer 2013: Annual Household Income of Study Participants

	Frequency	Percent
<$9,999	34	8.0
$10,000- $24,999	67	15.8
$25,000- $49,999	**96**	**22.7**
$50,000- $74,999	92	21.7
$75,000- $99,999	43	10.2
$100,000- $124,999	34	8.0
$125,000-$149,999	17	4.0
≥$150,000	40	9.6
Total	**423**	**100.0**

When the participants were asked to identify their primary residence, almost half of the participants (49.1%, *n*=237) reported being from Puerto Rico, while the other half reported being from United States (48.7%, *n*=235). A small number of the participants (2.2%, *n*=11) indicated other countries as their primary residence. These results are presented in Table 15.

Table 15. Summer 2013: Primary Residence of Study Participants

	Frequency	Percent
Puerto Rico	**237**	**49.1**
United States	**235**	**48.7**
Other	11	2.2
Total	**483**	**100.0**

SECTION II: Recreation Participation

When asked if this was their first visit at El Yunque National Forest, slightly more than half of the participants (53.8%, *n*=283) responded that this was their first visit. This result is reported in Table 16.

Table 16. Summer 2013: First visit to El Yunque National Forest

	Frequency	Percent
Yes	**283**	**53.8**
No	243	46.2
Total	**526**	**100.0**

The participants who reported this not being their first visit to the forest were asked to record how often they visited the forest during the past 12 months. More than a third of the respondents (34.9%, *n*=110) reported that they visited the forest more than 12 months ago. Most of the participants visited the forest once before (41.6%, *n*=131) followed by those who visited a few times before (16.5%, *n*=52). A low percentage of the respondents visited the forest once a month or more often (7.0%, *n*=22). Table 17 presents these results.

Table 17. Summer 2013: Visitation Frequency

	Frequency	Percent
Visited more than 12 months ago	**110**	**34.9**
Once	**131**	**41.6**
A few times	52	16.5
Once a month	4	1.3
A few times a month	10	3.2
Once a week	2	.6
More than once a week	5	1.6
Everyday	1	.3
Total	**315**	**100.0**

The respondents were asked to report how many hours they spent at the forest during the day of their visit. The majority of the respondents (53.0%, *n*=278) spent between 3 to 4 hours at the forest. A quarter of the respondents (25.0%, *n*=131) spent slightly more time at the forest, between 5 and 6 hours. Only a small percentage (1.0%, *n*=5) of the respondents stayed overnight, and all five respondents specified that they stayed two days at the forest. Table 18 demonstrates these results.

Table 18. Summer 2013: Time Spent at El Yunque National Forest

	Frequency	Percent
1-2 hours	86	16.2
3-4 hours	**278**	**53.0**
5-6 hours	**131**	**25.0**
7-8 hours	24	4.6
9-12 hours	1	0.2
1 day or more	5	1.0
Total	**525**	**100**

The respondents were requested to list the name of the site they most recently visited. Slightly more than a quarter of the respondents (28.7%, *n*=140) listed La Mina/Palo Colorado as the site they recently visited, followed by Mt. Britton/El Yunque Trail (19.3%, *n*=94) and Big Tree Trail (18.3%, *n*=89). Several respondents included multiple sites in their response (4.1%, *n*=20) or provided a very general description of the site (e.g. hiking, waterfall, picnic area, tower, trails) (8.2%, *n*=40) not a specific site name. These results are presented in Table 19.

Table 19. Summer 2013: Recreation Site Most Recently Visited

	Frequency	Percent
La Mina/ Palo Colorado	**140**	**28.7**
Mt. Britton/El Yunque Trail	**94**	**19.3**
Big Tree Trail	**89**	**18.3**
General description of site	40	8.2

Angelito & Puente Roto	37	7.6
Other sites outside of the forest (e.g. beach, Fajardo, bio-bay, Luquillo)	28	5.7
Multiple sites	20	4.1
La Coca	14	2.9
Other sites in the forest (e.g. Bano de Oro, Caimitillo)	10	2.2
Yokahu Tower	6	1.2
Sierra Palm	4	.8
El Portal	3	.6
None	2	.4
Total	**487**	**100.0**

The respondents were asked to report how many hours they spent at the most recently visited recreation site. The majority of the respondents (67.4%, *n*=335) reported they spent 1 to 2 hours at the most recently visited site followed by those who spent 3 to 4 hours (21.3%, *n*=106). These results are presented in Table 20.

Table 20. Summer 2013: Hours Spent at the Most Recently Visited Recreation Site

	Frequency	Percent
1-2 hours	**335**	**67.4**
3-4 hours	**106**	**21.3**
5-6 hours	42	8.5
7-8 hours	11	2.2
9 hours or more	3	0.6
Total	**497**	**100.0**

The respondents were asked to list all the other sites visited during the trip. More than a third of the respondents reported visiting one other site (42.6%, *n*=166), while approximately a quarter of the respondents listed two other sites they visited (25.4%, *n*=99). These results are presented in Table 21.

Table 21. Summer 2013: Number of Other Sites Visited

	Frequency	Percent
No other sites	44	11.2
1 site	**166**	**42.6**
2 sites	**99**	**25.4**
3 sites	54	13.8
4 sites	10	2.6
5 sites	17	4.4
Total	**390**	**100.0**

The study participants were asked to report what was the primary purpose for their visit at the site most recently visited. The most selected reasons were: nature viewing (61%, *n*=324), hiking/walking (60.1%, *n*=319), photography (44.8%, *n*=238), scenic driving (33.7%, *n*=179) and waterplay (28.4%, *n*=151). The activities least selected were: conducting and assisting with research (0.2%, *n*=1), biking (0.6%, *n*=3), and collecting non-timber forest products (0.6%, *n*=3). Thirteen of the respondents provided other reasons for visiting the forest such as: seeing the waterfall (*n*=1), being on a date (*n*=1), meditation and spiritual experience (*n*=2), spending time with family (*n*=2), learning about the area (*n*=2), and tourism (*n*=2). These results are presented in Table 22.

Table 22. Summer 2013: Primary Purpose for Recreation at the Site Most Recently Visited

	Yes	Percent	No	Percent
Nature viewing	**324**	**61**	**207**	**39.0**
Hiking/Walking	**319**	**60.1**	**212**	**39.9**
Photography	**238**	**44.8**	**293**	**55.2**
Scenic driving	**179**	**33.7**	**352**	**66.3**
Waterplay	**151**	**28.4**	**380**	**71.6**
Outdoor learning	76	14.3	455	85.7
Viewing cultural resources	74	13.9	457	86.1
Picnicking	62	11.7	469	88.3
Birdwatching	45	8.5	486	91.5
Nature study	38	7.2	492	92.8
Jogging/Running	31	5.8	500	94.2
Backpacking	31	5.8	500	94.2
Other	13	2.4	518	97.6
Camping	7	1.3	524	98.7
Trail maintenance work	4	.8	527	99.2
Biking	3	.6	528	99.4
Collecting non-timber forest products	3	.6	528	99.4
Conducting or assisting with research	1	.2	531	99.8

The results for primary purpose were analyzed looking at possible differences in relation to the participants' place of residence. The results showed significant differences between reasons for visiting the site between local visitors (from Puerto Rico), visitors coming from United States and those coming from other countries. Significant differences were found for hiking/ walking and nature study, more visitors from United States and other countries reporting that the primary reason for visiting the forest was hiking/ walking and nature study; followed by jogging/running, picnicking and waterplay, more visitors from Puerto Rico selecting these activities as a primary reason for visiting the most recently visited site. Table 23 demonstrates these results.

Table 23. Summer 2013: Primary Purpose for Visiting the Site Based on Place of Residence

	Puerto Rico (N=237)		United States (N=235)		Other (N=11)		
Primary purpose	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Pearson Chi-Square**
Hiking/Walking	**45.6**	**54.4**	**76.6**	**23.4**	**54.5**	**45.5**	**.000**
Camping	1.7	98.3	1.3	98.7	0.0	100.0	.858
Nature viewing	59.5	40.5	63.4	36.6	63.6	36.4	.676
Outdoor learning	13.9	86.1	14.9	85.1	0.0	100.0	.380
Picnicking	**18.6**	**81.4**	**6.0**	**94.0**	**9.1**	**90.9**	**.000**
Scenic driving	37.1	62.9	32.8	67.2	36.4	63.6	.607
Waterplay	**34.2**	**65.8**	**23.0**	**77.0**	**45.5**	**54.5**	**.013**
Biking	0.8	99.2	0.4	99.6	0.0	100.0	.817
Jogging/Running	**10.5**	**89.5**	**2.1**	**97.9**	**0.0**	**100.0**	**.001**
Photography	46.0	54.0	44.3	55.7	36.4	63.6	.788
Birdwatching	9.3	90.7	8.1	91.9	9.1	90.9	.898
Backpacking	5.9	94.1	6.4	93.6	0.0	100.0	.682
Nature study	**5.5**	**94.5**	**7.7**	**92.3**	**27.3**	**72.7**	**.014**
Viewing cultural resources	16.5	83.5	10.2	89.8	9.1	90.9	.124
Trail maintenance work	1.7	98.3	0.0	100.0	0.0	100.0	.123
Conducting or assisting with research	0.0	100.0	0.0	100.0	0.0	100.0	n/a
Collecting non-timber forest products	1.3	98.7	0.0	100.0	0.0	100.0	.209
Other	**3.8**	**96.2**	**0.4**	**99.6**	**9.1**	**90.9**	**.015**

When asked if they were part of a guided/outfitted tour today, a high percentage of the participants (92.4%, *n*=486) reported that they were not part of a guided/outfitted tour. This does not accurately reflect the number of visitors coming to the forest as part of a guided tour. Due to the very structured and time constrained nature of the organized tours, we were not able to interview visitors using these services. This is definitely a limitation for this study. These results are presented in Table 24.

Table 24. Summer 2013: Were you part of a guided/outfitted tour today?

	Frequency	Percent
Yes	40	7.6
No	**486**	**92.4**
Total	**526**	**100.0**

The participants were asked to report how many people accompanied them during their visit at the forest. The majority of the respondents (55.6%, *n*=286) reported that their group size

was between 1 to 4 people. Almost a quarter of the respondents (24.2%, *n*=124) reported that their group size was between 5 and 8 people. Table 25 presents these results.

Table 25. Summer 2013: Participant Group Size (not including guided/outfitted groups)

	Frequency	Percent
Zero	19	3.7
1-4 people	**286**	**55.6**
5-8 people	**124**	**24.2**
9 or more people	85	16.5
Total	**514**	**100.0**

An analysis was conducted to better understand group size differences based on primary residence. The results showed a significant difference (chi square = .006) in group size between local visitors, visitors coming from US and other countries. The groups coming from US and other countries tended to be smaller (1 to 4 people) as compared with the local groups. Table 26 presents these results.

Table 26. Summer 2013: Group Size Differences based on Primary Residence

	Primary Residence (%)			
People accompanying you on this trip	**Puerto Rico (N=227)**	**United States (N=228)**	**Other (N=11)**	**Total (N=466)**
0 people	4.8	2.6	9.1	3.7
1-4 people	**47.6**	**62.7**	**63.6**	**55.6**
5-8 people	26.0	24.2	27.3	24.2
9 or more people	21.6	10.5	0.0	16.5
Total %	**100.0**	**100.0**	**100.0**	**100.0**

When asked what type of group they traveled with, the majority of the respondents reported that they traveled in family with children (55.2%, *n*=283), followed by traveled with friends (24.4%, *n*=125) and traveling in family without children (19.5%, *n*=100). Twenty-six of the respondents provided other type of group that traveled with including: church group (*n*=1); partners (*n*=4); field trip (*n*=1); family (*n*=2); fraternity (*n*=1); family and friends (*n*=8); professors (*n*=1); teacher training (*n*=1); tourists (*n*=1); work (*n*=1). Table 27 demonstrates these results.

Table 27. Summer 2013: Participant Group Type

	Yes	Percent	No	Percent
Traveling alone	19	3.7	493	96.3
Family with children	**283**	**55.2**	230	44.8
Family without children	100	19.5	413	80.5
Friends	**125**	**24.4**	388	75.6
Other	26	5.1	488	94.9

The participants were asked to report the distance they traveled from the main road to reach their most recently visited recreation site. Slightly more than a third of the respondents (36.4%, *n*=165) listed that they traveled 1km to 5km from the main road, followed by those who traveled more than 5 km (33.4%, *n*=151) to get to the recreation site of choice. These results are presented in Table 28.

Table 28. Summer 2013: Distance Traveled to Recreation Site

	Frequency	Percent
0-99 m	69	15.2
100-999 m	68	15
1km- 5km	**165**	**36.4**
>5km	151	33.4
Total	**453**	**100.0**

SECTION III: Recreation Motivations and Satisfaction

The study participants were asked to report the motivations behind visiting the most recently visited site. The strongest motivations for participation (the cumulative responses of 4=important and 5=very important) were: to enjoy scenery (95.9% stated important or very important, *n*=468); to experience nature (93.5%, *n*=447); to explore the area (92.2%, *n*=445); to do something with my family (90.1%, *n*=437); to be close to nature (87.4%, *n*=416); to experience new and different things (86.3%, *n*=414); to get away from usual demands of life (84.4%, *n*=407); to learn more about nature (81.7%, *n*=389); and to relax physically (81.5%, *n*=395). Table 29 presents these results.

Table 29. Summer 2013: Site Visit Motivations

	Percent					M
Motivation Items	**1**	**2**	**3**	**4**	**5**	
To enjoy scenery	**0**	**.6**	**3.5**	**12.3**	**83.6**	**4.79**
To experience nature	**1.5**	**1.0**	**3.8**	**16.9**	**76.6**	**4.77**
To do something with my family	**2.3**	**.6**	**7.0**	**14.0**	**76.1**	**4.61**
To explore the area	**.6**	**1.2**	**6.0**	**22.8**	**69.4**	**4.59**
To be close to nature	**.8**	**1.7**	**10.1**	**22.5**	**64.9**	**4.49**
To experience new and different things	1.0	1.7	11.0	24.0	62.3	4.45
To get away from usual demands of life	2.1	1.5	12.0	21.8	62.6	4.41
To relax physically	2.1	1.4	15.1	19.2	62.3	4.38
To get exercise	2.1	3.3	15.8	21.0	57.9	4.29
To learn about the cultural history of the area	1.3	3.6	15.7	23.5	56.0	4.29
To learn more about nature	2.7	3.4	12.2	26.5	55.2	4.28
To enjoy the smells and sounds of nature	2.3	3.7	13.9	24.7	55.2	4.26
To learn about the natural history of the	4.0	4.6	17.0	24.7	49.7	4.12

area						
To be with members of my group	7.5	3.5	12.9	24.4	51.6	4.09
To be with people who enjoy the same things I do	5.4	4.4	15.8	24.3	50.1	4.09
To feel healthier	7.1	4.0	16.5	21.0	51.5	4.06
To have thrills and excitement	7.1	6.5	19.8	22.3	44.4	3.90
To grow and develop spiritually	17.4	8.5	18.6	18.4	37.1	3.49
To test my skills and abilities	16.6	10.9	22.2	21.0	29.4	3.36
To be away from people	18.9	7.5	24.7	17.7	31.2	3.35
To share my skills and knowledge with others	18.5	11.3	22.3	14.7	33.2	3.33
To be on my own	17.7	9.6	26.9	14.6	31.3	3.32
To develop personal spiritual values	21.3	9.8	23.8	12.3	32.8	3.25
To reflect on your religious or other spiritual values	24.4	9.0	23.1	12.5	31.0	3.17
To experience solitude	24.0	10.6	22.3	15.4	27.7	3.12
To use my own equipment	25.9	9.6	25.7	12.8	25.9	3.03
To meet new people	25.6	11.6	25.8	13.5	23.5	2.98

*Note: 1=not at all important, 3=neutral, 5=very important.

Respondents were asked to indicate how important the site conditions were during their recreation at the most recently visited site. The site conditions most highly rated (a cumulative of agree and strongly agree) were: well protected natural environment (94.20%, *n*=458); water free of litter and trash (93.5%, *n*=451); proper trails for the designated activity (89.10%, *n*=432); safety and security at the site (88.70, *n*=400); proper access to the recreation site of interest (88.50%, *n*=436); well protected cultural resources (88.30%, *n*=421); courteous and friendly staff members (88.20%, *n*=425); appearance and maintenance of the site (87.90%, *n*=436); opportunity to recreate without feeling crowded (86.60%, *n*=406); erosion free and well maintained trails (86.00%, *n*=418); no signs of vandalism at the site (84.60%, *n*=413); availability of staff to answer questions (82.60%, *n*=394); nature/historical information about the site (80.20%, *n*=381); enough directional signage (80.10%, *n*=384). Table 30 presents these results.

Table 30. Summer 2013: Importance of Site Conditions

	Percent						M
	1	**2**	**3**	**4**	**5**	**N/A**	
Water free of litter and trash	**.4**	**.4**	**5.0**	**14.5**	**79.0**	**.6**	**4.72**
Well protected natural environment	**0**	**.2**	**5.6**	**18.5**	**75.7**	**0**	**4.70**
Courteous and friendly staff members	**1.5**	**1.9**	**5.4**	**18.7**	**69.5**	**3.1**	**4.58**
Safety and security at the site	**.2**	**1.8**	**8.0**	**20.2**	**68.5**	**1.3**	**4.57**
Well protected cultural resources	**.4**	**.6**	**9.0**	**22.9**	**65.4**	**1.7**	**4.55**
Proper trails for the designated activity	.2	1.0	7.8	25.8	63.3	1.9	4.54

Appearance and maintenance of the site	.6	.8	10.3	24.0	63.9	.4	4.50
Proper access to the recreation site of interest	.6	2.0	8.9	25.6	62.9	0	4.48
No signs of vandalism at the site	2.9	1.6	10.7	16.6	68.0	.2	4.46
Erosion free and well maintained trails	.4	2.3	9.7	25.1	60.9	1.6	4.46
Opportunity to recreate without feeling crowded	1.1	2.8	7.7	25.6	61.0	1.9	4.45
Availability of staff to answer questions	2.5	2.7	8.2	20.3	62.3	4.0	4.43
Current and accurate information	1.3	1.5	13.5	21.9	55.9	6.1	4.38
Nature/historical information about the site	.8	3.4	12.2	22.7	57.5	3.4	4.37
Enough directional signage	1.5	2.5	13.4	24.4	55.7	2.5	4.34
Availability of trash containers	1.5	3.8	12.5	24.2	54.9	3.2	4.31
Adequate ranger/visitor assistance patrols	2.3	3.1	12.3	21.8	54.8	5.6	4.31
Adequate parking	2.1	4.6	10.9	23.9	56.2	2.3	4.30
Availability of safety information	1.5	4.4	14.4	20.1	55.8	3.8	4.29
General information available	2.3	4.0	11.6	23.5	53.6	5.0	4.29
Opportunity to recreate without being bothered by insects	2.7	4.9	12.2	20.4	57.7	2.2	4.29
Clean restrooms and in proper working order	4.3	2.7	12.0	18.8	50.2	12.0	4.23
Variety of services at the visitor center	2.1	2.6	14.1	23.3	45.1	12.8	4.22
Availability of information services away from the visitor center	1.7	3.0	14.4	24.7	45.1	11.2	4.22
Opportunity to recreate without being bothered by nuisance wild animals in the Forest	3.8	5.5	12.2	22.0	53.3	3.2	4.19
Adequate number of restroom facilities	4.3	2.9	14.9	21.9	47.0	8.9	4.15
Enough water fountains and faucets	4.5	6.4	18.3	20.0	40.8	10.2	3.96
Adequate number of picnic shelters	4.4	7.4	19.6	19.8	35.2	13.5	3.86
Picnic tables and grills conveniently located and in good condition	4.8	9.6	17.9	18.3	35.2	14.2	3.81
Accessibility for people with disabilities	13.1	8.3	16.0	16.4	37.8	8.3	3.63

*Note: 1=least important, 5=most important, n/a=not applicable.

The respondents were asked to assess on a scale from 1 to 5 the satisfaction levels with various site conditions at the forest. The respondents expressed higher level of satisfaction for the following site conditions (a cumulative of agree and strongly agree): well protected natural environment (92.30%, *n*=431); appearance and maintenance of the site (86.40%, *n*=414); courteous and friendly staff members (85.90%, *n*=400); proper access to the recreation site of

interest (85.10%, *n*=405); water free of litter and trash (84.60%, *n*=393); well protected cultural resources (83.90%, *n*=386), opportunity to recreate without being bothered by nuisance wild animals in the Forest (83.50%, *n*=385), proper trails for the designated activity (82.80%, *n*=386), and opportunity to recreate without being bothered by insects (80.50%, *n*=356). Table 31 demonstrates these results.

Table 31. Summer 2013: Satisfaction with Site Conditions

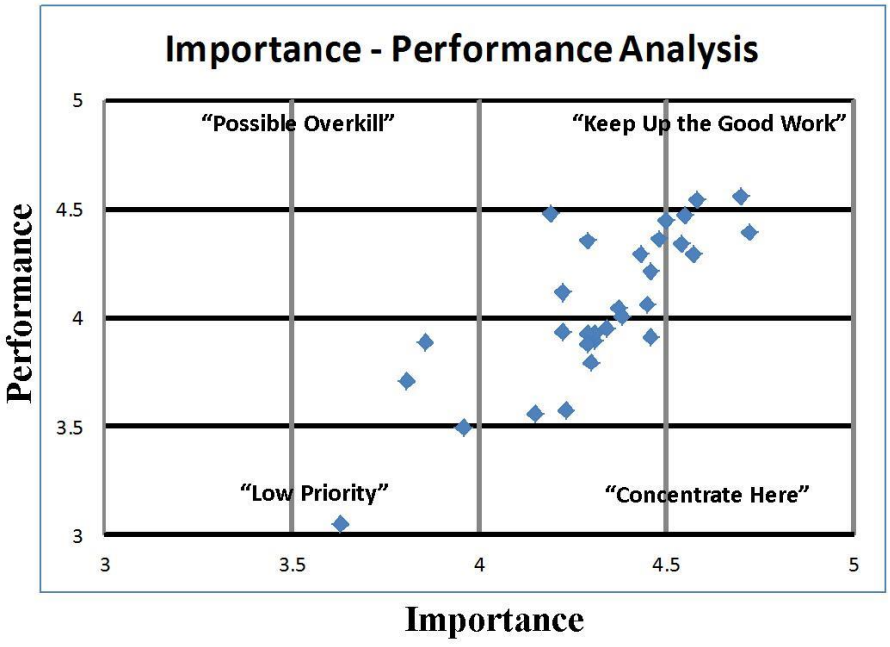
	Percent						M
	1	2	3	4	5	N/A	
Well protected natural environment	**.2**	**.4**	**7.1**	**27.4**	**64.9**	**0**	**4.56**
Courteous and friendly staff members	**1.3**	**1.3**	**7.1**	**20.4**	**65.5**	**4.5**	**4.54**
Opportunity to recreate without being bothered by nuisance wild animals in the Forest	**.4**	**1.5**	**8.7**	**24.9**	**58.6**	**5.9**	**4.48**
Well protected cultural resources	**.7**	**.9**	**10.9**	**23.9**	**60.0**	**3.7**	**4.47**
Appearance and maintenance of the site	**.4**	**.8**	**11.7**	**27.1**	**59.3**	**.6**	**4.45**
Water free of litter and trash	.9	2.8	11.2	26.5	58.1	.6	4.39
Proper access to the recreation site of interest	.6	1.9	12.4	30.7	54.4	0	4.36
Opportunity to recreate without being bothered by insects	1.1	2.7	11.5	26.2	54.3	4.1	4.35
Proper trails for the designated activity	1.1	2.4	10.9	30.7	52.1	2.8	4.34
Availability of staff to answer questions	3.3	2.4	12.2	21.8	54.5	5.9	4.29
Safety and security at the site	1.6	3.2	15.9	21.8	55.7	1.8	4.29
Erosion free and well maintained trails	1.3	3.7	16.1	29.2	47.5	2.2	4.21
Variety of services at the visitor center	1.3	2.9	15.8	27.0	35.1	18.0	4.12
Opportunity to recreate without feeling crowded	2.8	6.1	17.2	27.9	43.9	2.0	4.06
Nature/historical information about the site	1.9	6.9	18.0	26.8	42.0	4.3	4.05
Current and accurate information	3.9	4.1	16.8	28.8	37.5	8.9	4.01
Enough directional signage	3.7	6.8	20.6	25.8	40.7	2.4	3.95
Availability of information services away from the visitor center	2.7	5.5	17.9	28.8	31.6	13.5	3.94
Adequate ranger/visitor assistance patrols	4.4	7.0	18.6	23.1	39.1	7.9	3.93
Availability of safety information	3.1	6.4	21.7	25.2	37.3	6.4	3.93
No signs of vandalism at the site	5.1	8.3	20.5	22.2	43.5	.4	3.91

Availability of trash containers	3.1	7.2	19.5	31.1	34.0	5.0	3.90
Adequate number of picnic shelters	3.3	4.0	18.9	25.7	27.9	20.2	3.89
General information available	5.4	7.6	18.0	23.2	38.6	7.2	3.88
Adequate parking	6.5	9.7	17.7	25.9	37.5	2.8	3.80
Picnic tables and grills conveniently located and in good condition	4.9	7.0	20.0	19.0	26.2	22.8	3.71
Clean restrooms and in proper working order	8.9	10.1	16.1	19.2	28.1	17.5	3.58
Adequate number of restroom facilities	9.9	7.3	22.0	20.3	27.9	12.5	3.56
Enough water fountains and faucets	7.2	12.6	20.3	22.9	23.7	13.3	3.50
Accessibility for people with disabilities	17.7	15.7	15.5	15.5	20.1	15.5	3.05

*Note: 1=least satisfied, 5=most satisfied, n/a=not applicable.

To better understand the areas where improvements need to be made by the forest, we conducted an importance-performance analysis of visitors' responses on site conditions. The results are presented in Figure 1. The figure depicts areas of low priority for the forest, areas where the forest need to concentrate and address in future management efforts, areas where the forest needs to continue the good work is doing, and a series of site conditions that are low in importance for the visitors but currently the forest in performing well in addressing them.

Figure 1. Site Conditions Importance – Performance Analysis Summer 2013



The results are presented in more detail in Table 32. Some of the areas in which the forest needs to concentrate in terms of management actions are: adequate number of restroom facilities; clean restrooms and in proper working order; adequate parking; availability of trash containers; general information available; no signs of vandalism at the site; availability of information services away from the visitor center; adequate ranger/visitor assistance patrols; enough directional signage; current and accurate information; and availability of safety information. These areas of improvement can be directly linked to crowding perceptions; the more visitors at the sites the more the probability of visitors reporting lack of adequate number of facilities to support their recreation experience.

Table 32. Summer 2013: Management Priorities Based on Visitor Evaluation of Site Conditions

Priority Level	Site Conditions
Low Priority	Accessibility for people with disabilities
	Enough water fountains and faucets
	Picnic tables and grills conveniently located and in good condition
	Adequate number of picnic shelters
Concentrate Here	Adequate number of restroom facilities
	Clean restrooms and in proper working order
	Adequate parking
	Availability of trash containers
	General information available
	No signs of vandalism at the site
	Availability of information services away from the visitor center
	Adequate ranger/visitor assistance patrols
	Enough directional signage
	Current and accurate information
	Availability of safety information
Keep Up the Good Work	Well protected natural environment
	Courteous and friendly staff members
	Well protected cultural resources
	Opportunity to recreate without being bothered by nuisance wild animals in the Forest
	Appearance and maintenance of the site
	Water free of litter and trash
	Opportunity to recreate without being bothered by insects
	Proper access to the recreation site of interest
	Proper trails for the designated activity
	Safety and security at the site
	Availability of staff to answer questions
	Erosion free and well maintained trails

	Variety of services at the visitor center
	Opportunity to recreate without feeling crowded
	Nature/historical information about the site

The participants were asked to rate the quality of their experience at the most recently visited site. The responses were quite spread, however the majority of the respondents (81.5%, *n*=383) rated their experience at 8 or higher on a 1 to 10 scale. The mean response was 8.56, with a standard deviation of 1.291. Table 33 demonstrates these results.

Table 33. Summer 2013: Quality of Experience

0	1	2	3	4	5	6	7	8	9	10
1 (.2%)	0	0	0	1 (.2%)	12 (2.5%)	19 (4.0%)	55 (11.6%)	126 (26.8%)	118 (25.1%)	**139 (29.6%)**

*Note: 1=Very poor quality, 5=Neutral, 10= Excellent quality.

When asked if they intend to visit the forest again, a high percentage of the participants said yes (95.7%, *n*=463). This result is presented in Table 34.

Table 34. Summer 2013: Intention to Revisit

	Frequency	Percent
Yes	**463**	**95.7%**
No	21	4.3%
Total	**484**	**100.0**

SECTION IV: Social Encounters

The respondents were asked to report how many other visitors they encountered at the site most recently visited. The majority of the respondents (60.9%, *n*=294) encountered 31 other visitors or more. Of this number, more than a third of the respondents (38.5%, *n*=186) encountered 50 or more visitors. Table 35 demonstrates these results.

Table 35. Summer 2013: Number of Visitors Encountered

	Frequency	Percent
0	12	2.4
1-10	58	12.0
11-20	52	10.8
21-30	67	13.9
31-40	53	11.0
41-50	55	11.4
>50	**186**	**38.5**
Total	**483**	**100.0**

When asked in what way the encounters with other visitors impacted their experience, almost half of the respondents reported the encounter with other visitors as having no influence on their experience (47.9%, *n*=229), followed by having a positive influence on the experience (46.4%, *n*=222). Only a small percentage of the respondents (5.7%, *n*=27) rated that encounters with other visitors influenced their experience in a negative way. These results are presented in Table 36.

Table 36. Summer 2013: Perception of Encounters

	Frequency	Percent
Influenced in positive way	**222**	**46.4**
Influenced in negative way	27	5.7
No influence	**229**	**47.9**
Total	**478**	**100.0**

To further assess the impact of encounters on experience, we looked at differences in terms of perceptions of encounters based on primary residence. A significant difference was found between local visitors, and visitors from United States and other countries (chi-square=.001). Local visitors tended to report a positive influence of encounters on their experience as compared with visitors from United States who tended to report no influence of other visitors on their experience. Table 37 presents these results.

Table 37. Summer 2013: Perception on Encounters based on Primary Residence

	Primary Residence (%)			
	Puerto Rico (N=225)	United States (N=227)	Other (N=11)	Total (N=463)
Influenced in a positive way	**56.0**	**37.8**	**36.2**	**46.4**
Influenced in a negative way	4.4	6.2	18.3	**5.7**
No influence	39.6	**56.0**	**45.5**	**47.9**
Total %	**100.0**	**100.0**	**100.0**	**100.0**

Furthermore, we explored the role of ethnicity in explaining differences in perceptions of encounters. The results show a significant (chi-square = .000) difference in responses based on ethnicity. The Hispanic or Latino population was more inclined to see the number of encounters as having a positive influence on their experience as compared with non-Hispanic or Latino who reported more frequently that the number of encounters had no influence on their experience. Table 38 presents these results.

Table 38. Summer 2013: Perception of Encounters based on Ethnicity

	Ethnicity (%)		
	Hispanic or Latino (N=313)	Not Hispanic or Latino (N=146)	Total (N=459)
Influenced in a positive way	**54.0**	**31.5**	**46.9**
Influenced in a negative way	3.5	8.9	5.2

No influence	**42.5**	**59.6**	**47.9**
Total%	**100.0**	**100.0**	**100.0**

The respondents were asked if they felt crowded at the recreation site most recently visited. The majority of the respondents (63.2%, *n*=297) reported not feeling crowded at the site, while more than a third of the respondents (36.8%, *n*=173) said they felt crowded at the recreation site. These results are presented in Table 39.

Table 39. Summer 2013: Perception of Crowdedness at Recreation Site

	Frequency	**Percent**
Felt crowded	173	36.8
Did not feel crowded	**297**	**63.2**
Total	**470**	**100.0**

In our efforts to better understand crowding perceptions at the forest, we explored differences in crowding perceptions between the sites where data was collected. Significant differences (chi-square=.000) were observed in crowding perceptions between sites, more visitors feeling crowded at Big Tree Trailhead and less crowded at Mt. Britton. Table 40 presents these results.

Table 40. Summer 2013: Perception of Crowdedness Based on Data Collection Sites

	Perception of Crowdedness (%)		
Data collection sites	**Yes**	**No**	**N**
Palo Colorado	37.4	62.6	131
Big Tree Trailhead	**50.9**	**49.1**	**117**
Sierra Palm	35.8	64.2	95
Mt Britton	**16.5**	**83.5**	**85**
Angelito & Puente Roto	40.5	59.5	42
Total	**36.9**	**63.1**	**470**

To further explore crowdedness responses, we analyzed possible differences in perceptions of crowdedness based on primary residence. The results did not show a significant difference (chi-square=.517) between the groups in terms of crowding perceptions. Similarly, the analysis looking at differences based on ethnicity showed not significant differences (chi-square = .719) in terms of crowdedness perceptions between Hispanic or Latino and not Hispanic or Latino.

Those who expressed that they felt crowded at the recreation site, were asked to rate on a scale from 1 to 9, where 1=not crowded at all to 9=extremely crowded their perceived crowdedness at the recreation site. The responses were highly spread, less than a half of the respondents (42.5%, *n*=147) perceived to be moderately crowded (6-7 ratings) at the recreation site. The mean response for level of perceived crowdedness was 5.54 on a scale from 1 to 9 with a standard deviation of 2.294.These results are presented in Table 41.

Table 41. Summer 2013: Rating of Perceived Crowdedness at Recreation Site

	1	2	3	4	5	6	7	8	9
Frequency	28	23	30	13	42	**68**	**79**	39	24
Percent	8.1	6.6	8.7	3.8	12.1	**19.7**	**22.8**	11.3	6.9

*Note: 1= Not crowded at all, 3-4= Slightly crowded, 6-7= Moderately crowded, 9= Extremely crowded

When asked how acceptable the number of visitors they encountered at the recreation site was, a third of the respondents found it acceptable (33.2%, *n*=158), followed by more than acceptable (13.0%, *n*=62) and very acceptable (26.7%, *n*=127). These results are presented in Table 42.

Table 42. Summer 2013: Acceptability of the Number of Visitors Encountered

	-4	-3	-2	-1	0	1	2	3	4
Frequency	3	2	11	15	70	28	**158**	62	127
Percent	.6	.4	2.3	3.2	14.7	5.9	**33.2**	13.0	26.7

*Note: -4=Very unacceptable; -2=Unacceptable; 0=Neutral; 2=Acceptable; 4=Very acceptable

To better understand the data, we explored differences in terms of visitors' perceived acceptability of the number of visitors they encountered, differences based on primary residence. Significant differences (chi-square=.005) were observed between visitors based on their primary residence. Visitors from United States were less likely to find the number of encounters very acceptable to them. These results are presented in Table 43.

Table 43. Summer 2013: Acceptability of Visitor Encounters Based on Primary Residence

	Primary Residence (%)			
Acceptability of visitor encounters	**Puerto Rico (N=229)**	**United States (N=223)**	**Other (N=11)**	**Total (N=463)**
Very unacceptable	0.4	0.9	0.0	0.7
-3	0.4	0.4	16.7	0.4
Unacceptable	1.3	2.7	0.0	2.4
-1	1.3	4.5	0.0	2.8
Neutral	11.4	19.3	0.0	14.9
1	5.3	6.7	50.0	5.8
Acceptable	33.6	30.5	25.0	32.6
3	13.1	13.5	8.3	13.4
Very acceptable	**33.2**	**21.5**	**0.0**	**27.0**
Total %	**100.0**	**100.0**	**100.0**	**100.0**

Ethnicity was another factor explored as it relates to the acceptability of visitor encounters. A significant (chi-square=.000) difference was found between Hispanic or Latino visitors and not Hispanic or Latino visitors. The Hispanic or Latino visitors were found more

likely to found the number of encounters as acceptable and very acceptable. Table 44 presents these results.

Table 44. Summer 2013: Acceptability of Visitor Encounters Based on Ethnicity

	Ethnicity (%)		
Acceptability of visitor encounters	**Hispanic of Latino (N=316)**	**Not Hispanic or Latino (N=144)**	**Total (N=460)**
Very unacceptable	0.3	1.4	0.7
-3	0.3	0.7	0.4
Unacceptable	1.3	4.2	2.2
-1	1.3	6.3	2.8
Neutral	12.7	20.1	15.0
1	5.4	7.6	6.1
Acceptable	32.6	32.6	32.6
3	12.3	15.3	13.3
Very acceptable	**33.8**	**11.8**	**26.9**
Total %	**100.0**	**100.0**	**100.0**

The study participants were asked to report what would be the acceptable number of visitors to encounter at the recreation site. More than a quarter of the respondents (26.0%, *n*=121) said that 50 or more people will be acceptable to encounter at the recreation site. Less than a quarter of the respondents (21.0%, *n*=98) reported that seeing 21 to 30 people at the site will be acceptable. Overall, 74.0% of the respondents would prefer to encounter 50 people or less at the recreation site. Table 45 demonstrates these results.

Table 45. Summer 2013: Number of Visitors Acceptable to Encounter at Recreation Site

	Frequency	**Percent**
Less than 10	24	5.2
10-20	78	16.7
21-30	**98**	**21.0**
31-40	71	15.2
41-50	74	15.9
Greater than 50	**121**	**26.0**
Total	**466**	**100.0**

To better understand the results, we explored possible differences in terms of number of visitors to encounter, differences based on primary residence. A significant difference was observed between groups (chi-square=.013), visitors from United States being more inclined to select as acceptable a lower number of visitors encounters at the recreation site. These results are presented in Table 46.

Table 46. Summer 2013: Number of Visitors Acceptable to Encounter Based on Primary Residence

	Primary Residence (%)			
Visitors acceptable to encounter	**Puerto Rico (N=223)**	**United States (N=220)**	**Other (N=11)**	**Total (N=454)**
Less than 10	3.6	7.3	0.0	5.3
10-20	13.0	20.0	18.2	16.5
21-30	18.4	23.6	9.1	20.7
31-40	13.0	16.8	27.3	15.2
41-50	17.9	13.6	18.2	15.9
Greater than 50	**34.1**	**18.7**	**27.2**	**26.4**
Total %	**100.0**	**100.0**	**100.0**	**100.0**

Furthermore, we explored differences in the number of visitors acceptable to encounter, differences based on ethnicity. A significant difference was found (chi-square=.015), Hispanic or Latino visitors being more likely to report as adequate to encounter 50 visitors or more at the recreation site. These results are presented in Table 47.

Table 47. Summer 2013: Number of Visitors Acceptable to Encounter Based on Ethnicity

	Ethnicity (%)		
Visitors acceptable to encounter	**Hispanic of Latino (N=309)**	**Not Hispanic or Latino (N=142)**	**Total (N=451)**
Less than 10	4.2	7.7	5.3
10-20	13.9	22.5	16.6
21-30	19.4	23.2	20.6
31-40	15.5	15.5	15.5
41-50	16.2	13.4	15.3
Greater than 50	**30.7**	**17.6**	**26.6**
Total	**100.0**	**100.0**	**100.0**

Differences on the number of visitors acceptable to encounter were also explored based on the recreation sites where data was collected. Significant differences were found (chi-square=.014) between sites, respondents being willing to encounter more visitors at Palo Colorado and Angelito and Puente Roto. Table 48 presents these results.

Table 48. Summer 2013: Number of Visitors Acceptable to Encounter Based on Data Collection Site

	Data Collection Sites (%)					
Visitors acceptable to encounter	**Palo Colorado (N=130)**	**Big Tree Trail (N=113)**	**Sierra Palm (N=97)**	**Mt. Britton (N=84)**	**Angelito & Puente Roto (N=42)**	**Total (N=466)**
Less than 10	**2.3**	6.1	7.2	8.3	**4.8**	5.2

10-20	**15.4**	18.3	20.6	19.0	**2.4**	16.7
21-30	**16.2**	29.6	17.5	17.9	**26.2**	21.0
31-40	**17.7**	13.9	12.4	20.2	**7.1**	15.2
41-50	**22.3**	10.4	18.6	9.5	**16.7**	15.9
Greater than 50	**26.2**	21.7	23.7	25.0	**42.9**	26.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

When asked what the preferred group size to recreate with at the most recently visited site was, more than a third of the respondents selected the medium group size (6 to 15 people) (39.7%, *n*=187), followed by the small group size (5 people or less) (24.4%, *n*=115). Table 49 demonstrates these results.

Table 49. Summer 2013: Preferred Group Size for Recreating

	Frequency	Percent
Small (5 people or less)	115	24.4
Medium (6-15 people)	**187**	**39.7**
Large (16-25 people)	92	19.5
Makes no difference	77	16.4
Total	**471**	**100.0**

An analysis exploring differences based on primary residence, ethnicity and preferred group sized was conducted. The results showed no significant differences in preferred group size based on primary residence. However, significant differences were observed on preferred group size based on ethnicity (chi-square=.000). The Hispanic or Latino respondents were more inclined to prefer a medium or large group size for recreation. These results are presented in Table 50.

Table 50. Summer 2013: Preferred Group Size for Recreating Based on Ethnicity

	Ethnicity (%)		
Preferred group size	**Hispanic of Latino (N=313)**	**Not Hispanic or Latino (N=142)**	**Total (N=455)**
Makes no difference to me	17.9	13.4	16.5
Small (5 people or less)	**16.9**	**42.3**	**24.8**
Medium (6-15 people)	42.8	31.0	39.1
Large (16-25 people)	22.4	13.4	19.6
Total	**100.0**	**100.0**	**100.0**

SECTION V: Perceptions of Conflict and Preferred Management Actions

The respondents were asked to report to what extent their experiences were impacted by a series of conditions at the site. The areas with highest scores (a cumulative of agree and strongly agree) were: availability of parking (44.9%, *n*=203); seeing/ encountering other recreationists (36.7%, *n*=167); available space to participate in my recreation activities (36.0%, *n*=163); traffic

congestion (33.1%, *n*=150); and crowding/ congestion from tourists (32.4%, *n*=145). Table 51 presents these results.

Table 51. Summer 2013: Perceptions of Conflict Related to Recreation Engagement

	Percent						M
Experience at EYNF was impacted by…	**1**	**2**	**3**	**4**	**5**	**N/A**	
Availability of parking	**15.7**	**9.3**	**26.3**	**23.0**	**21.9**	**4.0**	**3.27**
Seeing/encountering other recreationists	**19.1**	**6.6**	**30.8**	**18.9**	**17.8**	**6.8**	**3.10**
Available space to participate in my recreation activities	**21.0**	**11.3**	**25.2**	**18.1**	**17.9**	**6.6**	**3.01**
Crowding/ congestion from tourists	**21.7**	**11.4**	**26.8**	**17.4**	**15.0**	**7.6**	**2.92**
Traffic congestion	**22.2**	**11.2**	**27.5**	**20.3**	**12.8**	**5.9**	**2.89**
Behavior of others outside of your group	24.3	10.4	27.7	12.4	17.3	8.0	2.87
Behavior of others in your group	26.9	9.9	26.5	10.2	17.9	8.6	2.80
Noise levels	24.9	12.8	29.4	12.4	14.1	6.4	2.76
Hours of operation	26.9	11.1	26.2	10.2	14.9	10.7	2.72
Litter or trash	28.4	14.1	22.2	14.8	13.7	6.8	2.69
Other uses of the forest besides recreation	28.5	10.6	27.2	9.3	11.5	12.8	2.59
Need for permits	30.5	8.6	23.3	7.3	9.5	20.9	2.45
Conflict between recreationists	35.0	11.3	25.5	7.8	11.1	9.3	2.43

*Note: 1=strongly agree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, n/a=not applicable.

The participants were asked to report their level of agreement with a series of potential future management actions. The respondents tended to view more positively (a sum of agree and strongly agree) the following management actions: establish a fine for not following forest recreation use and regulations (62.3%, *n*=281); provide low impact recreation educational programs to visitors (55.0%, *n*=249); increase number of facilities (add trails, picnic areas, etc.) (53.2%, *n*=232); and provide signage and information to change behavior (51.1%, *n*=232). The least favored actions (a sum of strongly disagree and disagree) were: require an entrance fee for all sites (56.8%, *n*=257); require an entrance fee for only some sites (49.0%, *n*=221); followed by establishing a maximum number of visitors to the site and close the site after the limit is reached (34.8%, *n*=158) and limit the size of groups (31.4%, *n*=144). These results are presented in Table 52.

Table 52. Summer 2013: Agreement with Potential Future Forest Management Actions

	Percent					M
Management Actions	**1**	**2**	**3**	**4**	**5**	
Establish a fine for not following forest recreation use rules and regulations	**10.6**	**4.2**	**22.8**	**23.5**	**38.8**	**3.76**

Provide low impact recreation educational programs to visitors	**10.4**	**5.3**	**29.4**	**31.6**	**23.4**	**3.52**
Increase number of facilities (add trails, picnic areas, etc.)	**10.1**	**8.5**	**28.2**	**28.4**	**24.8**	**3.49**
Provide signage and information to change behavior	**10.1**	**9.7**	**29.1**	**28.6**	**22.5**	**3.44**
Regulate car access at specific areas	**11.8**	**9.5**	**32.7**	**27.7**	**18.2**	**3.31**
Disperse recreation use to other sites	11.4	8.5	36.5	25.6	17.9	3.30
Regulate when visitors can use specific sites (day vs. overnight etc.)	14.1	9.9	33.9	24.2	17.8	3.22
Regulate where visitors can go at specific recreation sites (e.g. closure of heavily impacted picnic areas)	14.3	9.8	33.6	26.3	16.0	3.20
Close areas that have high impact due to visitation	16.3	12.3	29.1	26.0	16.3	3.14
Limit the size of groups	18.1	13.3	33.8	24.9	9.8	2.95
Establish a maximum number of visitors to the site and close the site after the limit is reached	18.9	15.9	30.0	22.5	12.8	2.94
Require an entrance fee for only some sites	35.7	13.3	22.4	16.2	12.4	2.56
Require an entrance fee for all sites	39.8	17.0	21.2	11.5	10.4	2.36

*Note: 1= strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

At the end of the survey, respondents were asked to include any comments they might have that would help better understand their experience at the El Yunque. Several respondents commented on the positive aspects of the forest, such as personnel and natural beauty, and how they enjoyed their trip at El Yunque. Listed below is a sample of such comments:

"The personnel are all very kind and nice."

"Of all the places in Puerto Rico where one can spend a tranquil moment, El Yunque is number 1!"

"The place is excellent to share family time. We have come for many years and I love it. It brings such emotional peace."

"Rangers extremely helpful. Knowledgeable of many sites besides rain forest."

Some the comments received were related to the site conditions and services available at the forest and how visitors see possibly improving the current situation. The respondents made comments in regard to the water fountains not working, cleanliness and maintenance of bathrooms, trails maintenance, lack of markers on the trails, signs of vandalism (e.g. graffiti), services for people with disabilities, better trash removal and better directional and interpretive signage, the availability of maps, crowding, better information regarding weather conditions, and comments about the entrance fee. Below are listed a sample of comments received related to forest services and site conditions:

"Promote picnic tables."

"Place water fountains in the area of towers, don't permit cars to go in the area of the towers (peaks), all should use the trolley, place personnel in the area of the towers."

"Install water fountains."

"It is necessary to have little maintenance and cleanliness in the bathrooms and we must create a consciousness so that people don't throw garbage on the ground. No more cement or concrete structures either! May everything be ecological!"

"More services are needed for the handicapped. Offer access to those who are handicapped or who have difficulty walking."

"Along El Yunque trail better drainage is needed. When it started raining, all the water ran along the trail."

"Yunque delights is too expensive, and the quality is not that good. There is not that much security around. Should create a warning system flash floods."

"There were some areas in need of rails on the trail at Big Tree. Some areas need to be cleared of the graffiti. Many bathrooms at Yokanu towers were not clean. Toilets were closed."

"Positive: Female worker at gift shop took the time to explain birds of the forest and her own personal pictures. Was very interesting and educational for a bird lover. The hike to the tower was well paved. Eating place good. Trans-mobile nice. Negative: too many potholes need a good sign (large) on highway 66. Park ranger or equivalent should give scheduled talks and let it be on a brochure. We are park lovers."

"Improve the access to the ponds/lakes/pools."

"More restrooms, please."

"Some of the locations where the picnic tables were smelled of urine."

"Some water stations throughout the trails would be convenient."

"Please clean up trash at top of Yokahu tower, please."

"Beautiful forest. Well maintained trails, though still rugged. Crowded but love it's free and open to everyone. Rangers are very personable and very helpful. Glad there's snack places. Keep up the great work. Thank you."

"Too crowded, especially at La Mina falls; some litter on trails; beautiful gem in Puerto Rico; Glad we came!"

"It was a little crowded but overall a great trip to the forest. More parking availability would be nice."

"Trams are blocking parking and impeding traffic flow; tram access should be regulated."

"Promote use and schedule of the shuttle buses."

"Better signs and paths prior to the entrance."

"The map on the brochure was unclear. The maps on the signs were very clear. The bus turnaround at La Mina Falls was too small."

"I believe it would be beneficial for all to place signs to prohibit the brining of domestic animals because people bring them and they get in the water and they are bothersome to others including children when they want to swim."

"More signage is needed to indicate areas for garbage, dangerous areas, etc."

"There needs to be a sign that indicates how many minutes or hours it takes to get to the waterfall, the tower or any other area that requires walking, climbing or descending."

"We noted some trash left at bench area which was disconcerting. We would love to see that packed out and signage reminding people about the delicate nature of the environment. Perhaps docents on trails to remind errant visitors of good behavior."

"We really enjoyed our visit even through it was pouring rain constantly and it was thundering and lightening. The only thing I emphasize that maps were not available. We did not pay to go to the visitor center and there were no maps available to us."

"Should provide a weather advisory on website."

"Better maps w/ distance of each trail and elevation."

"Why do maps seem to want us to stay ignorant? Perhaps to keep unappreciative tourists from getting off trail or onto more interesting trails? Thank you, Beautiful!!!"

"Note: on La Mina trail, trail markers indicating progress would be helpful."

"In order to have more funding, I am for an entrance fee to be charged to all visitors whether it is a charge per car or a charger per visitor."

"$4 per person charge in the visitor center is high. This has discouraged our group to going into the center."

"Don't charge to go to visitor center, instead charge $10.00/car that enters rainforest."

Results Winter (January) 2014

SECTION VI: Demographic Information

This section describes the demographic profile of the respondents for data collected in January 2014. The following demographic variables were measured: gender, age, ethnicity, race, relationship status, household composition, education level, employment status, income, and residence.

More than half of the respondents (60.0%, *n*=242) were female and 40.0%, *n*=161 were male. Table 53 depicts this result.

Table 53. Winter 2014: Gender of Participants

	Frequency	Percent
Male	161	40.0
Female	**242**	**60.0**
Total	**403**	**100.0**

Of the participants, more than a quarter of the respondents (28.2%, *n*=110) were between 26 and 35 years of age and less than one quarter (17.2%, *n*=67) were between 18 and 25 years and between 56 and 65 years. A small number of the participants were over 65 years (10.0%, *n*=39). The average age of the respondents was 42 years with a standard deviation of 16.198. These findings are presented in Table 54.

Table 54. Winter 2014: Age of Study Participants

	Frequency	Percent
18 to 25 years	**67**	**17.2**
26 to 35 years	**110**	**28.2**
36 to 45 years	48	12.3
46 to 55 years	59	15.1
56 to 65 years	**67**	**17.2**
Over 65 years	39	10.0
Total	**390**	**100.0**

The ethnic background of the participants reveals the majority of the participants (66.0%, *n*=272) were not Hispanic or Latino, while more than a third of the participants (34.0%, =140) were Hispanic or Latino. These results are presented in Table 55.

Table 55. Winter 2014: Ethnicity of Study Participants

	Frequency	Percent
Hispanic or Latino	140	34.0
Not Hispanic or Latino	**272**	**66.0**
Total	**412**	**100.0**

When asked to report their race, the majority of the respondents (82.6%, *n*=277) identified themselves as white, followed by respondents who identified themselves as Asian (8.3%, *n*=30). Only a small percentage of the respondents identified themselves as Black or African American (5.2%, *n*=19), American Indian or Alaska Native (2.5%, *n*=9), or Native Hawaiian or other Pacific Islander (1.4%, *n*=5). Table 56 presents these results.

Table 56. Winter 2014: Race of Study Participants

	Frequency	Percent
American Indian or Alaska Native	9	2.5
Asian	30	8.3
Black or African American	19	5.2
Native Hawaiian or other Pacific Islander	5	1.4
White	**299**	**82.6**
Total	**362**	**100.0**

When the participants were asked to specify their current relationship status, the majority of participants (57.5%, *n*=237) reported they were married/partnered, whereas more than a third of the participants (35.7%, *n*=147) indicated they were single. A small number of the participants (4.6%, *n*=19) answered they were divorced/separated, followed by widowed (2.2%, *n*=9). Table 57 shows the current relationship status of the event participants.

Table 57. Winter 2014: Relationship Status of Study Participants

	Frequency	Percent
Single	**147**	**35.7**
Married/partnered	**237**	**57.5**
Divorced/separated	19	4.6
Widowed	9	2.2
Total	**412**	**100.0**

When asked to provide information on the household composition, the majority of the respondents (54.1%, *n*=216) listed two adults living in the household, including themselves. This was followed by those with only one adult in the household (19.8%, *n*=79) and those with three adults in the household (11.8%, *n*=47). Table 58 presents these results.

Table 58. Winter 2014: Number of Adults Including Yourself in the Household

	Frequency	Percent
1 adult	79	19.8
2 adults	**216**	**54.1**
3 adults	47	11.8
4 adults	41	10.3
5 adults	8	2.0
6 adults	5	1.3
7 adults	2	.5
9 adults	1	.2
Total	**399**	**100.1**

The respondents were asked to report how many children less than 18 years old live in the household. The majority (74.5%, *n*=298) reported they had no children in the household followed by those who had one child (12.8%, *n*=51) and two children (9.0%, *n*=36). Table 59 demonstrates these results.

Table 59. Winter 2014: Number of Children under 18 in the Household

	Frequency	Percent
No children in the household	**298**	**74.5**
1 child	51	12.8
2 children	36	9.0
3 children	11	2.7
4 children	4	1.0
Total	**400**	**100.0**

A third of the participants (33.9%, *n*=138) reported they had a college degree, followed by a graduate degree or higher (28.5%, *n*=116), and some college (17.0%, *n*=69). The educational level of the study participants is presented in Table 60.

Table 60. Winter 2014: Education Level of Study Participants

	Frequency	Percent
Eighth Grade or Less	0	0.0
Some High School	14	3.4
High School Graduate or GED	21	5.2
Some College	69	17.0
College Graduate	**138**	**33.9**
Some Graduate School	49	12.0
Graduate Degree or Higher	**116**	**28.5**
Total	**407**	**100.0**

When asked their current employment status, the majority of the participants (59.0%, *n*=239) reported being employed full time followed by those currently retired (13.3%, *n*=54) and currently full time students (11.1%, *n*=45). These results are presented in Table 61.

Table 61. Winter 2014: Current Employment Status of Study Participants

	Frequency	Percent
Employed Full Time	**239**	**59.0**
Employed Part Time	26	6.4
Unemployed	13	3.2
Full Time Homemaker	11	2.7
Retired	**54**	**13.3**
Full Time Student	45	11.1
Part Time Student	3	.7
Other	14	3.6
Total	**405**	**100.0**

When asked to identify the range that best describes participants total annual household income, 16.2%, *n*=58 of the respondents indicated their income was $75,000 to $99,999. This was followed by those who reported their income between $25,000 and $49,999 (15.1%, *n*=54) and between $50,000 and $74,999 (15.4%, *n*=55). Table 62 displays the annual household income of study participants.

Table 62. Winter 2014: Annual Household Income of Study Participants

	Frequency	Percent
<$9,999	25	7.0
$10,000- $24,999	46	12.8
$25,000- $49,999	54	15.1
$50,000- $74,999	**55**	**15.4**
$75,000- $99,999	**58**	**16.2**
$100,000- $124,999	39	10.9

$125,000-$149,999	25	7.0
≥$150,000	**56**	**15.6**
Total	**358**	**100.0**

When the participants were asked to identify their primary residence, more than half of the participants (69.3%, *n*=302) reported being from United States, while the other reported being from Puerto Rico (22.0%, *n*=96). A small number of the participants (8.7%, *n*=38) indicated other countries as their primary residence. These results are presented in Table 63.

Table 63. Winter 2014: Primary Residence of Study Participants

	Frequency	Percent
Puerto Rico	96	22.0
United States	**302**	**69.3**
Other	38	8.7
Total	**436**	**100.0**

SECTION VII: Recreation Participation

When asked if this was their first visit at El Yunque National Forest, more than half of the participants (68.3%, *n*=298) responded that this was their first visit. This result is reported in Table 64.

Table 64. Winter 2014: First Visit to El Yunque National Forest

	Frequency	Percent
Yes	**298**	**68.3**
No	138	31.7
Total	**440**	**100.0**

Participants were asked to report how often they visited the forest during the past 12 months. A third of the respondents (33.7%, *n*=52) reported that they visited the forest more than 12 months ago. Most of the participants visited the forest once before (34.4%, *n*=53) followed by those who visited a few times before (21.4%, *n*=33). A low percentage of the respondents visited the forest once a month or more often (10.3%, *n*=16). Table 65 presents these results.

Table 65. Winter 2014: Visitation Frequency

	Frequency	Percent
Visited more than 12 months ago	**52**	**33.7**
Once	**53**	**34.4**
A few times	33	21.4
Once a month	5	3.2
A few times a month	7	4.5
Once a week	0	0

More than once a week	4	2.6
Everyday	0	0
Total	**154**	**100.0**

The respondents were asked to report how many hours they spent at the forest during the day of their visit. The majority of the respondents (57.0%, *n*=251) spent between 3 to 4 hours at the forest. Less than a quarter (19.8%, *n*=87) of the respondents spent slightly more time at the forest, between 5 and 6 hours. Only a small percentage (1.8%, *n*=8) of the respondents stayed overnight, spending two days at the forest (*n*=3), three days (*n*=1), or four days (*n*=2). Table 66 demonstrates these results.

Table 66. Winter 2014: Time Spent at El Yunque National Forest

	Frequency	Percent
1-2 hours	81	18.4
3-4 hours	**251**	**57.0**
5-6 hours	87	19.8
7-8 hours	13	3.0
9-12 hours	0	0
1 day or more	8	1.8
Total	**440**	**100.0**

The respondents were asked to list the name of the site they most recently visited. Slightly more than a quarter of the respondents (27.5%, *n*=117) listed La Mina/Palo Colorado as the site they recently visited, followed by Big Tree Trail (22.8%, *n*=97) and Mt. Britton (18.4 %, *n*=78). Several respondents provided a very general description of the site (e.g. hiking, waterfall, picnic area) (3.8%, *n*=16) not a specific site name. These results are presented in Table 67.

Table 67. Winter 2014: Recreation Site Most Recently Visited

	Frequency	Percent
La Mina/ Palo Colorado	**117**	**27.5**
Big Tree Trail	**97**	**22.8**
Mt. Britton/El Yunque Trail	**78**	**18.4**
Other sites outside of the forest (bio-bay, Luquillo beach)	37	8.7
La Coca	21	4.9
Sierra Palm	19	4.5
General description of site	16	3.8
Yokahu	12	2.8
El Portal	10	2.4
Other sites in the forest (e.g. Caimitillo, Juan Diego, Bano de Oro)	9	2.1
Angelito & Puente Roto	6	1.4
None	3	.7

Total	**425**	**100.0**

The respondents were asked to report how many hours they spent at the most recently visited recreation site. The majority of the respondents (75.2%, *n*=309) reported they spent 1 to 2 hours are the most recently visited site. These results are presented in Table 68.

Table 68. Winter 2014: Hours Spent at Most Recently Visited Recreation Site

	Frequency	Percent
1-2 hours	**309**	**75.2**
3-4 hours	70	17.1
5-6 hours	19	4.6
7-8 hours	5	1.2
9 hours or more	8	1.9
Total	**411**	**100.0**

The respondents were asked to list all the other sites visited during the trip. More than a third of the respondents reported seeing/visiting one other site (40.7%, *n*=121), while approximately a third of the respondents listed two other sites they visited (30.6%, *n*=91). These results are presented in Table 69.

Table 69. Winter 2014: Number of Other Sites Visited

	Frequency	Percent
No other sites	15	5.1
1 site	**121**	**40.7**
2 sites	**91**	**30.6**
3 sites	46	15.5
4 sites	15	5.1
5 sites	8	2.7
7 sites	1	.3
Total	**297**	**100.0**

The study participants were asked to report what was the primary purpose for their visit at the forest. The most selected reasons were: hiking/walking (73.6%, *n*=321), nature viewing (67.0%, *n*=292), photography (48.4%, *n*=211), scenic driving (36.9%, *n*=161) and waterplay (20.2%, *n*=88). These results are presented in Table 70.

Table 70. Winter 2014: Primary Purpose for Recreation at the Site Most Recently Visited

	Yes	Percent	No	Percent
Hiking/Walking	**321**	**73.6**	**115**	**26.4**
Nature viewing	**292**	**67.0**	**144**	**33.0**
Photography	**211**	**48.4**	**225**	**51.6**
Scenic driving	**161**	**36.9**	**275**	**63.1**

Waterplay	**88**	**20.2**	**348**	**79.8**
Outdoor learning	66	15.1	370	84.9
Viewing cultural resources	57	13.1	378	86.9
Birdwatching	41	9.4	395	90.6
Nature study	33	7.6	403	92.4
Picnicking	20	4.6	416	95.4
Jogging/Running	17	3.9	419	96.1
Other	14	3.2	421	96.8
Backpacking	13	3.0	423	97.0
Camping	7	1.6	429	98.4
Trail maintenance work	4	.9	432	99.1
Conducting or assisting with research	2	.5	433	99.5
Biking	1	.2	435	99.8
Collecting non-timber forest products	0	0	436	100.0

The results for primary purpose were analyzed looking at possible differences in relation to the participants' place of residence. The results found significant between reasons for visiting the site between local visitors (from Puerto Rico), visitors coming from United States and those coming from other countries. Significant differences were found for hiking/ walking and scenic driving, more visitors from Unites States reporting that the primary reason for visiting the forest was hiking/ walking and nature scenic driving; followed by jogging/running, conducting or assisting with research, and other activities, more visitors from Puerto Rico selecting these activities as a primary reason for visiting the most recently visited site. Table 71 demonstrates these results.

Table 71. Winter 2014: Primary Purpose for Visiting the Site Based on Place of Residence

	Puerto Rico (N=95)		**US (N=299)**		**Other (N=38)**		
Primary purpose	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Pearson Chi-Square**
Hiking/Walking	**55.8**	**44.2**	**80.9**	**19.1**	**63.2**	**36.8**	**.000**
Camping	3.2	96.8	1.3	98.7	0.0	100.0	.335
Nature viewing	67.4	32.6	67.6	32.4	57.9	42.1	.486
Outdoor learning	10.5	89.5	16.7	83.3	13.2	86.8	.320
Picnicking	6.3	93.7	4.7	95.3	0.0	100.0	.293
Scenic driving	**49.5**	**50.5**	**33.4**	**66.6**	**36.8**	**63.2**	**.019**
Waterplay	24.2	75.8	20.1	79.9	10.5	89.5	.206
Biking	1.0	99.0	0.0	100.0	0.0	100.0	.169
Jogging/Running	**11.6**	**88.4**	**1.7**	**98.3**	**2.6**	**97.4**	**.000**
Photography	60.0	40.0	45.5	54.5	44.7	55.3	.042
Birdwatching	9.5	90.5	9.0	91.0	13.2	86.8	.716
Backpacking	**7.4**	**92.6**	**2.0**	**98.0**	**0.0**	**100.0**	**.015**
Nature study	6.3	93.7	7.4	92.6	13.2	86.8	.385

Viewing cultural resources	18.1	81.9	11.0	89.0	15.8	84.2	.180
Trail maintenance work	2.1	97.9	0.3	99.7	2.6	97.4	.151
Conducting or assisting with research	**2.1**	**97.9**	**0.0**	**100.0**	**0.0**	**100.0**	**.027**
Collecting non-timber forest products	0.0	100.0	0.0	100.0	0.0	100.0	n/a
Other	**8.4**	**91.6**	**1.3**	**98.7**	**5.3**	**94.7**	**.002**

When asked if they were part of a guided/outfitted tour today, a high percentage of the participants (87.3%, *n*=377) reported that they were not part of a guided/outfitted tour. This does not say anything about the number of visitors coming to the forest as part of a guided tour. Due to the very structured and time constrained nature of the organized tours, we were not able to interview visitors using these services. This is definitely a limitation for this study. These results are presented in Table 72.

Table 72. Winter 2014: Were you part of a guided/outfitted tour today?

	Frequency	Percent
Yes	55	12.7
No	**377**	**87.3**
Total	**432**	**100.0**

The participants were asked to report how many people accompanied them during their visit at the forest. The majority of the respondents (68.5%, *n*=294) reported that their group size was between 1 to 4 people. Less than a quarter of the respondents (17.5%, *n*=75) reported that their group size was between 5 and 8 people. Table 73 presents these results.

Table 73. Winter 2014: Participant Group Size (not including guided/outfitted groups)

	Frequency	Percent
Zero	14	3.3
1-4 people	**294**	**68.5**
5-8 people	75	17.5
9 or more people	46	10.7
Total	**429**	**100.0**

An analysis was conducted to better understand group size differences based on primary residence. The results showed no significant differences (chi-square = .783) in group size between local visitors, visitors coming from US and other countries.

When asked what type of group they traveled with, less than half of the respondents reported that they traveled with friends (41.3%, *n*=177), followed by traveling without children (33.3%, *n*=143) and traveling in family with children (19.1%, *n*=82). Twenty-six of the respondents provided other type of group that traveled with. Table 74 demonstrates these results.

Table 74. Winter 2014: Participant Group Type

	Yes	Percent	No	Percent
Traveling alone	26	6.1	403	93.9
Family with children	82	19.1	347	80.9
Family without children	**143**	**33.3**	**286**	**66.7**
Friends	**177**	**41.3**	**252**	**58.7**
Other	26	6.1	403	93.9

The participants were asked to report the distance they traveled from the main road to reach their most recently visited recreation site. More than a quarter of the respondents (42.1%, *n*=163) listed that they traveled 1km to 5km from the main road, followed by traveling more than 5 km (23.8%, *n*=92) to get to the recreation site of choice. Table 75 illustrates these results.

Table 75. Winter 2014: Distance Traveled to Recreation Site

	Frequency	Percent
0-99 m	72	18.6
100-999 m	60	15.5
1km- 5km	**163**	**42.1**
>5km	**92**	**23.8**
Total	**387**	**100.0**

SECTION VIII: Recreation Satisfaction

Respondents were asked to indicate how important the site conditions were during their recreation at the most recently visited site. The site conditions most highly rated (a cumulative of agree and strongly agree) were: water free of litter and trash (92.7%, *n*=368); well protected natural environment (90.5%, *n*=361); proper access to the recreation site of interest (86.6%, *n*=348); proper trails for the designated activity (84.9%, *n*=332); appearance and maintenance of the site (84.2%, *n*=345); courteous and friendly staff members (84.0%, *n*=331); well protected cultural resources (83.3%, *n*=326); safety and security at the site (80.9%, *n*=305); and no signs of vandalism at the site (80.1%, *n*=318). Table 76 presents these results.

Table 76. Winter 2014: Importance of Site Conditions

	Percent						M
	1	2	3	4	5	N/A	
Water free of litter and trash	**0**	**1.5**	**5.0**	**25.2**	**67.5**	**.8**	**4.60**
Well protected natural environment	**.3**	**1.5**	**7.3**	**23.6**	**66.9**	**.5**	**4.56**
Courteous and friendly staff members	**.5**	**3.0**	**10.4**	**24.4**	**59.6**	**2.0**	**4.42**
Well protected cultural resources	**.3**	**1.3**	**11.3**	**28.6**	**54.7**	**3.8**	**4.42**
Safety and security at the site	**.8**	**2.1**	**14.3**	**23.1**	**57.8**	**1.9**	**4.38**
Proper trails for the designated	.5	1.5	12.0	32.0	52.9	1.0	4.37

activity							
Appearance and maintenance of the site	.5	1.7	13.4	34.9	49.3	.2	4.31
Proper access to the recreation site of interest	.7	2.5	10.0	36.8	49.8	.2	4.33
No signs of vandalism at the site	2.5	3.0	13.9	27.5	52.6	.5	4.25
Current and accurate information	1.0	1.8	16.7	29.2	47.1	4.2	4.25
Erosion free and well maintained trails	1.0	2.3	16.9	30.8	47.5	1.5	4.23
Availability of staff to answer questions	2.1	3.1	17.7	23.3	50.0	3.8	4.21
Nature/historical information about the site	.8	2.3	18.0	31.5	44.7	2.8	4.20
Enough directional signage	2.8	3.0	18.0	30.2	44.4	1.5	4.12
Adequate parking	3.8	3.6	16.5	28.2	45.8	2.0	4.11
Opportunity to encounter wildlife	2.8	5.7	18.9	27.7	42.5	2.3	4.04
General information available	2.8	5.4	20.5	25.9	41.3	4.1	4.02
Clean restrooms and in proper working order	4.8	5.3	16.5	23.1	40.9	9.5	3.99
Variety of services at the visitor center	2.6	5.2	20.7	24.3	37.2	9.9	3.98
Opportunity to recreate without being bothered by nuisance wild animals in the Forest	5.2	5.7	16.7	26.9	41.3	4.2	3.97
Opportunity to recreate without being bothered by insects	4.5	6.8	17.9	27.1	41.1	2.6	3.96
Availability of trash containers	4.1	7.4	19.6	24.4	41.7	2.8	3.95
Availability of information services away from the visitor center	2.1	6.0	22.0	27.5	35.3	7.1	3.95
Adequate number of restroom facilities	4.1	7.6	19.5	25.6	38.1	5.1	3.91
Availability of safety information	2.8	8.5	21.9	25.7	37.0	4.1	3.89
Adequate ranger/visitor assistance patrols	4.6	4.6	24.3	25.8	33.5	7.2	3.85
Enough water fountains and faucets	6.7	9.8	22.7	24.2	28.9	7.7	3.64
Adequate number of picnic shelters	9.9	12.5	20.4	20.6	24.2	12.5	3.42
Picnic tables and grills conveniently located and in good condition	12.7	8.6	24.1	20.0	21.8	12.9	3.34
Accessibility for people with disabilities	18.2	12.6	20.3	15.9	21.8	11.3	3.12

*Note: 1=least important, 5=most important, n/a=not applicable.

The respondents were asked to assess on a scale from 1 to 5 the satisfaction levels with various site conditions at the forest. The respondents expressed higher level of satisfaction for the following site conditions (a cumulative of agree and strongly agree): well protected natural environment (90.2%, *n*=340); proper access to the recreation site of interest (89.3%, *n*=342); appearance and maintenance of the site (87.9%, *n*=342); courteous and friendly staff members (87.5%, *n*=330); proper trails for the designated activity (84.4%, *n*=314); water free of litter and trash (83.6%, *n*=317); well protected cultural resources (82.6%, *n*=304); safety and security at the site (82.0%, *n*=302); opportunity to recreate without being bothered by insects (81.0%, *n*=297); and erosion free and well maintained trails (80.1%, *n*=298). Table 77 presents these results.

Table 77. Winter 2014: Satisfaction with Site Conditions

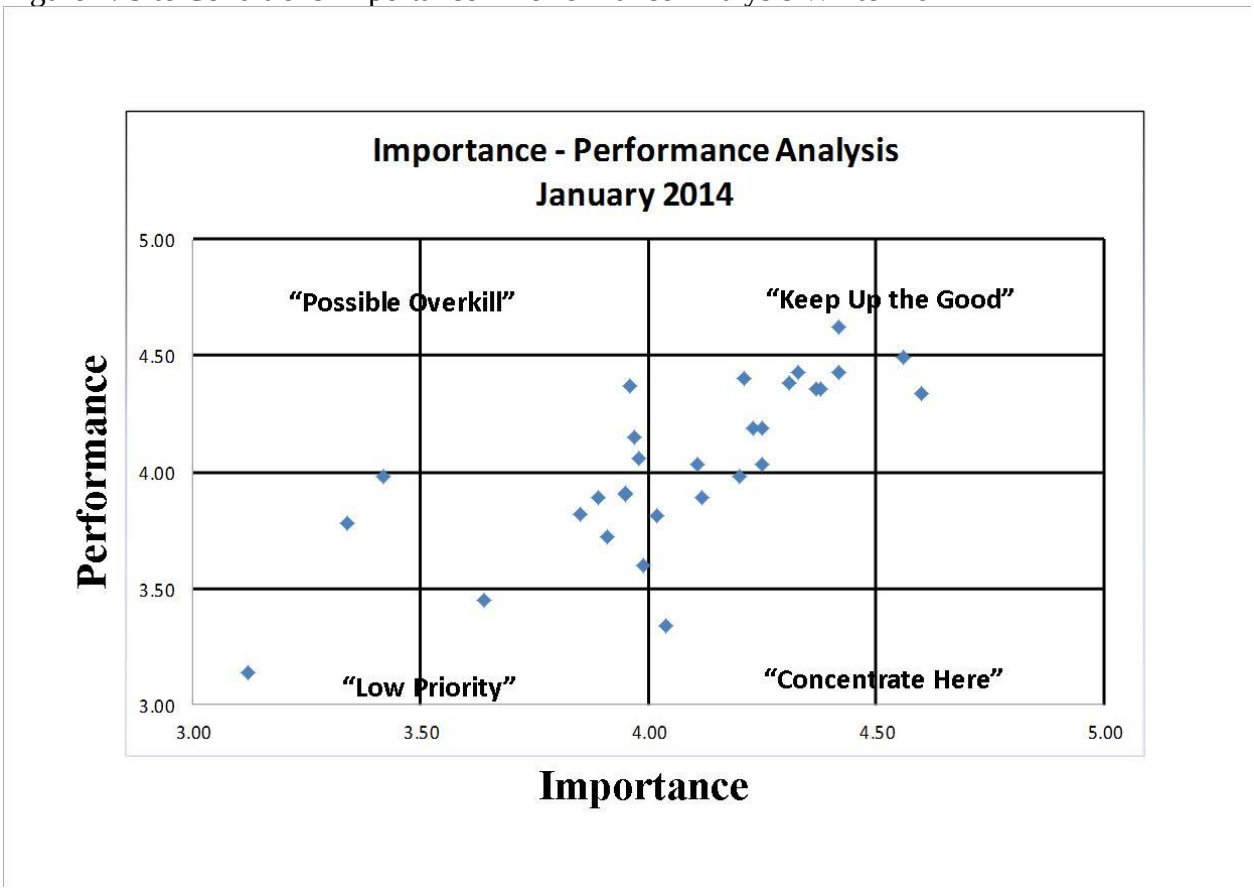
	Percent						M
	1	2	3	4	5	N/A	
Courteous and friendly staff members	**.8**	**1.1**	**6.6**	**17.2**	**70.3**	**4.0**	**4.62**
Well protected natural environment	**0**	**.8**	**8.8**	**30.5**	**59.7**	**.3**	**4.49**
Proper access to the recreation site of interest	**0**	**2.3**	**8.4**	**33.2**	**56.1**	**0**	**4.43**
Well protected cultural resources	**0**	**1.4**	**10.6**	**28.3**	**54.3**	**5.4**	**4.43**
Availability of staff to answer questions	**1.3**	**2.9**	**11.4**	**18.9**	**58.5**	**6.9**	**4.40**
Appearance and maintenance of the site	.3	1.3	10.5	35.7	52.2	0	4.38
Opportunity to recreate without being bothered by insects	.8	3.0	10.6	27.0	54.0	4.6	4.37
Safety and security at the site	3.0	3.0	9.0	23.6	58.4	3.0	4.36
Proper trails for the designated activity	1.1	3.0	9.9	29.6	54.8	1.6	4.36
Water free of litter and trash	1.8	4.0	10.0	26.1	57.5	.5	4.34
Current and accurate information	1.1	3.5	16.6	28.0	44.8	6.0	4.19
Erosion free and well maintained trails	3.2	1.9	13.2	34.7	45.4	1.6	4.19
Opportunity to recreate without being bothered by nuisance wild animals in the Forest	1.9	5.4	14.9	25.1	45.1	7.6	4.15
Variety of services at the visitor center	1.4	6.0	13.9	28.3	35.1	15.5	4.06
No signs of vandalism at the site	3.5	7.0	18.7	24.6	45.7	.5	4.03
Adequate parking	4.3	3.8	19.8	26.0	42.6	3.5	4.03
Adequate number of picnic shelters	2.4	5.1	18.4	22.1	34.0	18.1	3.98

Nature/historical information about the site	4.0	5.3	19.5	28.8	39.8	2.6	3.98
Availability of information services away from the visitor center	1.3	6.2	21.8	30.5	30.2	10.0	3.91
Availability of trash containers	3.2	6.4	22.3	28.2	34.9	5.1	3.90
Enough directional signage	4.8	8.5	16.2	30.9	37.0	2.7	3.89
Availability of safety information	3.2	5.9	23.3	28.6	34.2	4.8	3.89
Adequate ranger/visitor assistance patrols	5.9	5.9	21.2	20.7	34.7	11.6	3.82
General information available	5.1	9.8	19.5	25.0	35.9	4.8	3.81
Picnic tables and grills conveniently located and in good condition	5.9	4.0	19.0	23.3	27.0	20.9	3.78
Adequate number of restroom facilities	7.2	7.8	19.3	26.2	30.7	8.8	3.72
Clean restrooms and in proper working order	9.8	6.9	19.0	23.0	27.4	14.0	3.60
Enough water fountains and faucets	8.2	11.4	23.2	22.3	22.3	12.5	3.45
Opportunity to encounter wildlife	9.3	16.7	26.0	20.2	23.9	4.0	3.34
Accessibility for people with disabilities	15.3	7.9	20.0	17.0	16.2	23.6	3.14

*Note: 1=least satisfied, 5=most satisfied, n/a=not applicable.

To better understand the areas where improvements need to be made by the forest, we conducted an importance-performance analysis of visitor's response on site conditions. The results are presented in Figure 2. The figure depicts areas of low priority for the forest, areas where the forest need to concentrate and address in future management efforts, areas where the forest needs to continue the good work is doing, and a series of site conditions that are low in importance for the visitors but currently the forest in performing well in addressing them.

Figure 2. Site Conditions Importance – Performance Analysis Winter 2014



The results are presented in more detail in Table 78. Some of the areas in which the forest needs to concentrate in terms of management actions are: opportunity to encounter wildlife, clean restrooms and in proper working order, general information available, enough directional signage, and nature/historical information about the site. Some of these areas of improvement can be directly linked to crowding perceptions; the more visitors at the sites the more the probability of visitors reporting lack of adequate number of facilities to support their recreation experience.

Table 78. Winter 2014: Management Priorities Based on Visitor Evaluation of Site Conditions

Priority Level	Site Conditions
Low Priority	Accessibility for people with disabilities
	Enough water fountains and faucets
	Adequate number of restroom facilities
	Picnic tables and grills conveniently located and in good condition
	Adequate ranger/visitor assistance patrols
	Availability of safety information
	Availability of trash containers

	Adequate number of picnic shelters
Concentrate Here	Opportunity to encounter wildlife
	Clean restrooms and in proper working order
	General information available
	Enough directional signage
	Nature/historical information about the site
Keep Up the Good Work	Courteous and friendly staff members
	Well protected natural environment
	Well protected cultural resources
	Proper access to the recreation site of interest
	Availability of staff to answer questions
	Appearance and maintenance of the site
	Proper trails for the designated activity
	Safety and security at the site
	Current and accurate information
	Erosion free and well maintained trails
	Adequate parking
	No signs of vandalism at the site
Possible Overkill	Variety of services at the visitor center
	Opportunity to recreate without being bothered by nuisance wild animals in the Forest
	Opportunity to recreate without being bothered by insects

The participants were asked to rate the quality of their experience at the most recently visited site. The majority of the respondents (83.4%, *n*=331) rated their experience at 8 or higher on a 1 to 10 scale. The mean for this scale was 8.54, with a standard deviation of 1.238. Table 79 demonstrates these results.

Table 79. Winter 2014: Quality of Experience

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0	0	0	0	2 (.5%)	7 (1.7%)	13 (3.2%)	53 (13.1%)	111 (27.3%)	**114 (30.0%)**	106 (26.1%)

*Note: 1=Very poor quality, 5=Neutral, 10= Excellent quality.

When asked if they intend to visit the forest again, a high percentage of the participants said yes (95.3%, *n*=386). This result is presented in Table 80.

Table 80. Winter 2014: Intention to Revisit

	Frequency	**Percent**
Yes	**386**	**95.3**
No	19	4.7

Total	**405**	**100.0**

SECTION IX: Social Encounters

The respondents were asked to report how many other visitors they encountered at the site most recently visited. The majority of the respondents (56.3%, *n*=231) encountered 31 other visitors or more. Of this number, more than a quarter of the respondents (29.0%, *n*=119) encountered 50 or more visitors. Table 81 demonstrates these results.

Table 81. Winter 2014: Number of Visitors Encountered

	Frequency	Percent
0	4	1.0
1-10	37	9.0
11-20	64	15.5
21-30	75	18.2
31-40	55	13.4
41-50	57	13.9
>50	**119**	**29.0**
Total	**411**	**100.0**

When asked in what way the encounters with other visitors impacted their experience, more than half of the respondents reported the encounter with other visitors as having no influence on their experience (56.2%, *n*=230), followed by a positive influence on their experience (33.5%, *n*=137). Only for a small percentage of the respondents (10.3%, *n*=42) reported the encounters with other visitors influenced their experience in a negative way. These results are presented in Table 82.

Table 82. Winter 2014: Perception of Encounters

	Frequency	Percent
Influenced in positive way	**137**	**33.5**
Influenced in negative way	42	10.3
No influence	**230**	**56.2**
Total	**409**	**100**

To further assess the impact of encounters on experience, we looked at differences in terms of perceptions on encounters based on primary residence. A significant difference was found between local visitors, and visitors from United States and other countries (chi-square=.000). Local visitors tended to report a positive influence of encounters on their experience as compared with visitors from United States and other countries who tended to report no influence or a negative influence of other visitors on their experience. Table 83 presents these results.

Table 83. Winter 2014: Perception of Encounters based on Primary Residence

	Primary Residence (%)			
	Puerto Rico (N=94)	United States (N=277)	Other (N=35)	Total (N=406)
Yes, in a positive way	52.13	26.71	37.14	33.50
Yes, in a negative way	1.06	13.36	11.43	10.34
No influence	46.81	59.93	51.43	56.16
Total %	100.0	100.0	100.0	100.0

Furthermore, we explored the role of ethnicity in explaining differences in perceptions of encounters. The results show a significant (chi-square = .000) difference in responses based on ethnicity. The Hispanic or Latino population being more inclined to see the number of encounters as having a positive influence on their experience as compared with non-Hispanic or Latino who reported more frequently that there was no influence of encounters on the overall experience. Table 84 presents these results.

Table 84. Winter 2014: Perception on Encounters Based on Ethnicity

	Ethnicity (%)		
	Hispanic of Latino (N=138)	Not Hispanic or Latino (N=256)	Total (N=394)
Yes, in a positive way	48.55	25.39	33.50
Yes, in a negative way	3.62	13.28	9.90
No influence	47.83	61.33	56.60
Total %	100.0	100.0	100.0

The respondents were asked if they felt crowded at the recreation site most recently visited. The majority of the respondents (76.1%, *n*=316) reported not feeling crowded at the site, while less than a quarter of the respondents (23.9%, *n*=99) said they felt crowded at the recreation site. These results are presented in Table 85.

Table 85. Winter 2014: Perception of Crowdedness at Recreation Site

	Frequency	Percent
Yes	99	23.9
No	316	76.1
Total	415	100.0

To further explore these responses we analyzed possible differences in perceptions of crowdedness based on primary residence. The results did not show a significant difference (chi-square=.511) between the groups in terms of crowding perceptions. The analysis looking at differences based on ethnicity showed not significant differences (chi-square = .891) in terms of crowding perceptions between Hispanic or Latino and not Hispanic or Latino. To further explore the participants' perceptions of crowding at the forest, we analyzed differences in crowding

between the data collection sites. No significant differences (chi-square=.097) were observed between sites in terms of crowding perceptions.

Those who expressed that they felt crowded at the recreation site, were asked to rate on a scale from 1 to 9, where 1=not crowded at all to 9=extremely crowded, their perceived crowdedness at the recreation site. The responses were highly spread, a quarter of the respondents (25.4%, *n*=66) perceived to be moderately crowded (6-7 ratings) at the recreation site while 19.6% (*n*=51) of the respondents felt not crowded at all at the site. The mean response for level of perceived crowdedness was 4.05 with a standard deviation of 2.286.These results are presented in Table 86.

Table 86. Winter 2014: Rating of Perceived Crowdedness at Recreation Site

	1	2	3	4	5	6	7	8	9
Frequency	51	33	32	28	35	**33**	**33**	12	3
Percent	19.6	12.7	12.3	10.8	13.5	**12.7**	**12.7**	4.6	1.2

*Note: 1= Not crowded at all, 3-4= Slightly crowded, 6-7= Moderately crowded, 9= Extremely crowded

When asked how acceptable the number of visitors they encountered at the recreation site was, almost a third of the respondents found it acceptable (31.4%, *n*=127), followed by more than acceptable (10.4%, *n*=42) and very acceptable (27.9%, *n*=113). These results are presented in Table 87.

Table 87. Winter 2014: Acceptability of the Number of Visitors Encountered

	1	2	3	4	5	6	7	8	9
Frequency	5	2	5	21	68	22	**127**	**42**	**113**
Percent	1.2	.5	1.2	5.2	16.8	5.4	**31.4**	**10.4**	**27.9**

*Note: 1=Very unacceptable; 3=Unacceptable; 5=Neutral; 7=Acceptable; 9=Very acceptable

To better understand the data, we explored differences in terms of visitors' perceived acceptability of the number of visitors they encountered, differences based on primary residence. No significant differences (chi-square=.484) were observed between visitors based on their primary residence. Ethnicity was another factor explored as it relates to the acceptability of visitor encounters. A non-significant (chi-square=.098) difference was found between Hispanic or Latino visitors and not Hispanic or Latino visitors.

The study participants were asked to report what would be the acceptable number of visitors to encounter at the recreation site. Less than a quarter of the respondents (22.6%, *n*=88) said that 21 to 30 people will be acceptable to encounter at the recreation site. Similarly, less than a quarter of the respondents (22.3%, *n*=87) reported that seeing 50 people or more at the site will be acceptable. Overall, 77.7% of the respondents found acceptable to encounter 50 visitors or less at the recreation site. Table 88 demonstrates these results.

Table 88. Winter 2014: Number of Visitors Acceptable to Encounter at Recreation Site

	Frequency	Percent
Less than 10	29	7.4
10-20	75	19.2
21-30	**88**	**22.6**
31-40	63	16.2
41-50	48	12.3
Greater than 50	**87**	**22.3**
Total	**390**	**100.0**

To better understand the results, we explored possible differences in terms of number of visitors to encounter, differences based on primary residence. No significant difference was observed between groups (chi-square=.702). Furthermore, we explored differences in the number of visitors acceptable to encounter, differences based on ethnicity. Not a significant difference was found (chi-square=.351).

When asked what the preferred group size for recreation was, more than a third of the respondents selected the small group size (5 people or less) (39.0%, *n*=156), followed by the medium group size (6 to 15 people) (38.5%, *n*=154). Table 89 demonstrates these results.

Table 89. Winter 2014: Preferred Group Size for Recreating

	Frequency	Percent
Small (5 people or less)	**156**	**39.0**
Medium (6-15 people)	**154**	**38.5**
Large (16-25 people)	33	8.2
Makes no difference	57	14.3
Total	**400**	**100.0**

When further analyzing the data, significant differences as it relates to preferred group size were observed based on primary residence (chi-square=.000). Respondents from United States and other countries were more inclined to report preference for traveling with a small group. Table 90 presents these results.

Table 90. Winter 2014: Preferred Group Size for Recreating Based on Primary Residence

	Primary Residence (%)			
	Puerto Rico (N=92)	**United States (N=271)**	**Other (N=34)**	**Total (N=397)**
Makes no difference to me	7.61	16.97	11.76	14.36
Small (5 people or less)	**27.17**	**40.59**	**55.88**	**38.79**
Medium (6-15 people)	47.83	36.90	26.47	38.54
Large (16-25 people)	**17.39**	**5.54**	**5.88**	**8.31**
Total %	**100.0**	**100.0**	**100.0**	**100.0**

The analysis exploring differences based on ethnicity, showed significant differences based on preferred group size (chi-square=.000). The not Hispanic or Latino respondents were more inclined to report preference for traveling with a small group. Table 91 demonstrates these results.

Table 91. Winter 2014: Preferred Group Size for Recreating Based on Ethnicity

	Ethnicity (%)		
	Hispanic of Latino (N=136)	**Not Hispanic or Latino (N=251)**	**Total (N=387)**
Makes no difference to me	12.50	14.74	13.95
Small (5 people or less)	**27.94**	**45.42**	**39.28**
Medium (6-15 people)	45.59	34.66	38.50
Large (16-25 people)	**13.97**	**5.18**	**8.27**
Total %	**100.0**	**100.0**	**100.0**

SECTION X: Perceptions of Conflict and Preferred Management Actions

The respondents were asked to report to what extent their experience were impacted by a series of conditions at the site. . Although the scores were relatively low (less than 3 on a 5 point scale), the areas with highest scores (a cumulative of agree and strongly agree) were: availability of parking (26.5%, *n*=104); crowding/congestion from tourists (22.2%, *n*=86); litter or trash (22.0%, *n*=85); traffic congestion (21.6%, *n*=84) and available space to participate in my recreation activities (21.5%, *n*=83). Table 92 demonstrates these results.

Table 92. Winter 2014: Perceptions of Conflict Related to Recreation Engagement

	Percent						M
Experience at EYNF was negatively impacted by…	**1**	**2**	**3**	**4**	**5**	**N/A**	
Availability of parking	**26.3**	**21.2**	**21.4**	**15.8**	**10.7**	**4.6**	**2.62**
Traffic congestion	**31.4**	**19.5**	**20.6**	**13.1**	**8.5**	**6.9**	**2.44**
Crowding/ congestion from tourists	**31.8**	**20.2**	**19.4**	**13.2**	**9.0**	**6.5**	**2.44**
Litter or trash	**32.0**	**19.6**	**15.8**	**13.2**	**8.8**	**10.6**	**2.41**
Available space to participate in my recreation activities	**35.0**	**20.5**	**15.5**	**12.2**	**9.3**	**7.5**	**2.36**
Seeing/encountering other recreationists	31.7	20.4	21.4	11.9	5.6	9.0	2.33
Noise levels	37.9	21.9	16.0	8.8	9.3	6.2	2.25
Hours of operation	44.5	16.9	12.0	8.9	8.3	9.4	2.11
Other uses of the forest besides recreation	43.1	17.8	14.6	7.6	6.3	10.7	2.06
Need for permits	44.8	15.0	13.5	4.4	6.0	16.3	1.94

*Note: 1=strongly agree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, n/a=not applicable.

The participants were asked to report their level of agreement with a series of potential future management actions. The respondents tended to view more positively (a sum of agree and strongly agree) the following management actions: establish a fine for not following forest recreation use rules and regulations (67.0%, *n*=256); provide low impact recreation educational programs to visitors (53.3%, *n*=207); provide signage and information to change behavior (46.5%, *n*=180); increase number of facilities (add trails, picnic areas, etc.) (45.4%, *n*=172); regulate car access at specific areas (43.2%, *n*=166); and regulate where visitors can go at specific recreation sites (e.g. closure of heavily impacted picnic areas) (41.5%, *n*=160). The least favored actions (a sum of strongly disagree and disagree): require an entrance fee for all sites (60.8%, *n*=234); require an entrance fee for only some sites (52.0%, *n*=198); followed by establishing a maximum number of visitors to the site and close the site after the limit is reached (38.3%, *n*=147); close areas that have high impact due to visitation (31.6%, *n*=120) and limit the size of groups (31.3%, *n*=122). Table 93 demonstrates these results.

Table 93. Winter 2014: Agreement with Potential Future Forest Management Actions

	Percent					
Management actions	**1**	**2**	**3**	**4**	**5**	**M**
Establish a fine for not following forest recreation use rules and regulations	**7.6**	**5.5**	**19.9**	**30.6**	**36.4**	**3.83**
Provide low impact recreation educational programs to visitors	**7.0**	**8.5**	**31.2**	**34.0**	**19.3**	**3.50**
Provide signage and information to change behavior	**10.3**	**11.4**	**31.8**	**28.7**	**17.8**	**3.32**
Increase number of facilities (add trails, picnic areas, etc.)	**9.8**	**12.9**	**31.9**	**27.7**	**17.7**	**3.31**
Regulate car access at specific areas	**12.8**	**14.1**	**29.9**	**31.0**	**12.2**	**3.16**
Regulate where visitors can go at specific recreation sites (e.g. closure of heavily impacted picnic areas)	10.9	16.4	31.2	29.6	11.9	3.15
Regulate when visitors can use specific sites (day vs. overnight etc.)	12.3	16.2	33.7	25.2	12.6	3.10
Disperse recreation use to other sites	12.2	13.0	41.1	20.8	12.8	3.09
Close areas that have high impact due to visitation	12.9	18.7	29.0	25.6	13.7	3.08
Limit the size of groups	15.9	15.4	31.6	28.5	8.5	2.98
Establish a maximum number of visitors to the site and close the site after the limit is reached	16.4	21.9	28.9	24.2	8.6	2.87
Require an entrance fee for only some sites	33.6	18.4	26.0	15.5	6.6	2.43
Require an entrance fee for all sites	39.5	21.3	22.9	10.6	5.7	2.22

*Note: 1= strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

At the end of the survey, respondents were asked to include any comments they might have that would help better understand their experience at the El Yunque. Several respondents commented on the positive aspects of the forest, such as personnel, the visitor center and how they enjoyed their trip at El Yunque. Listed below is a sample of such comments:

"The staff were incredibly helpful and informative. We will definitely return!"

"Overall, this is one of my very favorite places on earth and I travel about 10 weeks a year. The particular site you asked me about wasn't indicative of the park as a whole. I love it here."

"I enjoyed the drive and the hike tremendously. People friendly and helpful always. Well-maintained trails. Gracias!"

"Most worthwhile and informative. Exceptional visitor center in every way, especially design."

Some the comments received were related to the site conditions and services available at the forest and how visitors see possibly improving the current situation. The respondents made comments in regard to cleanliness and maintenance of bathrooms, trails maintenance, lack of markers on the trails, availability of drinking fountains, signs of vandalism (e.g. graffiti),parking, roads, and traffic in general, better trash removal and better directional and interpretive signage, the availability of maps, lack of staff, and comments about the entrance fee. Below are listed a sample of comments received related to forest services and site conditions:

"Please maintain the trails. In the south is so beautiful, and less tourists. A trail fee would be more than acceptable, provided it's reasonable. Most wildlife/outdoor enthusiasts would be happy to support! Thank you!"

"We recommend that you institute a "carry in, carry out" policy like other national parks. You can then eliminate the unsightly trash cans and trash along the trails."

"I enjoyed this trip greatly but the toilet tissue at the bathrooms is so thin that a lot ends up at the floors. Also more bathrooms at the visitor stops along the way. Need for more parking spaces. The trees and flowers should be marked with a big sign and big print (to identify them.) Otherwise all the forest personnel were friendly and gave me a lot of information."

"Everything was beautiful the trails were well maintained. Wish we saw more wildlife. It was a very nice experience."

"You need trail markers! It's very confusing which way to go. You also need to keep people from swimming in the waterfall - dangerous for them and the rainforest. The trails were a little slippery and narrow - if possible to widen so people could pass, that would be safer. But it's beautiful and we're impressed that you maintained the trail."

"Please better maps at visitor center and available/posted at trails. I need a mark that says YOU ARE HERE to help give me orientation as to where I am starting and where I am going."

"Placards with wildlife information (species you might see) would be helpful."

"Design a way to limit non-commercial vehicles during time of heavy visitation. Widen the road of limit vehicle size. Repair the road!"

"Some labels on some of the plants would be helpful to me. Make road wider - wouldn't want to go into ditch."

"Inadequate parking. Trail adequately maintained. More frequent trail signs."

"Maybe expand the trail where possible. Two-way traffic is a bit tight at La Mina waterfalls. Thank you so much for taking such good care of forest."

"Love that people are allowed to bathe in Mina."

"No fees are needed, but a donation system may be helpful to help preserve wildlife and for maintenance."

"Great forest, roads are terrible. Only real complaint. Also, picnicking in some areas was frustrating due to lack of."

"The hike to the peak was gorgeous and well maintained. Need some better signage for trails on my way down. Thanks!"

"Restroom in tower needs attention."

"You must fix the road. It's very dangerous the road."

"You need more signs to indicate where you are on the path (distance to go). Need restrooms. Need to explain the hike is more difficult than an easy walk (in and out). This is not easy for asthma, hip issues, knees, etc. Need to explain the terrain better at the start of the trailhead."

"Improvements: less graffiti, more free info on plants and animals we saw, clearer route maps with time for each trail written on it, more trails that are "private"/less crowded and more rugged and challenging."

"Improve drinking fountain quality!"

"Only complaint is the fee for the nature center. Information should be free. Especially maps, rules, and guidance for visitors to enjoy and protect the resource! Love the option for permit camping in less used areas of the park."

"For the Mr. Britton trail, once people walk up the steep part of the road, there needs to be a sign specifically saying "Mt. Britton Tower" rather than what it currently says 'wildlife observation'. Rather than going right (as the sign indicated). I went straight thinking that was Mt. Britton and it ended up being the trail to the top of El Yunque. Staff implied that they were being asked to do the same amount of work with less resource which seems hard/unfair. Finally, more patrolling of trails by park rangers and or/using emergency call buttons along trails would make female hikers traveling alone feel more safe. Bringing back the trolley would be great too."

"Visitors should not be allowed to swim/bathe in La Mina. It ruins photo opportunities/enjoyment by all. Your visitor center is outstanding! You do a great job of educating people about the importance of rain forests and all forests. Thank you!"

"Areas like La Mina too heavily impacted (at times too many people). At the rest huts at the upper trails, no trash cans. Feral dogs and cats in the forest!"

"Signage lacking on #3 to show us way to rain forest - generally all over Puerto Rico - better directional signage would be appreciated."

"Interpretive signs would be great on Palo Colorado side of the trail."

"Caution sign that say the rocks are slippery. Bathroom at each parking lot. Small museum next to souvenir shop. Scenery was beautiful!"

"Literature says not to take food and drink in. People should take water. Please post sign that says so. Beautiful we love La Mina Falls."

"The trash cans are AWESOME! I think it really helps! The stone structure on the way to Torre de Britton has graffiti and it would be nice if it cleaned it up. The metal is

exposed on the trail to Torre de Britton, it could be repaired. AWESOME! I like the permit system for camping."

"Increase entrance fee to help with maintenance, Graffiti remediation, Empty trash more consistently, Great nature trail! Thanks."

"Free maps."

Social Carrying Capacity Analysis

To understand the current visitation levels at the forest, we have explored the visitation data from 2013 (the data included all the visitors that paid at the El Yunque fee booth and the outfitters data). The results show that the highest visitation at the forest (outfitters and persons with tickets or with free admission) occurs in March and December. These data are presented in Table 94.

Table 94. Visitation Numbers for Outfitters and Persons Visiting the Visitor Center in 2013

Month 2013	Total persons outfitters only	Total Persons with Tickets	Total persons free admission	Total persons	Outfitters Nr persons EP Collections	Total visitors
January	**6,767**	**9,011**	**2,964**	**18,742**	**5,343**	**24,085**
February	**6,676**	**9,746**	**2,944**	**19,366**	**4,725**	**24,091**
March	**11,414**	**13,447**	**4,582**	**29,443**	**7,022**	**36,465**
April	**8,536**	**10,095**	**4,454**	**23,085**	**4,850**	**27,935**
May	6,588	8,358	2,275	17,221	2,624	19,845
June	6,470	9,815	4,037	20,322	2,509	22,831
July	**6,739**	**10,342**	**3,874**	**20,955**	**3,108**	**24,063**
August	6,203	9,533	3,355	19,091	3,098	22,189
September	2,863	2,542	936	6,341	2,069	8,410
October	2,045	2,782	722	5,549	1,314	6,863
November	6,204	6,616	3,743	16,563	4,476	21,039
December	**9,125**	**9,967**	**3,584**	**22, 676**	**5,493**	**28,169**
TOTAL	**79,630**	**102,254**	**37,470**	**219,354**	**46,631**	**265,985**

The results further illustrate that approximately half of the visitors who come to the forest are coming with outfitters while half are part of non-organized trips. The average visitation (outfitters and persons with tickets or with free admission) per day is of approximately 729 visitors with a standard deviation of approximately 387 visitors. The total visitation numbers per day ranged from 0 to 2,384 visitors. The average just for outfitter visits is approximately 346 visitors per day with a standard deviation of approximately 231 visitors. The total number of visitors per day just for outfitters ranged from 0 to 1,407 visitors. In 2013, the highest number of visits per day was 2,384 visitors (this does not include the visitors who did not visit the visitor center). Table 95 presents a visitation summary for 2013.

Table 95. Visitation Summary 2013

	Total Outfitters	Total Other Visitors	Total Visitors
Visitors	126,261	139,724	265,985

To address the visitation concerns at the forest, we conducted an analysis to determine the social carrying capacity of the forest. The analysis incorporates the average acceptable number of visitors as reported by the respondents in this study for each of the recreation sites of interest. Furthermore, we used the information regarding average time visitors spend at each of the recreation sites in the study. Ultimately, we determined the total number of visitors acceptable at the forest taking into considering the average time visitors spent at the sites and the average acceptable number of encounters at each site (i.e., average time spent at site multipled by the average acceptable number of encounters/site). Based on our calculations (the sum of total acceptable number of visitors at each site/day), we determined that the social carrying capacity of the forest is around 1,485 visits per day. Table 96 presents these results.

Table 96. Visitor Social Carrying Capacity Calculations

Site	Acceptable Nr of Encounters	Time Spent at Site	Time Blocks	Total/Day
Palo Colorado	50	1hr 30min	5.5	275
Big Tree Trail	40	1hr 30min	5.5	220
Sierra Palm	40	1hr 30 min	5.5	220
Mt. Britton	40	2hrs	4	160
Angelito	50	3hrs 30min	2.5	125
Puente Roto	50	3hrs 30min	2.5	125
Camittillo	30	2hrs	4	120
La Coca	30	2hrs	4	120
Bano de Oro	30	2hrs	4	120
Total				**1485**

Environmental Assessment of Recreation Trails and Picnic Sites

Environmental Assessment of Recreation Trails

This environmental assessment of the recreation trails at EYNF sought to establish what the most prominent impacts from trail use are and to see if those impacts are correlated to the frequency of trail use or trail length. To measure human impacts, 11 distinctly separate trails in El Yunque were surveyed by a park volunteer, who recorded number of occurrences of certain impacts, as well as installed mitigation devices. Recorded data included: type—hiking, biking, both, or research; difficulty; distance; width, at narrowest and widest parts; signs/information; trail grade, if it exceeded 20 percent; excessive side slopes; erosion; root exposure; visitor-created trails; litter; graffiti; and tree damage. The surveyor added additional comments under "site expansion potential" and "additional comments," which are included below.

Most of the impact categories (see Table 97) were not noticeably correlative with use level. In fact, only two categories were: excessive side slope and graffiti. All 7 of the side slopes documented were on the two high-use trails, with one every 0.27 miles on Big Tree and 0.23 on La Mina. There were 16 separate graffiti occurrences between those two trails, or one every 0.11 miles when combined. Meanwhile, graffiti occurred about every 0.22 miles on moderate-use trails and every 0.90 on low-use trails.

Trail length (which tend to be not paved at higher elevations) appeared to play a significant role in three impact categories—soil erosion, wet soil on trail, and root exposure—while potentially in two other categories —litter and damaged trees. The three trails longer than one mile (5.44 miles total) had 22 instances of soil erosion, or one instance for every 0.25 miles, while the seven under one mile (3.38 total) had three instances, or one for about every 1.13 miles. The three longer trails had 16 instances of wet soil on the trail, or one for every 0.34 miles, while the shorter seven had 5, or one for every 0.68 miles. Root exposure showed the largest disparity in total but not necessarily average miles, with 85 instances in the longer trails, or one for every 0.06 miles, and 35 instances among the short trails, or one for every 0.1 miles. Interestingly, the shortest trail, the 0.16-mile Los Picachos, had the third most instances of root exposure at 16.

There were eight litter instances on the longer trails, or one for every 0.68 miles, and three on the shorter trails, or one about every 1.13 miles. There were five damaged trees on longer trails or one for every 1.09 miles, and two on the shorter trails, or one everyone 1.69 miles. As far as the surveyed trail development and mitigation strategies, the results indicate that use level does not play a significant role in the amount of signs and information posted. The high-use trails, Big Tree and La Mina, have signs posted, on average, every 0.05 and 0.12 miles, while the moderate trails are every 0.06 and 0.4 miles. The three out of four low-use trails with information have it every 0.19, 0.07, and 0.08 miles. Average number of culverts, ditches, and sets of steps also fluctuate greatly by trail regardless of use. But bridges do appear to depend on use, with seven on the two high-use trails, one between the two moderate trails, and 0 on the four low-use trails. Below are summary results for each of the trails assessed:

Angelito

This 0.4-mile trail is rated as Easiest and has a use level of Moderate. The trail was consistently about 48 inches. Among the trail features: 0 set of steps, 8 culverts, 1 sign/information presentation, 1 bridge, and 4 ditches. Nowhere does the trail grade exceed 20%, and there is 0 excessive slope to the side of the trail. There were 0 occurrences of soil erosion, 0 instances of wet soil on the trail, 0 instances of running water on the trail, and 4 instances of root exposure. There were 0 visitor-created trails, 1 litter, 0 graffiti, and 1 damaged tree.

Additional comments: *"There are some sections that will soon require some re-graveling of the trail. Bare soil at the end of the trail in Mameyes River can be very muddy during rainy periods."*

Bano de Oro

This 0.39-mile trail is rated as Easiest and does not have a classified use level. The maximum trail width was 48 inches, while the minimum was 33. Among the trail features: 2 set of steps, 12 culverts, 6 different signs/information presentations, 3 bridges, and 0 ditches. Nowhere does the trail grade exceed 20%, and there is 0 excessive slope to the side of the trail.

There were 6 occurrences of soil erosion, 2 instances of wet soil on the trail, 1 instance of running water on the trail, and 5 instances of root exposure. There were 0 visitor-created trails, 1 litter, 2 graffiti, and 0 damaged trees.

Additional comments: *"Trail requires maintenance, some sections are badly eroded. Ditches to channel water runoff are overgrown with vegetation. Old pool next to rain shelter where trout was raised is overgrown, badly noticeable."*

Big Tree

This 1.06-mile trail was not given a difficulty level but does have a use level of High. The trail had a maximum width of 48 inches, while the minimum was 26. Among the trail features: 2 sets of steps, 10 culverts, 20 signs/information presentations, 3 bridges, and 4 ditches. The trail grade exceed 20% in one area, and there are four instances of excessive slope to the side of the trail. There were 0 occurrences of soil erosion, 1 instance of wet soil on the trail, 0 instances of running water on the trail, and 2 instances of root exposure. There was 1 visitor-created trail, 1piece of litter, 10 graffiti, and 0 damaged trees.

Additional comments: *"Trail is well maintained except for a small section where the side slope is vertical and is heavily eroded. Close to the entrance, a fallen tree damaged a sign."*

Caimitillo

This 0.36-mile trail is rated as More Difficult and has a use level of Low. The trail width remained about 60 inches. Among the trail features: 1 set of steps, 0 culverts, 5 different signs/information presentations, 0 bridges, and 0 ditches. Nowhere does the trail grade exceed 20%, and there is 0 excessive slope to the side of the trail. There are 0 occurrences of soil erosion, 1 instance of wet soil on the trail, 0 instances of running water on the trail, and 3 instances of root exposure. There were 0 visitor-created trails, 0 litter, 0 graffiti, and 0 damaged trees.

Site expansion potential: *"The area if refurbished would have a nice potential of being a picnic site favored by visitors since it is close to the road and of easy access. For some reason, it looks like it has been abandoned for some time."*

Additional comments: *"The trail mostly in asphalt needs maintenance. It is broken by roots in several places. The picnic area looks abandoned and neglected. Some of the huts are dirty with dead vegetation and runoff mud."*

El Portal

This 0.4-mile trail is rated as Easiest and doesn't have a classified use level. The trail had a maximum width of 88 inches, while the minimum was 55. Among the trail features: 2 set of steps, 0 culverts, 26 signs/information presentations, 0 bridges, and 0 ditches. Nowhere does the trail grade exceed 20%, and there is 0 excessive slope to the side of the trail. There was 1 occurrence of soil erosion, 1 instance of wet soil on the trail, 0 instances of running water on the trail, and 8 instances of root exposure. There was 1 visitor-created trail, 0 litter, 0 graffiti, and 0 damaged trees.

Additional comments: *"In some sections of the trail, the liner is exposed. The interpretative signs along the trail do not relate with. For example, there were signs of fish and shrimp when the trail is not near a body of water."*

El Yunque

This 2.46-mile trail was unrated and doesn't have a classified use level. The maximum width was 48 inches, while the minimum was 24. Among the trail features: 6 set of steps, 43 culverts, 15 different signs/information presentations, 3 bridges, and 35 ditches. Nowhere does the trail grade exceed 20%, and there is 0 excessive slope to the side of the trail. There were 16 occurrences of soil erosion, 7 instances of wet soil on the trail, 0 instances of running water on the trail, and 53 instances of root exposure. There were 7 visitor-created trails, 7 litter, 8 graffiti, and 2 damaged trees.

Additional comments: *"Trail is relatively in good condition during the first half. At the 1.3 mile to the end of the trail, it is in a wilder state. Several sections along the second half are badly eroded and need maintenance. In several rain shelters, the wood planks that make up the seats are loose or missing, creating a hazard."*

La Coca

This 1.92-mile trail is rated as More Difficult and has a use level of Low. The maximum trail width is 48 inches, and the minimum declines all the way to 0. Among the trail features: 6 sets of steps, 11 culverts, 10 different signs/information presentations, 0 bridges, and 2 ditches. At 3 points does the trail grade exceed 20%, but there is 0 excessive slope to the side of the trail. There are 6 occurrences of soil erosion, 8 instances of wet soil on the trail, 2 instances of running water on the trail, and 30 instances of root exposure. There was 1 visitor-created trail, 0 litter, 0 graffiti, and 3 damaged trees.

Site expansion potential: *"This trail is the most beautiful of all the trails on the north side of road 191. It has beautiful hidden waterfalls and pools, but it is very neglected. Second half of trail is in a wild state, lot of erosion and muddy sections. If it can be repaired it would be a nice attraction to more visitors."*

Additional comments: *"Trails need a lot of maintenance, it seems very neglected. From the first crossing of La Coca Creek forward, the trail is very neglected and in a wild state. From the second crossing of La Coca Creek, trail is limited to a small pass, almost nonexistent. Big trees have fallen and you have to go around."*

La Mina

This 0.7-mile trail is rated as More Difficult and has a use level of High. The trail had a maximum width of 40 inches, while the minimum was 29. Among the trail features: 22 set of steps, 5 culverts, 6 signs/information presentations, 4 bridges, and 4 ditches. Nowhere does the trail grade exceed 20%, but there are 3 instances of excessive slope to the side of the trail. There were 0 occurrences of soil erosion, 0 instances of wet soil on the trail, 0 instances of running water on the trail, and 2 instances of root exposure. There were 2 visitor-created trails, 0 litter, 6 graffiti, and 0 damaged trees.

Additional comments: *"Relatively well maintained. Several ditches that cross perpendicular the concrete path are wide, requiring a long stride to pass it. Because the concrete is wet and covered with algae, it is slippery and a potential fall hazard."*

Los Picachos

This 0.16-mile trail is rated as More Difficult and has a use level of Low. The trail width remained about 24 inches. Among the trail features: 2 set of steps, 1 culvert, 0 different signs/information presentations, 0 bridges, and 2 ditches. Nowhere does the trail grade exceed 20%, and there is 0 excessive slope to the side of the trail. There are 0 occurrences of soil erosion, 3 instances of wet soil on the trail, 0 instances of running water on the trail, and 16 instances of root exposure. There were 3 visitor-created trails, 1 litter, 2 graffiti, and 1 damaged tree.

Site expansion potential: *"The trail should be refurbished and the observation point at the end should be cleaned since it offers one of the best views in the north side of El Yunque."*

Additional comments: *"Trail needs maintenance. In some sections of the trail the vegetation has reduced trail width to approximately 12 inches. Heavy graffiti in the observation point at the end of the trail."*

Mt. Britton

This 0.72-mile trail is rated as More Difficult and has a use level of Moderate. The maximum trail width is 36 inches, and the minimum is 24. Among the trail features: 6 sets of steps, 25 culverts, 13 different signs/information presentations, 0 bridges, and 8 ditches. The trail grade never exceeds 20%, and there is 0 excessive slope to the side of the trail. There are 2 occurrences of soil erosion, 0 instances of wet soil on the trail, 0 instances of running water on the trail, and 1 instance of root exposure. There were 0 visitor-created trails; 1 Moderate instance of litter; 5 instances of graffiti: 2 Moderate and 3 Severe; and 0 damaged trees.

Additional comments: *"Trail is mostly in good condition, except for a section in the .72 mi that asphalt is broken."*

Mt. Britton Spur

This 0.25-mile trail is rated as Easiest and has a use level of Low. The trail width is about 48 inches throughout. Among the trail features: 0 sets of steps, 10 culverts, 3 different signs/information presentations, 0 bridges, and 7 ditches. Nowhere does the trail grade exceed 20%, and there are 0 excessive slopes to the side of the trail. There are 0 occurrences of soil erosion, 0 instances of wet soil on the trail, 0 instances of running water on the trail, and 1 instance of root exposure. There were 2 visitor-created trails, 0 litter, 1 Slight graffiti, and 0 damaged trees.

Additional comments: *"Trail is in good condition. The section that connects with El Yunque trail is being regraveled."*

Trails surveyed and the assessment results are presented in Table 97.

Table 97. Recreation Trails Environmental Assessment Results

	El Yunque *2.46 mi*	**La Coca** *1.92 mi*	**Big Tree 1***.06 mi*	**Mt. Britton** *0.72 mi*	**La Mina** *0.7 mi*	**Angelito** *0.4 mi*	**El Portal** *0.4 mi*	**Bano de Oro** *0.39 mi*	**Caimitillo** *0.36 mi*	**Mt. Britton Spur 0.25 mi**	**Los Picachos 0.16 mi**
Use level	N/A	Low	High	Moderate	High	Moderate	N/A	N/A	Low	Low	Low
Difficulty level	N/A	More difficult	N/A	More difficult	More difficult	Easiest	Easiest	Easiest	More difficult	Easiest	More difficult
Minimum/maximum width (inches)	24/48	0/48	26/48	24/36	29/40	48/48	55/88	33/48	60/60	48/48	24/24
Sets of steps	6	6	2	6	22	0	2	2	1	0	2
Culverts	43	11	10	25	5	8	0	12	0	10	1
Signs and/or information presentation	15	10	20	13	6	1	26	6	5	3	0
Bridges	3	0	3	0	4	1	0	3	0	0	0
Ditches	35	2	4	8	4	4	0	0	0	7	2
Grade exceeds 20%	0	3	1	0	0	0	0	0	0	0	0
Excessive side slope	0	0	4	0	3	0	0	0	0	0	0
Soil erosion	16	6	0	2	0	0	1	6	0	0	0
Wet soil on trail	7	8	1	0	0	0	1	2	1	0	3
Running water on trail	0	2	0	0	0	0	0	1	0	0	0
Root exposure	53	30	2	1	2	4	8	5	3	1	16
Visitor-created trails	7	1	1	0	2	0	1	0	0	2	3
Litter	7	0	1	1	0	1	0	1	0	0	1
Graffiti	8	0	10	5	6	0	0	2	0	1	2
Damaged trees	2	3	0	0	0	1	0	0	0	0	1

High-use trails were found to more likely have excessive side slopes and graffiti, and longer trails more often had soil erosion, wet soil on the trail, and root exposure. The practical use for these findings is alerting El Yunque's management to the more common impacts, allowing for more appropriate future development planning. Also, though there may be an absence of trends, all data collected can be used in strategic, trail-by-trail mitigation and restoration. This study also doesn't take into account geologic settings, which could contribute to the number of impacts or the lack thereof.

Environmental Assessment of Picnic Areas

The environmental impacts at picnic areas were assessed. Information was collected capturing the location of the picnic area, type of site (e.g. developed, primitive, other), type of vegetation at the site, distance to closest trail, distance to water, party size, facilities present, vegetation loss, social trails, etc. Picnic sites were assessed at three locations: Sierra Palm, Caimitillo, and Palo Colorado. As reported in Table 98, several impacts were observed at these sites. Of primary concern is the graffiti found at multiple locations, screening not maintained at various sites, user created trails, water standing at various sites, and maintenance of informational signage.

Table 98. Picnic Areas Environmental Assessment Results

	Nr. Of Picnic Areas	Maximum Capacity	Average Distance from Trail	Nr. of water faucets not working	Nr. of Sites with Graffiti	Impacts Observed
Sierra Palm	9	135	59.6 feet	7	2	-1 broken grill -Screening not maintained at 7 sites
Caimitillo	9	90	37.4 feet	11	1	-1 abandoned site
Palo Colorado	14	210	10 areas are on the trail Other - 30 to 100 feet from the trail	4	4	-2 user created trails -roots exposed at one site -water standing at 3 sites -bees present at one site -signs of rats presence at one site -several litter items at one site -signs washed-no visible text at 6 sites -grills need to be cleaned -1 trash can full with garbage *all picnic areas are paved

Semi-structured Interview with Outfitters/Guides

Due to being unable to collect data from visitors using outfitters/tour operators for their travel to the forest, in-depth semi-structured interviews were conducted with a few of the outfitters as they were coming in to sign the paperwork for their permits. In-depth interviews were conducted with 12 outfitters. The interview included five open ended questions (see Appendix D), the respondents being asked to describe the services they provide at the forest; to depict the most important forest features/site conditions for them as tour operators; to discuss how satisfied are they with the current site conditions at El Yunque; to reflect on visitor perceptions of crowding at the forest; to depict the most important problems the forest is currently facing, and to express any suggestions they might have regarding possible management solutions to address current problems at the forest.

Description of Services Provided by Tour Operators

The tour operators emphasized the amount of experience they have in bringing visitors to the forest. The years of experience in working with the forest ranged from 10 years to 41 years. As one of the tour operators mentioned, there are currently 324 permit holders at the forest. Most of the visitors served are from hotels, cruise ships, or door service. The tour operators own multiple vehicles, from mini-buses (25 passenger vehicle) to vans (10 to 14 passenger vehicles). Some of the operators' limit the group size at 12-13 per van in order to make the trip more personal. The tour groups are typically accompanied by the driver and a tour guide, but not in all cases. At least one agency mentioned that they have only the driver accompanying the groups (which provides interpretation as well) but due to lack of parking they cannot guide the group on the hikes. The majority of the tour operators mentioned that the trips tend to be 5 to 6 hours long, with 3 to 4 hours spent at the forest visiting on average 5 sites/stops. The most visited sites are El Portal, Yokahu Tower, La Coca Falls, Caimitillo trail, La Mina from Palo Colorado and Big Tree Trailhead, Bano Grande, and a trip typically encompasses a break for lunch. Due to lack of time, some groups don't get to visit El Portal. Only one tour operator mentioned taking groups at Angelito, and typically small groups, with a ratio of one tour guide per 12 visitors. This particular agency is working with cruise ships which have a big volume of visitors but they break larger groups based on preferences, age, impairments, etc. to design the appropriate trip. A trip typically encompasses only one hike, Caimitillo trail tends to be used more for older visitors or those who are not ready for a strenuous hike; and La Mina is for visitors who are ready for a more challenging experience. Also, on rare occasions tour operators mentioned that they take people at Mt. Britton. The tours operators move a lot of people through the forest, one agency said that last year they brought approximately 6,000 visitors to the forest. One of the tour operators mentioned: *"we move more volume than do personalized tours."*

Importance and Satisfaction with Site Conditions at El Yunque

The tour operators were asked to mention their most important site conditions at El Yunque. The following site conditions were mentioned: parking and parking information for those who come with their own vehicles; roads; bathrooms; vegetation; flowers; birds; beautiful

views; better facilities for people with disabilities (some of the tour operations mentioned that they bring a lot of elderly people); security; more staff; more offerings in terms of sites to visit; signage; trails and their condition; encouraging the use of picnic sites; more variety of places for visitors to pick up a snack . The tour operators tended to express that they currently work with what they have but there is definitely room for improvement. When asked their satisfaction with the current conditions at the forest, the tour operators tended to give on average an 8 for satisfaction on a 1 to 10 scale.

Reflections on Perceived Crowding at El Yunque

The interviewees were asked to reflect on the level of crowdedness at the forest. The opinions on crowding were divided, some of the tour operators tended to see the forest is crowded while others felt the forest is most crowded on holidays, like July 25th (a Puerto Rican holiday), 4th of July, throughout the summer season due local use, and around Christmas time. Below are some of the tour operator comments regarding crowdedness:

> *"Parking is the problem, not crowding… Because as we said, since we're entertaining the people; that we know so we're going down with guides and we're going down with them we're constantly babying them. So he could have his hundred and I could have my hundred and we both know how to work. […] They enjoy it a little bit more because of crowding; they get to see the charisma of the thing. I've never heard that aspect (crowding) because we always entertain."*
>
> *"Visitors do feel crowded… the crowding is really because there are a lot of closed areas. That's really why the crowding is going on. If you funnel people just to one spot, that's going to happen anyway… Also, it depends on what type of – if you're cruise ship passengers, they don't care. But if you're more into – it really depends on, there's different types of people who visit here. You just have to see which type of visitor. Each one has particular interests."*
>
> *"Don't feel crowded [talking about the visitors] – they enjoy it when they see more people."*

Some of the tour operators avoid the holidays because of the crowds or adept to the situation. Some of the tour operators prepare the visitors by telling them from the beginning that it will be crowded and how they should behave on the trail. For example, as one of the tour operators said, they occasionally tell their visitors: *"You're not really going to enjoy because there are too many people."* Others just adept to the situation: *"I know it's something maybe it's uncontrollable sometimes because everybody wants to come up here … we change a little bit to adapt based on that information."* To a certain extent crowding is expected. The respondents emphasized that holidays are really crowded and something needs to be done either in terms of group size or limit the size of vehicles.

The tour operators emphasized the importance of following the rules, which will eliminate problems associated with crowding. The majority of the respondents did not see impacts on the trails as a result of crowding. However, respondents mentioned that it was difficult to pass other hikers on the narrow trails, and they had to occasionally walk in the dirt on the side of the trail.

When asked, what would be an acceptable number of encounters to see while at the forest, some of the respondents mentioned 20 to 25 with 12 visitors/ tour; or between 35 to 45 with 15 to 18 visitors per tour.

Current Problems at El Yunque

The respondents identified a series of problems at the forest. The problems mentioned were: parking, traffic, roads, crowding, safety (primarily at Angelito), lack of law enforcement, permits checks not being done due to lack of staff, bathrooms, concentrating people in one spot, more strict rules to follow, lack of training for tour guides, becoming more popular, communication with outfitters (e.g. bathrooms closed), understaffed, law enforcement treatment of guides/outfitters (outfitters being treated differently as compared to locals and other visitors), areas heavily impacted (e.g. Juan Diego), lack of signs on trails, trail maintenance, safe trails (bad design in certain places – "V" shapes for water drainage, slippery surfaces, handrails needed due to steep areas), better equipment (no radio signals), emergency communication, trolley not being safe, taxi drivers have a permit but they are not guides, vandalism (e.g. graffiti), the environment being more deteriorated (e.g., they do not see *" walking sticks or coqui much anymore"*), behavior of locals (coolers on the trail, smoking, drinking), no diversity in terms of offerings, outfitters are doing the same tours, limited total recreation area, closed trails, lack of forest staff interacting with visitors and enforcing the law, lack of care from some people and outfitters.

Possible Management Solutions

The interviewees were asked to provide management recommendations taking into consideration the problems identified. Some of the recommendations were:

- Communication with outfitters. The following quote illustrates this recommendation:

"Since the last two years, we've been getting more communication, we know what's going on, and we know what's going to close. Those things didn't happen before. But it's something that is starting to work. We're more informed and there's more data coming to us. Where we can adjust ourselves to what's going on in the rainforest.

- Trainings for tour guides.
- All tours should be guided - crowding is a safety concern and guides can provide the needed information and support for visitors to be safe; groups of maximum 10 per 1 guide.
- More staff - staff or volunteers needed to provide information at all stops.
- Road needs to be fixed.
- Designated parking for tour busses only.
- Everybody should pay at the visitor center; everybody going through the booth at the entrance and be given the needed information and the rules and regulations to follow.

- More recreation options/sites – more trails needed with the outfitters willingness to spread out; explore the opportunity to open new trails that have been lost to natural causes.
- Keep a count on the number of vehicles entering the forest (identify the capacity of parking at the forest); parking on an angle as compared with parallel parking.
- Maintenance of trails: guardrails; signs (including signage with rules and regulations; no coolers on trails, no smoking, no drinking at La Mina, etc.); interpretive signage on trails; building a platform over the rocks at La Mina to avoid slippery surfaces.
- More educational programs – involve schools.
- Change the movie at El Portal to English and do subtitles in Spanish.
- More use of the picnic areas.

Implications and Recommendations

The implications and recommendations of this study are designed to support the Forest Service's efforts to provide for ecological sustainability and contribute to social and economic sustainability in the area. The results of this study should be viewed as quality scientific information to inform forest planning decisions as it relates to recreation experiences at the forest. We acknowledge that these recommendations are foundational in starting a comprehensive discussion that integrates public/ stakeholders input on the best actions to take that will be ecologically, social and economically sustainable and best take into consideration the challenges of climate change.

Based on the findings of this study and our observations in the field, we believe there is a great need for forest managers to target several identified problems. Of primary concern, is the impact of crowding on visitors' experience as it relates to having proper services and facilities to support their experience as well as the increased pressure on resources to accommodate the number of visitors coming to the forest on a regular basis. As reflected in the results, people do not necessarily feel crowded in El Yunque, but they did express dissatisfaction with a series of facilities and services, which are directly impacted by the amount of visitors at the forest (e.g. parking, bathrooms become a problem when there are a lot of visitors at the forest) – especially during the summer months when there are more visitors. Furthermore, with increased visitation environmental impacts are starting to be observed primarily in areas that are heavily used (e.g. La Mina trail), areas that are not prepared for high visitation (e.g. trails that are not paved) and visitors are increasingly exploring new opportunities for recreation at sites that would provide the experience they are looking for (e.g. pristine areas, solitude). For example, Juan Diego trail is not a developed trail; however, visitors have explored that area and extensive environmental degradation can be observed. Without management action and proper monitoring, more areas could be impacted by visitors who are displaced from engaging in recreation due to crowding and not being able to engage in the recreation experience they are looking for at the developed recreation sites. Furthermore, increased visitation is becoming a safety problem in the forest, causing traffic concerns and accidents on trails. Visitation numbers have increased in El Yunque over the years, and one could expect that trend to continue. Accordingly, forest managers need to be more pro-active in their efforts to support quality recreation experiences at the forest, experiences that take into consideration ecological sustainability and contribute to social and economic sustainability in the area. Based on the results of this study, a series of recommendations (long and short-term) are provided that address the environmental, social, and economic sustainability of the forest.

Long-Term Recommendations:

The El Yunque National Forest management team should consider the following long-term recommendations to address recreation planning at the forest:

- Recreation Opportunity Spectrum (ROS) should be revised. Management decisions need to be made in order to establish what type of experiences the forest will provide and their location. Trails that are currently closed should be included in this discussion (e.g. Rio de La Mina -Trail #24) and also the wilderness area. As part of this process, management

objectives, indicators and standards of quality need to be established for each of the recreation opportunity areas defined in the forest and a constant monitoring of standards should be undertaken. Currently, it is not clear what type of experiences the forest is trying to provide at different recreation sites.

- Develop a long-term communications strategy to provide visitors and outfitters/guides with information to access different recreation areas throughout El Yunque.
- Consider possible developments at Puente Roto. Minimal recreation support (picnic areas) to enhance the experience of the visitors of the area should be explored. The feasibility of adding other improvements at Puente Roto recreation area should be studied.
- Adjust visitor capacities at Palo Colorado and Big Tree to accommodate visitors with varying desires for social interactions (this should be part of the ROS discussion).
    - Potentially increase parking and visitor facilities and services at Palo Colorado to accommodate higher use, which currently exists and will continue to grow.
    - Work to sustain existing conditions at Big Tree to provide visitors with the opportunity to escape some of the crowds that can be found at Palo Colorado and the La Mina trail.
    - Develop a communication strategy to better direct visitors and guides to Palo Colorado (i.e., visitors tolerant of high use levels) and Big Tree (i.e., visitors who are less tolerant of high use) based on visitors expectations for crowding.
    - The observed differences in recreation participation and perceptions of crowding (differences based on primary residence, ethnicity, and sites) come to support the need for providing a variety of recreation sites that respond to various recreation needs and preferences.

Short-Term Recommendations:

1) **Environmental Sustainability: Recreation Sites Recommendations**

The recommendations regarding recreation sites are based on the environmental assessment conducted and the feedback received from the respondents concerning site conditions at the forest. A series of visitor related impacts were observed on trails and at various recreation sites. Thus, the forest management needs to be pro-active in minimizing such impacts in the future. Furthermore, the importance-performance analysis conducted depicted a series of site conditions that need to be become a priority for the forest. The forest management should consider the following short-term recommendations:

- Identify key indicators and standards to maintain environmental conditions.
    - Environmental conditions should be tied to ecological conditions as identified in management plans and other USFS research and management documents.
- Address negative environmental impacts occurring because of carrying capacity currently being exceeded. Trail maintenance efforts should be implemented to address impacts on trails. Longer trails are currently being heavily impacted in higher elevation areas where they are not paved. Assess the current user created trails around the forest (e.g. Juan Diego trail). A decision needs to be made about Juan Diego trail (excessive environmental degradation was observed).

- Address the propriety items identified in the importance-performance analysis conducted as part of this study: adequate number and clean restrooms, adequate parking, availability of information, vandalism, directional and interpretive signage.
- Implement a "Pack It In/Pack It Out" policy. The forest is already moving towards establishing trash-free zones and this effort should be continued.
- Assess signage in the forest, directional, informational (e.g. difficulty of trails; rules and regulations) and interpretive signage and update as needed. Provide maps at different locations in the forest.
- Several water fountains were identified as not working. Thus, those water fountains that are not working should be removed or repaired.
- Picnic sites that are not used should be eliminated.
- Establish parking capacity and close parking in undesignated spots. Do not allow for parking along road if it is not a designated parking spot.
- Angelito trail is a site where visitation and environmental degradation could increase rapidly if the recreation opportunity for this area is not defined. Monitoring of this area is recommended.
- Any new development in recreation sites should be based on ROS with the awareness that hardening a site will likely increase visitation. Developed sites result in different expectations and ultimately increase used. When visitors see concrete/pavement they feel like it will be an easy hike, an experience available for everybody, situation that raises major safety concerns.

2) Social Sustainability: Recreation Experience/Visitation Recommendations

This study explored extensively visitors' perceptions of crowding. While visitors tended not to feel crowded at the forest or express that crowding had a positive or no influence on their experience, they did express dissatisfaction with a series of facilities and services, which are directly impacted by the amount of visitors at the forest (e.g. parking, bathrooms, and traffic). Thus, high visitation is having a major impact on recreation facilities and services provided at the forest. To mitigate these impacts, the following short-term recommendations are proposed:

- Identify key indicators and standards to maintain recreation quality conditions.
    - Recreation quality should be tied to accessible facilities and services (e.g., restrooms, parking, and trash containers)
- Determine use patterns at recreation sites and adjust carrying capacities based on accurate visitation levels.
    - Install visitor counters (pedestrian counters) at trail heads to estimate use at sites.
    - Vehicle counters for automobiles can also be used to estimate visitation to the entire forest and specific sites. Vehicle counters are commonly used by public land management agencies and provide accurate numbers for automobiles but varying estimates of visitor numbers.
- Keep visitation under 1500 visitors/day. Continuous monitoring of use and recreation experiences at each site (e.g. visitor/vehicles counters, surveys, and comment boxes) should be conducted.
- Explore the potential of increasing visitor use of El Portal and the informational and educative offerings at the center. An informational booth before the entrance should be

considered to provide information to the visitors about El Portal and the forest (including rules and regulations), and provide maps. Another option will be to explore the possibility of putting a gate house on the road and charge entrance fees (even if minimal fees) that will allow for better communication with the public and better sharing of information. It is important to mention that establishing an entrance fee was one of the least preferred management actions by the visitors, but this is a common finding in recreation research. Research also shows that visitors grow to accept fees if they see improvement in the recreation setting, which is tied to the fee.

- Consider issuing permits for certified guides to provide tours in the forest at random times. Their services would be primarily for visitors who do not visit the forest with an outfitter.
- Increase law enforcement and Forest Service presence in the forest, especially at Angelito.
- Hire seasonal staff for the high season and consider working with volunteer groups to provide assistance when visitation is high.

3) Economic Sustainability: Outfitters and Special Uses Recommendations

Forest managers' working relationship with outfitters should be expanded and improved. Although outfitters can provide quality recreation experiences for many visitors under the guidance of professionals, there is animosity between managers and outfitters and hosting outfitters at El Yunque is likely not benefiting either party to the extent possible. Like many businesses that depend on public lands, outfitters to El Yunque will work to obtain as much economic benefit from the forest as possible, working to bring more visitors and achieve more access to an aesthetic, healthy forest that provides quality recreation experiences. With this understanding and improved communication with outfitters, managers can implement a pro-active plan that benefits both parties.

It must be realized that outfitters currently provide important services at the forest, but they are experiencing a series of problems that are impacting the quality of services they provide. Forest managers can start to improve their relationship with outfitters by focusing on some of these problems. Some of the problems mentioned by the outfitters were: parking, traffic, roads, crowding, safety (primarily at Angelito), lack of law enforcement, etc. Outfitters are bringing a large number of visitors to the forest and it is important to make sure that the quality of experience of the visitors is sustained over time in order to sustain a healthy forest and quality recreation experiences for all visitors - including customers of the outfitters.

Taking into consideration the problems identified by the outfitters and crowding at the forest, the following short-term recommendations are proposed:

- Ensure that an El Yunque administrator develops a regular communication strategy with outfitters to inform them of management changes, site conditions and other relevant issues that periodically present themselves. Also, this communication strategy should enlist feedback from outfitters, so forest managers regularly understand their issues and concerns in a positive and constructive atmosphere.
- Require all outfitters to have one guide for every 12-15 visitors. Limit the size of outfitter groups at 15 visitors. Conduct continuous monitoring of the use of guides by outfitters.

- Establish seasonal restrictions in the number of groups each outfitter can bring to the forest.
- Establish designated parking for outfitters (parking for outfitters busses only).
- Encourage outfitters to diversify their recreation offerings. Currently, the majority of the outfitters provide tours to the same sites for almost the same amount of time.
- Provide trainings for guides in order to assure quality educational experiences for the visitors.
- Perform frequent evaluation of outfitters (at least 2 times a year) and make sure rules are being enforced.
- Establish separate permits for La Mina/ Big Tree Trail for outfitters and establish restrictions during weekends and holidays at these two sites.

In conclusion, this study provides insights on visitors' perceptions of crowding and the quality of recreation facilities and services at El Yunque National Forests' major recreation sites. The results of this study and proposed recommendations are based on the scientific surveys conducted at El Yunque and from the experience of the researchers. However, it is expected that these recommendations be evaluated through the vast experience and expertise of El Yunque managers and be altered and adjusted to best work in the forest. It is hoped that with this holistic perspective of visitation at El Yunque this work will inform and guide the Land and Resource Management Plan (LRMP) revision and long term alternatives.

Appendix A. Sample Survey in English

Your Experience at El Yunque National Forest

Thank you for agreeing to complete this survey about your experience at El Yunque National Forest (EYNF). Please read each question carefully before responding. Answer to the best of your ability and save any additional comments for the end. Your answers will help the US Forest Service better understand the quality of your recreation experience at EYNF in order to improve the management of the Forest. Your responses are confidential; the law prohibits disclosure of confidential statistical data and any non-statistical uses of the data.

This first section asks about your recreation activity participation at EYNF.

1. Is this your first visit to El Yunque National Forest? ☐ Yes ☐ No
If yes, proceed to Question 3. If no, please respond to the following question:

2. During the last 12 months, how often did you visit El Yunque National Forest? Please ✓ one answer.

Visited more than 12 months ago	Once	A few times	Once a month	A few times a month	Once a week	More than once a week	Everyday
❒	❒	❒	❒	❒	❒	❒	❒

3. Approximately, how many hours did you spend at El Yunque National Forest today?
☐ 1-2 hours ☐ 3-4 hours ☐ 5-6 hours ☐ 7-8 hours ☐ 9-12 hours
☐ 1 day or more (If more than 1 day, please specify the total number of days _____)

4. What recreation site did you most recently visit? Please specify the name of the site:_____

5. Approximately, how many hours did you spend at the recreation site you most recently visited?
☐ 1-2 hours ☐ 3-4 hours ☐ 5-6 hours ☐ 7-8 hours ☐ 9 hours or more

6. What other sites did you visit during this visit to El Yunque National Forest? Please list all the sites visited:

_____

_____

7. What was the primary purpose for your recreation experience and/ or volunteer experience at the site you most recently visited?

❒ Hiking/ Walking
❒ Camping
❒ Nature viewing (scenery, plants, wildlife)
❒ Outdoor learning (interpretive areas, visitor center)
❒ Picnicking
❒ Scenic driving
❒ Waterplay
❒ Biking
❒ Jogging/Running
❒ Photography
❒ Birdwatching
❒ Backpacking
❒ Nature study
❒ Viewing cultural resources
❒ Trail maintenance work
❒ Conducting or assisting with research
❒ Collecting non-timber forest products
❒ Other (please specify_____)

8. Were you a part of a guided/outfitted tour today? ☐ Yes ☐ No

9. Not including the guided/outfitted tour group, how many people are accompanying you on this trip?
☐ 0 ☐ 1-4 ☐ 5-8 ☐ 9 or more

10. Not including the guided/ outfitted tour group, what type of group are you traveling with? Please ✓ all that apply.

☐ Traveling alone ☐ Family with children ☐ Family without children ☐ Friends
☐ Other (Please specify _____)

11. Approximately, how far from the main road did you travel to get to the recreation site you most recently visited?

☐ 0-99m (~100yd) ☐ 100-999m (~100yd-1000yd) ☐ 1km-5km (1000yd-3mi) ☐ more than 5km (more than 3mi)

This section asks about motivations and satisfaction with your recreation experience at the site you most recently visited.

12. People respond differently to various recreation settings. Please indicate how important each of the following site conditions were to you during your recreation at the most recently visited site and rate your level of satisfaction with those conditions at the site today. Circle one number for each statement evaluating importance on the 5 point scale, where 1=least important and 5=most important and satisfaction on the 5 point scale, where 1=least satisfied and 5=most satisfied; and n/a = not applicable item to the visited site.

	Importance					Satisfaction					
	Least				Most	Least				Most	Not applicable
Appearance and maintenance of the site	1	2	3	4	5	1	2	3	4	5	n/a
Proper access to the recreation site of interest	1	2	3	4	5	1	2	3	4	5	n/a
Well protected natural environment	1	2	3	4	5	1	2	3	4	5	n/a
Well protected cultural resources	1	2	3	4	5	1	2	3	4	5	n/a
No signs of vandalism at the site	1	2	3	4	5	1	2	3	4	5	n/a
Water free of litter and trash	1	2	3	4	5	1	2	3	4	5	n/a
Erosion free and well maintained trails	1	2	3	4	5	1	2	3	4	5	n/a
Proper trails for the designated activity	1	2	3	4	5	1	2	3	4	5	n/a
Accessibility for people with disabilities	1	2	3	4	5	1	2	3	4	5	n/a
Clean restrooms and in proper working order	1	2	3	4	5	1	2	3	4	5	n/a
Picnic tables and grills conveniently located and in good condition	1	2	3	4	5	1	2	3	4	5	n/a
Adequate parking	1	2	3	4	5	1	2	3	4	5	n/a
Adequate number of restroom facilities	1	2	3	4	5	1	2	3	4	5	n/a
Adequate number of picnic shelters	1	2	3	4	5	1	2	3	4	5	n/a
Availability of trash containers	1	2	3	4	5	1	2	3	4	5	n/a
Enough water fountains and faucets	1	2	3	4	5	1	2	3	4	5	n/a
Enough directional signage (i.e., restrooms, parking, picnic).	1	2	3	4	5	1	2	3	4	5	n/a
Courteous and friendly staff members	1	2	3	4	5	1	2	3	4	5	n/a
Availability of staff to answer questions	1	2	3	4	5	1	2	3	4	5	n/a
Adequate ranger/visitor assistance patrols	1	2	3	4	5	1	2	3	4	5	n/a
Nature/historical information about the site	1	2	3	4	5	1	2	3	4	5	n/a
Availability of safety information	1	2	3	4	5	1	2	3	4	5	n/a

General information available (e.g., brochures about the forest)	1	2	3	4	5	1	2	3	4	5	n/a
Current and accurate information	1	2	3	4	5	1	2	3	4	5	n/a
Variety of services at the visitor center	1	2	3	4	5	1	2	3	4	5	n/a
Availability of information services away from the visitor center	1	2	3	4	5	1	2	3	4	5	n/a
Opportunity to recreate without feeling crowded	1	2	3	4	5	1	2	3	4	5	n/a
Opportunity to recreate without being bothered by nuisance wild animals in the Forest	1	2	3	4	5	1	2	3	4	5	n/a
Opportunity to recreate without being bothered by insects	1	2	3	4	5	1	2	3	4	5	n/a
Safety and security at the site	1	2	3	4	5	1	2	3	4	5	n/a

13. **People go to particular areas and participate in recreation activities for any number of reasons. Please indicate how important each experience was for you during your recreation at the most recently visited site.** Circle one number for each statement on the 5 point scale, where 1=not at all important and 5=very important.

	Not at all important		**Neutral**		**Very important**
To enjoy the scenery	1	2	3	4	5
To relax physically	1	2	3	4	5
To do something with my family	1	2	3	4	5
To get exercise	1	2	3	4	5
To explore the area	1	2	3	4	5
To experience nature	1	2	3	4	5
To be on my own	1	2	3	4	5
To use my own equipment	1	2	3	4	5
To grow and develop spiritually	1	2	3	4	5
To learn about the natural history of the area	1	2	3	4	5
To be away from people	1	2	3	4	5
To have thrills and excitement	1	2	3	4	5
To learn more about nature	1	2	3	4	5
To reflect on your religious or other spiritual values	1	2	3	4	5
To meet new people	1	2	3	4	5
To test my skills and abilities	1	2	3	4	5
To enjoy the smells and sounds of nature	1	2	3	4	5
To get away from usual demands of life	1	2	3	4	5
To share my skills and knowledge with others	1	2	3	4	5
To be with members of my group	1	2	3	4	5
To be close to nature	1	2	3	4	5
To be with people who enjoy the same things I do	1	2	3	4	5
To experience new and different things	1	2	3	4	5
To learn about the cultural history of the area	1	2	3	4	5
To develop personal spiritual values	1	2	3	4	5
To experience solitude	1	2	3	4	5
To feel healthier	1	2	3	4	5

14. **On a scale of 1 to 10, with 10 being a perfect trip, how would you rate the overall quality of your experience at the recreation site you most recently visit?** Circle one response.

1	2	3	4	5	6	7	8	9	10
Very poor quality				Neutral					Excellent quality

15. Would you like to visit this site again? ☐ Yes ☐ No

This section asks about your social interactions during your recreation experience at the recreation site you most recently visited.

16. Not including those in your group, approximately how many other visitors did you encounter at the recreation site?

☐ Zero ☐ 1-10 ☐ 11-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Greater than 50

17. Did the number of people you encountered at the site influence your experience today?

☐ Yes, in a positive way ☐ Yes, in a negative way ☐ No influence

18. Did you feel crowded today at the recreation site? ☐ Yes ☐ No

19. If yes, how crowded did you feel on a scale of 1 to 9? Circle one response.

1	2	3	4	5	6	7	8	9
Not at all Crowded		Slightly Crowded			Moderately Crowded			Extremely Crowded

20. Was the number of visitors you encountered today acceptable to you? Circle a number.

-4	-3	-2	-1	0	1	2	3	4
Very Unacceptable		Unacceptable		Neutral		Acceptable		Very Acceptable

21. Please indicate the approximate number of visitors that would be acceptable for you to encounter while using the recreation site you most recently visited at El Yunque National Forest?

☐ Zero ☐ Less than 10 ☐ 10-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Greater than 50

22. What would be your preferred group size to recreate with at the site you recently visited? ✓ one answer.

☐ Small (5 people or less) ☐ Medium (6-15 people) ☐ Large (16-25 people) ☐ Makes no difference to me

23. What are the three words that come to your mind when you think of <u>El Yunque National Forest</u>?

A_____ B_____ C_____

This section asks about your perceptions of conflict and possible management actions at the recreation site you most recently visited.

24. People experience various types of conflict when engaging in a recreation experience. Please indicate your level of agreement with the following statements in terms of their impact on your recreation experience at the site you most recently visited. Circle one number for each statement on the 5 point scale, where 1=strongly disagree and 5=strongly agree or select n/a = not applicable item to the visited site.

My experience at El Yunque was impacted by …	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable

Seeing/encountering other recreationists	1	2	3	4	5	n/a
Litter or trash	1	2	3	4	5	n/a
Traffic congestion	1	2	3	4	5	n/a
Availability of parking	1	2	3	4	5	n/a
Noise levels	1	2	3	4	5	n/a
Conflict between recreationists	1	2	3	4	5	n/a
Other uses of the Forest besides recreation (e.g. research, commercial activities)	1	2	3	4	5	n/a
Need for permits	1	2	3	4	5	n/a
Hours of operation	1	2	3	4	5	n/a
Crowding/ congestion from tourists	1	2	3	4	5	n/a
Available space to participate in my recreation activities	1	2	3	4	5	n/a
Behavior of others in your group	1	2	3	4	5	n/a
Behavior of others outside of your group	1	2	3	4	5	n/a

25. **Management decisions need to be made on a constant basis by forest staff in order to provide quality recreation experiences at EYNF. Please indicate to what degree you agree or disagree with the following possible management actions to better address visitor and resource needs at the recreation site you most recently visited.** Circle one number for each statement on the 5 point scale, where 1=strongly disagree and 5=strongly agree.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Limit the size of groups	1	2	3	4	5
Establish a maximum number of visitors to the site and close the site after the limit is reached	1	2	3	4	5
Provide signage and information to change behavior	1	2	3	4	5
Provide low impact recreation educational programs to visitors	1	2	3	4	5
Regulate when visitors can use specific sites (day vs. overnight; dry vs. wet conditions)	1	2	3	4	5
Disperse recreation use to other sites	1	2	3	4	5
Regulate car access at specific areas	1	2	3	4	5
Close areas that have high impact due to visitation	1	2	3	4	5
Regulate where visitors can go at specific recreation sites (e.g., closure of heavily impacted picnic areas)	1	2	3	4	5
Increase number of facilities (add trails, picnic areas, etc.)	1	2	3	4	5
Require an entrance fee for all sites	1	2	3	4	5
Require an entrance fee for only some sites	1	2	3	4	5
Establish a fine for not following forest recreation use rules and regulations	1	2	3	4	5

This final section asks about your household and demographic information. This information will be kept confidential and used for statistical purposes only.

26. What is your gender? ☐ Male ☐ Female

27. What year were you born? _____

28. Please specify your ethnicity. ☐ Hispanic or Latino ☐ Not Hispanic or Latino

29. From the list below, which one best represents your race?

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or Other Pacific Islander
☐ White

30. Are you? ☐ Single ☐ Married/partnered ☐ Divorced/separated ☐ Widowed

31. How many adults and children live in your household? (fill in a number)
Number of adults including yourself _____ Number of children (under 18) _____

32. What is the highest level of education you have completed? Please ✓ one answer.

☐ Eighth grade or less
☐ Some High School
☐ High School Graduate or GED
☐ Some College
☐ College Graduate
☐ Some Graduate School
☐ Graduate Degree or Higher

33. Which of the following best represents your current employment status? Please ✓ one answer.

☐ Employed Full Time
☐ Employed Part Time
☐ Unemployed
☐ Full Time Homemaker
☐ Retired
☐ Full Time Student
☐ Part Time Student
☐ Other (please specify _____)

34. What is your profession or occupation? _____

35. What is your annual household income? Please ✓ one answer.

☐ Less than $9,999
☐ Between $10,000 and $24,999
☐ Between $25,000 and $49,999
☐ Between $50,000 and $74,999
☐ Between $75,000 and $99,999
☐ Between $100,000 and $124,999
☐ Between $125,000 and $149,999
☐ $150,000 or more

36. Where is your primary residence? Please ✓ one answer and include details.

☐ Puerto Rico (Please specify municipality _____ Zip Code _____)
☐ United States of America (Please specify state_____ Zip Code _____)
☐ Other (Please specify Country of residence _____)

Thank you for completing this survey!

In the space provided below, please feel free to include any comments that you think might help us in better understanding your overall recreation experience at El Yunque National Forest.

Appendix B. Sample Survey in Spanish

Su Experiencia en el Bosque Nacional El Yunque

Gracias por aceptar llenar esta encuesta sobre su experiencia en el Bosque Nacional El Yunque (BNEY). Lea cuidadosamente cada pregunta antes de responder. Responda en la medida de su capacidad; favor incluir comentarios adicionales únicamente al final. Sus respuestas ayudarán al Servicio Forestal de los Estados Unidos a entender mejor la calidad de su experiencia recreativa en BNEY con el fin de mejorar el manejo del bosque. Sus respuestas son confidenciales; la ley prohíbe la divulgación de datos estadísticos confidenciales y cualquier uso no estadístico de los mismos.

La primera sección se refiere a su participación en actividades recreativas en BNEY.

20. ¿Es esta su primera visita al Bosque Nacional El Yunque? ☐ Sí ☐ No
Si responde que Sí, pasar a la pregunta #3. Si responde No, favor conteste la próxima pregunta:

21. Durante los últimos 12 meses ¿Cuántas veces visitó el Bosque Nacional El Yunque? Por favor✓ una sola respuesta.

Visité hace más de 12 meses	1 sola vez	Algunas veces	1 vez al mes	Algunas veces al mes	1 vez a la semana	Más de 1 vez por semana	Todos los días
❒	❒	❒	❒	❒	❒	❒	❒

22. Aproximadamente ¿Cuántas horas pasó en el Bosque Nacional El Yunque el día de hoy?
☐ 1-2 horas ☐ 3-4 horas ☐ 5-6 horas ☐ 7-8 horas ☐ 9-12 horas
☐ 1 día o más (Si fue más de 1 día, especifique el número total de días _____)

23. ¿Qué área recreativa visitó recientemente? Por favor especifique el lugar:_____

24. Aproximadamente ¿Cuántas horas pasó en el área recreativa que visitó recientemente?
☐ 1-2 horas ☐ 3-4 horas ☐ 5-6 horas ☐ 7-8 horas ☐ 9 horas o más

25. ¿Qué otros lugares visitó durante su visita al Bosque Nacional El Yunque? Por favor indique todos los lugares que visitó:

_____

_____

26. ¿Cuál fue el propósito principal de su experiencia recreativa o experiencia de voluntariado en el área que visitó recientemente?

❒ Senderismo/Caminata
❒ Acampar
❒ Observación de la Naturaleza (paisaje, plantas, vida silvestre)
❒ Aprendizaje al aire libre (áreas interpretativas, centro de visitantes)
❒ Pasadía "Picnic"
❒ Paseo panorámico
❒ Recreación en el agua (quebradas, ríos, cascadas)
❒ Ciclismo
❒ Ejercitarse/Correr
❒ Fotografías
❒ Observación de aves
❒ Caminata con Mochila "Backpacking"
❒ Estudio de la Naturaleza
❒ Observar recursos culturales
❒ Mantenimiento de veredas/senderos
❒ Realizar o ayudar en trabajos de investigación
❒ Recolectar productos del Bosque
❒ Otro (Por favor especifique_____)

27. ¿Su visita fue parte de una excusión guiada comercialmente (tour operador)? ☐ Sí ☐ No

28. ¿Sin incluir el grupo de personas de la excursión guiada, cuántas personas le acompañan en este viaje?

☐ 0 ☐ 1-4 ☐ 5-8 ☐ 9 o más

29. ¿Sin incluir el grupo de personas de la excursión guiada, quiénes le acompañan en su viaje? Marque ✓ todas las que aplican.

☐ Viajando solo(a) ☐ Familia con niños ☐ Familia sin niños ☐ Amigos
☐ Otro (Especifique _____)

30. ¿Aproximadamente, cuán lejos viajó usted desde la carretera principal para llegar al área recreativa que visitó recientemente?

☐ 0-99m (~100yd) ☐ 100-999m (~100yd-1000yd) ☐ 1km-5km (1000yd-3mi) ☐ más de 5km (más de 3mi)

Esta sección pregunta acerca de las motivaciones y el grado de satisfacción obtenido durante su experiencia recreativa en el área que visitó recientemente.

31. Las personas responden de forma diferente a distintos ambientes recreativos. Por favor indique cuán importantes fueron cada una de las siguientes condiciones del área que usted visitó recientemente, y su nivel de satisfacción con las condiciones experimentadas en el área el día de hoy. Circule un número para cada línea de evaluación de importancia en una escala de 5 puntos, donde 1=menor importancia y 5=mayor importancia, y en satisfacción en una escala de 5 puntos, donde 1=menor satisfacción y 5=mayor satisfacción; y n/a = no aplica al área visitada.

	Importancia					**Satisfacción**					
	Menos				**Más**	**Menos**				**Más**	**No aplica**
Apariencia y mantenimiento del área	1	2	3	4	5	1	2	3	4	5	n/a
Acceso adecuado al área recreativa de interés	1	2	3	4	5	1	2	3	4	5	n/a
Entorno natural bien protegido	1	2	3	4	5	1	2	3	4	5	n/a
Recursos culturales bien protegidos	1	2	3	4	5	1	2	3	4	5	n/a
Sitio sin rastros de vandalismo	1	2	3	4	5	1	2	3	4	5	n/a
Agua limpia y sin desperdicios y sin basura	1	2	3	4	5	1	2	3	4	5	n/a
Senderos sin erosión y bien mantenidos	1	2	3	4	5	1	2	3	4	5	n/a
Senderos adecuados para la actividad designada	1	2	3	4	5	1	2	3	4	5	n/a
Accesibilidad para personas discapacitadas	1	2	3	4	5	1	2	3	4	5	n/a
Baños limpios y en debido funcionamiento	1	2	3	4	5	1	2	3	4	5	n/a
Mesas de picnic y parrillas convenientemente situadas y en buenas condiciones	1	2	3	4	5	1	2	3	4	5	n/a
Estacionamiento adecuado	1	2	3	4	5	1	2	3	4	5	n/a
Número adecuado de baños	1	2	3	4	5	1	2	3	4	5	n/a
Número adecuado de casetas de picnic	1	2	3	4	5	1	2	3	4	5	n/a
Disponibilidad de contenedores de basura	1	2	3	4	5	1	2	3	4	5	n/a
Suficientes fuentes de agua y grifos	1	2	3	4	5	1	2	3	4	5	n/a
Suficientes letreros direccionales (ej. baños, estacionamiento, picnic).	1	2	3	4	5	1	2	3	4	5	n/a
Personal cortés y amable	1	2	3	4	5	1	2	3	4	5	n/a
Disponibilidad del personal para responder a preguntas	1	2	3	4	5	1	2	3	4	5	n/a

Patrullaje y asistencia adecuada del guardabosque	1	2	3	4	5	1	2	3	4	5	n/a
Información natural/histórica sobre el área	1	2	3	4	5	1	2	3	4	5	n/a
Disponibilidad de información relacionada a seguridad	1	2	3	4	5	1	2	3	4	5	n/a
Información general disponible (ej. folletos sobre el bosque)	1	2	3	4	5	1	2	3	4	5	n/a
Información actualizada y precisa	1	2	3	4	5	1	2	3	4	5	n/a
Variedad de servicios en el centro de visitantes	1	2	3	4	5	1	2	3	4	5	n/a
Disponibilidad de información sobre servicios, en lugares además del centro de visitantes	1	2	3	4	5	1	2	3	4	5	n/a
Oportunidad para recrearse sin sentirse en medio de una multitud	1	2	3	4	5	1	2	3	4	5	n/a
Oportunidad para recrearse sin ser molestado por animales salvajes en el bosque	1	2	3	4	5	1	2	3	4	5	n/a
Oportunidad para recrearse sin ser molestado por los insectos	1	2	3	4	5	1	2	3	4	5	n/a
Seguridad y protección en el área	1	2	3	4	5	1	2	3	4	5	n/a

32. La gente visita áreas particulares y participa de actividades recreativas por muchas razones. Por favor indique cuán importante fue cada experiencia recreativa para usted durante su visita al área recientemente visitada. Circule un número para cada una de las alternativas en una escala de 5 puntos, donde 1=No es importante y 5=Muy importante.

	No es importante		**Neutral**		**Muy Importante**
Para disfrutar del paisaje	1	2	3	4	5
Para relajarme físicamente	1	2	3	4	5
Hacer algo con mi familia	1	2	3	4	5
Hacer ejercicio	1	2	3	4	5
Para explorar la zona	1	2	3	4	5
Para disfrutar de la naturaleza	1	2	3	4	5
Para estar solo(a)/conmigo mismo(a)	1	2	3	4	5
Para utilizar mi propio equipo	1	2	3	4	5
Para crecer y desarrollarme espiritualmente	1	2	3	4	5
Para aprender sobre la historia natural de la zona	1	2	3	4	5
Para estar alejado(a) de la gente	1	2	3	4	5
Para experimentar retos y emociones	1	2	3	4	5
Para aprender más acerca de la naturaleza	1	2	3	4	5
Para reflexionar sobre mis valores espirituales y religiosos	1	2	3	4	5
Para conocer gente nueva	1	2	3	4	5
Para poner a prueba mis habilidades y capacidades	1	2	3	4	5
Para disfrutar de los olores y los sonidos de la naturaleza	1	2	3	4	5
Para alejarme de la rutina	1	2	3	4	5
Para compartir mis habilidades y conocimientos con los demás	1	2	3	4	5
Para estar con los miembros de mi grupo	1	2	3	4	5
Para estar cerca de la naturaleza	1	2	3	4	5

Para estar con personas que disfrutan de las mismas cosas que yo disfruto hacer	1	2	3	4	5
Para experimentar cosas nuevas y diferentes	1	2	3	4	5
Para aprender sobre la historia cultural de la zona	1	2	3	4	5
Para desarrollar valores espirituales personales	1	2	3	4	5
Para experimentar la soledad	1	2	3	4	5
Para sentirme más saludable	1	2	3	4	5

33. En una escala de 1 a 10, con 10 siendo un viaje perfecto, ¿Cómo evaluaría la calidad general de su experiencia en el área recreativa que visitó recientemente? Circule un número**.**

1	2	3	4	5	6	7	8	9	10
Muy mala Calidad				**Neutral**					**Excelente calidad**

34. ¿Le gustaría visitar nuevamente ésta área? ☐ Sí ☐ No

En ésta sección se le preguntará sobre sus interacciones sociales durante su experiencia recreativa en el área que visitó recientemente.

35. Sin incluir los miembros de su grupo, ¿Cuántos visitantes adicionales encontró/vió en el área recreativa?
☐ Cero ☐ 1-10 ☐ 11-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Más de 50

36. ¿El número de personas que encontró/vió en el área influyó en su experiencia el día de hoy?
☐ Sí, de forma positiva ☐ Sí, de forma negativa ☐ No influencia

37. ¿Se sintió hoy entre una multitud en el área recreativa? ☐ Sí ☐ No

38. En caso afirmativo, en una escala de 1 a 9, ¿cuán congestionado/lleno sintió el sitio? Circule un número.

1	2	3	4	5	6	7	8	9
No estaba lleno		**Ligeramente lleno**			**Moderamente lleno**			**Extremadamente lleno**

20. Para usted, ¿Fue aceptable el número de visitantes que encontró el día de hoy? Circule un número.

-4	-3	-2	-1	0	1	2	3	4
Totalmente Inaceptableble		**Inaceptable**		**Neutral**		**Aceptable**		**Totalmente Aceptable**

21. Favor sírvase indicar el número aproximado de visitantes que para usted sería aceptable encontrar mientras usa el área recreativa que visitó recientemente en el Bosque Nacional El Yunque?
☐ Cero ☐ Menos de 10 ☐ 10-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Más de 50

22. Aproximadamente, ¿Cuál sería el tamaño ideal de su grupo para recrearse en el área que visitó recientemente? Marque ✓ una respuesta.
☐ Pequeño (5 personas o menos) ☐ Mediano (6-15 personas) ☐ Grande (16-25 personas) ☐ No es importante

23. ¿Cuáles son las tres palabras que vienen a su mente cuando piensa en el Bosque Nacional El Yunque?
A_____ B_____ C_____

En ésta sección se le preguntará sobre su percepción acerca de los conflictos y las posibles acciones de manejo en el área recreativa que visitó recientemente.

24. Las personas experimentan varios tipos de conflicto cuando participan en actividades recreativas. Por favor, indique su grado de conformidad con las siguientes declaraciones en relación al impacto sobre su experiencia recreativa en el área que visitó recientemente. Circule un número para cada una de las alternativas en una escala de 5 puntos, donde 1=en total desacuerdo y 5=en total acuerdo, o seleccione n/a= no aplica al lugar visitado.

Mi experiencia en El Yunque fue afectada por...	En Total Desacuerdo	En Desacuerdo	Neutral	De Acuerdo	En Total Acuerdo	No Aplica
Ver/encontrar otras personas recreándose	1	2	3	4	5	n/a
Desperdicios o basura	1	2	3	4	5	n/a
Congestión del tráfico	1	2	3	4	5	n/a
Disponibilidad de estacionamiento	1	2	3	4	5	n/a
Niveles de ruido	1	2	3	4	5	n/a
Conflictos entre las personas recreándose	1	2	3	4	5	n/a
Otros usos no recreativos del bosque (investigación, actividades comerciales)	1	2	3	4	5	n/a
Necesidad de obtener permisos	1	2	3	4	5	n/a
Horas de operación	1	2	3	4	5	n/a
Multitud/lleno de turistas	1	2	3	4	5	n/a
Espacio disponible para participar en mis actividades recreativas	1	2	3	4	5	n/a
Comportamiento de los demás miembros de su grupo	1	2	3	4	5	n/a
Comportamiento de otros que no son parte de su grupo	1	2	3	4	5	n/a

25. Constantemente el personal del servicio forestal debe tomar decisiones con el fin de proporcionar experiencias recreativas de calidad en BNEY. Por favor, indique su grado de conformidad con las siguientes acciones de manejo posibles para abordar las necesidades de los visitantes, y de los recursos naturales que se necesita en el área que visitó recientemente. Circule un número para cada alternativa en una escala de 5 puntos, donde 1=en total desacuerdo y 5=en total acuerdo.

	En Total Desacuerdo	En Desacuerdo	Neutral	De Acuerdo	En Total Acuerdo
Limitar el tamaño de los grupos	1	2	3	4	5
Establecer un número máximo de visitantes por área y cerrar después que se alcance el límite	1	2	3	4	5
Proporcionar letreros e información para cambiar el patrón de comportamiento de los visitantes	1	2	3	4	5
Proporcionar programas recreativos educativos de bajo impacto para los visitantes	1	2	3	4	5
Regular horarios/días en que los visitantes puedan utilizar las áreas específicas (ej. día vs noche; condiciones de clima seco vs lluvioso)	1	2	3	4	5
Dispersar el uso recreativo a otras áreas	1	2	3	4	5
Regular el acceso de vehículos en áreas específicas	1	2	3	4	5
Cerrar las áreas altamente impactadas por la visitación	1	2	3	4	5
Regular/estipular lugares que los visitantes puedan visitar en áreas recreativas específicas (ej. cierre de casetas en áreas altamente impactadas)	1	2	3	4	5

Incrementar el número de instalaciones (Añadir rutas/senderos, áreas de picnic, etc.).	1	2	3	4	5
Requerir una cuota de entrada para todas las áreas	1	2	3	4	5
Requerir una cuota de entrada en algunas áreas	1	2	3	4	5
Establecer una multa por no cumplir con las normas y reglas de uso de recreativo en el bosque	1	2	3	4	5

En ésta sección final se le preguntará sobre su información demográfica y familiar. La información será manejada de forma confidencial, y utilizada únicamente con fines estadísticos.

26. ¿Cuál es su género? ☐ Masculino ☐ Femenino

27. ¿En qué año nació? _____

28. Por favor especifique su grupo étnico. ☐ Hispano o Latino ☐ No Hispano o Latino

29. De la siguiente lista, ¿cuál representa de mejor manera su raza?
☐ Indio Americano o Nativo de Alaska
☐ Asiático
☐ Negro o Afroamericano
☐ Nativo de Hawaii o Islas del Pacífico
☐ Blanco

30. ¿Es usted? ☐ Soltero(a) ☐ Casado(a)/convive ☐ Divorciado(a)/separado(a) ☐ Viudo(a)

31. Composición familiar, ¿Cuantos adultos y/o niños viven en su hogar? (complete con un número)

Número de adultos incluyéndose usted_____ Número de niños (menores de 18 años) _____

32. ¿Cuál es su nivel o grado de escolaridad completado? Por favor ✓ una respuesta.
☐ Octavo grado o menos
☐ Escuela Superior o Equivalente
☐ Curso Técnico/Vocacional
☐ Grado Asociado
☐ Bachillerato
☐ Maestría
☐ Doctorado

33. ¿Cuál de las siguientes alternativas mejor representa su estatus de empleo actual? Por favor ✓ una respuesta.
☐ Empleo a Tiempo Completo
☐ Empleo a Tiempo Parcial
☐ Desempleado(a)
☐ Trabajar en Casa
☐ Jubilado(a)
☐ Estudiante a Tiempo Completo
☐ Estudiante a Tiempo Parcial
☐ Otro (Por favor especificar _____)

34. ¿Cuál es su profesión u ocupación/oficio? _____

35. ¿Cuál es su ingreso anual familiar? Por favor ✓ una respuesta.
☐ Menos de $9,999
☐ Entre $10,000 y $24,999
☐ Entre $25,000 y $49,999
☐ Entre $50,000 y $74,999
☐ Entre $75,000 y $99,999
☐ Entre $100,000 y $124,999
☐ Entre $125,000 y $149,999
☐ $150,000 o más

36. ¿Dónde se ubica su residencia principal? Por favor ✓ una respuesta e incluir detalles.

☐ Puerto Rico (Por favor detalle el municipio _____ Código postal _____)

☐ Estados Unidos de América (Por favor detalle el estado_____ Código postal _____)

☐ Otro (Por favor detalle el país de residencia _____)

¡Muchas gracias por completar esta encuesta!

En el espacio provisto a continuación, favor incluir cualquier comentario que usted considere podría ayudarnos a entender mejor su experiencia recreativa en el Bosque Nacional El Yunque.

Appendix C. Environmental Assessment Forms

EYNF Assessment of Recreation Trails – Visitor-caused Resource Impact Monitoring Form

Trail Name: **Weather/Temp:**
Date: **Start Time:**
Day of Week: **End Time:**
Surveyor Name:

I. Site Description						Comments:
a. Use type for the trail:	Mixed Hiking/Biking=MHB	Mostly Hiking=MH	Mostly Biking=MB	Mostly Research/Biologists =MR	Other (please specify) _____	
b. Trail difficulty	E Easiest	M More difficult	D Most difficult			
c. Natural and cultural features	Natural High Moderate Low	Cultural High Moderate Low				
d. Level of use	H High	M Moderate	L Low			
e. Distance from trailhead point and final point	Distance (m):					
f. Trail Width (in)	Width (cm):					
g. Vegetation type and density (describe shortly)						
h. Existing maintenance features: steps	Number of Occurrences:		Linear Distance between identified steps:			
i. Existing maintenance features: culverts	Number of Occurrences (include diameter length & material – pvs, pipe, rock – for each):		Linear Distance between culverts:			

j. Existing maintenance features: signs, information available	Number of Occurrences:	Linear Distance between existing signs:	
k. Existing maintenance features: bridges	Number of Occurrences:	Linear Distance between bridges:	
II. Inventory Indicators			**Comments:**
Excessive grade (exceeding 20%)	Number of Occurrences:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Existing ditch	Number of Occurrences (width and depth for each):	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Excessive side slopes (greater than 25%)	Number of Occurrences:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Vegetation loss %	Number of Occurrences and level of loss at	Linear Distance (measure the distance between the	

(Level of loss: S=Slight M=Moderate SV=Severe) *Legend: S (10-30% reduction when compared with adjacent undisturbed area); M (30-40% reduction); SV (>60% reduction)*	each location (add distance from trail to area of loss if applicable):	beginning and the end of the linear feature at each location):	
Bare soil % (Level: S=Slight M=Moderate SV=Severe) *Legend: S (<30 of soil at location is bare); M (30-60%); SV (>60% of soil is bare)*	Number of Occurrences and severity level at each location (add distance from trail to area of loss if applicable):	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Soil compaction % (Level: S=Slight M=Moderate SV=Severe) *Legend: S (<30 of soil at location shows sign of compaction); M (30-60%); SV (>60% of soil shows signs of compaction)*	Number of Occurrences and severity level at each location (add distance from trail to area of loss if applicable):	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Drainage dip: (Effectiveness: VE=Very effective PE=Partially effective I=Ineffective) *Legend: Assess effectiveness based on the amount of water at the site (no water on trail=VE; water present but minimal=PE;extensive water on trail=I)*	Number of Occurrences and level of effectiveness at each location:	Linear Distance between each location identified:	
Water Bar (Effectiveness: VE=Very effective PE=Partially effective I=Ineffective) *Legend: Assess effectiveness based on the amount of water at the site (no water on trail=VE; water present but minimal=PE;extensive water on trail=I)*	Number of Occurrences and level of effectiveness at each location (include height and width for each):	Linear Distance between each location identified:	

Soil erosion (Level A=1 to 1.9ft of soil erosion observed; Level B=2 to 2.9ft of soil erosion; Level C=3-3.9ft of soil erosion)	Number of Occurrences and level of erosion at each location (comment if direct discharge to a stream):	Linear distance (measure the distance between the beginning and the end of the linear feature at each location):	
Wet soil (more than half of the tread with mud holes and standing water)	Number of Occurrences:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Trail widening: Excessive width (3-6ft wider than adjacent, more typical, sections of the trail)	Number of Occurrences:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Root exposure (Level: S=Slight M=Moderate SV=Severe) *Legend: S – 1 root exposed in site (2 in diameter within 6ft of the trail; M- 2 roots exposed in site; SV – 3 or more roots exposed in site)*	Number of Occurrences and severity level at the location:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Secondary treads – more than one definable tread	Number of Occurrences:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each location):	
Running Water on Trail	Number of Occurrences:	Linear Distance (measure the distance between the beginning and the end of the linear feature at each	

		location):	
Visitor-created side trails/ informal trails that exceed 10ft in length	Number of Occurrences:	Linear Distance between each location identified:	
Litter (S=Slight M=Moderate SV=Severe) *Legend: S-less than 5 signs of litter observed; M-between 5 and 15 signs of litter; SV-over 15*	Number of Occurrences and severity level at each location:	Linear Distance between each location where litter was identified:	
Graffiti (S=Slight M=Moderate SV=Severe) *Legend: S-less than graffiti signs at the site; M-between 5 and 15 graffiti signs; SV-over 15 graffiti signs at the site*	Number of Occurrences and severity level at each location:	Linear Distance between each location where graffiti was identified:	
Tree damage (S=Slight M=Moderate SV=Severe) *Legend: S (<10 of trees have broken limbs, gashes, or other damage) ; M (10-35% of trees have broken limbs, gashes, or other damage); SV (>35% of trees)*	Number of Occurrences and severity level at each location:	Linear Distance between each location where tree damage was identified:	
Tree stumps counted	Number of Occurrences:	Linear Distance between each site where tree stumps were identified:	
River/ Water Based Assessment – this section is to be used only if the trail is by the water and a quick assessment of the river is possible (record for each of the variables the extent to which each of the listed conditions are a problem or not at the site – use personal judgment for this assessment and include additional comments as needed)			

Litter in the river	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Muddy water	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Erosion of river banks	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Trampled vegetation along river bank	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Polluted water	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Litter on river banks	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Improper disposal of human wastes	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:
Trail visible from river	Not a Problem	Slight Problem	Moderate Problem	Serious Problem	Very Serious Problem	Comments:

III. Other Considerations

Site expansion potential	Please comment/ provide input on the extent to which the site could be expended – discuss if the site expansion appeared to be inhibited by topography, rockiness, or dense woody vegetation
Comments: (trail maintenance needs; limiting factors – environmental or social)	Please include additional comments as you see appropriate and relevant for this assessment:
Photographs:	Please take pictures of relevant observations and include them with the report. Include the total number of pictures provided.

Campsite and Picnic Site Rapid Monitoring Estimation Worksheet

GENERAL SITE DESCRIPTION

1. SITE NUMBER_____
2. UTM COORDINATES:_____E_____N
3. DATE CODED:___/_____/_____ (Month/Date/Year)
4. CODED BY: (Name)_____
5. ELEVATION: _____feet

6. TYPE OF SITE:
   a. Developed picnic area
   b. Primitive campsite
   c. Other: _____

7. VEGETATION (Circle One)
   a. Closed forest
   b. Open forest
   c. Riparian
   Dominant species_____
   Habitat type - Flora:
   (see Vegetation Map)_____

8. LANDFORM (Circle one)
   a. Floodplain
   b. Upland
   c. Slope, Aspect (N, E, S, or W) _____
   d. Marsh

9. DISTANCE TO CLOSEST TRAILHEAD:_____
   (do in the office)

10. DISTANCE TO CONSTRUCTED TRAIL:_____(feet)
    Screening: a. complete Maintained: a. yes
    b. partial b. no
    c. none

11. DISTANCE TO WATER:_____(feet)

(Circle one)
   a. River/creek
   b. Spring – keep
   c. Seep or wetland
   d. Other_____

12. DISTANCE TO CLOSEST PICNIC/CAMP SITE:_____(feet)
    Screening (circle one): a. complete
    b. partial
    c. none

13. NUMBER OF OTHER SITES WITHIN ¼ MILE _____ (Do in the office)

14. MAXIMUM PARTY SIZE ACCOMMODATED: (Circle one)
    a. 1-2 c. 7-10 e. more than 15
    b. 3-6 d. 11-15
15. TYPE OF USE: (Circle as many as apply)
    a. Foot c. Outfitter
    b. Biking d. Other (Please specify _____)
16. CLOSEST FIREWOOD SOURCE: (Circle one)
    a. on-site d. 300ft-1/4 mile
    b. <100 feet e. >1/4 mile
    c. 100-300 feet
17. Soil Type (estimate percent, if possible)
    a. sand _____%
    b. silt _____%
    c. clay _____%

18. FACILITIES: Present_____ Absent_____
(If present, write number of each type in blank)
    a. Table ____ d. Water faucet _____
    b. Concrete shelter _____ e. Fire ring_____
    c. Other shelter _____ f. Other _____

IMPACT EVALUATION ON SITE _____ ON UNUSED COMPARATIVE AREA _____

19. VEGETATION COVER: (Be sure to compare similar areas, same species, slope, rockiness, and canopy cover) Circle one	a. 0-5% b. 6-25%	c. 26-50% d. 51-75%	e. 76-100%	a. 0-5% b. 6-25%	c. 26-50% d. 51-75%	e. 76-100%
20. MINERAL SOIL EXPOSURE (Percent of area that is bare mineral soil) Circle one	a. 0-5% b. 6-25%	c.26-50% d. 51-75%	e. 76-100%	a. 0-5% b. 6-25%	c. 26-50% d. 51-75%	e. 76-100%

		RATING (Circle one category)			Calculation of impact index (do in office) *Weight x Rating = Total*
21	VEGETATION LOSS:	(no difference in coverage)	(difference one coverage class)	(difference two or more coverage classes)	x =
22	MINERAL SOIL INCREASE:	(no difference in coverage)	(difference one coverage class)	(difference two or more coverage classes)	x =
23	TREE DAMAGE: No. of trees scarred or felled____	(no more than broken lower branches	(1-8 scarred trees, or 1-3 badly scarred or felled)	(>8scarred trees or >3 badly scarred or felled)	x =
24	ROOT EXPOSURE: No. of trees with roots exposed____ % of trees with roots exposed____	(none)	(1-6 trees with roots exposed)	(>6 trees with roots exposed)	x =
25	CLEANLINESS: No. of trash ____	(no more than one or two small pieces of litter)	(more than 5 obvious pieces of litter)	(human waste, much litter)	x =
26	SOCIAL TRAILS: No. of trails____	(no more than 1 discernible trail)	(2-3 discernible, max. 1 well-worn)	(>3 discernible or more than 1 well-worn)	x =
27	SITE AREA Estimated area_____feet	(<500 ft^2)	(500-2000 ft^2)	(>2000 ft^2)	x =
28	BARREN CORE SITE AREA Estimated area _____ (ft2)	(<50ft^2)	(50-500ft^2)	(>500ft^2)	x =
29	PHOTO RECORD:_____				
30	COMMENTS: (Details about location of site, impacts, management suggestions, etc.)				

31. IMPACT INDEX _____

El Yunque National Forest Campsite/Picnic Site Rapid Monitoring Estimation Procedure Instructions
Adapted from:
Cole, David N. 1989. Wilderness Campsite Monitoring Methods: A Sourcebook. USDA Forest Service, Intermountain Research Station, GTR INT-259.

The information on the first side of the form consists of locational and environmental information. The impact data are included on the second side of the form. Information on the first side is self explanatory. Instructions for filling out the second side of the form follows.

Item 18: Using the five coverage classes on the form, estimate the percent coverage of the live understory vegetation. Do not include dead vegetation, duff, trees, tree seedlings, or shrubs taller than a person. Estimate cover for the entire site. If the site includes a picnic shelter, estimate approximately 10 feet from the edge of the shelter.

For large sites, it may help to divide the site into equal quarters; estimate the percentage cover of each quarter and take the average. It might also help to visually cluster all vegetation into one part of the site and estimate what percentage of the site would be covered. Try to select one coverage class decisively. If you cannot, circle your best estimate and note the other coverage class it might be.

Make the same estimate of vegetation cover on a nearly unused site similar-except for the impact to the site. **The idea here is to select a site that is similar to what the site probably looke3d like before it was used.** Choose a site that is similar to the campsite in terms of rockiness, slope, aspect, overstory composition and cover, and understory species composition. Protected plants around the base of trees or rocks can provide hints about species composition.

Item 19: Using the same five coverage classes, estimate the percentage of the campsite without either live vegetation or duff – the percentage of which mineral soil is exposed. In many cases, a thin layer of disturbed needles leaves, or wood chips is scattered about with mineral soil showing through. Consider these areas to be exposed soil.

Make the same estimate on the comparative area. In practice it will be easiest to estimate both vegetation cover and mineral soil exposure on the site, select the comparative area, and make the same estimates there.

Item 20: Using the information in Item 18, record the difference in vegetation cover class between campsite and comparative area. If there is no difference (for example, if both site and comparative area are “class 4, 51-75 percent”), circle rating “1”. If coverage on the campsite is one class less than on the comparative area 9for example if the site is “class 3, 26-50 percent,” and the comparative area is class “4, 51-75 percent”), circle “2”. If the difference is greater, circle “3.”

Item 21: Using the information in item 19, record the difference in mineral soil coverage class between the campsite and comparative area. In this case, ratings of “2” and “3” are given when mineral soil is one, or more than one class higher on the campsite, respectively.

Item 22: Count the total number of damaged trees on the campsite, the area visible from the campsite, and any areas where people are likely to move and impact the trees. Never count the same tree on

more than one site. Damaged trees include stumps that show cut marks, scarred trees, and trees with nails in them. Trees with lower branches cut off for firewood are not included. If no trees were damaged, rate the site "1." If one to eight trees were damaged or if one to three trees were felled or had bad scars (scars larger than 1 ft^2 (929 cm^2), rate the site "2." If more trees are damaged, badly scarred, or felled, rate the site "3."

Item 23: Count the number of trees with exposed roots on the same area as for tree damage. Exposure should be pronounced, extending at least 1 ft (0.3m) from the tree trunk. It should also be the result of trampling – not the result of a root running over a rock, for example. Assign a rating of "1" no trees with exposed roots), "2" (one to six trees), or "3" (more than six trees).

Item 24: Count the number of litter, waste, and fire scars on the site, including any firerings as fire scars. Assign the site a "1" if there is only one fire scar and essentially no evident litter, or human waste on the campsite. Assign the site a "2" if there is more than one fire scar or if litter or other waste is evident. If litter is "all over the place," or if there is any human waste, assign the site a "3."

Item 25: Social trails are the informal trails that lead from the site to water, the main trail, other sites, or satellite sites. Discernible trails are trails that you can see but that are still mostly vegetated. Well-worn trails are mostly devegetated. Count the total number of trails, regardless of whether they are discernible or well worn. Assign the site a "1" if there is only one discernible trail and no well-worn trails. Assign a "2" if there are two or three discernible trails or one well-worn trail. Assign a "3" if there are more than three discernible trails or more than one well-worn trail.

Item 26: Estimate the square footage of the disturbed site and any satellite or other used areas around the site. The disturbed area can usually be identified by either shorter or no vegetation in comparison to the periphery of the site. Where there is no vegetation naturally and no other evidence of disturbance to identify the edge of the site, place an N/A in the estimated area space and assign a rating of "1." This might also be necessary on lightly used sites were little vegetation loss is evident.

Visualize the site as a circle, a rectangle, or some combination of these geometric figures. Pace off the appropriate dimensions. Calculate area and assign a rating of "1" (<500 ft^2 [<46 m^2]), "2" (500-2,000 ft^2 [45-186 m^2]), or "3" (>2,000 ft^2 [>186 m^2]).

Item 27: Using geometric areas and pacing, estimate the area without any vegetation. Bare area might or might not be covered with duff. Areas with scattered vegetation are not counted as bare area. Lump together in one measure all bare areas on the site, including the area around the fire, as well as bare tent areas, if applicable. Also, include the bare area leading from the main trail to the site, if it exists. If the bare area extends off the site into the neighboring undisturbed areas – in other words, if the area is devoid of vegetation naturally – write N/A in the estimated area space and assign a rating of "1." If the bare area is less than 50 ft^2 (5 m^2), 50-500 ft^2 (5-46 m^2), or more than 500 ft^2 (>46 m^2), assign ratings of "1," "2," or "3," respectively.

Item 30: The impact index is either the sum of the ratings of each of these parameters or the sum of weighted ratings. Managers should identify the relative importance of impacts and weight each impact based on this importance. For example, if *cleanliness* is something managers consider to be extremely issue, they should give it a weight of"5." If *site area* is not a major concern, then it should receive a

weight of “1” or “2.” If managers do not use weights, they are implicitly stating that each of these types of impacts is of equal importance.

The weights assigned in the example site were as follows: vegetation loss “2,” mineral soil increase “3,” tree damage “2,” root exposure “3,” cleanliness “1,” social trails “2,” site area “4,” and barren core site area “2.” Individual ratings are multiplied by these weights and then these products are summed to obtain the impact index. In the example, this index could vary from “20” (least impact) to “60” most impact. In the example, the first column of values, under “calculation of impact index” is the weights; the second column consists of ratings. Other weighting values have been used to reflect different opinions about the most critical types of impact.

Appendix D. Semi-structured Interview Guide

Interview Questions:

1. Please describe programs or activities you provide for customers at the forest?
    - How long the tours are and how many sites do the tourists get to visit?

2. What are the most important features, site conditions at El Yunque National Forest for you as a tour operator?

3. On a scale from 1 to 10, how satisfied are you with the current site conditions at El Yunque National Forest?
    - Please elaborate on your response.

4. Please provide your reflections on crowding at the forest. Do you see the forest as being typically crowded or not? Do you think your costumers are experiencing crowding while on the forest?
    - What would you see as being an acceptable number of encounters while at the forest?
    - How big do you think groups should be?
    - Do you see any problems that are a result of crowding at the forest?

5. Please tell us what you perceive as being the most important problems the forest is currently facing.

6. What do you see as possible management solutions to the current situation? Do you have any suggestions/ preferences for management actions to address current problems?

7. Is there anything you would like to add?

Thank you very much for your participation in this study.