

Preliminary Evaluation of Recreational Skills and Ethics  
Training Programs Occurring on Public Lands:  
The Leave No Trace Visitor Education Program



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## **INTRODUCTION TO THE REPORT**

This report presents findings from a study undertaken to develop and pilot test a methodology for evaluating the effectiveness of the Leave No Trace (LNT) outdoor skills and ethics visitor education program in a selection of federally administered public lands. Immediately following this introduction is the Executive Summary of salient research findings and management implications. Section I contains background information and purpose of the study. Section II provides an overview of LNT promotion strategies within the three NPS Units investigated as part of this pilot study. Section III explains the two theoretical frameworks that guided selection and development of study variables. Section IV details the methods and procedures utilized, including variable development, sampling procedures, response rates, and bias checks. Section V provides descriptive results regarding variables pertinent to this evaluation. Note: these results are not presented in the same order as the questionnaire (Appendix II). Section VI explores the important relationships amongst primary study variables. Section VII presents a summary of findings across the three NPS Units, conclusions, and recommendations for the future promotion of the message. There are three appendices in this report. Appendix I contains a copy of the PowerPoint presentation intended to facilitate broad dissemination of research findings. An electronic copy of this presentation is located on a CD attached to the last sheet of this report. Appendix II contains the questionnaire and supporting material used to collect data. Appendix III provides comments offered by visitors in an anonymous format sorted by NPS Unit. Lastly, any mistakes or errors are the sole responsibility of the authors.

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## **EXECUTIVE SUMMARY**

### **Introduction**

Leave No Trace (LNT) is the most pervasive outdoor skills and ethics training program addressing human powered recreationalists in existence. As currently defined, the LNT message consists of seven principles for responsible and ethical recreation. The LNT program is particularly appealing to land managers and others charged with land management as it is a 'light-handed' approach for protecting natural resources and is considered more inline with the spirit of the Wilderness Act. LNT was formally adopted by the National Park Service (NPS) in 2001 through a Memorandum of Understanding between the NPS and Leave No Trace, Inc. Since that time, the LNT message has been promoted at varying levels and through various means across the NPS. However, empirical investigations into the effectiveness and diffusion of the program have been scant to nonexistent.

This study was undertaken to examine the degree to which the LNT message has been diffused amongst NPS backcountry visitors and the effectiveness of the LNT backcountry visitor education program within three NPS Units; Cumberland Island National Seashore (CINS) Georgia, Glacier National Park (GNP) Montana, and Olympic National Park (ONP) Washington. In addition, this study developed, tested, and validated several new measures suitable for future investigations into the abovementioned phenomenon. Thus, this study provides both a baseline of understanding and the necessary foundation for the development of a larger scale research effort to fully assess the effectiveness of the LNT message promoted on public lands. Finally, this study aims to inform management decisions regarding the future direction of the LNT program and improve existing education tools to reach a broader segment of the recreating public and enhance both enjoyment and resource protection.

Data were collected using a mail-back self-administered questionnaire following a modified Dillman (2007) procedure with multiple contacts (n=3). Overnight backcountry visitors were intercepted at ranger stations and addresses collected from those who consented to participate. In all, 1085 valid addresses were collected and each individual was mailed a survey. Seven-hundred and fifty five (755) questionnaires were returned providing a 69.6% response rate.

### **Respondent Characteristics (Demographics)**

The sample is approximately 60% male with mean ages ranging from 36.2 for GNP respondents to 41.6 for CINS respondents. Over 95% of the total sample (all NPS Units surveyed) were white and 93.5 reported earning a college degree or higher. The three parks attract local visitors as well as those who travel great distances. At CINS, 90.6% of respondents indicated a home ZIP code in the south

Census Region. 84.3% of ONP respondents and 49.1% of GNP respondents, respectively, indicated the west Census Region as their home ZIP code.

### **Trip Characteristics**

Average group size ranged from 2.8 at GNP to 3.8 at ONP to 7.4 at CINS. Greater than 87% of overnight backcountry parties at GNP and ONP were composed of family and friends compared to 75.2% at CINS. 23.6% of CINS respondents indicated being with an organized group (primarily scouting groups – authors’ observation). Reflecting the average group size, 53% of GNP and 56% of ONP respondents reported serving as the registered trip leader while only 37% of respondents from CINS indicated that they were the registered trip leader.

Foot remains the primary mode of transportation (96.4% at GNP, 98.1% at ONP, and 89.4% at CINS) however, bicycles are popular at CINS as a primary means of transportation (6.9%). Total miles traveled during the duration of respondents stay varied inversely with group size; GNP respondents reported traveling an average of 31.3 miles, ONP respondents averaged 20.6 miles and CINS respondents averaged 20 miles. GNP respondents also spent the longest period in the backcountry; 2.7 nights compared to 2.6 at ONP and 2.4 at CINS. Amongst GNP respondents, greater than 95% indicated staying in NPS designated campsites with another 7.2% using undesignated campsites at least one night during their trip. This contrasts with ONP respondents; 76.3% of whom indicated using NPS designated campsites at least one night and 35.6% who indicated staying in undesignated campsites at least one night. At CINS, 57.8% indicated they stayed at Sea Camp at least one night while less than 32% indicating staying at Stafford Beach or points further north on the island (including all campgrounds within the wilderness boundary).

Overall, respondents reported high levels of overall satisfaction with their NPS overnight camping experience. When asked to respond to the statement ‘overall, how satisfied were you with your trip to \_\_\_\_ National Park?’, 95.9% of GNP respondents, 96.4% of ONP respondents, and 95.5% of CINS respondent indicated either ‘very satisfied’ or ‘extremely satisfied.’

### **Experience Use History (EUH)**

For 75.5% of GNP respondents and 62.5% of CINS respondents this was their first trip to the respective NPS Unit. This contrasts sharply with ONP respondents as 66.3% indicating at least one previous visit before being contacted for participation in this study. ONP respondents reported having the most overnight backcountry/camping experience (average year first overnight backcountry camped = 1985; 1993 at GNP and 1991 at CINS). However, GNP respondents reported taking more backcountry trips per year than their counterparts; 2.9 contrasted to 2.7 at both ONP and CINS.

When asked to respond to the statement: ‘regarding the skills necessary for backcountry travel, I consider myself a:’ (5 point scale: 1=novice to 5=expert) 25% of CINS respondents indicated they were novices or beginners as opposed to 11% in GNP and 7% in ONP. Fifty three percent (53%) of ONP, 50% of GNP, and 40% of CINS respondents self-report as either ‘advanced’ or ‘expert.’ When treated as a continuous measure, ONP respondents self-reported the highest skill level (mean=3.59) compared to GNP (mean=3.49) and CINS (mean=3.12) which had the lowest reported mean skill level.

## **Diffusion of the Leave No Trace Message**

### ***Awareness of the LNT Message***

The LNT message, at least in name recognition, appears to be well diffused. When asked, ‘have you ever heard of Leave No Trace?’ 93.8% of GNP respondents, 97.4% of ONP respondents, and 89.4% of CINS indicated ‘yes.’ As a follow-up, respondents who answered *yes* were asked to indicate the year they first heard of LNT. ONP respondents, consistent with their longer experience-use history with backpacking, indicated having heard of the LNT in 1992.5 (mean year) while GNP and CINS respondents both indicated 1995.

### ***Sources of the LNT Message***

Respondents were asked to select, from amongst 9 categories, both their initial and primary sources for LNT information. For the first question, family and friends were the most popular initial source of LNT information. Twenty nine percent (29.2%) of GNP respondents, 28.1% of ONP respondents, and 24.4% of CINS respondents indicated family and friends as their initial source of LNT information. However, when asked what has been their primary source of LNT information, 41.6% of GNP respondents, 34.6% of ONP respondents, and 29.4% of CINS respondents indicated that NPS outreach strategies used to disseminate the LNT message (park personnel/talks and kiosks/literature) were their primary source of LNT information. Family and friends were also an important primary source of LNT information as indicated by 18.6% of GNP respondents, 26.4% of ONP respondents, and 18.7% of CINS respondents.

### ***NPS-LNT Diffusion Sources***

Respondents were also asked about their use of several NPS communication outreach strategies. Respondents indicated (yes or no) if they had: spoken with a ranger regarding LNT; watched a video regarding LNT; reviewed any printed NPS park material regarding LNT; or reviewed the webpage of the NPS Unit they planned to visit to learn about LNT. If they answered yes, they were asked to indicate, via a 7-point scale ranging from 0=nothing to 6=an extensive amount, how much they learned about LNT

from the experience. In GNP, the most popular source of LNT information was the backcountry video (86% of respondents indicated they watched the video), followed by a ranger (76.6% reported speaking with a ranger regarding LNT), printed material (72% reported reviewing printed material related to LNT), and finally the GNP website (41.4% reported visiting the GNP website to learn more about LNT). Visitor comments solicited on the final page of the questionnaire supported this point. A 35-year-old female from GNP remarked:

*Park ranger discussion when getting our permits was very informative. Ranger was very knowledgeable and helpful. That was incredibly helpful information when preparing for our trip.*

In GNP, respondents indicated that they learned the most about LNT from the video (M=3.86), followed by printed material (M=3.59), the GNP website (M=3.54), and finally speaking with a ranger (M=3.31).

In ONP, the most popular source of LNT information was printed material (54.4% of respondents reported reviewing printed park media), followed by speaking with rangers (52.8%), and finally visiting the ONP website (20%). ONP does not use a video to disseminate LNT/backcountry camping information. In ONP, respondents indicated that they learned the most about LNT from the ONP website (M=3.33), followed by printed material (M=2.93), and then speaking with rangers (M=2.84). A 28-year-old female commented that:

*We were impressed by the organization of ONP. Before each of our overnight hikes, we spoke to rangers who emphasized Leave No Trace. At the Heart Lake Campsite on the High Divide Trail we were visited by a ranger at dinnertime. ONP is the best-organized national park I've ever visited.*

In CINS, the most popular source of LNT information was printed park literature (62%), speaking with a ranger (45%), visiting the CINS website (41%), and finally watching a CINS video (13.7%). CINS respondents indicated that they learned the most from the video (M=3.95), followed by the CINS website (M=3.52), the printed CINS material (M=3.23), and finally speaking with a ranger (M=3.1). However, the mean score for watching a video (M=3.95) should be interpreted with caution as only n=20 individuals responded to this question.

Results indicate that respondents perceive learning moderate amounts regarding LNT information from NPS outreach efforts, irrespective of the source or NPS unit. Additionally, certain outreach strategies appeared more effective depending on the emphasis placed on a particular source by management (see Section II). For example, the source with the highest degree of 'coverage' from the three units was the informational video at GNP, with 86% of GNP respondents reporting viewing this video. The video was also considered the most effective at promoting learning of LNT information by GNP respondents (mean score=3.86). Management at GNP requires all backcountry trip leaders to attend

the video and strongly encourages attendance for all backcountry visitors. Ranger interaction with backcountry visitors is also heavily emphasized (primarily with trip planning); consequently, these two sources were highly used by GNP respondents. Ultimately, this multi-pronged approach appeared to be successful at promoting the LNT message (see Section II for review of promotion efforts in the three units and Sections V & VI for full empirical results). Additionally, based on the results, it appears that opportunities exist at the other units for improving the *diffusion* of their public outreach and LNT visitor education programs. CINS offers perhaps the best opportunity for targeted educational outreach strategies, as all overnight visitors are required to attend a trip briefing immediately after arrival on the island.

### ***Self-Reported Knowledge of LNT Practices***

A predominance of respondents from the park units assessed their knowledge of LNT principles as either ‘above average,’ ‘extensive,’ or ‘expert.’ When asked to self-report on their current knowledge of LNT Practices (7-point scale; 0=no knowledge, 1=very limited, 2=limited, 3=average, 4=above average, 5=extensive, 6=expert) 84% of GNP, 74% of ONP, and 65% of CINS respondents classified their knowledge as ‘above average’ or greater. CINS had both the widest variation in scores (standard deviation=1) and lowest overall mean score at 3.83. GNP respondents, who had the least backcountry experience and who were the youngest (average age=36.2) across the three NPS units, indicated the highest mean score on the LNT knowledge question (m=4.26). Results indicate that backcountry visitors to the three NPS units felt they had a strong working knowledge of the LNT principles.

### ***Global Perceptions of the LNT Education Program***

To address respondents global perceptions of LNT as a program, respondents were asked to respond to four items anchored from 1=strongly disagree to 7=strongly agree. Overall, respondents showed universal support for the LNT program. For instance, 91.1% of GNP respondents, 92.7% of ONP respondents, and 88.8% of CINS respondents answered either ‘6’ or ‘7’ to the item ‘it is important to use minimum-impact / LNT techniques when in the backcountry.’ Respondents similarly indicated an overall strong willingness to modify their behaviors, as 92.4% of GNP respondents, 90.3% of ONP respondents, and 89% of CINS respondents indicating that they ‘strongly agreed’ to the item ‘if I learned my actions in the backcountry damaged the environment I would change my behavior.’ Likewise, a predominance of respondents indicated that they believe the LNT practices reduced environmental harm. Eighty-nine percent (89%) of GNP respondents, 90% of ONP respondents, and 83% of CINS respondents ‘strongly disagreed’ with the statement: “Minimum-impact/LNT techniques do not reduce the environmental harm caused by backcountry travel.” Finally, when the four questions were treated as a global measure of



attitudes toward the LNT program, the mean scores across the three units were extremely positive averaging over 6.3 on a 7-point scale.

### **Why Do Some Visitors Follow the LNT Practices and Others Do Not?: Theory of Planned Behavior**

Researchers often use theory to provide a roadmap for exploring complex phenomenon. This is perhaps nowhere more important than in attempting to understand and explain the nuances of human behavior. To more completely explore the predictors of NPS backcountry visitors' behaviors, this research utilized the Theory of Planned Behavior, a widely used and robust theory for the prediction of human behavior. A review of the Theory of Planned Behavior is provided in Section III. Briefly however, the theory contends that salient attitudes toward the outcome of a behavior, the influence of peers (subjective norms), and levels of perceived behavioral control (efficacy) determine one's intention to behave in a certain way. Intention is the best predictor of actual behavior. To ascertain measures related to the constructs detailed above (attitudes regarding specific LNT practices, attitudes toward the influence of norms on these behaviors, and attitudes toward perceived behavioral control regarding specific LNT practices), backcountry visitors were asked to respond to a battery of items all scored on a 7-point scale ranging anchored with either 1=very inappropriate to 7=very appropriate (for LNT attitudes) or 1=strongly disagree to 7=strongly agree (for LNT behaviors, control, intentions, and normative influence). \*\*\*NOTE: LOWER SCORES ON '*ATTITUDES REGARDING SPECIFIC LNT PRACTICES*' AND '*SELF-REPORTED BEHAVIORS REGARDING LNT PRACTICES*' INDICATE MORE POSITIVE ATTITUDES AND THUS HIGHER LEVELS OF COMPLIANCE. For all other Theory of Planned Behavior constructs (variables), higher scores reflect stronger influence or attitudes.

#### ***Attitudes Regarding Specific LNT Practices***

Respondents' attitudes regarding the appropriateness of specific LNT practices were measured via a 23-item scale anchored from 1=very inappropriate to 7=very appropriate. Section V, Tables 20 through 25, contain a complete results of findings regarding these items. Interestingly for park managers, while the results of the global measures of attitudes toward the LNT program indicated an overwhelmingly positive attitude toward the program and its effectiveness, attitudes toward specific recommended practices varied widely. This variability in responses suggests that certain recommended practices are not currently understood and/or supported.

For example, attitudes toward LNT Principle 2 'travel and camp on durable surfaces' which measured attitudes regarding behaviors such as 'moving rocks and logs to make a camp more comfortable,' or 'walking around muddy spots on the trail' (both inappropriate) received both supportive and unsupportive responses. The first item, 'moving rocks and/or logs to make a campsite more

comfortable' is viewed by 32.6% of GNP respondents as appropriate or very appropriate, 19% had a neutral response, and 48.3% felt the behavior was inappropriate or very inappropriate. Similarly, in CINS, 59% of respondents felt it was appropriate or very appropriate to 'walk around muddy spots on the trail,' 22% were neutral, and 19% felt it was inappropriate or very inappropriate.

Respondents also appeared to be uncertain regarding the appropriateness of certain behaviors associated with LNT principle #3 'dispose of waste properly.' The items from this principle that solicited the most variability (spread in scores) pertain to treatment of used toilet paper and urinating on vegetation. More specifically, 47% of GNP respondents, 53% of ONP respondent, and 56% at CINS indicated that burying used toilet paper was appropriate to very appropriate. When queried about urinating on vegetation, 21% of GNP respondents, 26% of ONP respondents, and 52% of CINS respondents indicated this was a slightly appropriate to very appropriate behavior.

Similar results can be found involving attitudes associated with Principle #4 'minimize campfire impacts.' Attitudes towards such behaviors as 'cooking over a campfire' illustrated that 34% of GNP respondents, 33% of ONP respondents, and 47% of CINS respondents felt this was slightly to very appropriate behavior. The story is similar regarding attitudes regarding 'building a fire ring if one is not present.' Distribution of scores for this item showed that 17% of GNP respondents, 23% of ONP respondents, and 33% of CINS felt this was slightly to very appropriate behavior.

The 5<sup>th</sup> LNT principle 'leave what you find' was evaluated via the item 'keeping a single small item like a rock or feather as a souvenir.' Here too responses varied. Nineteen percent (19%) of GNP respondents, 28% of ONP respondents, and 36% of CINS respondents indicated this as slightly appropriate to very appropriate.

Overall, the results discussed above regarding attitudes towards specific backcountry behaviors indicate that visitors are somewhat unsupportive and/or confused about the appropriateness of certain specific actions deemed important by the LNT educational message for protecting natural and social resources. Consequently, in designing educational interventions, strategists *must consider specificity of the behaviors in question in the educational message.*

### ***Normative Influence Regarding Specific LNT Practices***

The influence of peers on both group decisions (group norms) and individual decision making (individual norms) were evaluated via nine statements. Regarding group norms (4-items), GNP respondents agreed most strongly with the statements: 'I insist that minimum-impact/LNT practices are followed by all members of my backcountry party' with 93% of GNP respondents, 90% of ONP respondents, and 85% of CINS respondents indicated slight to strongly agreeing with aforesaid statement. The other group norm item, 'Other members of my group believe all litter and trash should be carried

out,' found 97% of GNP respondents, 92% of ONP respondents, and 95% of CINS respondents to be in slightly to strong agreement.

The influence of peers on individual decision-making varied widely depending on the item & NPS Unit. Specifically, the item 'other members of my backcountry party would approve of me moving a few rocks or logs around to make camp more comfortable' illustrated that 42% of GNP respondents, 68% of ONP respondents, and 66% of CINS respondents were in slight to strong agreement with the statement. Similarly, the statement 'Other members of my backcountry group would find it acceptable for me to bathe in a stream or lake' received slight to strong agreement from 39% of GNP respondents, 48% of ONP respondents, and 32% of CINS respondents. These results suggest that individual normative pressure does in fact influence backcountry behaviors and such pressures need to be considered when developing and implementing LNT educational strategies.

### ***Perceived Behavioral Control Regarding Specific LNT Practices***

Perceived Behavioral Control was explored via two similar yet different constructs; firstly, the level of control respondents felt they have over their own LNT oriented behaviors (herein 'control'), and secondly, levels of difficulty respondents felt toward carrying out a variety of LNT oriented behaviors (herein 'difficulty'). Each construct was measured with five items; control items anchored via a 7-point scale ranging from 1=not at all under my control to 7=completely under my control and difficulty items anchored on 1=very difficult to 7=very easy.

Results from the series of questions investigating 'levels of control' were quite similar across parks with limited variability in responses. For example, when asked to respond to the item 'the way I act while in the backcountry of XNP is...'; 96% of GNP respondents, 98% of ONP respondents, and 96% of CINS respondents felt that their actions were largely under their control with mean scores ranging from 6.48 (GNP) to 6.59 (ONP) to 6.70 for CINS respondents. This suggests that overnight visitors perceive themselves very much 'in control' of their behaviors.

Difficulty, as explored through the lens of Perceived Behavioral Control, received slightly more variation than control. For instance, approximately 94% of all respondents felt that following recommended minimum impact/LNT camping guidelines to be relatively easy to very easy. However when asked about the ease of 'carrying used toilet paper out of the backcountry of XNP,' 69% of GNP respondents, 63% of ONP respondents, and 53% of CINS respondents believe this behavior to be relatively easy to very easy. These results indicate that visitors believe performing recommended NPS/LNT practices were not unreasonably difficult.

### ***Behavioral Intentions to Comply with LNT Practices***

Respondents were asked a series of four questions investigating their intentions to adhere to general LNT practices. Results indicated that across NPS Units, respondents were fairly unified and positive regarding their intentions to follow promoted LNT practices. When a composite measure was created (summing all items and dividing by 4) to assess overall intentions to follow LNT Practices, GNP respondents scored an average of 6.63 compared to 6.48 at ONP and 6.55 at CINS on a 7 point scale.

### ***Self-Reported Behaviors Regarding LNT Practices***

Behaviors were measured by asking backcountry visitors to self-report to a series of items exploring their actions during their recent backcountry trip. Four items utilizing a dichotomous response format (yes/no) assessed behaviors associated with LNT Principle #1 plan ahead and prepare. Twenty-nine (29) items evaluated the frequency with which individuals engaged in specific behaviors consistent with LNT Principles two through seven. These 29 items utilized a 7-point Likert-type scale with answer choices of '1=never, 2=almost never (<10%), 3=occasionally (30%), 4=sometimes (50%), 5=frequently (70%), 6=almost every time (90%), 7=every time (100%)' plus a 'not applicable' category. Broadly, results from this construct suggest that most respondents conform to promoted and recommended practices.

When investigating the behaviors associated with LNT Principle #1, 77% of GNP respondents, 75.1% of ONP respondents, and 74.7% of CINS respondents indicated they had spent time on the internet researching the trip. Similarly, 90% of GNP, 84% of ONP, and 65% of CINS respondents checked with the host NPS unit regarding backcountry regulations. Overall, results suggest that the majority of respondents spent time planning and preparing prior to their overnight camping trip.

Seven items were used to investigate the frequency of behaviors associated with LNT Principle #2, travel and camp on durable surfaces. The most problematic behaviors appeared to be 'walking around muddy spots on the trail,' 'when hiking off trail, the group hiked in a single file line' and 'moving rocks and logs around to make the camp more comfortable.' Future educational efforts, depending on context, may need to focus on these specific behaviors.

Initially 11 items were used to investigate the frequency of behaviors associated with LNT principle #3, dispose of waste properly. When looking at the individual behaviors, items pertaining to disposing of toilet paper and human feces appeared most problematic. However, it should be noted that many of the backcountry camps in the three NPS units studied have NPS provided toilet facilities/privies and a high percentage of individuals selected the NA response. Six of the items that shown a high percentage of 'not applicable responses' were dropped. This high number of 'not applicable' responses for these items suggests that, for instance, campfire bans in GNP and above certain elevations in ONP, are

effectively modifying behaviors and that campers are utilizing provided privies and outhouses. Utilizing the remaining five items, a composite measure was developed. When scores on this composite measure of waste management practices are evaluated (GNP M=2.64; ONP M=2.9; CINS M=2.71), results would suggest that respondents, on average ‘almost always to frequently’ performed appropriate LNT behaviors and ‘almost never to occasionally’ performed inappropriate LNT behaviors.

To investigate the behaviors associated with LNT principle four, minimize campfire impacts, three questions were asked. Campfires were built, on average, 50-70% of the time by CINS respondents (mean=4.46) but ‘almost never’ (mean=2.1) by GNP respondents and ‘occasionally’ (mean=3.05) by ONP respondents. These results largely reflect management policies on the ground. For example in GNP, fires are banned in many backcountry areas and throughout the park after about mid-July. In ONP however, campfires on the beach have long been part of the backcountry experience.

Two items were used to measure behaviors pertaining to LNT principle five, leave what you find. Mean scores on the composite measure (GNP M=1.4; ONP M=1.8; CINS M=2.0) reflect that a predominance of individuals from the three units reported ‘never’ or ‘almost never’ picking up a souvenir or ‘keeping something found in the backcountry.’

‘Respect for Other Visitors’, LNT Principle six, was measured by investigating self-reported behavioral compliance with the item ‘When hiking, I took breaks out of sight of the main trail’. The LNT Principles would suggest that to limit your impact on the experience of other visitors it is best to take a break just out of sight of the main trail. CINS and GNP respondents were nearly identical on scores for this item, indicating breaks were taken out of sight of the main trail ‘almost never’ (means=1.69 & 1.66, respectively). ONP visitors were slightly more compliant with taking breaks out of sight of the main trail (mean=1.81). Results reflect that approximately 80% of all respondents ‘never’ or ‘almost never’ take breaks out of sight of the main trail.

‘Respect wildlife,’ LNT principle seven, was measured with three items. The composite measure (GNP M=1.4; ONP M=1.8; CINS M=2.0) reflect that a predominance of individuals from the three units reported ‘never’ or ‘almost never’ or, conversely, ‘every time’ or ‘almost every time’ undertook the appropriate LNT behaviors related to wildlife interaction. Ninety five percent of respondents self-reported that they ‘never’ or ‘almost never’ fed wildlife food scraps. Similarly, 75% of GNP respondents, 65% of ONP, and 50% of CINS respondents reported that they ‘never’ or ‘almost never’ approached wildlife to get a good view and/or take a picture. Finally, approximately 83% of all respondents indicated that ‘before setting up camp, I placed food in agency provided containers or hung in the air,’ ‘every time’ or ‘almost every time.’

Broadly, results from this construct suggest that most respondents conform to promoted and recommended practices. The reader of this report is encouraged to specifically examine Tables 38

through 50 which report behaviors of respondents in the three units at both a frequency (%) and descriptive (means, standard deviations, and ranges) format.

### **Bivariate Relationships amongst Primary Variables**

Correlations were examined between the primary study variables and composite measures of LNT Attitudes and LNT Behaviors. For a full discussion of development/treatment of these variables, see Sections V & VI. Note, lower scores on LNT Attitudes and LNT Behaviors indicate higher levels of compliance with recommended practices. For example, a negative correlation between LNT Attitude and age would be interpreted as age increases (individual gets older), LNT Attitude goes down (gets stronger as interpreted through the 'lower score'). Section VI contains additional information regarding interpreting statistical correlations.

Perhaps the most salient finding to emerge from these bivariate analyses was the statistically significant and positive correlation found to exist between LNT Attitudes and LNT Behaviors. For NPS Program Managers and others charged with promotion of the LNT Message, this finding suggests that modifying behaviors as they relate to LNT Practices requires the explicit targeting of Attitudes (as they relate to LNT Practices) through education and outreach.

Other statistically significant correlations amongst primary study variables include the following. Among GNP respondents, age was found to be significantly correlated with both stronger LNT Attitudes and LNT Behaviors. This finding suggests that, at least at GNP, younger overnight backcountry visitors are less likely to hold positive LNT attitudes and are less compliant with recommended LNT Practices. Also of note is the statistically significant positive relationship between individual norms and the composite measures LNT Attitudes and LNT Behaviors. This significant relationship exists with both GNP and ONP respondents (with both attitudes and behaviors) and LNT Attitude amongst CINS respondents. This correlation suggests that as normative pressure to comply with recommended LNT Practices increases, both LNT Attitudes and LNT Behaviors improve in a desired direction. Similarly, a statistically significant positive relationship exists between respondents' belief regarding the ease of performing a behavior (Perceived Behavioral Control – Difficulty) and improvements in both LNT Attitudes and LNT Behaviors. This finding was true with both GNP and ONP respondents for both variables LNT Attitude and LNT Behavior and for CINS respondents on the variable LNT Attitude. Finally, there was a statistically significant positive relationship between Behavioral Intentions to comply with LNT practices and both LNT Attitudes and LNT Behaviors across all three NPS Units. The lone exception was between CINS LNT Behavior – Behavioral Intention variables, which can likely be accounted for by small sample size.

## **Noteworthy Findings and Management Implications**

### ***Demographic & Trip Characteristics***

- Younger overnight visitors are less likely to comply with LNT behaviors than older visitors (Table 53).
- At least at GNP and ONP, individuals in larger groups are less likely to hold appropriate LNT attitudes than those in smaller groups (Table 53).

### ***Experience Use History***

- Higher level of backcountry experience (years experience) or self-reported skill level regarding backcountry travel (5-points scale) does not necessarily correlate with either stronger LNT attitudes or LNT behaviors that are consistent with recommended LNT Principles. It is likely that more experienced users feel they ‘know what they need to know’ regarding LNT and thus are less likely to pursue or be open to additional LNT/NPS education efforts (see Table 53).

### ***Diffusion of LNT & Global Attitudes Regarding the LNT Programs’ Effectiveness***

- Respondents had overwhelmingly positive global attitudes regarding the efficacy of the LNT visitor education program and receiving advice and direction for NPS personnel. This suggests they feel the program is worthwhile, is working, and they are open to changing behaviors if their behaviors were found to damage the environment (see Table 18).
- The more positive an individual’s general attitudes toward the efficacy of LNT as a program (global attitudes), the more positive their attitudes and behaviors are toward specific recommended LNT practices (Table 53).
- NPS outreach strategies used to disseminate the LNT message (park personnel/talks and kiosks/literature) were the most important primary source of LNT information (Table 15). Family and friends were also an important primary source of LNT information (Table 14).
- One-time educational strategies addressing LNT practices like face-to-face conversations with a ranger, watching a video, reviewing literature, and visiting the host NPS Unit’s webpage had small to nonexistent correlations with LNT Attitudes and LNT Behaviors (Table 53). This by no means suggests that parks should abandon these efforts. What it does suggest is that there is likely room for improvement in such educational strategies (i.e. targeting attitudes toward specific

behaviors, normative attitudes, and perceived behavioral control-difficulty of performing a behavior). Educational strategists in the NPS charged with diffusing the LNT principles in the hopes of changing behavior would be wise to focus on the ‘why’ of LNT. In short, target not just knowledge but emotions/attitudes. Visitor comments support this notion. Consider the comments of a 41-year-old male GNP respondent:

*Include more information on why the LNT practices are advocated. I think I speak for most (people) when I say I like to know why I am being asked to do something. We burned our combustible trash in campfires even though we were asked not to because we did not know, and still don't, why this practice is frowned on.*

This sentiment was echoed by a 60-year-old male from ONP who stated:

*I'd like to see stepped up education/promotion of LNT. If the rationale for various LNT guidelines are given e.g. packing out used toilet paper – then others might be more likely to adhere to those practices.*

Even ‘front country’ campers at CINS, staying at Sea Camp commented about wanting more information and the ‘why’ behind the information. Consider the comments from a 57-year-old female who stated:

*We camped at Sea Camp the entire time. The orientation session for campers needs to be much more thorough about LNT behaviors, including the reasons for LNT.*

- NPS Management can greatly influence the diffusion of the LNT message. When visitors are required to watch a video or have an informational talk with NPS personnel, results show both wide ‘coverage’ (contact with a high percentage of individuals) and moderate effectiveness in inspiring learning regarding LNT principles (Table 16). A 62-year-old male visiting GNP stated:

*As a British visitor to Glacier NP, I was very impressed by the advice and information available from rangers. It was clear and accurate, encouraged hikers to act responsibly and to be alert to risks of all kinds. They facilitated access to marvelous places while adhering to LNT practices.*

Visitor comments appear to be in support of this notion of openness to information and a desire for the park service to provide such information (note the call for specificity in targeted messages). A 57-year-old female respondent from ONP commented:

*I believe that groups (campers) should be required to attend a short video regarding accepted practices in the area they are camping as minimum impact is different in*



*different areas and some practices are acceptable in some areas and not in others. Even though I consider myself an "expert" some practices surprise me i.e. urinating in rivers while boating in the S.W. and my friends consider themselves low impact campers and still urinate in the meadow at night even though the deer tore up the area every time they did and I informed them they weren't to do so.*

- As self-reported knowledge in LNT increases, LNT attitudes and LNT behaviors become more positive and more compliant with recommended LNT practices (Table 53).

### ***Theory of Planned Behavior***

- Attitudes toward the specific recommended LNT behaviors varied (Tables 20-25). These results suggest that educational efforts need to target not only the seven general principles but more importantly the specific behaviors that underpin each principle. This research strongly suggests that the educational messages must target each specific behavior in order to inform NPS visitors regarding specific appropriate LNT behaviors and ultimately influence behaviors.
- As attitudes strengthen (increase in a positive direction) regarding the appropriateness of various backcountry behaviors, actual behaviors become more aligned with recommended LNT practices (Table 53). Therefore, educational efforts that target overnight visitor's salient attitudes (i.e. targeting attitudes toward specific behaviors, normative attitudes, and perceived behavioral control-difficulty of performing a behavior) regarding recommended LNT practices will likely result in behavior changes in the desired direction.
- Positive normative pressure regarding a behavior applied at the individual level influences both attitudes and behaviors to become more aligned with recommended practices. Thus, NPS managers should consider targeting trip leaders or those on the trip with the most experience with strategic educational messages as their opinions and actions appear to influence other member's behaviors (Table 53).
- The easier the individual perceives the behavior in question, the more likely they are to be compliant with a recommended LNT practice. NPS management should attempt to remove *perceived* barriers to performing appropriate actions and emphasize the ease in which LNT behaviors can be followed (Table 53).
- Intention to follow LNT practices is significantly correlated with both positive attitudes and behaviors regarding recommended LNT principles (Table 53).

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## SECTION I – BACKGROUND

### Visitor Management

Today's park and protected area land managers face a plethora of difficult and diverse challenges. In particular, the National Park Service (NPS), which is mandated to balance long-term protection of valuable cultural and natural resources while also providing for visitor enjoyment, is faced with incompatible adjacent land use, invasive species, climate change, and improper human behavior, amongst many other challenges.

One obstacle to sustaining the long-term ecological viability of parks and protected areas involves effective management of the human behaviors. Visitors to a park or protected area operate in a state of continual interaction with the environment that surrounds them. This interaction can sustain, degrade, or have no impact on the natural and social environment. Examples of such interactions and behaviors include human/wildlife interaction, visitor-to-visitor interaction, off-trail hiking, and camping practices. Behaviors that sustain or have zero impact on the environment are of little concern to managers. Conversely, behaviors that negatively affect the natural and/or social environment are of great concern (Ham & Krumpel, 1996). This problem of managing visitor behaviors is difficult as predicting visitor behaviors is complex and recent empirical investigations indicate that even nominal use in certain environments can accentuate resource degradation (Leung & Marion, 2000) and cumulative impacts can be substantial (Hammit & Cole, 1998).

### Visitor Education and the Promotion of Resource Protection

Visitor education is frequently part of a multi-pronged strategy of resource protection within the national parks, forests and wilderness areas (Hendee & Dawson, 2002; Roggenbuck, 1992). Education provides a mechanism for assisting the park or protected area in promoting conservation/stewardship behaviors (Kohl, 2005) by raising awareness (Ballantyne & Uzzell, 1999), mitigating negative behaviors (Kimmel, 1999), enhancing the visitor experience, and raising support for larger conservation efforts (Ham & Krumpel, 1996).

However, the task of effectively educating the recreating public regarding appropriate behaviors can be a difficult for park and land managers. Challenges include non-captive audiences, limited contact time between park personnel and the public, amongst others (Orams, 1997). To assist in overcoming the abovementioned challenges a variety of education initiatives have been undertaken, including campaigns such as *Woodsy Owl's Give a Hoot, Don't Pollute*, *Smokey Bear's 'Only You Can Prevent Forest Fires,'* and the *Leave No Trace Environmental Education and Ethics Program*.



## Leave No Trace

Leave No Trace (LNT) is an educational initiative/tool designed to promote minimum-impact camping ethics and practices to the recreating public. The LNT message acknowledges that effective educational efforts need to address both ecological and sociological environments and that human's play an integral role in preserving and protecting the resource. The initiative is built upon sound scientific research that presents a broad conceptual framework suitable for application in a multitude of environmental settings (Monz, 1994). LNT is particularly appealing to federal land managers as it provides a light-handed approach of modifying visitor behavior regarding stewardship of the resource in a positive way as opposed to using more heavy-handed approaches such as regulations and fines.

The LNT program can be traced back to the 1960s when various land management agencies began to encourage 'pack it in – pack it out' messages to users (Monz, 1994). This fledgling effort was based in part on the success of the anti-forest fire campaign (Smokey the Bear) and was aimed to reduce littering in wildlands. By the mid-70s the 'pack it in – pack it out' message had evolved to what are now considered early 'minimum impact camping' messages (Daniels & Marion, 2005). However, by the 1980s it was becoming evident that a more comprehensive program was needed to address ecological and social impacts from recreationalists upon the nation's wildlands.

To meet the growing need for a more comprehensive educational program to promote minimum-impact guidelines, the US Forest Service teamed with the National Outdoor Leadership School (NOLS) and began to develop what are now known as the seven LNT Principles (Daniels & Marion, 2005). Through this partnership with NOLS, LNT continued to expand throughout the 1990s (Marion & Reid, 2001). The growing LNT message was incorporated in 1994 as a 501-c-3 nonprofit organization and named 'The Leave No Trace Center for Outdoor Ethics' (The Center) The mission statement of The Center states it is 'dedicated to the responsible enjoyment and active stewardship of the outdoors by all people, worldwide' ([www.Int.org](http://www.Int.org)). On January 3<sup>rd</sup> 2001, The Center signed a memorandum of understanding with the US Department of Agriculture Forest Service and Department of the Interior, Bureau of Land Management, Fish & Wildlife Service, and National Park Service to promote the LNT message on federal lands. Currently, the LNT message consists of the seven principles depicted below.

Figure 1  
Seven Leave-No-Trace Principles

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- 1) Plan ahead and prepare
  - 2) Travel and camp on durable surfaces
  - 3) Dispose of waste properly
  - 4) Minimize campfire impacts
  - 5) Leave what you find
  - 6) Be considerate of other visitors
  - 7) Respect wildlife
- 
-

## **Purpose of the Study**

This study was undertaken to examine the diffusion and effectiveness of the Leave No Trace (LNT) backcountry visitor education program within three National Park Service (NPS) Units; Cumberland Island National Seashore (CINS), Glacier National Park (GNP), and Olympic National Park (ONP). In addition, this study developed and tested several new measures suitable for investigations into the abovementioned phenomenon. Thus, this study provides both a baseline of understanding and the necessary foundation for the development of a larger scale research effort to fully assess the effectiveness of the LNT message promoted on public lands. Finally, this study aims to inform management decisions regarding the future direction of the LNT program and improve existing education tools to reach a broader segment of the recreating public and enhance both enjoyment and resource protection.

## **Unit Selection Criteria and Study Locations**

The three NPS units selected for inclusion in this research; Glacier National Park (GNP), Olympic National Park (ONP) and Cumberland Island National Seashore (CINS) were selected based upon the following criteria:

1. Large backcountry/wilderness areas conducive to overnight and multi-night trips by backcountry travelers.
2. Selected units needed to have a backcountry permit office with a mandatory reservation system for all backcountry users. In order for the researchers to intercept and obtain a large, representative sample of overnight backcountry travelers, the units selected needed to issue backcountry permits from a limited number of sites (to facilitate the potential for a high number of intercepts without 'missing' certain types of visitors). For instance, at Glacier National Park backcountry visitors can only obtain backcountry permits at one of five stations with 60+ percent utilizing Apgar Backcountry Visitor Center. Conversely, at Great Smoky Mountains National Park backcountry travelers can obtain a permit via a self-service information kiosk at any number of trailheads. Thus, the parks selected all had a limited number of permit issuing sites.
3. Support/cooperation of NPS staff/personnel within each unit to providing access to individuals and groups requesting and/or obtaining permits for overnight backcountry travel within the park.
4. Willingness to support the research team as a recognized part of the backcountry/ranger station staff during data collection. This facilitated buy-in with potential participants and reduced instances of outright refusal by potential respondents to provide contact information.

## SECTION II – LNT PROMOTION STRATEGIES OF THE THREE NPS UNITS INVESTIGATED

### Glacier National Park

#### *Overview of the Unit*

Located in the northwestern corner of Montana and straddling the continental divide, Glacier National Park (GNP) encompasses one million acres of vast forests, lakes, and mountain peaks. Annually, the park receives some 25,000 backcountry overnight visitor stays, primarily concentrated in the months of July and August. There are five backcountry permit issuing stations within the park; however, the Apgar Backcountry Permit Center on the western gate receives approximately 60-65% of the total backcountry volume (Figure 2).

Figure 2  
GNP Apgar Backcountry Permit Center



#### *Backcountry Reservation System*

Backcountry permits are required for all overnight camping within the confines of the park. The park issues two different types of backcountry permits depending on season: Winter Permits (November 20 – April 30) and Summer Permits (May 1 – November 19). Winter permits can be requested up to 7 days in advance or in person at the Apgar Backcountry Ranger Station. Summer permits are issued via both walk-in and the advanced reservation system. Advanced reservations are only accepted for trips between June 15 through October 31 and with reservations accepted starting April 1<sup>st</sup> of that year. Figure 3 displays the backcountry permit reservation form for the GNP.

Figure 3

GNP backcountry permit reservation form

Permit # Office Use Only	Last Name Office Use Only	Date Processed and Ranger's Initials Office Use Only	
<b>Trip Leader Information</b> (please print)			
Name _____	<b>Trip 1 - First Choice</b>	<b>Trip 2 - First Choice</b>	If we can't come close to what you have requested, will you accept a completely different itinerary for the dates you have listed. This itinerary might be shorter (in days or miles), it might be in a different area of the park than you requested, and could significantly effect transportation logistics.  Trip 1 - <input type="checkbox"/> Yes <input type="checkbox"/> No Trip 2 - <input type="checkbox"/> Yes <input type="checkbox"/> No
Address _____	Day Date Code Campground	Day Date Code Campground	
_____	Example 8/16 CRA Cracker lake	Example 8/16 CRA Cracker lake	
City _____	Night 1 _____	Night 1 _____	
State and Zip _____	Night 2 _____	Night 2 _____	
Daytime Phone # _____	Night 3 _____	Night 3 _____	
Evening Phone # _____	Night 4 _____	Night 4 _____	
_____	Night 5 _____	Night 5 _____	
_____	Night 6 _____	Night 6 _____	
_____	Night 7 _____	Night 7 _____	
email address (make legible) _____	<b>Trip 1 - Second Choice</b>	<b>Trip 2 - Second Choice</b>	Comments...for example: max. number of miles per day, max elevation gain per day, etc... _____ _____ _____ _____ _____
Method of Payment (\$30.00 U.S. Funds)	Day Date Code Campground	Day Date Code Campground	
<input type="checkbox"/> Check <input type="checkbox"/> Mastercard	Example 8/16 CRA Cracker lake	Example 8/16 CRA Cracker lake	
<input type="checkbox"/> Money Order <input type="checkbox"/> Discover	Night 1 _____	Night 1 _____	
<input type="checkbox"/> Visa <input type="checkbox"/> American Express	Night 2 _____	Night 2 _____	
Credit Card Number (include spaces) _____	Night 3 _____	Night 3 _____	
_____	Night 4 _____	Night 4 _____	
Expiration Date _____	Night 5 _____	Night 5 _____	
Name on Card (please print) _____	Night 6 _____	Night 6 _____	
Signature of Cardholder _____	Night 7 _____	Night 7 _____	
_____	<b>Trip 1 - Other Options</b>	<b>Trip 2 - Other Options</b>	
Number of Campers _____	Will you accept different start/end dates?	Will you accept different start/end dates?	
Number of Stock _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Number of Watercraft _____	• Earliest Date You Can Start _____	• Earliest Date You Can Start _____	
FAX 406-888-5819	• Last Night You Can Stay _____	• Last Night You Can Stay _____	
	• Will you accept minor changes on your first or second choice itinerary... <input type="checkbox"/> Yes <input type="checkbox"/> No	• Will you accept minor changes on your first or second choice itinerary... <input type="checkbox"/> Yes <input type="checkbox"/> No	
	for example: different campgrounds, reverse route, shorter trip, etc...	for example: different campgrounds, reverse route, shorter trip, etc...	

**Do not submit duplicate applications**

<http://www.nps.gov/gnac/planyourvisit/backcountry.htm> - 7

Reservations are logged into a data file manager (Figure 4) that allows NPS backcountry staff within the various backcountry ranger stations to immediately view the availability of various campgrounds (see Figure 5).

Figure 4

GNP screen shot of backcountry reservation program



Logging reservations into this system allow for instant updates and tracking of campground status as well as multi-day outlook (five-day outlook seen here in Figure 5).

Figure 5  
 GNP backcountry campground status report (July 11, 2008)  
**Glacier National Park Backcountry Campground Status for July 11 at 8:30am**  
 Updated April 15 thru October 31

CAMPGROUND NAME	11	12	13	14	15	16	CAMPGROUND NAME	11	12	13	14	15	16
ADAR	3	4	4	3	4	4	LK ELLEN WILSON @*	3	2	4	2	3	2
AKOKALA LAKE *	3	3	3	3	3	3	LOGGING LAKE, FT	3	2	3	3	3	3
ARROW LAKE *	■	2	2	1	1	2	LOWER NYACK	3	3	3	3	3	2
ATLANTIC CREEK	2	3	4	2	2	2	LOWER QUARTZ LAKE	4	4	4	4	4	3
BEAVER WOMAN LAKE *	2	2	2	2	2	2	MANY GLACIER @*	■	2	3	1	2	1
BOULDER PASS *#	1	■	■	1	1	1	MCDONALD LAKE	■	■	■	■	■	■
BOWMAN LAKE, HD	■	3	4	2	4	3	MOKOWANIS JUNCTION *	4	4	3	4	3	2
BROWN PASS *	2	3	2	2	1	1	MOKOWANIS LAKE *	2	■	1	2	■	1
CAMAS LAKE *	■	■	■	■	■	■	MORNING STAR *	■	■	■	■	■	■
COAL CREEK	■	■	■	■	■	■	NO NAME LK @*	1	2	2	■	■	■
COBALT LAKE @*	1	2	2	2	2	2	OLDMAN LAKE @*	■	■	■	■	■	■
COSLEY LAKE *	■	2	3	■	1	2	OLE CREEK	3	3	3	3	3	3
CRACKER LAKE *	■	■	■	■	■	■	OLE LAKE	2	2	2	2	2	2
ELIZABETH LAKE, FT *@	■	■	1	2	3	2	OTOKOMI LAKE *	■	3	3	3	3	3
ELIZABETH LAKE, HD !	1	■	1	2	2	2	PARK CREEK	3	3	3	3	1	3
FIFTY MOUNTAIN *	1	5	4	4	3	3	POJA LAKE *	3	3	3	2	3	2
FLATTOP *	3	■	3	3	2	2	QUARTZ LAKE, FT *	■	3	3	3	3	3
GABLE CREEK	1	3	2	2	1	2	RED EAGLE, FT *	■	■	■	■	■	■
GLENNS LAKE, FT *	4	4	2	3	3	2	RED EAGLE, HD *	■	■	■	■	■	■
GLENNS LAKE, HD	1	■	1	1	1	1	REYNOLDS CREEK !	2	2	2	2	2	1
GOAT HAUNT SHELTERS @	4	4	4	2	3	4	ROUND PRAIRE (FOOT) !	3	3	3	2	3	3
GRACE LAKE	1	3	2	3	3	3	ROUND PRAIRE (RIVER) !	2	2	2	2	2	2
GRANITE PARK @!*	4	1	3	4	1	1	SLIDE LAKE	3	3	2	3	1	2
GUNSIGHT LAKE *	■	■	■	3	2	3	SNYDER LAKE *	1	1	2	2	3	2
HARRISON LAKE	3	3	3	3	3	3	SPERRY *@	3	4	2	4	4	3

**Promotion of the LNT Message**

Promotion of the LNT message in GNP is inextricably linked to educating visitors regarding bear camping procedures and proper trip preparation into the mountainous environment of the park. The park has a document, the “Backcountry Guide,” available to download from the GNP webpage (Figure 6). This highly informative eight-page document details the permit process, backcountry practices with a particular focus on bear camping procedures, hazards, campground information, route planning, amongst other pertinent details.

Figure 6  
GNP Backcountry Guide - 2008



Upon entry into the Apgar Backcountry Permit Station (the primary intercept point during data collection in GNP), individuals are greeted by ranger staff (Figure 7).

Figure 7  
GNP Apgar backcountry ranger staff



Based on observations, an initial assessment was conducted by GNP staff regarding the individual/group's preparedness and trip planning. Depending on the outcome of this assessment groups are either immediately issued their backcountry permit or assistance is provided in trip/route planning for the less prepared. Trip planning is facilitated by a large message board (Figure 8) that displays the status of each backcountry campground and large topographic maps of the park (Figure 9).

Figure 8  
GNP backcountry campground status board

CODE	CAMPGROUND	STATUS	CODE	CAMPGROUND	STATUS	CODE	CAMPGROUND	STATUS
ADA	Adair	OPEN*	GOA	Goat Haunt Shelters	OPEN*	OLD	Oldman Lake	CLOSED
AKO	Akokala Lake	OPEN*	GRA	Grace Lake	OPEN*	OLC	Ole Creek	OPEN*
ARR	Arrow Lake	OPEN*	GRN	Granite Park	OPEN*	OLL	Ole Lake	OPEN*
ATL	Atlantic Creek	OPEN*	GUN	Gunsight Lake	OPEN*	OTO	Otokomi Lake	OPEN*
BEA	Beaver Woman Lake	OPEN*	HAR	Harrison Lake	OPEN*	PAR	Park Creek	OPEN*
BOU	Boulder Pass	WINTER	HAW	Hawksbill	OPEN*	POI	Poia Lake	OPEN*
BOW	Bowman Lake HD	OPEN*	HEL	Helen Lake	OPEN*	QUA	Quartz Lake	OPEN*
BRO	Brown Pass	OPEN*	HOL	Hole in the Wall	N / AVAIL	REF	Red Eagle Lake FT	CLOSED
CAM	Camas Lake	N / AVAIL	ISA	Lake Isabel	OPEN*	REH	Red Eagle Lake HD	CLOSED
COA	Coal Creek	OPEN*	JAN	Lake Janet	OPEN*	REY	Reynolds Creek	OPEN*
COB	Cobalt Lake	OPEN*	KIN	Kintla Lake HD	OPEN*	ROU	Round Prairie	OPEN*
COS	Cosley Lake	OPEN*	KOO	Kootenai Lake	OPEN*	SLI	Slide Lake	OPEN*
CRA	Cracker Lake	CLOSED	LIN	Lincoln Lake	OPEN*	SNY	Snyder Lake	OPEN*
ELF	Elizabeth Lake FT	OPEN*	LNJ	Lower Nyack	OPEN*	SPE	Sperry	OPEN*
ELH	Elizabeth Lake HD	OPEN*	LOF	Logging Lake FT	OPEN*	STO	Stoney Indian Lake	OPEN*
ELL	Lake Ellen Wilson	OPEN*	LQU	Lower Quartz Lake	OPEN*	TMC	Two Medicine CG	OPEN*
FIF	Fifty Mountain	OPEN*	MAN	Many Glacier CG	OPEN*	UPK	Upper Kintla Lake	OPEN*
FLA	Flattop	OPEN*	MCD	McDonald Lake	CLOSED	UPN	Upper Nyack	OPEN*
FRA	Lake Francis	OPEN*	MOJ	Mokowanis Junction	OPEN*	UPP	Upper Park Creek	OPEN*
GAB	Gable Creek	OPEN*	MOL	Mokowanis Lake	OPEN*	UPT	Upper Two Med Lake	OPEN*
GLF	Glenns Lake FT	OPEN*	MOR	Morning Star Lake	CLOSED	WAT	Waterton River	OPEN*
GLH	Glenns Lake HD	OPEN*	NON	No Name Lake	OPEN*			

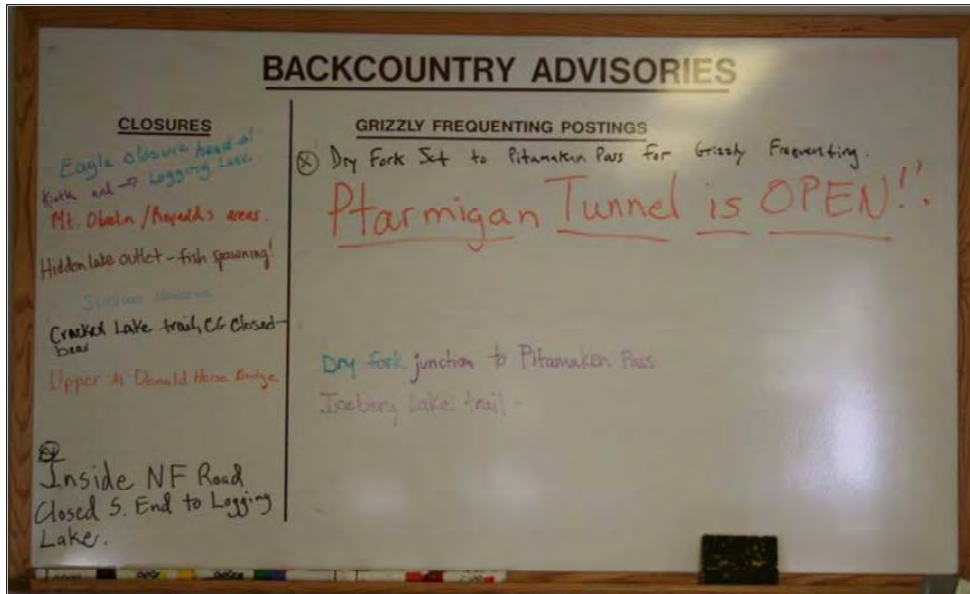
**CAMPGROUND STATUS DEFINITIONS:**  
**WINTER** - Campground is 100% snow covered, requiring winter camping skills and equipment. Pit toilet is serviceable. Special precautions are required for proper food and garbage storage. Use is limited to one party and a maximum of 6 persons per night.  
**NOT AVAILABLE** - Campground is temporarily not available for overnight camping due to sensitive environmental conditions.  
**OPEN** - Campground is open for use. The snowpack has melted out and all facilities are serviceable. \*Use is contingent on campsite availability.  
**CLOSED** - Campground is closed to all use and entry due to hazardous or emergency conditions.

Figure 9  
GNP USGS maps



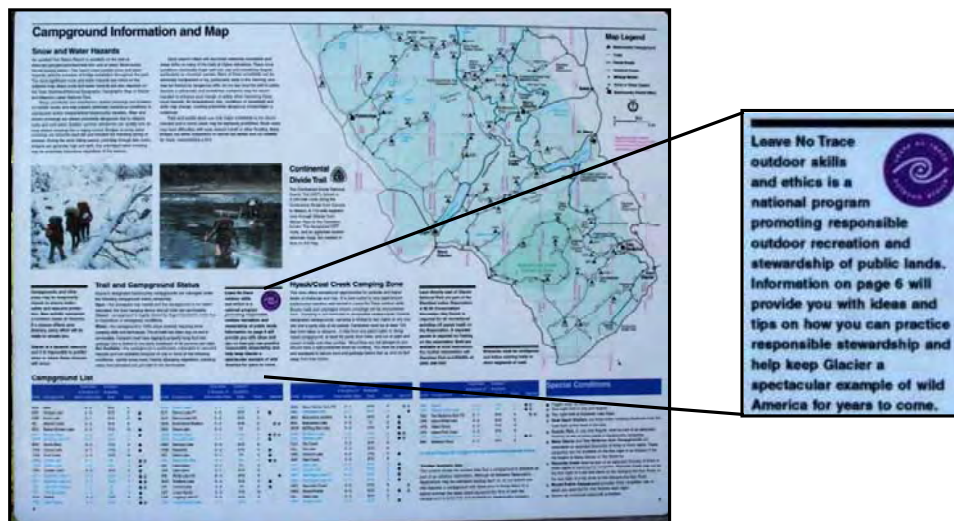
Additionally, an advisory message board provides current information regarding the GNP backcountry, which also aids visitors with preparation and planning (Figure 10).

Figure 10  
GNP backcountry advisory board



Perhaps the most routinely used tool of the Apgar staff is the Backcountry Campground and Trip Planning Map presented below in Figure 11. This map illustrates all campgrounds as well as distances (in miles and hours) between major points. The map also references the corresponding USGS quadrangle maps for the park.

Figure 11  
GNP backcountry campground and trip planning map



All trip leaders are required to view a 14-minute video regarding backcountry travel at least once a year and staff encourage all backcountry visitors to watch this video. The video content does not focus



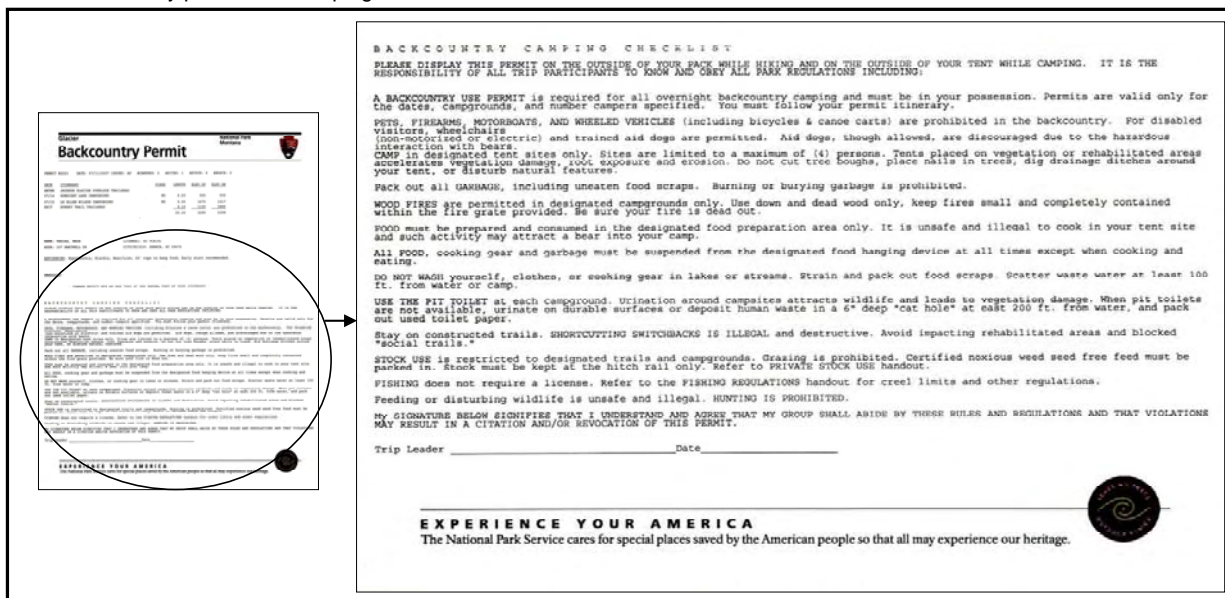
exclusively on LNT, but rather it focuses on camping in bear country and the practices necessary to make the experience as safe and enjoyable as possible. The video is also accessible online so that it can be watched remotely before arrival at the park. The video is shown in a dedicated room adjacent to the main trip planning room (Figure 12).

Figure 12  
GNP backcountry video room



After viewing the video and just before receiving the permit, a ranger then addresses the entire group to answer any questions and review the rules and regulations (many oriented around LNT practices) regarding backcountry camping. These one-on-one discussions last from several minutes to upwards of 15. Based on researcher observation, the average party spends approximately 30 minutes in the Apgar BC Permit Center planning, permitting, viewing videos, and reviewing information and regulations. Finally, on the backcountry permit, each backcountry party receives a 'backcountry camping checklist' that lists all recommended and mandatory backcountry practices (see Figure 13).

Figure 13  
GNP backcountry permit and camping checklist



To summarize, GNP utilizes the following tools for promoting the LNT message: the GNP website, a required video, formal and informal ranger-led education, and a range of visual aids and printed material including the Backcountry Guide, a downloadable document detailing pertinent information to assist visitors with securing the necessary permits and trip preparation.

## **Olympic National Park**

### ***Overview of the Unit***

Olympic National Park (ONP) is located on the Olympic Peninsula in the northwest corner of Washington State. The park is a geographic medley of rugged coastline, temperate rainforest, and high alpine peaks and meadows. Covering nearly 1,000,000 acres, approximately 95% of the park is designated as wilderness. In 2006, the NPS statistics use office recorded approximately 40,000 overnight backcountry visitor nights.

### ***Backcountry Reservation System***

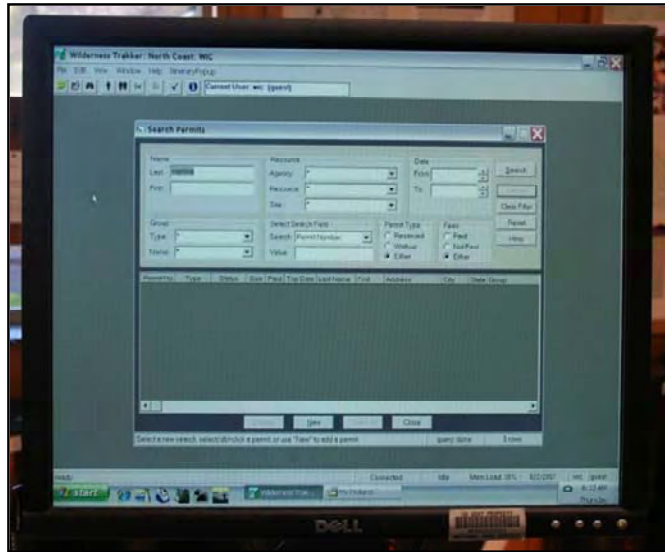
Wilderness Camping Permits (WCP) are necessary for overnight travel into the backcountry at ONP. Permits are available at the Wilderness Information Center (WIC) in Port Angeles (Figure 14), at the various ranger stations across the park, and at self-registration information kiosks at various trailheads. WCP must be reserved ahead of time for certain areas of the park during peak season.

Figure 14  
ONP Wilderness Information Center (WIC)



ONP uses a similar system to GNP for logging permits and tracking use (see Figure 15). This system logs names, permit number, group type and other pertinent information to allow managers to track users.

Figure 15  
ONP screen shot of backcountry reservation system



### ***Promotion of the LNT Message***

Anecdotally, ONP has the reputation of being one of the most active NPS units in promoting the LNT message amongst its backcountry travelers. ONP has developed an extensive website for promoting the LNT message and a recent paper by Griffin (2004) noted that ONP references LNT extensively on all backcountry website pages.

The majority of backcountry travelers in ONP come through the Wilderness Information Center (WIC) in Port Angeles, Washington (personnel communication with ONP backcountry staff). The WIC is located just behind the main visitor's center in a large trailer. Upon entry into the trailer, visitors are greeted by NPS staff behind a circular desk in the middle of the room. Trip itineraries are reviewed and basic recommendations are suggested. As oppose to GNP, ONP does not go to the great length to assist visitors in trip planning and route finding. There are several large maps available for visitor use (Figure 16) however, the WIC is not a large structure which limits the ability of the NPS to provide education and help large groups with trip planning.

Figure 16  
ONP backcountry map



Also inside the WIC are several large wall murals dedicated to LNT and the promotion of environmental ethics (Figures 17 & 18).

Figure 17  
ONP environmental ethics wall mural



Figure 18  
ONP LNT wall mural



ONP also sells to backcountry visitors ‘custom correct maps.’ These maps are based on USGS topographic maps but instead of covering a quad, they cover an entire section of the park with all hiking trails and camping locations clearly marked.

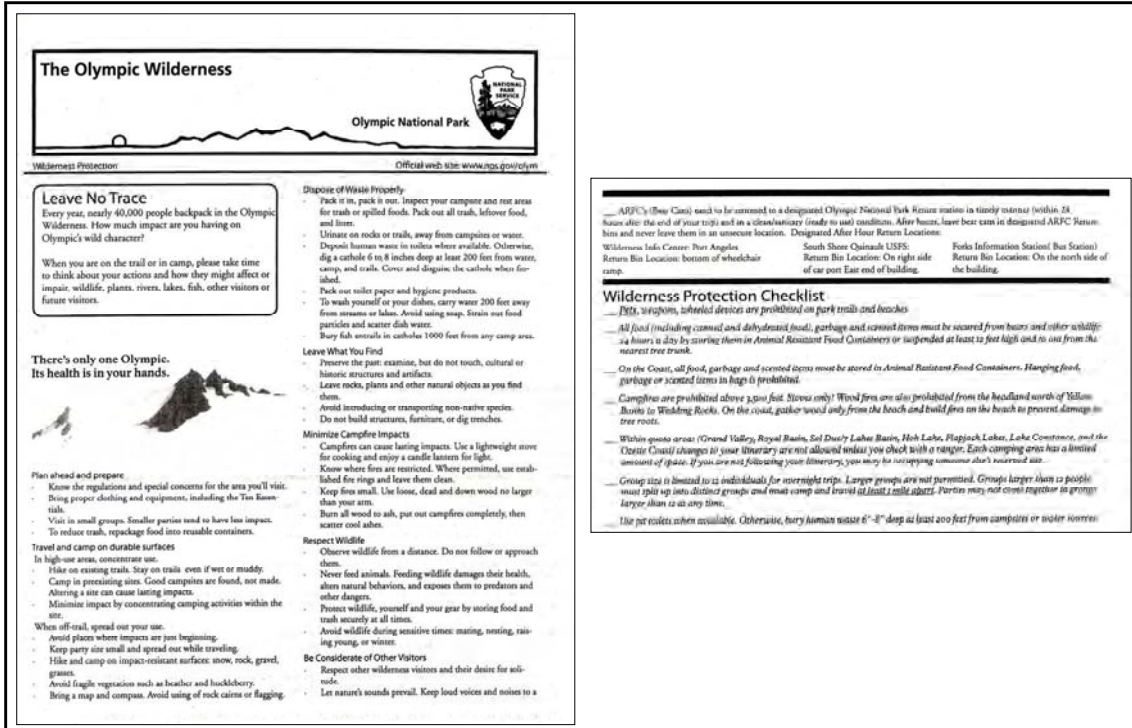
ONP also relies heavily on printed media to help disseminate the LNT message. The most detailed information regarding backcountry camping policies and guidelines are contained within the “Wilderness Trip Planner” (Figure 19). Inside this fold out pamphlet readers will find introductory information, places to go and camp, permit processes, stewardship and LNT principles, and a full map of the park including coastal wilderness.

Figure 19  
ONP Wilderness Trip Planner



Flyers such as the one in Figure 20 review the LNT principles and make appeals such as “when you are on the trail or in camp, please take the time to think about your actions and how they might affect or impair, wildlife, plants, rivers, lakes, fish, other visitors or future visitors.” Also, note the ‘wilderness protection checklist,’ located on the back of the LNT flyer.

Figure 20  
ONP LNT flyer #1



Other flyers such as the one below in Figure 21 provide even more detail regarding regulations, food storage, and LNT principles.

Figure 21  
ONP LNT flyer #2

# Olympic

Olympic National Park

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How Can You Help Protect Your Wilderness?

Official website [www.nps.gov/olyjm](http://www.nps.gov/olyjm)

**Help us preserve the wild character of Olympic National Park.**

In 1988, 95% of Olympic National Park was designated as The Olympic Wilderness. Congress defines wilderness as "...where the forces of nature predominate and the imprint of human activities is substantially unnoticeable."

Nearly 40,000 people backpack in Olympic National Park each year - more than most other national parks. Because so many people enjoy Olympic, even small impacts can turn into large ones. The following information can help prevent damage to vegetation, harm to wildlife, human waste problems and other impacts. Please try to Leave No Trace of your stay and help us keep Olympic wild!

**Regulations**

- All food, garbage and scented items must be secured from all wildlife 24 hours a day in bear canisters, on bear wires or hung at least 12 feet high and 10 feet out from the nearest tree trunk.
- Check with the Wilderness Information Center (WIC) for bear wire locations.
- Animal resistant food containers are required on the coast and in areas where trees are not suitable for food hanging.
- Pets, weapons, bicycles and wheeled devices are prohibited in the wilderness/backcountry and on park trails and beaches.
- To protect fragile vegetation, fires are prohibited above 3,500 feet. Burn only dead and down wood. Always use pre-existing fire rings.
- Maximum party size is 12. Larger groups must separate and camp and travel at least 1 mile apart and may not come together in a group larger than 12 at any time.
- No more than 8 head of stock are allowed per group. Pellets and rolled grain are required for supplemental stock feed. Some trails are closed to stock. Please contact the WIC for more information. In most areas, camping with stock animals is prohibited above 3,500 feet.

**Food Storage**

**Your Food**  
A determined bear can get hung food. If you are hanging your food, it must be hung at least 12 ft. high and 10 ft. out from the tree trunk.

75-100 ft. of rope is recommended.

1. Tie one end of your rope to the base of the first tree. Then drape your rope over a branch about 15 feet to 20 feet high.
2. Then throw the end of your rope over a branch (15 feet to 20 feet high) on another tree that is at least 30 feet away from the first tree.
3. Before pulling the line taut, tie a loop knot in the middle of the rope and attach your food bag to the knot.
4. Pull the line taut and tie the other end of the rope to the base of the second tree.

**Leave No Trace**

Leave No Trace is a set of guidelines not regulations that can help reduce impacts to the wilderness.

1. **Plan ahead and prepare**
  - Before your trip, find out trail and road conditions and research regulations and other local concerns.
  - Bring proper clothing and equipment, including the Ten Essentials.
  - Reduce party size, smaller parties tend to have less impact.
  - To reduce trash, repackage food into reusable containers.
2. **Travel and camp on durable surfaces**

In high-use areas, concentrate use.

  - Hike on existing trails down the middle of the trail, even if wet or muddy.
  - Camp in preexisting sites. Good campsites are found, not made. Altering sites can cause lasting impacts.
  - Minimize impact by concentrating camping activities within the site.

**When off-trail, spread out your use.**

  - Avoid places where impacts are just beginning.
  - Keep party size small and spread out while traveling. Hike and camp on durable surfaces: snow, rock, gravel, grasses.
  - Avoid fragile vegetation such as heather and huckleberry.
  - Bring a map and compass to eliminate the use of rock cairns or flagging.
  - Protect riparian areas by camping at least 200 feet from lakes and streams.
3. **Dispose of Waste Properly**
  - Pack it in, pack it out. Inspect campsites and rest areas for trash or spilled foods. Pack out all trash, leftover food, and litter.
  - Urinate on rocks or trails, away from campsites or water sources.
  - Deposit human waste in toilets where available. If not available, dig a cathole 6 to 8 inches deep at least 200 feet from water, campsites, and trails. Dispose the cathole when finished.
  - Pack out toilet paper and hygiene products.
  - To wash yourself or your dishes, carry water 200 feet away from streams or lakes. Avoid using soap. Strain food particles and scatter dish water.
  - Bury fish entrails in catholes.
4. **Leave What You Find**
  - Leave rocks, plants and other natural objects as you find them so others may enjoy them.
  - Avoid introducing or transporting non-native species. Rinse off hiking boots prior to trips.
  - Leave the wilderness wild. Don't build structures, furniture, or dig trenches.
5. **Minimize Campfire Impacts**
  - Campfires can cause lasting impacts to the wilderness. Use a lightweight stove for cooking and enjoy a candle for light.
  - Know where fires are restricted. Where permitted, use established fire rings and leave them clean.
  - Keep fires small. Use loose, dead and down wood no larger than your arm.
  - Burn all wood to ash, put out campfires completely and then scatter cool ashes.
6. **Respect Wildlife**
  - Observe wildlife from a distance. Do not follow or approach them.
  - Never feed wildlife. It damages their health, alters natural behaviors, and exposes them to predators.
  - Always secure food, garbage and scented items from all wildlife 24 hours a day. Never leave food unattended unless it is secured in bear canisters, on bear wires or hung 12 feet high and 10 feet out from the tree trunk.
7. **Be Considerate of Other Visitors**
  - Respect other wilderness visitors and their desire for solitude.
  - Let nature's sounds prevail. Keep loud voices to a minimum.

**Before your trip**

- Contact the Wilderness Information Center (WIC) to check for any special regulations or considerations and to check if desired camping areas require reservations.
- Group leaders should educate all group members in Leave No Trace camping methods.
- Check weather forecasts and trail conditions.

**For More Information**  
Contact the Wilderness Information Center (WIC):

Phone Number: (360) 565-3100  
Email Address: [olyjm\\_wic@nps.gov](mailto:olyjm_wic@nps.gov)  
Park web site: [www.nps.gov/olyjm](http://www.nps.gov/olyjm)

Also of interest for other NPS Units to consider are area specific flyers such as the one presented in Figure 22. Such flyers contain information that is more detailed and can be customized to meet management objectives and the specific ecological context.



Figure 22  
ONP area specific flyer

# Olympic

Olympic National Park

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**Seven Lakes Basin Wilderness Destination** Official web site: [www.nps.gov/olym](http://www.nps.gov/olym)

Olympic National Park is one of the wildest places left in the contiguous United States. In 1988, Congress designated 45% of Olympic as wilderness to further protect the wild areas of the park from development. Congress defines Wilderness as "...an area where the earth and its community of life are untrammeled by man, where man himself is a visitor and does not remain." These areas "shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness." Learn more about your National Wilderness Preservation System at [www.wilderness.net](http://www.wilderness.net).

Each year, nearly 40,000 people camp in the Olympic Wilderness. Because of the large number of people, each of us should take the time to consider what effect our actions have on wildlife, plants, other visitors and the overall wilderness of Olympic National Park.

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### Camping

**Permits:** A Wilderness Permit is required for all overnight trips. Permits are limited for trips between May 1 and September 30. Advance reservations may be made no more than 30 days in advance by calling the Wilderness Information Center (WIC) at (360) 565-3100. Permits for overnight trips must be obtained at the WIC during business hours. Permits cost \$5 plus \$2 per person, per night for those 16 yrs. of age and older.

**Campsites:** Groups of 7-12 people must camp in designated group sites. Main camping areas are: Sol Duc Falls to Appleton Pass Junction (6), Appleton Pass Junction to 3,500 ft. (3), Seven-mile group site, Lower Bridge Creek (2), Sol Duc Park (4+1 group), Heart Lake (5), Lunch Lake (5), Round Lake (1), Deer Lake (10+1 group + 1 llama site), Potholes (2), Deer Lake to Sol Duc Falls (3), and Sol Duc Falls (3).

**Toilets:** Toilets are available at Sol Duc Park, Heart Lake, Lunch Lake, Hob Lake and Deer Lake. Otherwise, bury waste 6-8" deep and 200 ft. from campsite and water sources. Always carry a ziplock bag to pack out your toilet paper. Do not urinate in toilets; urinate on rock or trail 200 ft. from campsite or water.

**Water Sources:** Sol Duc River and various streams and lakes. Always boil, filter or treat your water.

**Stocks:** Must camp in designated stock camps; call the WIC for locations.

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### Special Concerns

**Leave No Trace:** Camp in designated sites. Camping or walking on vegetation will kill it. Pack it in, pack it out! Please avoid revegetation areas. Areas marked with closed signs or stakes have been trampled and damaged. Please allow these areas to recover by staying on trails. Do not walk on plants to avoid puddles or snow patches.

**Fires:** Subalpine forests and meadows need dead and decaying wood for nutrients. Because of the general lack of dead wood, no fires are allowed above 3,500 feet.

**Wildlife:** Black bears frequent the Sol Duc/Seven Lakes Basin. Campers are required to secure food, garbage and scented items 24 hours a day. Bear wires are located at some camps; call the WIC for wire locations. In other areas, use approved Animal-Resistant Food Containers (AREC) or hang your food at least 12 feet high and 10 feet out from the nearest tree trunk. Never leave food unattended unless it is secured from animals.

**Other Regulations:** Pets, weapons and wheeled vehicles are prohibited on park trails and in the backcountry.

- Camp only in designated sites.
- No campfires above 3,500 feet!
- If no toilet, bury human waste 200 feet from campsites or water. Pack out your toilet paper.
- Animal-Resistant Food Containers are recommended at many locations; call WIC for bear wire locations.

Every year, nearly 40,000 people backpack in the Olympic Wilderness. How much impact are you having on Olympic's wild character?

After issuing the permit, LNT guidelines are briefly reviewed by NPS staff and the visitor is on their way. Finally, it is important to note that the WIC has approximately the same size staff as Apgar Backcountry Permit Center at GNP but deals with nearly twice the volume of backcountry travelers.

To summarize, ONP utilizes the following tools for promoting the LNT message: ONP website, informal ranger-led education, an extensive system of web pages dedicated to trip planning and preparedness, and a range of visual aids and printed material. Of special note are the ONP area specific flyers such as the one presented in Figure 22.

## Cumberland Island National Seashore

### *Overview of the Unit*

Cumberland Island National Seashore (CINS) is Georgia's largest barrier island and is located approximately 30 miles north of Jacksonville, Florida. The island is large, approximately 18 miles in length, and is unique in the east with its large wilderness area. The majority of visitors to CINS arrive by ferry from the mainland (Figure 23).

Figure 23  
CINS ferry boat



The ferry docks at the Sea Camp Ranger Station where day visitors are free to explore the island (Figure 24). Overnight visitors are ushered into a trip briefing room in the ranger station where they are addressed by the ranger on duty regarding camping procedures.

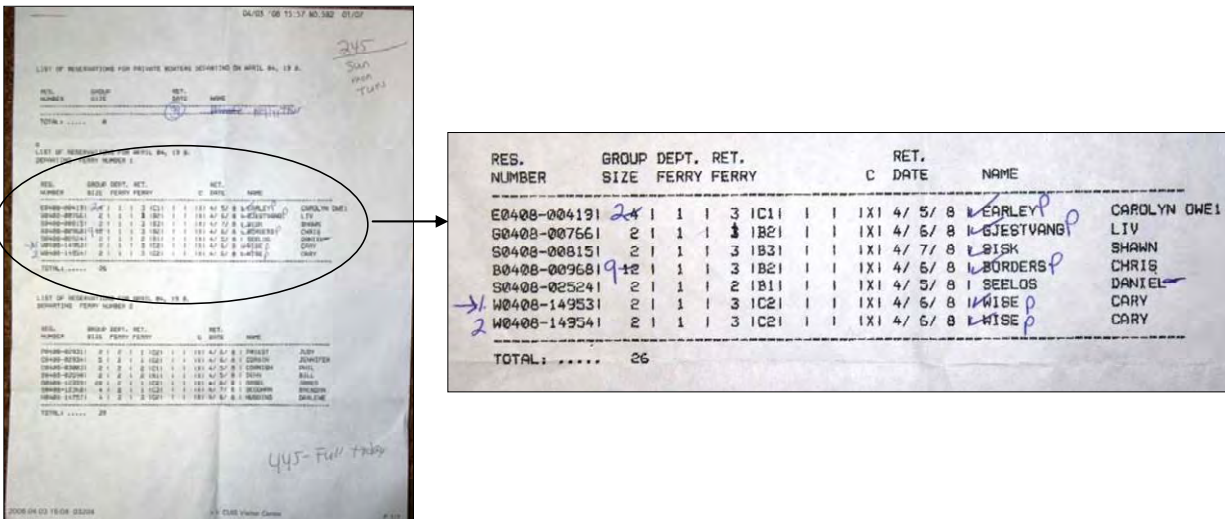
Figure 24  
CINS Sea Camp Dock and Ranger Station



**Backcountry Reservation System**

CINS uses an antiquated DOS program to take reservations for overnight stays on the island. The process is initiated by a prospective overnight visitor calling the visitor center on the mainland to make a reservation. The reservation is logged by the receptionist. Every day a ranger commuting from the mainland to the island brings the days printout of expected overnight campers (see Figure 25).

Figure 25  
CINS camping printout



**Promotion of the LNT Message**

The island has one frontcountry campground, Sea Camp, located approximately 3/8 of a mile east of the ranger station. Visitors are provided wheeled carts to haul their gear back and forth from the dock to the campground. The island also has three wilderness campgrounds (all of which are located within the wilderness area) and one backcountry campground (Stafford Beach) outside the wilderness boundary.

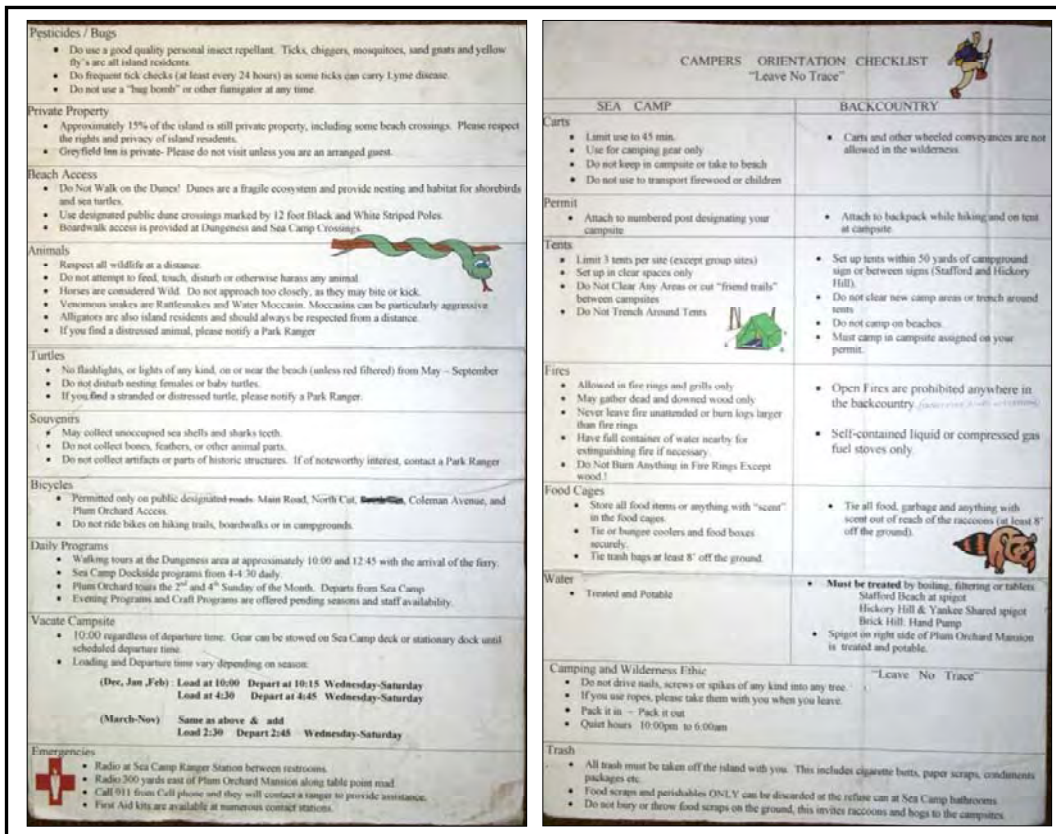
Upon entering the briefing room (Figure 26) at the Sea Camp Ranger Station, all overnight visitors (all campgrounds) are given an orientation to the island.

Figure 26  
CINS trip briefing room



Depending on the individual delivering the orientation briefing, the session could last anywhere from several minutes to upwards of 30. There are several props available to the ranger conducting the briefing (Figure 27). As evident in Figure 27, these props cover many of the LNT principles, however review of the points contained on these checklists seemed to be largely dependent on the ranger delivering the orientation talk.

Figure 27  
CINS trip talk props



CINS also has several audiovisual tools available to rangers for promoting the LNT message, displayed in Figure 28. On the left is a slide projector and on the right a large flat panel television recently purchased for the ranger station.

Figure 28  
CINS audiovisual equipment



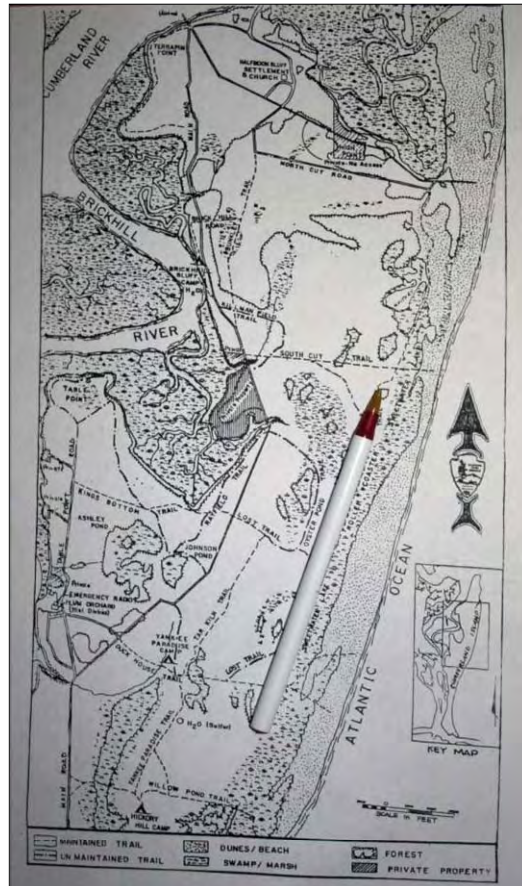
After attending the ranger-led briefing, the overnight backcountry visitors are provided with a general map of the island (see Figure 29).

Figure 29  
CINS general information and map

The brochure is divided into several sections. At the top left, 'Enjoying Cumberland Island' includes a photo of a tent and text about visitor information and responsible recreation. The top right, 'Cumberland Island', features a large photo of a beach and text about the island's history and management. Below these are three columns of text and photos: 'Saltwater marsh', 'Maritime forest', and 'Beach'. The bottom left contains a large map of Cumberland Island National Seashore with a legend. The bottom right, 'The Human Impact', includes a photo of a plantation house and text about the island's history and the impact of human activity.

If an overnight party requests a better or more specific map, the park does have photocopies of the map in Figure 30. As is evident however, the map is small (note the ink pen in the picture), is not waterproof, and the photo quality is poor.

Figure 30  
CINS backcountry map



To summarize, CINS utilizes the following tools for promoting the LNT message: NPS website (minimal information regarding LNT), an optional video (offered on mainland however the video does not address LNT specifically), and formal ranger-led education during briefings immediately after visitors arrive on the island. CINS is well suited to increase dissemination efforts regarding LNT, particularly in light of the captive nature of visitors in the briefing room (Figure 26) and the availability of technology such as the wide screen television (Figure 28).



## **SECTION III – CONCEPTUAL FOUNDATION**

### **Why Theory?**

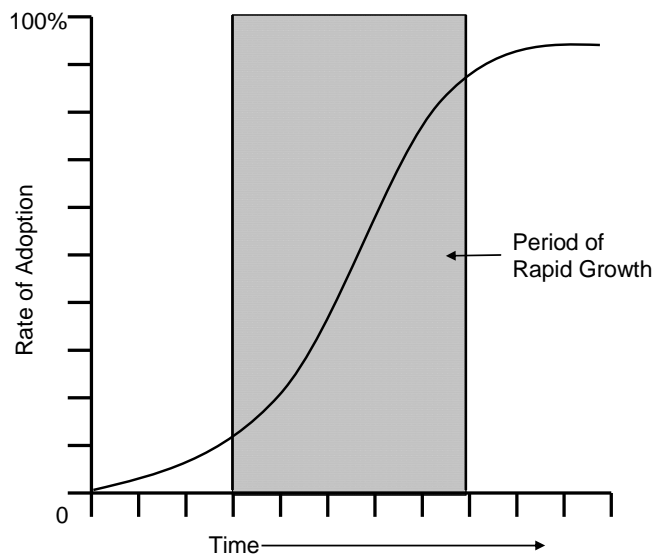
Theory can be defined as “the construction of explicit explanations in accounting for empirical findings” (Bengtson, Burgess, & Parrott, 1997, p. 572). The utilization of relevant theory in research provides a road map for researchers in understanding phenomenon of interest. Additionally, the application of the appropriate theory leads to asking the correct types and forms of questions (Henderson, Preseley, & Bialeschki, 2004). It is also recognized that “there is no single theoretical approach that can be applied in all situations, and no one campaign can predict with certainty what its outcome will be” (Carter, 2001, p. 8, from Johnson & Vande Kamp, 1996). To this end, several theoretical approaches are discussed in light of the purpose of the proposed research.

The theoretical basis of this study was drawn from relevant social-psychological and communication theories, respectively Diffusion of Innovations Theory (Rogers, 2003) and The Theory of Planned Behavior (Ajzen, 1991). The following is a synopsis of both theories.

### **Theoretical Framework for Understanding Adoption of Innovations: Diffusion of Innovations Theory**

Diffusion of Innovations (DIT) is a theory of communication based on how an idea or technology becomes accepted into society and the rate at which it does so (Rogers, 2003). Diffusion refers to more than communication; the theory is specifically concerned with the diffusion or implementation of new ideas or innovations and the rate at which they are accepted (Rogers, 2003). Diffusion is defined as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 5). Underlying the theory is that new ideas are not immediately adopted into society, they take time and may succeed or fail for any number of reasons; DIT critically examines the antecedents of this acceptance. This process of acceptance is frequently diagrammed as an ‘S’ shaped curve, evident in Figure 31.

Figure 31  
Adoption of an Innovation Over Time  
(Rogers, 2003, pg. 344)



Diffusion is recognized to be a process of four things; an innovation (1) communicated through channels (2), over time (3), among social systems (4) (Rogers, 2003). Further, adoption of ideas occurs at different rates, allowing segmentation of adopters'. Figure 32 below classifies the five categories of adopters as identified by Rogers (2003).

Figure 32  
Adopter Categorization on the Basis of Innovativeness  
(Rogers, 2003, pg. 281)

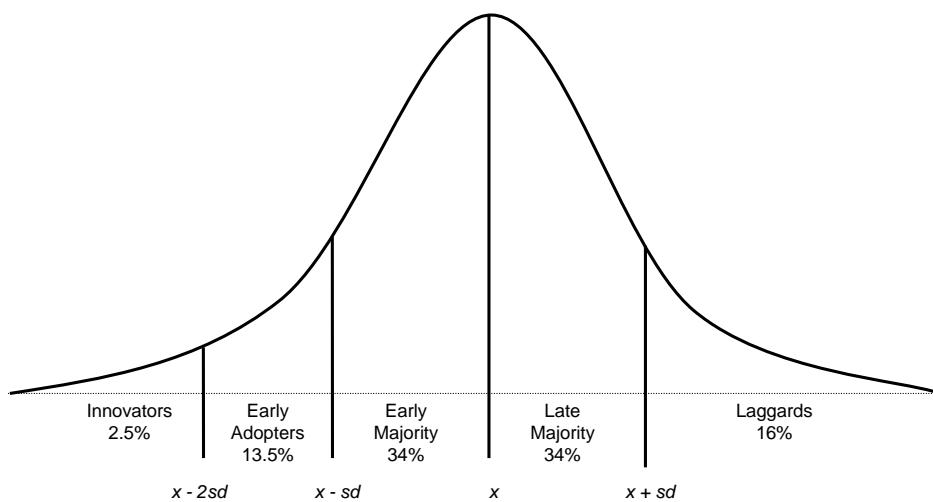
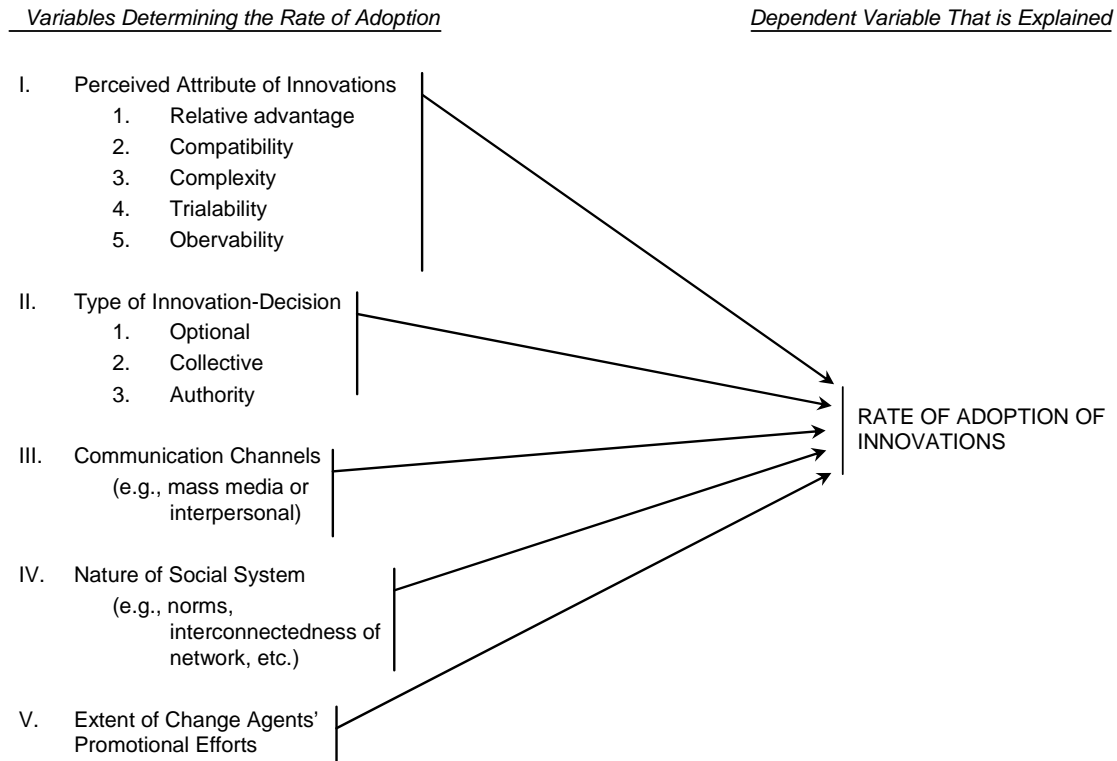


Figure 33 shows the five variables posited by Rogers that best explain the rate an idea or innovation is adopted by society or a population (2003).

Figure 33  
Variables Determining the Rate of Adoption of Innovations  
(Rogers, 2003, pg. 222)



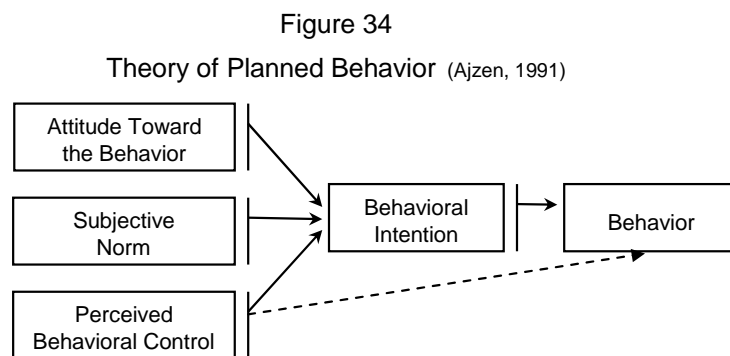
The fourth main element of diffusion deals with how the idea or innovation is spread throughout a social system. Rogers defines a social system as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal” (2003, p. 37). Rogers provides discussion of how a social system has a structure that allows for regularity and stability for individuals behavior within the system. Norms are also a recognized and integral part of social systems. The system itself may consist of “all consumers in the US” or all “peasants in a village” (2003). One of the most important parts of the system for ensuring diffusion appears to be individuals that provide ‘opinion leadership.’ These individuals are members of a social unit who are “able to influence other individuals’ attitudes or overt behavior informally in a desired way with relative frequency” (Rogers, 2003, p. 27).

The other important individual during this period is termed the ‘change agent.’ Change agents are professional individuals who “influence the innovation-decision in a direction deemed desirable by a change agency” (Rogers, 2003, p. 27).

Diffusion of Innovations Theory is well supported by the scientific literature as evidenced by the popularity of the theory. To date some 5,200 publications have used diffusion theory with approximately 120 new studies per year utilizing the theory (Rogers, 2003). Somewhat surprisingly, application of DIT within the natural resource management field has remained scant. The one piece identified after a long literature search was written by Vita Wright, scientist with the Aldo Leopold Wilderness Research Institute, and was largely conceptual (2004). In the piece, she provides an overview of the theory for individuals and land managers not yet familiar with the theory. The theory is unique in that applied research potentially will provide valuable information for understanding the status of an innovation such as LNT and potentially identifying barriers are preventing full diffusion of the message.

**Theoretical Framework for Explaining Human Behavior: Theory of Planned Behavior**

The Theory of Planned Behavior (TpB) is a general theory of social psychology that provides structure for examining human behavior and the determinants of that behavior. Specifically the TpB is a theory “designed to predict and explain human behavior in specific contexts” (Ajzen, 1991, p. 181). It is because of this function that the TpB is so well suited for application in the current study of exploring antecedents of backcountry behavior (or behavioral intention). The theory puts forward that ones behavior is best predicted by intention to engage in said behavior. Further, ones intention to act becomes a product of the interaction of salient attitudes towards the behavior, the influence of peers and other important people (social norms), and the level of control (efficacy) that an individual feels they have over said behavior (termed perceived behavioral control) (Ajzen, 1991). Further, attitudes, norms and perceived levels of behavioral control are all influenced by a core set of salient beliefs. Beliefs can be created or manipulated through direct experience or from outside sources, including other people or media sources (Fishbein & Ajzen, 1975). Visually, the TpB is represented in Figure 34 below.



The TpB has received widespread application within the field of leisure sciences (Fishbein & Manfredo, 1992). This has included application of the theory for understanding public attitudes regarding

forest fires in national parks (Bright, Fishbein, Manfred, & Bath, 1993; Manfred, Fishbein, Haas, & Watson, 1990), power boaters compliance with posted speed limits (Aipanjiguly, Jacobson, & Flamm, 2003), and understanding recreation behavior (Young & Kent, 1985),

The TpB has also received widespread application within a variety of other field's. One recent paper by Francis et. al., reported that over 600 studies published in PsychINFO from 1985 through January 2004 utilized the TpB (2004). The TpB has also received wide application and support within the natural resources management literature. Recent application of the theory include the examination of hunting intentions (Hrubes, Ajzen, & Daigle, 2001) and compliance with leash laws (Nesbitt, 2006). Finally the TpB is recognized as a robust theory suitable for investigations into the efficacy of visitor education in natural areas (Marion & Reid, 2007).

The underlying value of the TpB to wilderness management lays in the relationships it hypothesizes that exists between the determinants (attitudes primarily) and the outcome (behavior or behavioral intention). If attitudes are an accurate predictor of intentions, intentions guide behavior, and attitudes can be changed, then wilderness managers can use education to influence salient attitudes which ultimately will manipulate visitors' behaviors. Thus, the theory contends that attitudes can be manipulated or changed in what is deemed a positive direction by the employment of persuasive messages that target individual's salient beliefs toward the outcome of the behavior, the social norms regarding the behavior, and the perceived ease or difficulty in performing an action.

## SECTION IV – METHODS

### Variable Development

The variables selected for inclusion within this study were developed to reflect the theoretical underpinning (Theory of Planned Behavior and Diffusion of Innovations Theory) and the LNT education program. For reference, the complete questionnaire is available in Appendix II of this report. The following section briefly describes the origin and/or development of measures used within the study.

### *Section A*

Section A of the questionnaire explored the characteristics of the respondent's backcountry trip. Questions exploring total mileage traveled, group composition, modes of transportation, and campsite type were explored. Additionally the 29-item Self-Reported Behavioral Compliance Scale (SRBCS) was part of Section A and asked respondents to indicate the frequency that they engaged in a wide variety of backcountry behaviors. The scale was anchored on a 7-point scale from 1 (never) to 7 (every time). Additionally there was a place for respondents to mark 'Not Applicable.' The SRBCS serves as the primary dependent variable (behavioral compliance with LNT practices) within the TpB conceptual model (Figure X). The SRBCS was developed based on past research efforts (for example see Confer, Absher, Graefe, & Hille, 1999; Daniels & Marion, 2005; Newman, Manning, Bacon, Graefe, & Kyle, 2003), the 7 LNT principles, input from six backpacking instructors at Clemson University, and pilot testing that utilized 70 Clemson University students who had participated in an overnight backpacking trip as part of a university course. Additionally the scale was refined using cognitive testing procedures in Glacier National Park. As part of this process focus group interviews with NPS Permit Issuing Staff (n = 5) and overnight backpacking groups (n = 17 individuals, 8 independent groups) were conducted at the Apgar Backcountry Visitor Center at Glacier National Park, Montana.

### *Section B*

Section B of the questionnaire explores respondents levels of activity involvement (Manning, 1999; Tuan, 1977). The utility of examining levels of involvement, termed specialization, allows both researchers and managers to differentiate between visitors (Bryan, 1977). Formally, recreation specialization is defined as "a continuum of behavior from the general to the particular, reflected by equipment and skills used in the sport and activity setting preferences" (Manning, 1999, pp. 235-236). It has been hypothesized and supported empirically that recreationalists with varying levels of specialization will likewise have varying levels of attitudes, beliefs, preferences, and behaviors (Manning, 1999). The behavioral component of specialization has been most commonly employed by examining what is termed

‘experience use history’ or EUH (Schreyer, Lime, & Williams, 1984; Watson & Niccolucci, 1992). The focus of this component of specialization has centered upon such variables as years of experience with an activity, frequency of participation, number of sites visited, number of visits to a particular area, and number of years since first visit to the area in question (Manning, 1999).

### ***Section C***

Section C of the questionnaire explored the TpB components behavioral intentions (four items) and subjective norms (eight items) (see Figure X). These measures were adopted from past research and adapted for application within this study. Additionally three items were included in the section that explored early life experience, including time hunting, outside enjoying nature, and engagement in mechanized recreational activities.

### ***Section D***

Section D of the questionnaire explored the perceived behavioral control box of the TpB (see Figure X). This two construct measure was composed of 10 items (5-items/construct) that probed levels of control and difficulty in following recommended LNT practices (Traifmow, Sheeran, Conner, & Finlay, 2002). Also included within this section was a single item evaluating respondents overall satisfaction with their backcountry experience.

### ***Section E***

Section E of the questionnaire was comprised of 24 items designed to explore respondents attitudes regarding a variety of backcountry behaviors. Prior to this research, such a measure did not exist within the literature. The procedures to develop this multi-item measure were similar to the SRBCS in Section A and included an extensive review of literature, evaluation by experts, pilot testing (n=220), and cognitive interviews. The seven-point scale used to anchor the items ranged from 1 ‘very inappropriate’ to 7 ‘very appropriate’ with neutral indicated by a four.

### ***Section F***

Section F of the questionnaire explored a variety of variables related to the diffusion and communication sources of the LNT message. Respondents were asked to indicate first and primary sources of the message, overall attitudes regarding the effectiveness of the LNT message, the influence of diffusion sources including rangers, videos, printed park media and the internet.

## ***Section G***

Section G of the questionnaire investigated demographic variables including age, gender, ethnic background, education, and income.

### **Questionnaire Development**

The questionnaire was pilot tested at Clemson University in mid-March 2007 with a sample of undergraduate students. Minor corrections were made based on these pilot tests and the instrument was submitted to the National Park Service Social Science Office for review on April 11, 2007.

### **Cognitive Interviews**

Cognitive interviewing is a process in which researchers can fine tune measurement indices to lessen instances of future respondents becoming confused or misinterpreting items (Willis, 1999). Two measures from the LNT Questionnaire were subjected to cognitive interviews at the suggestion of The Office of Management and Budget; the self-reported behaviors portion (Section A) and the attitudinal measure (Section E).

All cognitive interviews were conducted at the Apgar Backcountry Ranger Station in St. Mary's Village, Glacier National Park. Participants in the interviews included overnight backpacking groups (n = 18 individuals, 8 independent groups). Procedures for the cognitive interviews followed those recommended by Willis (Willis, 1999). All interviews lasted approximately 20 to 25 minutes and were conducted until the researcher felt a point of data saturation (redundancy in responses) was achieved for both measures (Schram, 2003; Tashakkori & Teddlie, 1998).

### **Sampling Procedures and Response Rate**

The sample was selected by intercepting individuals and groups as they registered/picked-up their backcountry permits at the backcountry offices/ranger stations within the three respective NPS Units. A systematic sampling strategy was employed to ensure both representativeness and a more accurate estimate of the error (Babbie, 2001). All members of a group were asked to provide their contact information. Additionally this strategy allowed for the sampling of all party members not just the registered trip leader. Past studies have shown that less experienced backcountry travelers rely heavily on more experienced individuals as sources of information (Ramthun, 1998).

Contact information was collected in each of the units during a time-period specifically chosen to coincide with historical peak use. The graduate student research assistant was station at the GNP Apgar Backcountry Permit Station from June 23<sup>rd</sup> through July 13<sup>th</sup> 2007. Data was collected at the ONP Wilderness Information Center (WIC) from July 21<sup>st</sup> through August 4<sup>th</sup> 2007. Contact information was



collected during two different times at CINS; over a three weekends in the fall 2007 (n=145) and a 10-day period in the spring, from Friday March 28<sup>th</sup> through Friday April 4<sup>th</sup> 2008 (n=109). Unlike overnight backcountry visitation at GNP and ONP which follows a traditional ‘bell-shaped’ curve (peaking in mid to late summer) overnight visitation at CINS peaks both in late fall (November) and in spring (late March through early April).

Data collection procedures followed a modified Dillman (2007) technique with multiple contacts (n=3) to increase response. At the conclusion of the contact information collection phase for each respective unit, all potential respondents were mailed a cover letter reiterating the purpose of the study and a questionnaire (see Appendix II for copies of these documents). Approximately 10 business days later, those who had not returned a questionnaire were mailed a reminder postcard. Finally, approximately 10 days after the post-card was sent, those who had still not returned a questionnaire were mailed a second letter and a replacement questionnaire. In all, 1111 addresses were collected. One thousand eighty five (1085) of the 1111 were valid addressees (26 undeliverable questionnaires were returned by the USPS). Total, 755 questionnaires were returned providing an adjusted response rate of 69.6%. Table 1 has a complete breakdown of the response rate across units.

Table 1  
Response rates

Park	Initial Contact				Mail-back Procedure			Adjusted Response Rate
	N Individuals Asked to Participate	N of Outright Refusals	N of Addresses Collected	% Willing to Provide Address	N of Invalid Addresses	N of Valid Addresses	N of Valid Returns	
GNP	430	5	425	98.8	17	408	279	68.4
ONP	450	18	432	96.0	4	428	314	73.4
CINS - Fall '07	172	27	145	84.3	4	141	89	63.1
CINS - Spring '08	--	--	109	--	1	108	73	67.6
<b>Totals</b>			<b>1111</b>			<b>1085</b>	<b>755</b>	<b>69.6</b>

Respondents who returned questionnaires but indicated they did not camp overnight in the backcountry of the NPS Unit were deleted from the datafile (n=2, both at ONP). Additionally, respondents who completed less than 50% of the questionnaire were deemed invalid and removed from further analyses (n=1 from CINS). Table 2 illustrates the proportion of respondents from each of the three respective units.

Table 2  
Respondents by NPS unit

	N	Percent
GNP	279	37.1
ONP	312	41.5
CINS	161	21.4

In order to determine if the two samples from CINS differed, mean values were examined on five variables; group size, length of stay (nights), total years of backcountry camping experience, self-reported knowledge of LNT Principles, and age. Results are presented in Table 3.

Table 3  
T-test comparisons of CINS Fall 2007 & Spring 2008 visitors

Variable		N	Mean	SD	t-statistic	p-value
Group Size	Fall 2007	110	7.4	5.5	-.04	.965
	Spring 2008	73	7.4	7.2		
Length of Stay: Nights Out	Fall 2007	111	2.3	1.5	-.60	.548
	Spring 2008	73	2.4	1.1		
Years of Backcountry Camping Experience	Fall 2007	100	14.9	12.6	-.57	.570
	Spring 2008	68	16.2	13.7		
Self-reported Knowledge of LNT Principles	Fall 2007	109	3.6	1.1	-.63	.531
	Spring 2008	70	3.7	1.4		
Age	Fall 2007	109	38.0	11.9	-2.89	.005
	Spring 2008	71	43.2	11.0		

No significant differences were found between the fall and spring visitors except for on one variable, age. Results indicated that significant differences ( $p=.005$ ) existed between the samples however, the means differed by only 5.2 years (average age 38 to 43.2) which is likely inconsequential to findings. Thus, from here onward, CINS respondents from both samples are treated as one group.

### Non-Response Bias Testing

A non-response bias check was undertaken to ascertain if differences existed between respondents and non-respondents. Nonrespondents were systematically selected from the original contact sheet using a random start point. Repeated attempts were made via telephone to contact every  $n^{\text{th}}$  nonrespondent. These procedures continued until approximately 30 individuals per unit were contacted and successfully interviewed.

Consistent with the test conducted regarding differences between CINS visitors presented above, mean values were examined on five variables; group size, length of stay (nights), total years of backcountry camping experience, self-reported knowledge of LNT Principles, and age (all variables treated as continuous). Results are presented in Table 4.

Table 4  
T-test comparisons of respondents and nonrespondents

Unit	Variable		N	Mean	SD	t-statistic	p-value
GNP	Group Size	Respondents	279	2.8	1.3	.46	.645
		Nonrespondents	31	2.7	1.0		
	Length of Stay: Nights Out	Respondents	279	2.7	1.8	-.15	.885
		Nonrespondents	31	2.8	1.7		
	Years of Backcountry Camping Experience	Respondents	273	13.4	12.0	1.75	.087
		Nonrespondents	31	10.4	8.7		
	Self-reported Knowledge of LNT Principles	Respondents	268	4.2	.9	-3.23	.001
		Nonrespondents	31	4.7	.8		
	Age	Respondents	273	36.2	12.4	1.85	.066
		Nonrespondents	31	31.9	10.4		
ONP	Group Size	Respondents	313	3.8	2.7	.59	.552
		Nonrespondents	28	3.5	2.3		
	Length of Stay: Nights Out	Respondents	314	2.6	1.6	-.49	.627
		Nonrespondents	28	2.7	1.9		
	Years of Backcountry Camping Experience	Respondents	302	21.7	14.4	2.41	.016
		Nonrespondents	28	14.8	13.8		
	Self-reported Knowledge of LNT Principles	Respondents	303	4.0	.9	-2.86	.005
		Nonrespondents	28	4.5	1.0		
	Age	Respondents	311	41.7	12.5	1.95	.052
		Nonrespondents	28	36.8	14.5		
CINS	Group Size	Respondents	161	7.4	6.3	-.37	.709
		Nonrespondents	22	7.9	5.5		
	Length of Stay: Nights Out	Respondents	162	2.4	1.3	-.33	.744
		Nonrespondents	22	2.5	1.7		
	Years of Backcountry Camping Experience	Respondents	146	15.5	13.1	1.51	.140
		Nonrespondents	22	12.1	9.3		
	Self-reported Knowledge of LNT Principles	Respondents	157	3.6	1.2	.78	.436
		Nonrespondents	22	3.4	.9		
	Age	Respondents	158	40.3	11.7	2.5	.014
		Nonrespondents	22	33.7	11.4		

As evident in Table 4, there were no significant differences between respondents and nonrespondents across NPS Units on the variables Group Size and Length of Stay. Specific to GNP and ONP, respondents differed from nonrespondents on the variable Self-reported Knowledge of LNT Principles, with nonrespondents indicating higher levels of knowledge. This is likely an artifact of two different interview styles (self-administered questionnaire vs. oral interview). ONP respondents also differed from nonrespondents on the variables years of backcountry camping experience (respondents having approximately 7 years more backcountry experience). This finding is consistent with many public opinion surveys which routinely find respondents are older (hence having more backcountry experience) (Dillman & Carley-Baxter, 2000). Finally CINS visitors differed only on the variable age, again consistent with public opinion surveys (see Dillman & Carley-Baxter, 2000) and NPS research specifically (Papadogiannaki, Le, & Hollenhorst, 2007). Based on the abovementioned, we infer that potential data contamination due to nonresponse bias is largely nonexistent.

#### **Data Analysis & Presentation of Results**

Returned questionnaires were coded and entered into Microsoft Access Database to facilitate data entry and lessen instances for data entry errors. The data was then transferred to SPSS (version 13.0) for screening and analysis. Univariate outliers were examined via scatter plots. The majority of the results are presented in tables with several graphical figures to facilitate presentation and comprehension of findings (See Sections V and VI).

## **SECTION V – UNIVARIATE RESULTS**

### **Visitor Characteristics**

This portion of the results section presents demographic data from the three NPS Units included within this study. As can be seen in Table 5 males represent approximately 60% of the total sample. Age of respondents ranges across units with GNP having the youngest mean age of overnight backcountry visitors (36). The sample is almost entirely white, regardless of NPS Unit, and highly educated with greater than 90% of respondents having at least a college education.

Table 5  
Demographic characteristics of the sample

	GNP		ONP		CINS	
	N	Percent	N	Percent	N	Percent
<b>Gender</b>						
Male	176	63.3	187	59.9	99	61.5
Female	102	36.7	125	40.1	62	38.5
Totals	278	100.0	312	100.0	161	100.0
<b>Age Profile (years)</b>						
29 or younger	118	43.2	68	22.0	36	22.8
30 - 39	57	20.9	70	22.7	30	19.0
40 - 49	47	17.2	71	23.0	58	36.7
50 - 59	41	15.0	80	25.9	29	18.4
60 - 69	10	3.7	19	6.1	5	3.2
70 or older	0	0.0	1	0.3	0	0.0
Totals	273	100.0	309	100.0	158	100.0
<i>Mean age (sd) for unit</i>	36.2	(12.4)	41.6	(12.3)	40.3	(11.7)
<b>Hispanic or Latino?</b>						
Yes	--	--	--	--	4	2.5
No	--	--	--	--	155	97.5
Totals	Data not available <sup>1</sup>		Data not available <sup>1</sup>		159	100
<b>Race</b>						
White, not of Hispanic descent	263	98.5	287	97.0	154	95.7
Black, not of Hispanic descent	0	0.0	0	0.0	1	0.6
Hispanic	1	0.4	2	0.7	4	2.5
Asian	2	0.7	7	2.4	1	0.6
American Indian / Pacific Islander	1	0.4	0	0.0	1	0.6
Totals	267	100.0	296	100.0	161	100.0
<b>Education</b>						
Less than high school	5	1.8	1	0.3	0	0.0
High School	20	7.3	10	3.2	12	7.6
College	140	51.3	141	45.6	80	51.0
Graduate Study	108	39.6	157	50.8	65	41.4
Totals	273	100.0	309	100.0	157	100.0
<b>Total Household Income (2006)</b>						
Less than \$20,000	28	10.6	19	6.4	7	4.7
\$20,000 - \$39,999	46	17.4	31	10.5	24	16.0
\$40,000 - \$59,999	54	20.4	50	16.9	34	22.7
\$60,000 - \$79,999	43	16.2	49	16.6	17	11.3
\$80,000 - \$99,999	38	14.3	46	15.6	21	14.0
Greater than \$100,000	56	21.1	100	33.9	47	31.3
Totals	265	100.0	295	100.0	150	100.0

<sup>1</sup> Due to a communication error data were not collected on this question for GNP & ONP

Utilizing ZIP Codes of respondents, Table 6 was constructed which displays the proportion of residents from the four Census Regions by NPS Unit. Refer to Figure 35 for a depiction of Census Regions by state.

Table 6  
Respondents by Census Region

	GNP		ONP		CINS	
	N	Percent	N	Percent	N	Percent
Northeast	35	12.6	14	4.7	2	1.3
Midwest	62	22.4	20	6.7	10	6.3
South	44	15.9	13	4.3	145	90.6
West	136	49.1	252	84.3	3	1.9
Totals	277	100.0	299	100.0	160	100.0

Figure 35



### Trip Characteristics

Trip characteristics refer to descriptors of respondents' backcountry experience, including length of stay (nights out), camping locations and types, means of transportation, group role (trip leader or not), group composition, and trip satisfaction. Table 7 contains results of categorical variables related to trip characteristics. Trip leaders for the GNP and ONP samples make up approximately 55% of total respondents. Conversely, CINS trip leaders represent 36.6% of respondents. The vast majority of respondents in all parks were visiting the NPS Unit in the company of family and/or friends. The 23.6% of CINS respondents who indicated 'organized group' were primarily scout groups visiting the island (researchers' observation). Foot travel was the predominant form of transportation across all units and most respondents utilized NPS designated campsites.

Table 7  
 Tripographic characteristics of the sample: categorical

	GNP		ONP		CINS	
	N	Percent	N	Percent	N	Percent
<b>Trip roles</b>						
Registered trip leader	148	53.0	174	55.8	59	36.6
Not registered trip leader	131	47.0	138	44.2	102	63.4
Total	279	100.0	312	100.0	161	100.0
<b>Group composition</b>						
Alone	19	6.8	19	6.1	2	1.2
Family / Friends	253	90.7	273	87.5	121	75.2
Organized group (scouts, camp)	2	0.7	17	5.4	38	23.6
Commercial group	1	0.4	3	1.0	0	0.0
Other	4	1.4	0	0.0	0	0.0
Total	279	100.0	312	100.0	161	100.0
<b>Primary mode of transportation</b>						
Foot (hiking)	269	96.4	306	98.1	143	89.4
Boat (kayak, raft, canoe)	10	3.6	5	1.6	6	3.8
Stock (horses, mules, llamas)	0	0.0	0	0.0	--	--
Bicycle	--	--	--	--	11	6.9
Other	0	0.0	1	0.3	0	0.0
Total	279	100.0	312	100.0	160	100.0
<b>NPS designated campsites?</b>						
Yes	267	95.7	238	76.3	--	--
No	12	4.3	74	23.7	--	--
Total	279	100.0	312	100.0	-- <sup>1</sup>	-- <sup>1</sup>
<b>Undesignated campsites?</b>						
Yes	20	7.2	111	35.6	--	--
No	259	92.8	201	64.4	--	--
Total	279	100.0	312	100.0	-- <sup>1</sup>	-- <sup>1</sup>

<sup>1</sup> - See Table 8 for CINS campsite use information

Table 8 contains information related to campsite selection at CINS. At CINS there are five designated camping areas; Sea Camp near the Sea Camp Ranger Station, Stafford Beach approximately three miles north of Sea Camp but outside the wilderness boundary, and Hickory Hill, Yankee Paradise, and Brickhill Bluff inside the wilderness boundary. Nearly 60% of CINS visitors reported spending at



least one night at Sea Camp; less than 32% indicated they spent at least one night in a campground other than Sea Camp.

Table 8  
CINS campsite information

---

*Where did you camp?*

	N	Percent
<b>Sea Camp</b>		
Yes	93	57.8
No	68	42.2
Total	161	100.0
<b>Stafford Beach</b>		
Yes	50	31.1
No	111	68.9
Total	161	100.0
<b>Hickory Hill / Yankee Paradise / Brickhill Bluff</b>		
Yes	51	31.7
No	110	68.3
Total	161	100.0

Three variables addressing trip characteristics were continuous in nature (meaning measures of central tendency can be reported); group size, total miles traveled, and length of stay. As seen in Table 9, average group size ranged from 2.8 at GNP to 7.4 at CINS. GNP respondents logged the most miles with a mean of 31.3 as well as the longest time in the backcountry with a mean of 2.7 nights.

Table 9  
Tripographic characteristics of the sample: continuous data

---

Unit	Variable	N	Mean	SD	Min-Max
	Group Size	279	2.8	1.3	1-9
GNP	Total Miles Traveled	274	31.3	19.8	1-125
	Length of Stay: Nights Out	279	2.7	1.8	1-14
ONP	Group Size	312	3.8	2.7	1-19
	Total Miles Traveled	312	20.6	14.4	1-90
	Length of Stay: Nights Out	312	2.6	1.6	1-10
CINS	Group Size	160	7.4	6.3	1-28
	Total Miles Traveled	157	20.0	12.4	2-60
	Length of Stay: Nights Out	161	2.4	1.3	1-7

Satisfaction was measured via a single item with a 5-point anchor ranging from 1=not at all satisfied to 5=extremely satisfied (Table 10). Mean values were nearly identical across the three NPS Units regarding overall satisfaction with the backcountry trip. A vast majority of respondents were extremely to very satisfied with their NPS backcountry experience.

Table 10  
Frequencies (N & %), means, and standard deviations regarding overall satisfaction with overnight backcountry trip

Item	Unit	N	Mean <sup>1</sup>	SD	(1) Not at all satisfied	(2) Slightly satisfied	(3) Moderately satisfied	(4) Very satisfied	(5) Extremely satisfied
<i>Overall, how satisfied were you with your backcountry trip to XNP?</i>	GNP	272	4.54	0.58	0.0	0.0	4.0	38.2	57.7
	ONP	305	4.58	0.56	0.0	0.0	3.6	34.8	61.6
	CINS	157	4.47	0.61	0.0	0.6	3.8	43.3	52.2

<sup>1</sup> - Means based on a 5-point Likert scale

### Experience Use History

Experience Use History (EUH) refers to ones prior experience in relation to the activity under investigation. This research examined four primary variables related to EUH; sum number of wilderness/backcountry areas camped in, first year camped in wilderness/backcountry, sum number of wilderness/backcountry trips per year, and past overnight backcountry/wilderness at the study area under investigation, results of which are summarized in Table 11. As evident in the table, 66.3% of ONP respondents indicated they have camped overnight before in the park verse 24.5% of GNP respondents and 37.5% of CINS respondents. ONP respondents also have been overnight backpacking longer and have visited more wilderness/backcountry areas than their GNP and CINS counterparts. However, GNP respondents indicate taking more trips per year (2.9) than respondents from the other units.

Table 11

## Backcountry / wilderness overnight camping experience use history of respondents

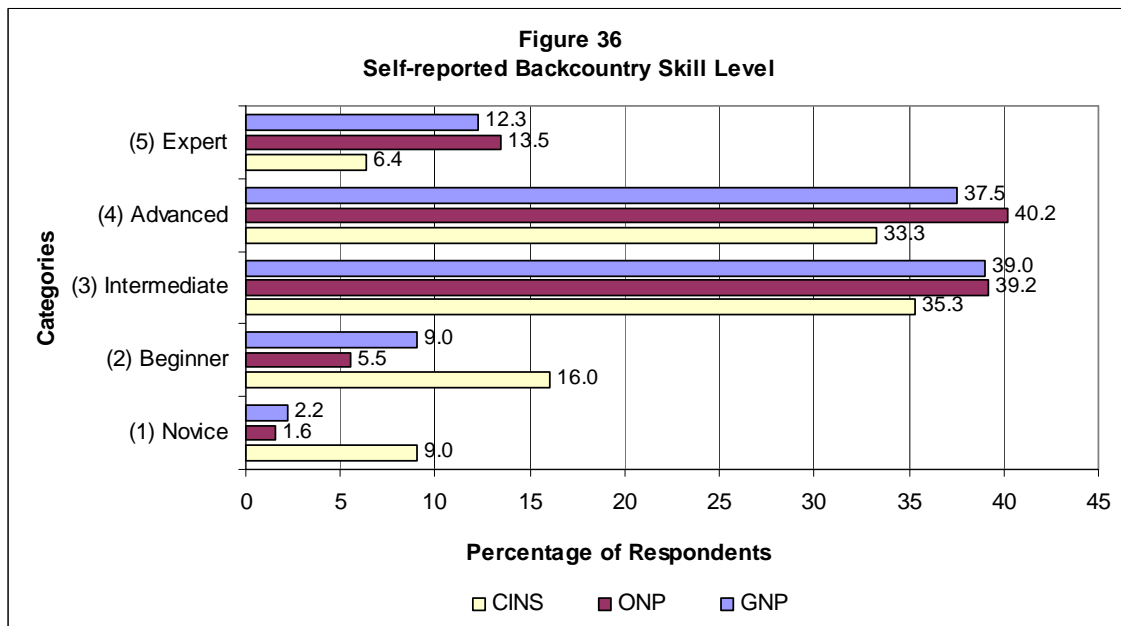
Unit	Variable	N	Percent	Mean	SD	Range
	Was this your first overnight trip in the backcountry of GNP?					
	Yes	210	75.5	--	--	--
	No	68	24.5	--	--	--
	how many previous overnight backcountry trips have you made to GNP?	67	--	13.3	26.2	1-100
	If no... in what year did you first overnight camp in the backcountry of GNP?	68	--	1997.9	11.1	1955-2007
GNP	in an average year, how many overnight backcountry trips do you take at GNP?	59	--	2.0	2.4	0-15
	About how many different wilderness/backcountry areas have you camped in?	270	--	11.4	15.7	0-100
	In what year did you first overnight camp in a wilderness/backcountry area?	273	--	1993.6	12.0	1955-2007
	On average, how many overnight wilderness/backcountry trips do you take in a year?	272	--	2.9	4.3	0-30
	Was this your first overnight trip in the backcountry of ONP?					
	Yes	105	33.7	--	--	--
	No	207	66.3	--	--	--
	how many previous overnight backcountry trips have you made to ONP?	201	--	14.6	29.3	1-200
	If no... in what year did you first overnight camp in the backcountry of ONP?	204	--	1989.1	14.3	1950-2007
ONP	in an average year, how many overnight backcountry trips do you take at ONP?	203	--	1.4	1.6	0-12
	About how many different wilderness/backcountry areas have you camped in?	291	--	14.7	21.8	0-200
	In what year did you first overnight camp in a wilderness/backcountry area?	302	--	1985.3	14.4	1950-2007
	On average, how many overnight wilderness/backcountry trips do you take in a year?	307	--	2.7	2.9	0-25
	Was this your first overnight camping to CINS?					
	Yes	100	62.5	--	--	--
	No	60	37.5	--	--	--
	how many previous overnight camping trips have you made to CINS?	60	--	4.8	5.5	1-30
	If no... what year did you first overnight camp in the backcountry of CINS?	58	--	1998.4	8.9	1976-2007
CINS	in an average year, how many overnight camping trips do you take to CINS?	56	--	1.2	1.2	0-8
	About how many different wilderness/backcountry areas have you camped in?	152	--	10.4	20.2	0-200
	In what year did you first overnight camp in a wilderness/backcountry area?	146	--	1991.5	13.1	1954-2007
	On average, how many overnight wilderness/backcountry trips do you take in a year?	154	--	2.7	3.7	0-25

Also explored under the topic of EUH was respondents' self-reported skill level regarding backcountry travel. As can be viewed in Table 12 and in Figure 36, the mean score for backcountry skill level for ONP visitors was the highest (M=3.59; intermediate-advanced) while CINS attracted the least skilled (M=3.12; intermediate). CINS respondents also have the most variability in self-reported skill level (standard deviation = 1.05) with 9% classifying as themselves as 'novice' compared to 2.2% and 1.6% at GNP and ONP, respectively.

Table 12  
Frequencies (N & %), means, and standard deviations regarding self-reported backcountry skill level

Item	Unit	N	Mean <sup>1</sup>	SD	(1) Novice	(2) Beginner	(3) Intermediate	(4) Advanced	(5) Expert
<i>Regarding the skills necessary for backcountry travel, I consider myself a:</i>	GNP	277	3.49	0.90	2.2	9.0	39.0	37.5	12.3
	ONP	311	3.59	0.85	1.6	5.5	39.2	40.2	13.5
	CINS	156	3.12	1.05	9.0	16.0	35.3	33.3	6.4

<sup>1</sup> - mean based on 5-point scale



## Diffusion of Innovation Theory Results: Diffusion and Perceived Effectiveness of the Leave No Trace Message

The extent of diffusion and perceived efficacy of the LNT message was examined utilizing a variety of question formats. This section provides details regarding variables related to awareness of minimum-impact practices and the LNT message specifically; initial and primary sources of the LNT message; diffusion sources and perceived efficacy of such sources, and self-reported knowledge of LNT practices.

### *Awareness of the Leave No Trace Message*

Respondents were asked to indicate if they had ever heard of minimum-impact practices, and if so, the year (results in Table 13). Eighty eight percent (88%) of GNP respondents, 87.7% of ONP respondents and 76.4% of CINS respondents indicated having heard of minimum-impact backcountry practices. Next respondents were asked if they had ever heard of LNT, and if so, the year. 97.4% of ONP respondents, 94% of GNP respondents and 89% of CINS respondents indicated they have heard of LNT, suggesting the program is at least superficially diffused amongst overnight backcountry travelers in the three NPS Units. This finding also suggests that respondents incorrectly differentiate between the terms ‘minimum-impact’ and ‘Leave No Trace.’ Mean year respondents indicated first hearing of LNT ranged from 1992 at ONP to 1995 at both GNP and ONP.

Table 13  
Self-reported awareness of minimum-impact / LNT principles

	Unit		N	Percent		N	Mean <sup>1</sup>	SD
<i>Have you ever heard of minimum-impact backcountry ethics / practices?</i>	GNP	No	33	12.0				
		Yes	242	88.0	<i>If yes -&gt;</i>	209	1996.2	10.0
	ONP	No	38	12.3				
		Yes	272	87.7	<i>If yes -&gt;</i>	226	1991.6	11.7
	CINS	No	38	23.6				
		Yes	123	76.4	<i>If yes -&gt;</i>	100	1995.2	10.2
<i>Have you ever heard of Leave No Trace?</i>	GNP	No	17	6.2				
		Yes	258	93.8	<i>If yes -&gt;</i>	216	1995.8	10.3
	ONP	No	7	2.2				
		Yes	304	97.4	<i>If yes -&gt;</i>	234	1992.5	11.0
	CINS	No	17	10.6				
		Yes	144	89.4	<i>If yes -&gt;</i>	115	1995.6	9.5

<sup>1</sup>- Mean value represents the average year respondents reported first hearing of minimum-impact / LNT

***Sources of the Leave No Trace Message***

As a follow-up to the questions reported above, respondents were asked to indicate both their initial and primary sources of LNT information (Table 14). Family and Friends was the most popular selection regarding respondents’ initial source of LNT information, indicated by 24.4 to 29.2 percent of respondents depending on NPS Unit. Park outreach strategies, including personnel and information kiosks and literature were indicated by 26.8% of both GNP and respondents as being the initial source of LNT information. This number is higher than the 22.2% of CINS respondents who indicated park outreach strategies as their initial source of LNT information.

Table 14  
Frequencies (N & %) regarding initial source of LNT information

Where or from whom did you first hear of Leave No Trace?	GNP		ONP		CINS	
	N	Percent	N	Percent	N	Percent
Family / Friends	75	29.2	83	28.1	33	24.4
Park personnel / Park education talk	35	13.6	17	5.8	15	11.1
Information kiosk / Park literature	34	13.2	62	21.0	15	11.1
Popular media (magazine, book)	34	13.2	32	10.8	17	12.6
Class / Course	20	7.8	25	8.5	9	6.7
Boy / Girl Scouts	24	9.3	37	12.5	33	24.4
Internet in general	3	1.2	4	1.4	3	2.2
LNT Webpage	1	0.4	2	0.7	0	0.0
Other	31	12.1	33	11.2	10	7.4

Respondents were also asked to indicate who / what has been their primary source of LNT information. As evident in Table 15, family and friends still play an important role in disseminating the message, however across all units, park outreach strategies (park personnel, park education talks, information kiosks and printed literature) were indicated to be their primary source of LNT information by the highest percentage of respondents (41.6% of GNP respondents, 34.6% of ONP respondents, and 29.4% of CINS respondents). At CINS, Boy / Girl Scouts were indicated by 20.9% of respondents as serving as primary source of LNT information. The LNT, Inc., webpage appears to have little influence on those surveyed in this study with only n=10 indicating it as their primary source of LNT information.

Table 15

Frequencies (N &amp; %) regarding primary source of LNT information

What has been your primary source of Leave No Trace information?	GNP		ONP		CINS	
	N	Percent	N	Percent	N	Percent
Family / Friends	47	18.6	78	26.4	25	18.7
Park personnel / Park education talk	58	22.9	31	10.5	22	16.4
Information kiosk / Park literature	47	18.6	71	24.1	18	13.4
Popular media (magazine, book)	33	13.0	25	8.5	16	11.9
Class / Course	16	6.3	17	5.8	8	6.0
Boy / Girl Scouts	16	6.3	25	8.5	28	20.9
LNT Webpage	5	2.0	3	1.0	2	1.5
Internet in general	10	4.0	16	5.4	11	8.2
Other	21	8.3	29	9.8	4	3.0

### *NPS Specific LNT Diffusion Sources*

Respondents were asked to indicate (yes or no) if they had; spoken with a ranger regarding LNT, watched a video regarding LNT, reviewed any printed park material regarding LNT, or reviewed the webpage of the NPS Unit they planned to visit to learn about LNT. If they answered yes, they were asked to indicate, via a scale ranging from 0 (nothing) to 6 (an extensive amount), how much they learned about LNT from the experience (see Table 16 and Figure 37). In GNP, over 3 out of 4 individuals indicated having spoken with a ranger regarding LNT prior to embarking on the trip. This contrasts significantly with ONP and CINS where 52.8% and 45.2% of respondents indicated having spoken with a ranger regarding LNT prior to the trip. Of those who spoke with a ranger, respondents from GNP indicated learning the most (3.31 verse 2.84 at ONP and 3.10 at CINS). Respondents were also asked if they viewed a video regarding minimum-impact / LNT and if so how much they learned from it. ONP does not show a video addressing LNT to backcountry visitors. GNP has a video dedicated to backcountry travel which was viewed by 86.2% of respondents. The video was also perceived as being informative with a mean score of 3.86, the highest of all mean scores for the variables presented in Table 16 (note the mean score for CINS under the video category is not reliable with only n=20 respondents). GNP visitors also indicated reviewing printed park media more often and learning more from it than their ONP and CINS counterparts. NPS webpage's appear to be only moderately useful in disseminating LNT information amongst overnight backcountry visitors. While those who visited the NPS Units webpage indicated learning moderate amounts from it (3.54 at GNP, 3.33 at ONP, and 3.52 at CINS), fewer than

42% of respondents at any of the parks reported visiting the web for information on LNT (Table 16 contains complete results).

Table 16

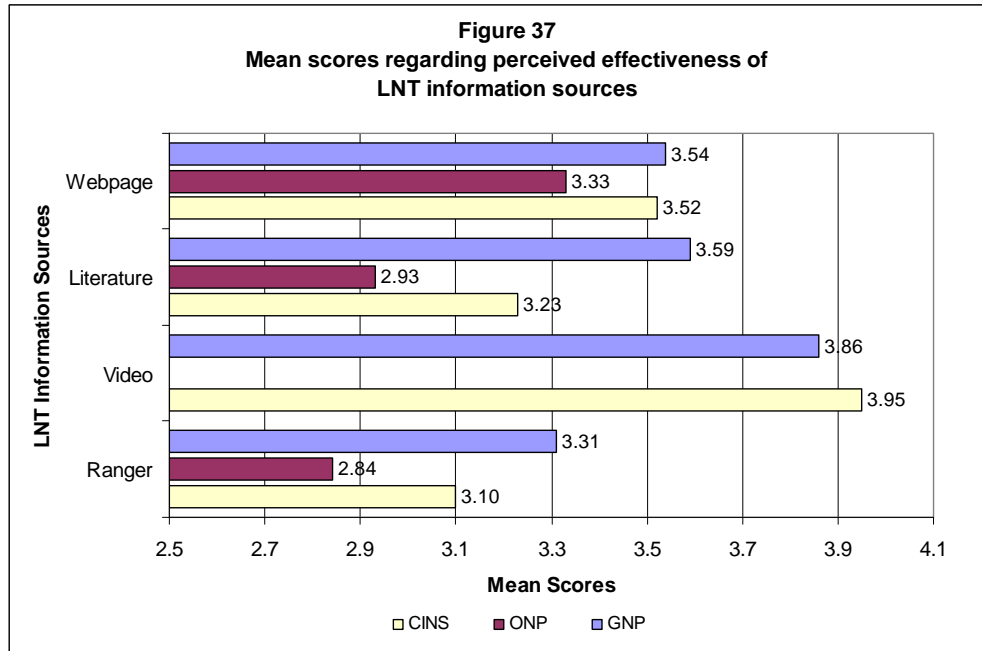
Frequencies (N & %), means and standard deviations regarding LNT information sources

<i>Did you do any of the following before your recent trip?</i>					<i>If yes --&gt;, how much did you learn about minimum-impact / LNT from this experience?</i>		
	Unit		N	Percent	N	Mean <sup>1</sup>	SD
Speak with a ranger regarding minimum-impact / LNT practices?	GNP	No	64	23.3	<i>If yes --&gt;</i>	211	3.31
		Yes	211	76.6			
	ONP	No	145	47.2	<i>If yes --&gt;</i>	162	2.84
		Yes	162	52.8			
	CINS	No	85	54.8	<i>If yes --&gt;</i>	68	3.10
		Yes	70	45.2			
Watch a video regarding minimum-impact / LNT practices?	GNP	No	38	13.8	<i>If yes --&gt;</i>	237	3.86
		Yes	237	86.2			
	ONP	No	307	100.0	<i>If yes --&gt;</i>	--	--
		Yes	0	0.0			
	CINS	No	132	86.3	<i>If yes --&gt;</i>	20 <sup>2</sup>	3.95
		Yes	21	13.7			
Review any printed park literature regarding minimum-impact / LNT practices?	GNP	No	78	28.4	<i>If yes --&gt;</i>	197	3.59
		Yes	197	71.6			
	ONP	No	140	45.6	<i>If yes --&gt;</i>	167	2.93
		Yes	167	54.4			
	CINS	No	59	38.1	<i>If yes --&gt;</i>	94	3.23
		Yes	96	61.9			
Visit the XNP website to learn about minimum-impact / LNT practices?	GNP	No	160	58.6	<i>If yes --&gt;</i>	113	3.54
		Yes	113	41.4			
	ONP	No	245	79.8	<i>If yes --&gt;</i>	61	3.33
		Yes	62	20.2			
	CINS	No	91	58.7	<i>If yes --&gt;</i>	62	3.52
		Yes	64	41.3			

<sup>1</sup> - Mean scores regarding amount learned from interaction (0=nothing, 6=extensive amount)

<sup>2</sup> - Caution should be exercised in interpreting this mean value as only 20 individuals responded to this question





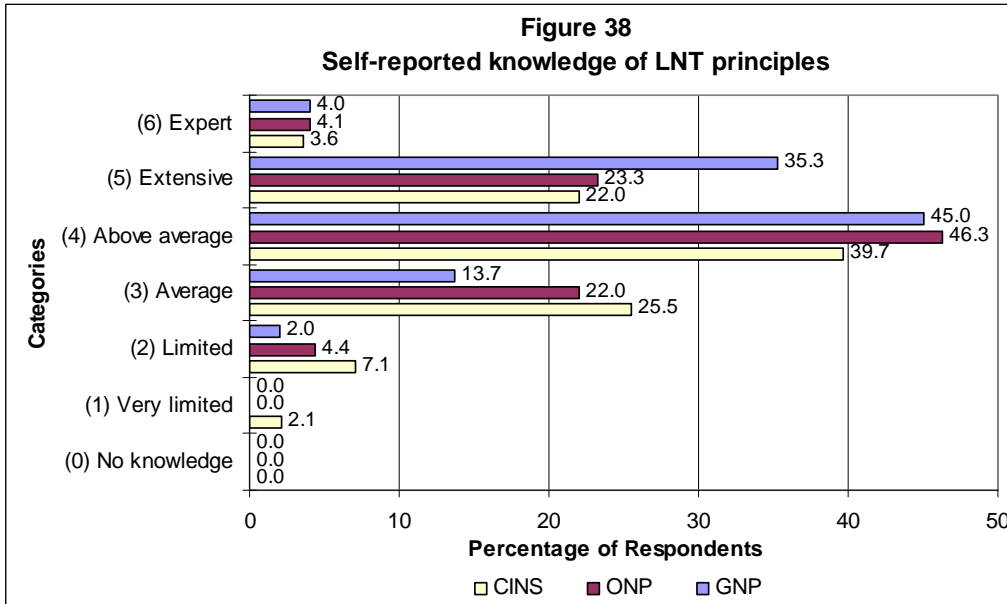
***Self-Reported Knowledge of LNT Practices***

Respondents were asked to self-report on their perceived knowledge of the LNT Principles. As evident in Table 17 below, GNP visitors reported the highest level of knowledge of LNT Principles, followed by ONP then CINS. Of note, few if any respondents indicated having ‘no knowledge’ or ‘very limited’ knowledge of the LNT Principles. Figure 38 represents the frequency distribution of respondents’ self-reported knowledge of LNT by NPS Unit.

Table 17  
Frequencies (N & %), means, and standard deviations regarding self-reported knowledge of LNT practices

Item	Unit	N	Mean <sup>1</sup>	SD	(0) No knowledge	(1) Very limited	(2) Limited	(3) Average	(4) Above average	(5) Extensive	(6) Expert
<i>How would you describe your current knowledge of Leave No Trace Practices?</i>	GNP	249	4.26	0.8	0.0	0.0	2.0	13.7	45.0	35.3	4.0
	ONP	296	4.01	0.9	0.0	0.0	4.4	22.0	46.3	23.3	4.1
	CINS	141	3.83	1.0	0.0	2.1	7.1	25.5	39.7	22.0	3.6

<sup>1</sup> - Mean scores regarding self-reported knowledge of LNT practices (0=no knowledge to 6=expert)



***Global Perceptions of LNT***

*Global Perceptions of LNT: Individual Items*

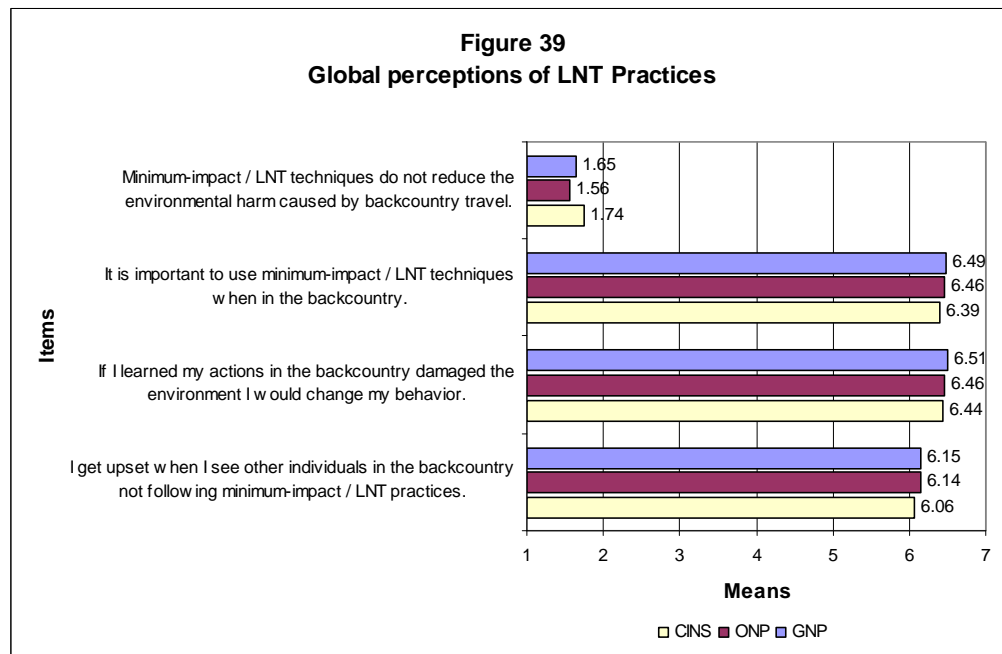
In order to address salient global attitudes regarding the perceived efficacy of LNT as a program, respondents were asked to indicate their level of agreement with the four statements listed in Table 18. Results across the three NPS Units are nearly identical with respondents overwhelmingly indicating positive perceptions of the efficacy of LNT as a program. Figure 39 illustrates mean scores related to the four global perceptions of LNT items in Table 18.

Table 18

Frequencies (N & %), means, and standard deviations of global perceptions regarding the perceived effectiveness of the LNT program

Item	Unit	N	Mean <sup>1</sup>	SD							
					(1) Strongly Disagree	(2)	(3)	(4) Neutral	(5)	(6)	(7) Strongly Agree
<i>Minimum-impact / LNT techniques do not reduce the environmental harm caused by backcountry travel.</i>	GNP	256	1.65	1.3	67.6	21.4	3.1	1.6	1.6	2.0	2.7
	ONP	302	1.56	1.6	68.9	21.5	3.3	1.7	1.6	2.0	1.0
	CINS	141	1.74	1.7	61.7	21.3	7.1	2.8	5.0	2.1	0.0
<i>It is important to use minimum-impact / LNT techniques when in the backcountry.</i>	GNP	257	6.49	1.2	1.9	1.6	0.4	1.2	3.8	19.1	72.0
	ONP	302	6.46	1.2	1.7	2.0	1.3	1.3	1.0	22.5	70.2
	CINS	142	6.39	1.2	2.8	0.7	0.7	2.1	4.9	21.2	67.6
<i>If I learned my actions in the backcountry damaged the environment I would change my behavior.</i>	GNP	257	6.51	0.9	0.4	0.8	0.4	1.7	4.3	27.4	65.0
	ONP	302	6.46	0.9	0.0	0.7	1.0	3.0	5.0	27.4	62.9
	CINS	142	6.44	1.0	0.0	1.4	0.7	2.8	6.3	23.3	65.5
<i>I get upset when I see other individuals in the backcountry not following minimum-impact / LNT practices.</i>	GNP	257	6.15	1.1	0.4	0.8	1.6	4.7	12.1	34.1	46.3
	ONP	303	6.14	1.1	0.7	1.0	2.0	4.6	12.5	30.4	48.8
	CINS	142	6.06	1.2	1.4	2.1	0.7	3.5	15.5	30.3	46.5

<sup>1</sup> - Means based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree)



### *Global Perceptions: Composite Measure*

Social researchers commonly construct what are known as composite measures. A composite measure is a numerical summation of variables (two or more) that allows a more simplistic view of mean scores and dispersion of scores (Tabachnick & Fidell, 2001). The four individual measures in Table 18 were combined into a composite measure of overall LNT attitude (in effect a ‘global score’); scores of which are depicted below in Table 19 (note the first item ‘Minimum-impact/LNT techniques do not reduce the environmental harm caused by backcountry travel’ was reverse coded before creation of the composite measure). Respondents across NPS Units are nearly identical in their overall attitudes regarding the efficacy of the LNT Program, which is overwhelmingly positive.

Table 19  
Means, standard deviations, and ranges of composite measure of global perceptions regarding the perceived effectiveness of the LNT program

Item	Unit	N	Mean <sup>1 2</sup>	SD	Range
Composite Measure of Global Attitudes re: LNT <sup>1</sup>	GNP	256	6.38	0.68	3.5 - 7
	ONP	300	6.38	0.78	3.3 - 7
	CINS	141	6.30	0.76	3.8 - 7

<sup>1</sup> - Composite measure of 4 global items in Table 18 (1st item recoded) divided by 4

<sup>2</sup> - Higher mean score reflects stronger attitude (global) regarding efficacy of LNT program

### **Theory of Planned Behavior**

Recall from Section III that the Theory of Planned Behavior (TPB) contends that behavior is best predicted by an individual’s intention to engage in said behavior. Intentions are a function of the interaction of attitudes, normative influence, and levels of perceived behavior control (or efficacy). The following portion of this study examines findings on the TPB constructs detailed above.

### ***Attitudes Regarding LNT Practices***

Attitudes regarding various backcountry practices were explored via 23 different items. These practices were then grouped by LNT Principle in an attempt to cover the ‘scope’ of each principle (DeVellis, 2003). The items were anchored via a 7-point scale ranging from 1=not appropriate to 7=very appropriate. For the reader of this report evaluating the findings, it is important to note that all behaviors listed in this section are viewed as ‘inappropriate’ in the majority of backcountry contexts. For instance, trails are widened by hikers walking around muddy spots and walking abreast of others. Both of these behaviors are considered inappropriate in the eyes of LNT.

*Frequency and Descriptive Statistics*

LNT Principle #2: Travel and Camp on Durable Surfaces

Attitudes towards Travel and Camp on Durable Surfaces, LNT Principle #2, were evaluated by eight statements, results of which are provided in Table 20. Results across NPS Unit vary widely. For example, ‘moving rocks and/or logs to make a campsite more comfortable’ is viewed by GNP respondents as slightly inappropriate (mean = 3.59) but slightly appropriate by both ONP and CINS respondents (means = 4.25 and 4.35 respectively). Respondents also appear to be uncertain regarding the appropriateness of certain behaviors; ‘camping along the edge of a stream or lake’ and ‘walking around muddy spots on the trail’ each had mean scores near 4 (neutral).

Table 20

Frequencies (N & %), means, and standard deviations for attitudes regarding LNT principle #2: travel and camp on durable surfaces

Item	Unit	N	Mean <sup>1,2</sup>	SD							
					(1) Very Inappropriate	(2)	(3)	(4) Neutral	(5)	(6)	(7) Very Appropriate
<i>Walking around muddy spots on the trail.</i>	GNP	273	4.31	1.7	6.2	9.9	13.9	24.2	19.8	14.7	11.4
	ONP	308	4.02	1.6	6.8	10.7	18.8	25.6	18.5	14.3	5.2
	CINS	157	4.67	1.5	2.5	8.9	7.6	21.7	28.7	20.4	10.2
<i>Hiking side by side with my friends on existing backcountry trails.</i>	GNP	275	2.88	1.7	25.1	24.0	16.7	18.9	6.9	4.0	4.4
	ONP	308	2.93	1.6	22.7	22.7	19.2	19.5	8.4	4.9	2.6
	CINS	159	3.55	1.6	11.3	20.8	10.7	32.1	11.9	10.7	2.5
<i>Camping along the edge of a stream or lake.</i>	GNP	271	4.22	1.9	11.4	10.7	11.8	22.9	13.7	12.9	16.6
	ONP	309	3.78	1.9	15.5	16.5	12.3	18.8	12.9	14.9	9.1
	CINS	159	4.22	1.9	10.1	13.8	13.8	10.7	22.0	17.0	12.6
<i>Moving rocks from where I plan to place my tent.</i>	GNP	275	4.37	1.6	6.5	8.4	13.1	21.5	22.5	20.4	7.6
	ONP	308	4.74	1.7	5.2	6.5	12.3	13.6	25.6	21.1	15.6
	CINS	159	4.94	1.5	4.4	3.1	8.8	16.4	24.5	30.2	12.6
<i>Moving rocks and/or logs to make a campsite more comfortable.</i>	GNP	273	3.59	1.7	12.8	18.7	16.8	19.0	18.3	9.2	5.1
	ONP	308	4.25	1.7	7.8	9.1	15.9	17.2	26.0	15.3	8.8
	CINS	158	4.35	1.6	7.0	7.0	15.8	18.4	25.3	19.6	7.0
<i>When camping in heavily used areas, placing the tent in an undisturbed spot.</i>	GNP	271	2.14	1.6	49.4	22.1	11.1	8.5	3.3	1.8	3.7
	ONP	306	2.07	1.4	46.1	26.8	13.1	7.5	3.3	1.6	1.6
	CINS	158	2.81	1.7	26.6	25.9	17.1	10.8	11.4	6.3	1.9
<i>In popular backcountry areas, camping where no one has camped before.</i>	GNP	273	1.77	1.2	60.1	20.9	8.1	7.3	1.8	0.7	1.1
	ONP	309	1.77	1.2	61.5	18.1	9.7	6.1	3.2	0.0	1.3
	CINS	159	2.31	1.4	40.9	20.8	15.7	15.1	5.0	1.9	0.6
<i>Camping two nights in a pristine camp.</i>	GNP	269	4.90	1.7	6.3	3.0	6.7	27.5	16.4	15.2	24.9
	ONP	301	4.67	1.8	8.0	6.0	7.6	26.6	14.0	16.9	20.9
	CINS	153	5.07	1.4	2.6	1.3	4.6	32.0	17.0	22.2	20.3

<sup>1</sup> - Means based on a 7-point Likert scale (1=very inappropriate, 4=neutral, 7=very appropriate)

<sup>2</sup> - Lower mean score reflects stronger attitude regarding inappropriateness of behavior in question

LNT Principle #3: Dispose of Waste Properly

Table X displays results relating to LNT Principle #3, Dispose of Waste Properly. As evident in Table 21, respondents across NPS Units are fairly consistent in their attitudes towards proper waste management practices. Of particular interest for park managers is the attitude that ‘burying used toilet paper’ is viewed as slightly appropriate in all units. Also of interested are attitudes regarding urinating on vegetation. Particularly in alpine environments, urinating on vegetation deposits salts which are later dug up by animals, sometimes killing the plant.

Table 21

Frequencies (N & %), means, and standard deviations for attitudes regarding LNT principle #3: dispose of waste properly

Item	Unit	N	Mean <sup>1,2</sup>	SD							
					(1) Very Inappropriate	(2)	(3)	(4) Neutral	(5)	(6)	(7) Very Appropriate
<i>Burying used toilet paper.</i>	GNP	274	4.17	2.2	17.5	13.9	9.1	12.4	11.3	12.0	23.7
	ONP	308	4.46	2.1	14.3	8.8	11.7	12.0	13.6	14.3	25.3
	CINS	158	4.75	2.0	10.1	3.2	13.3	17.1	14.6	15.2	26.6
<i>Urinating on vegetation.</i>	GNP	273	3.15	1.6	21.2	18.7	15.8	23.4	12.8	5.1	2.9
	ONP	304	3.46	1.7	16.1	15.8	18.8	23.4	11.2	11.2	3.6
	CINS	159	3.70	1.9	19.5	10.1	11.9	23.3	15.7	13.8	5.7
<i>Burning paper trash in the campfire.</i>	GNP	274	3.16	1.9	28.8	14.6	11.3	19.0	13.1	9.5	3.6
	ONP	309	3.84	2.1	23.6	8.1	10.0	13.9	18.4	15.2	10.7
	CINS	159	4.08	1.9	17.0	8.8	10.7	11.3	26.4	16.4	9.4
<i>Using soap in streams as long as there are currents to help dilute the suds.</i>	GNP	275	1.89	1.2	53.8	23.3	10.5	7.3	3.3	1.5	0.4
	ONP	310	1.95	1.3	52.3	22.3	12.9	6.8	2.9	2.3	0.6
	CINS	158	2.13	1.4	46.2	24.7	12.7	8.9	3.2	3.2	1.3
<i>Depositing human waste on top of the ground so it will decompose quickly.</i>	GNP	275	1.55	1.1	72.4	14.2	5.1	5.1	1.5	1.1	0.7
	ONP	309	1.58	1.1	69.9	15.9	5.5	6.1	1.3	0.6	0.6
	CINS	159	1.86	1.3	61.0	13.2	11.3	9.4	3.8	1.3	0.0
<i>Disposing of dishwater in streams or lakes.</i>	GNP	275	1.52	0.9	69.5	16.4	8.0	5.1	0.7	0.4	0.0
	ONP	310	1.53	1.0	71.0	15.8	6.8	3.9	1.3	0.6	0.6
	CINS	159	1.45	0.9	73.6	11.9	10.1	4.4	0.0	0.0	0.0

<sup>1</sup> - Means based on a 7-point Likert scale (1=very inappropriate, 4=neutral, 7=very appropriate)

<sup>2</sup> - Lower mean score reflects stronger attitude regarding inappropriateness of behavior in question

#### LNT Principle #4: Minimize Campfire Impacts

Table 22 provides descriptive data on respondents views regarding various practices related to LNT Principle #4, Minimize Impact from Campfires. Campfires have long been a part of backcountry travel and the results of this study show wide dispersion of scores on this item (see standard deviations for item ‘having a campfire’). Attitudes regarding other campfire-oriented behaviors are similarly varied. The item ‘building a fire ring if one is not present’ received mean scores across all units below 4, however a substantial proportion of respondents in all units indicated this as an appropriate behavior.

Table 22

Frequencies (N & %), means, and standard deviations for attitudes regarding LNT principle #4: minimize campfire impacts

Item	Unit	N	Mean <sup>1,2</sup>	SD							
					(1) Very Inappropriate	(2)	(3)	(4) Neutral	(5)	(6)	(7) Very Appropriate
<i>Having a campfire.</i>	GNP	269	4.15	1.7	8.9	10.0	6.7	38.3	13.8	12.3	10.0
	ONP	305	4.10	1.8	14.4	7.9	7.2	29.5	14.8	17.0	9.2
	CINS	158	4.37	1.8	10.8	6.3	8.9	23.4	22.8	15.2	12.7
<i>Cooking over a campfire in the backcountry.</i>	GNP	274	3.84	1.9	15.3	12.4	10.2	28.5	13.1	9.5	10.9
	ONP	308	3.72	1.9	20.1	9.7	10.1	27.6	11.4	12.3	8.8
	CINS	159	4.21	1.8	11.9	9.4	9.4	22.6	20.8	13.2	12.6
<i>Building a fire ring if one is not present.</i>	GNP	273	2.41	1.9	52.0	14.7	8.8	7.7	4.8	5.5	6.6
	ONP	308	2.80	2.0	44.8	11.4	7.8	13.3	7.5	8.1	7.1
	CINS	159	3.25	2.3	38.4	10.7	7.5	10.1	10.7	10.1	12.6
<i>Leaving charred wood contained in the fire ring.</i>	GNP	272	3.88	1.9	16.2	11.0	10.3	26.8	11.8	15.1	8.8
	ONP	307	4.13	1.9	15.6	7.5	6.5	28.3	16.0	12.7	13.4
	CINS	157	4.55	1.7	7.0	7.6	8.3	26.8	16.6	18.5	15.3

<sup>1</sup> - Means based on a 7-point Likert scale (1=very inappropriate, 4=neutral, 7=very appropriate)

<sup>2</sup> - Lower mean score reflects stronger attitude regarding inappropriateness of behavior in question

LNT Principle #5: Leave What You Find

As seen in Table 23, respondents were asked to comment on the appropriateness of leaving what they might find in the backcountry, LNT Principle #5. Mean scores ranged from 2.91 in GNP to 3.70 at CINS. Collecting seashells and other beach artifacts is popular at both CINS and ONP and is not discouraged by either agency, likely leading to these scores being higher than their GNP counterparts.

Table 23

Frequencies (N & %), means, and standard deviations for attitudes regarding LNT principle #5: leave what you find

Item	Unit	N	Mean <sup>1,2</sup>	SD							
					(1) Very Inappropriate		(4) Neutral			(7) Very Appropriate	
<i>Keeping a single small item like a rock or feather as a souvenir.</i>	GNP	275	2.91	1.7	28.4	20.4	15.6	16.4	9.8	5.8	3.6
	ONP	309	3.52	1.7	17.5	14.9	13.9	24.9	13.6	11.0	4.2
	CINS	158	3.70	1.8	15.8	15.2	12.0	20.9	19.0	10.8	6.3

<sup>1</sup> - Means based on a 7-point Likert scale (1=very inappropriate, 4=neutral, 7=very appropriate)

<sup>2</sup> - Lower mean score reflects stronger attitude regarding inappropriateness of behavior in question

LNT Principle #6: Be Considerate of Other Visitors

LNT Principle #6, Respect Other Visitors, was evaluated via two statements provided below in Table 24. The LNT Principles maintain that groups should be kept small and large groups broken into small groups. When responding to this item, ONP respondents felt large groups were the least appropriate when compared to their GNP and CINS counterparts. Not surprisingly, based on mean group size (see Table 9), CINS respondents were nearly neutral (mean=3.81) regarding their views of large groups camping in wilderness.

Table 24

Frequencies (N & %), means, and standard deviations for attitudes regarding LNT principle #6: be considerate of other visitors

Item	Unit	N	Mean <sup>1,2</sup>	SD							
					(1) Very Inappropriate		(4) Neutral			(7) Very Appropriate	
<i>Taking a break along the edge of a trail.</i>	GNP	272	5.68	1.4	1.5	2.2	3.3	15.1	15.4	23.2	39.3
	ONP	304	5.69	1.4	1.6	0.3	2.6	17.1	17.1	23.4	37.8
	CINS	158	5.51	1.5	3.2	1.9	4.4	10.8	22.8	25.3	31.6
<i>Camping with large groups (8 or more people) in the backcountry.</i>	GNP	274	3.10	1.7	22.3	18.6	16.1	26.3	7.3	5.5	4.0
	ONP	309	2.98	1.6	23.0	20.1	18.8	23.6	6.8	4.2	3.6
	CINS	159	3.81	1.6	6.3	15.7	20.8	28.3	13.2	8.2	7.5

<sup>1</sup> - Means based on a 7-point Likert scale (1=very inappropriate, 4=neutral, 7=very appropriate)

<sup>2</sup> - Lower mean score reflects stronger attitude regarding inappropriateness of behavior in question



LNT Principle #7: Respect Wildlife

The seventh LNT Principle, Respect Wildlife, was evaluated via the two items listed below in Table 25. Scores between GNP and ONP were quite similar across both items while CINS visitors indicating slightly higher scores for both items. Overall, respondents indicated that the behaviors were very inappropriate.

Table 25

Frequencies (N & %), means, and standard deviations for attitudes regarding LNT principle #7: respect wildlife

Item	Unit	N	Mean <sup>1,2</sup>	SD							
					(1) Very Inappropriate		(4) Neutral			(7) Very Appropriate	
<i>Dropping food on the ground to provide wildlife a food source.</i>	GNP	275	1.19	0.7	89.1	7.3	1.8	1.1	0.0	0.0	0.7
	ONP	310	1.19	0.7	87.1	10.3	1.0	1.0	0.0	0.0	0.6
	CINS	159	1.33	0.8	79.9	11.3	5.7	2.5	0.6	0.0	0.0
<i>Feeding wildlife.</i>	GNP	273	1.16	0.6	91.2	4.8	2.2	1.5	0.0	0.0	0.4
	ONP	310	1.21	0.8	89.4	6.1	2.3	0.6	0.6	0.0	1.0
	CINS	159	1.30	0.7	81.8	8.8	6.9	2.5	0.0	0.0	0.0

<sup>1</sup> - Means based on a 7-point Likert scale (1=very inappropriate, 4=neutral, 7=very appropriate)

<sup>2</sup> - Lower mean score reflects stronger attitude regarding inappropriateness of behavior in question

*Composite Attitude Measures by LNT Principle*

To provide a more simplistic view of the data, composite scores were calculated for the data presented in Table 26. The composite was created by summing mean values and dividing by the number of categories. Across all LNT Principles, CINS visitors were highest on mean scores. This indicates their attitudes are less strong than their ONP and GNP counterparts regarding the appropriateness of various behaviors as they relate to the LNT Practices. Figure 40 visually depicts mean scores presented in Table 26.

Table 26

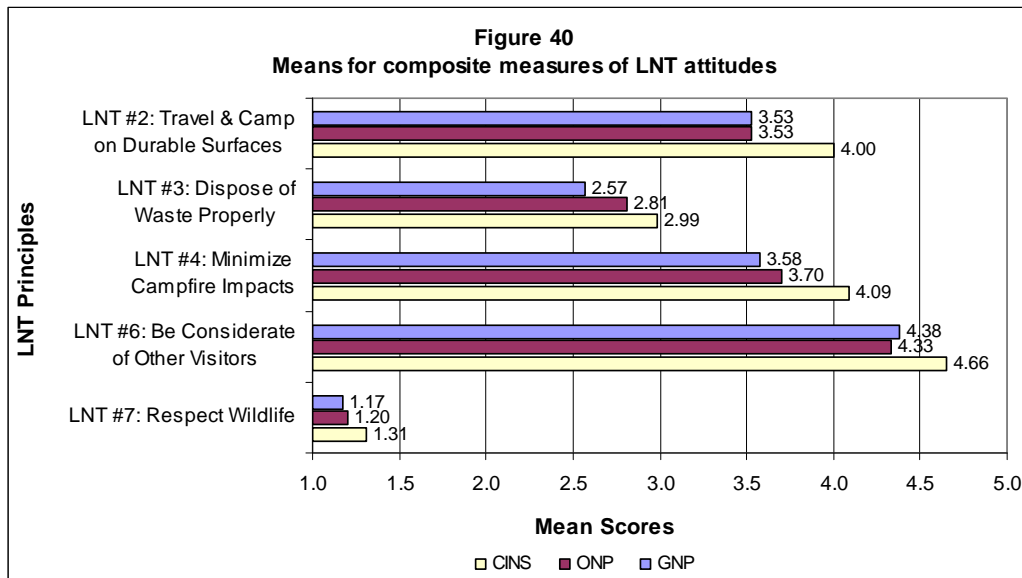
Means and standard deviations for composite measures of LNT attitudes by LNT principle

Composite Measure <sup>1 3</sup>	Unit	N	Mean <sup>2</sup>	SD
LNT Principle #2: Travel & Camp on Durable Surfaces	GNP	258	3.53	0.94
	ONP	290	3.53	0.92
	CINS	149	4.00	0.97
LNT Principle #3: Dispose of Waste Properly	GNP	271	2.57	0.90
	ONP	300	2.81	0.93
	CINS	157	2.99	0.91
LNT Principle #4: Minimize Campfire Impacts	GNP	264	3.58	1.26
	ONP	300	3.70	1.48
	CINS	156	4.09	1.35
LNT Principle #6: Be Considerate of Other Visitors	GNP	271	4.38	1.21
	ONP	303	4.33	1.17
	CINS	158	4.66	1.18
LNT Principle #7: Respect Wildlife	GNP	273	1.17	0.57
	ONP	310	1.20	0.62
	CINS	159	1.31	0.68

<sup>1</sup> - Composite measure of items in Table 20 - 25 grouped by LNT Principle

<sup>2</sup> - Lower mean score reflects stronger attitude regarding LNT Principle

<sup>3</sup> - Composite created by summing items and dividing by total number of items



*Global Composite Attitudinal Measure*

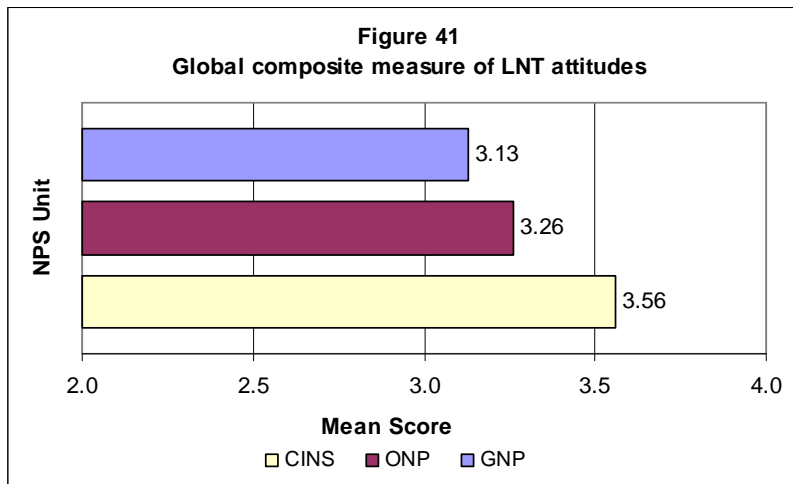
To present the most simplistic view of attitudes regarding backcountry practices as they relate to LNT Principles, a global composite measure was created and is presented in Table 27. This measure was created by summing all attitudinal items presented in Tables 20-25 and dividing by 23 (total number of items). GNP respondents had the lowest (and therefore strongest) attitudes regarding compliance with the LNT principles. CINS respondents had the highest, and therefore weakest, attitudes regarding attitudinal compliance with the LNT Principles.

Table 27  
Means and standard deviations for global composite measure of LNT attitudes

Item	Unit	N	Mean <sup>2</sup>	SD
Composite Measure of Attitudes re: LNT <sup>1</sup>	GNP	246	3.13	0.76
	ONP	272	3.26	0.78
	CINS	144	3.56	0.79

<sup>1</sup> - Composite measure of 23 items presented in Tables 20 - 25

<sup>2</sup> - Lower score reflects stronger attitude regarding LNT Principles



### Normative Influence Regarding Leave No Trace Practices

According to the TPB, normative influence (or what are known as ‘subjective norms’ or simply ‘norms’) refers to influence or pressures individuals’ perceived coming from peers. Normative influence was evaluated via nine statements. These statement covered a broad range of LNT oriented behaviors and can be further subdivided into two categories; *group norms* (see Table 28) characterized by statements such as ‘other members of my group think it important to...’ and *individual norms* (see Table 30) typified by statements such as ‘other members of my group feel I should not...’.

#### Normative Influence - Group Norms

Table 28 illustrates descriptive and frequency information regarding group norms. The first item addresses pressure the respondent places on other members of their group regarding compliance with LNT Practices. GNP respondents indicated the highest levels of pressure (mean=6.08) compared to 5.84 at ONP and 5.76 at CINS. Items two through four in Table 28 address more specific behaviors and the influence of group norms on those behaviors. Campfires, item #3, solicited wide variation between NPS Units. For instance, GNP respondents indicated little group pressure to have a campfire (mean=3.36) while CINS respondents indicated significantly higher pressure (mean=4.41). All respondents across NPS Units were similar in their views regarding the influence of group norms for camping near bodies of water and removal of trash and litter.

Table 28  
Frequencies (N & %), means, and standard deviations for Subjective Norms: group norms individual items

Item	Unit	N	Mean <sup>1</sup>	SD							
					(1) Strongly Disagree		(4) Neutral			(7) Strongly Agree	
<i>I insist that minimum-impact / LNT practices are followed by all members of my backcountry party.</i>	GNP	266	6.08	1.0	0.0	1.1	1.9	4.1	15.8	35.0	42.1
	ONP	306	5.84	1.2	0.3	1.6	2.9	5.2	22.2	34.0	33.7
	CINS	143	5.76	1.4	2.1	2.1	0.7	10.5	17.5	31.5	35.7
<i>The people who travel with me on backcountry trips think it is important to camp close to bodies of water.</i>	GNP	277	5.00	1.5	4.0	4.3	4.7	21.7	20.9	28.9	15.5
	ONP	309	4.68	1.6	5.2	8.7	6.1	21.4	22.0	24.9	11.7
	CINS	160	4.46	1.4	3.1	6.9	8.1	36.3	21.9	15.6	8.1
<i>Other members of my group think it is important to have a campfire during our backcountry trips.</i>	GNP	276	3.36	1.8	20.3	17.0	10.9	27.2	12.3	7.6	4.7
	ONP	308	3.82	2.0	21.8	10.7	8.4	18.2	14.6	15.9	10.4
	CINS	158	4.41	1.9	7.6	12.7	7.0	28.5	10.8	15.8	17.7
<i>Other members of my group believe all litter and trash should be carried out.</i>	GNP	276	6.62	0.9	0.7	0.7	0.4	1.4	4.7	15.2	76.8
	ONP	308	6.40	1.2	1.6	1.0	1.0	4.2	4.5	20.1	67.5
	CINS	160	6.43	1.0	0.6	0.0	1.3	3.1	8.1	22.5	64.4

<sup>1</sup> - Mean based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree)

Creating a composite measure of the four variables above provides a more simplistic representation of the normative pressure backcountry respondents are subjected to. As shown in Table 29, GNP and CINS respondents have identical mean scores. ONP respondents are slightly lower, suggesting they are slightly less inclined to be influenced by group pressure when making backcountry decisions based on behaviors listed in Table 28.

Table 29  
Means and standard deviations for composite measure of subjective norms: group norms

Item	Unit	N	Mean <sup>1 2</sup>	SD
Composite Measure of Subjective Norms: Group Behavior Statements	GNP	261	5.27	0.72
	ONP	302	5.18	0.86
	CINS	158	5.27	0.75

<sup>1</sup> - Means based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree) divided by 4)

<sup>2</sup> - Higher values reflect higher levels of group normative pressure

*Normative Influence - Individual Norms*

Individual normative influence was evaluated via the five statements provided in Table 30. Note item #2 (in general, the opinions of other...), #3 (the opinions of other members of my group...), #4 (other members of my backcountry group...) and #5 (other members of my backcountry party would...) are negatively worded. When interpreting the scores for the abovementioned items, lower mean scores indicate more normative influence to follow recommended LNT Practices. The largest division between respondents in the three various NPS Units can be seen in the 5<sup>th</sup> item ‘other members of my backcountry party would approve of me moving a few rocks or logs around to make camp more comfortable.’ GNP respondents scored a full one point lower than their ONP and CINS counterparts on this item.

Table 30  
Frequencies (N & %), means, and standard deviations for Subjective Norms: individual norms individual items

Item	Unit	N	Mean <sup>1</sup>	SD	(1) Strongly Disagree	(2) Disagree	(3) Somewhat Disagree	(4) Neutral	(5) Somewhat Agree	(6) Agree	(7) Strongly Agree
<i>The other members of my group believe I should not keep any items I may find in the backcountry.</i>	GNP	275	5.49	1.6	2.9	2.9	4.0	19.6	10.5	22.9	37.1
	ONP	309	4.74	1.7	4.9	5.8	8.4	29.1	14.2	17.8	19.7
	CINS	159	5.09	1.5	0.0	6.3	8.8	24.5	13.8	22.6	23.9
<i>In general, the opinions of others has little effect on what I choose to do in the backcountry.</i>	GNP	277	3.46	1.9	15.2	24.9	15.2	15.2	10.8	10.5	8.3
	ONP	309	3.37	1.9	17.5	23.3	18.8	11.7	11.0	10.0	7.8
	CINS	160	3.64	1.9	15.0	22.5	11.3	18.1	8.8	16.3	8.1
<i>The opinions of other members of my group have no effect on where I choose to camp in the backcountry.</i>	GNP	276	2.85	1.7	26.1	28.3	14.9	10.9	9.1	7.2	3.6
	ONP	308	2.85	1.6	22.4	25.6	24.4	11.0	7.8	5.8	2.9
	CINS	159	3.26	1.7	17.6	19.5	18.9	25.2	7.5	5.0	6.3
<i>Other members of my backcountry group would find it acceptable for me to bathe in a stream or lake.</i>	GNP	276	3.87	2.0	17.8	15.9	6.5	21.0	10.9	15.6	12.3
	ONP	306	4.26	2.0	12.1	13.4	5.9	20.9	14.7	18.3	14.7
	CINS	160	3.63	1.7	18.1	13.1	5.6	31.3	19.4	8.1	4.4
<i>Other members of my backcountry party would approve of me moving a few rocks or logs around to make camp more comfortable.</i>	GNP	276	3.94	1.8	13.0	12.3	12.0	20.3	20.7	15.9	5.8
	ONP	307	4.98	1.6	4.9	3.3	8.1	15.6	26.4	24.4	17.3
	CINS	160	4.93	1.4	3.8	3.8	3.8	23.1	26.9	28.1	10.6

<sup>1</sup> - Mean based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree)

To simplify the results from Table 30 above, a composite measure was created utilizing the five variables listed in Table X. Note the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, & 5<sup>th</sup> items were reverse coded before computation of

composite measure. As can be viewed in Table 31, GNP respondents are slightly more disposed to individual normative pressure to follow LNT Practices.

Table 31

Means and standard deviations for composite measure of subjective norms: individual norms

Item	Unit	N	Mean <sup>1 2</sup>	SD
Composite Measure of Subjective Norms:	GNP	272	4.67	1.02
Individual Behavior Statements <sup>3</sup>	ONP	304	4.26	1.00
	CINS	158	4.33	0.88

<sup>1</sup> - Means based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree) divided by 5

<sup>2</sup> - Higher values reflect higher levels of individual normative pressure

<sup>3</sup> - items 2 - 5 in Table 30 reverse coded before computation of composite measure

***Perceived Behavioral Control (Efficacy) Regarding Leave No Trace Practices***

Perceived behavioral control (PBC) is a concept closely linked to the concept of self-efficacy. PBC explores the extent to which a person believes their actions are under their control or that they are able to carry out the behavior in question. This research utilized two constructs theorized to capture the full spectrum of PBC; control over actions and difficulty in carrying out said actions.

***Perceived Behavioral Control - Control***

PBC – Control was evaluated through the five statements listed below in Table 32. Item one, two, and five are very similar in both wording and scores within NPS Units. Based on these three items it can be safely inferred that respondents feel completely in control of their actions. Items three and four explore more specific behaviors and the extent to which respondents feel their camping behavior is under their own volitional control. Again, respondents are quite similar between units with the exception of GNP respondents on the item ‘my choosing to have a campfire in the backcountry of XNP is...’. The lower mean score for GNP respondents (mean=4.65) is likely an artifact of certain areas of the park closed to campfires.

Table 32

Frequencies (N &amp; %), means, and standard deviations regarding perceived behavioral control - control: individual items

Item	Unit	N	Mean <sup>1</sup>	SD							
					(1) Not at all under my control	(2)	(3)	(4) Neutral	(5)	(6)	(7) Completely under my control
<i>How I act in the backcountry of XNP is...</i>	GNP	278	6.42	0.9	0.0	0.4	1.1	3.6	5.8	29.5	59.7
	ONP	307	6.58	0.6	0.0	0.0	0.0	1.6	3.6	30.3	64.5
	CINS	160	6.63	0.8	0.0	0.0	1.3	3.1	3.8	15.6	76.3
<i>The way I act while in the backcountry of XNP is...</i>	GNP	275	6.48	0.8	0.0	0.0	0.7	2.9	5.1	29.8	61.5
	ONP	307	6.59	0.7	0.3	0.0	0.0	1.3	2.9	29.6	65.8
	CINS	160	6.70	0.8	0.0	0.0	1.3	2.5	2.5	12.5	81.3
<i>My choosing to have a campfire in the backcountry of XNP is...</i>	GNP	273	4.65	2.5	22.3	7.7	4.0	9.2	4.0	11.0	41.8
	ONP	306	5.68	1.9	8.2	3.9	2.6	8.5	6.9	13.7	56.2
	CINS	157	5.11	2.3	19.1	1.3	1.3	12.7	8.3	7.6	49.7
<i>Walking around muddy areas on the trail while in XNP is...</i>	GNP	274	5.95	1.3	1.1	1.5	2.2	12.4	10.6	23.7	48.5
	ONP	306	6.10	1.2	1.0	1.3	1.3	8.2	12.7	22.5	52.9
	CINS	159	6.23	1.2	0.0	0.6	2.5	11.3	7.5	14.5	63.5
<i>My backcountry camping practices in XNP are...</i>	GNP	277	6.17	1.3	1.8	1.4	2.2	4.7	6.5	29.6	53.8
	ONP	308	6.42	0.9	0.0	0.6	1.3	1.9	5.5	33.1	57.5
	CINS	160	6.21	1.3	1.3	1.3	3.1	5.6	10.0	16.3	62.5

<sup>1</sup> - Mean based on a 7-point Likert scale (1=not at all under my control, 4=neutral, 7=completely under my control)

To simplify the data presented in Table 32 above, a composite measure of PBC – Control was constructed by summing items and dividing by five. Results are presented in Table 33. ONP respondents feel slightly more in control of their actions (m=6.29) as compared to their GNP and CINS counterparts (means=5.93 and 6.17, respectively).

Table 33

Means and standard deviations for composite measure of perceived behavioral control: control

	Unit	N	Mean <sup>1 2</sup>	SD
Composite Measure of Perceived Behavioral Control: Control	GNP	269	5.93	0.91
	ONP	303	6.29	0.74
	CINS	156	6.17	0.89

<sup>1</sup> - Means based on a 7-point Likert scale (1=not at all under my control, 4=neutral, 7=completely under my control) divided by number of items comprising the scale (5)

<sup>2</sup> - Higher values reflect higher levels of perceived control over actions



*Perceived Behavioral Control - Difficulty*

PBC – Difficulty refers to the difficulty the individual perceives with carrying out the behavior in question. Table 34 contains the five items utilized in this research to explore PBC – Difficulty. As evident, all respondents across all NPS Units indicated the behaviors in question are on the ‘very easy’ (7) side of neutral (4).

Table 34

Frequencies (N & %), means, and standard deviations regarding perceived behavioral control - difficulty: individual items

Item	Unit	N	Mean <sup>1</sup>	SD							
					(1) Very difficult	(2)	(3)	(4) Neutral	(5)	(6)	(7) Very easy
<i>If I wanted to, carrying all of my litter out of the backcountry of XNP would be:</i>	GNP	278	6.55	0.8	0.0	0.0	0.7	2.2	6.5	22.3	68.3
	ONP	309	6.52	0.9	0.0	0.6	1.6	1.9	7.1	18.1	70.6
	CINS	159	6.08	1.4	0.6	1.3	8.2	3.8	6.9	24.5	54.7
<i>Carrying used toilet paper out of the backcountry of XNP would be:</i>	GNP	275	5.20	1.9	6.2	6.9	10.2	8.0	10.5	22.9	35.3
	ONP	309	4.87	2.0	6.5	11.3	12.6	8.1	12.0	19.1	30.4
	CINS	160	4.39	2.2	15.0	11.9	11.3	9.4	10.0	18.8	23.8
<i>Depositing my human waste in a small hole in the soil:</i>	GNP	276	6.09	1.3	0.0	1.4	5.8	6.2	8.3	25.7	52.5
	ONP	310	6.36	1.0	0.0	1.0	2.9	1.0	11.0	22.3	61.9
	CINS	160	5.91	1.5	1.9	2.5	5.0	6.9	11.9	20.6	51.3
<i>Walking around a muddy portion of the trail is:</i>	GNP	277	5.57	1.4	1.8	1.8	2.5	19.5	15.5	23.8	35.0
	ONP	306	5.24	1.5	1.6	2.9	8.2	18.0	19.9	24.8	24.5
	CINS	159	5.67	1.3	1.3	0.0	5.0	14.5	18.9	24.5	35.8
<i>I find following XNP recommended minimum-impact/LNT camping guidelines to be:</i>	GNP	278	6.17	0.8	0.0	0.0	1.1	2.9	12.2	46.0	37.8
	ONP	310	6.00	1.0	0.0	0.3	1.9	5.8	12.6	47.7	31.6
	CINS	160	6.16	0.9	0.0	0.0	1.9	5.6	8.1	43.8	40.6

<sup>1</sup> - Mean based on a 7-point Likert scale (1=very difficult, 4=neutral, 7=very easy)

Table 35 illustrates composite scores of the data presented in Table 34. Mean scores are similar, with GNP respondents indicating the highest levels of perceived ease in complying with the five behaviors in question and CINS the lowest.

Table 35

Means and Standard Deviations for Composite Measure of Perceived Behavioral Control: Difficulty

	Unit	N	Mean <sup>1 2</sup>	SD
Composite Measure of Perceived Behavioral Control: Difficulty	GNP	272	5.92	0.77
	ONP	304	5.80	0.83
	CINS	158	5.65	0.89

<sup>1</sup> - Means based on a 7-point Likert scale (1=very difficulty, 4=neutral, 7=very easy) divided by number of items comprising the scale (5)

<sup>2</sup> - Higher values reflect higher perceptions of ability to carry out said actions

### ***Behavioral Intentions to Comply with Leave No Trace Practices***

#### ***Behavioral Intentions: Individual Items***

According to the Theory of Planned Behavior (Ajzen, 1991), ones intention to act is the best predictor of ones actual behavior. To ascertain respondents' intentions to comply with the LNT Principles, respondents were asked to respond to four items, results of which are presented in Table 36 below. Note item #3 'I did not plan to follow recommended minimum-impact practices in the backcountry' is negatively worded.

Table 36

Frequencies (N &amp; %), means, and standard deviations regarding behavioral intentions to follow minimum-impact / LNT practices: individual items

Item	Unit	N	Mean <sup>1</sup>	SD							
					(1) Strongly Disagree			(4) Neutral			(7) Strongly Agree
<i>I intended to follow minimum-impact practices during my backcountry trip in XNP.</i>	GNP	278	6.67	0.62	0.0	0.0	0.0	1.8	2.5	22.3	73.4
	ONP	310	6.62	0.70	0.0	0.0	0.0	1.6	3.2	24.8	70.0
	CINS	159	6.58	0.88	0.0	0.0	0.6	2.5	5.7	16.4	74.2
<i>I made every effort to follow XNP recommended minimum-impact practices.</i>	GNP	278	6.57	0.62	0.0	0.0	0.0	0.4	5.0	31.7	62.9
	ONP	310	6.34	0.87	0.0	0.6	0.6	3.2	6.1	38.4	51.0
	CINS	160	6.52	0.78	0.0	0.6	0.0	1.3	7.5	26.3	64.4
<i>I did not plan to follow recommended minimum-impact practices in the backcountry.</i>	GNP	278	1.17	0.47	86.0	11.5	1.8	0.7	0.0	0.0	0.0
	ONP	310	1.23	0.64	83.9	13.5	0.0	1.6	0.6	0.3	0.0
	CINS	159	1.36	1.04	81.8	1.9	1.9	1.9	0.0	0.6	1.9
<i>I was determined to follow recommended minimum-impact practices during my backcountry trip in XNP.</i>	GNP	277	6.43	0.76	0.0	0.0	0.4	2.2	7.9	33.6	56.0
	ONP	310	6.14	1.00	0.3	0.3	1.0	4.8	14.8	34.2	44.5
	CINS	160	6.41	0.80	0.0	0.0	0.6	1.9	10.6	29.4	57.5

<sup>1</sup> - Mean based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree)

*Behavioral Intentions: Composite Measure*

A composite measure of respondents’ intentions to comply with LNT Principles was created by summing scores across the 4 individual measures presented in Table 36. Note the third item was reverse coded prior to summation in order to provide meaningful and interpretable scores. Results are provided in Table 37. As evident, GNP respondents had the highest mean (strongest intentions to follow LNT principles) scores followed by CINS and then ONP.

Table 37  
Means and standard deviations for composite measure of behavioral intentions

Item	Unit	N	Mean <sup>1 2</sup>	SD
Composite Measure of Behavioral Intentions to Follow Minimum-impact Practices <sup>3</sup>	GNP	275	6.63	0.46
	ONP	307	6.48	0.62
	CINS	158	6.55	0.60

<sup>1</sup> - Means based on a 7-point Likert scale (1=strongly disagree, 4=neutral, 7=strongly agree)

<sup>2</sup> - Higher values reflect stronger intention to comply with LNT practices

<sup>3</sup> - 3rd item in Table X reverse coded before computation of composite measure

***Behavioral Compliance Regarding Leave No Trace Practices***

*Frequency Statistics*

LNT Principle #1: Plan Ahead and Prepare

This research utilized self-reported measures of respondents’ behaviors. To address LNT Principle #1 – Plan Ahead and Prepare, four questions were asked of respondents utilizing a dichotomous response format. Questions and results are presented in Table 38.

Table 38  
Frequencies (N & %) of behaviors regarding LNT principle #1: plan ahead and prepare

		GNP		ONP		CINS	
		N	Percent	N	Percent	N	Percent
<i>Spend time on the internet researching the trip?</i>	No	62	22.6	77	24.9	40	25.3
	Yes	212	77.4	232	75.1	118	74.7
<i>Check with XNP regarding backcountry regulations?</i>	No	28	10.2	50	16.2	54	34.6
	Yes	246	89.8	258	83.8	102	65.4
<i>Carry a topographic map and compass?</i>	No	61	22.3	73	23.7	88	55.7
	Yes	213	77.7	235	76.3	70	44.3
<i>Check with XNP regarding trail closures before arriving at the park?</i>	No	70	25.5	85	27.5	117	74.5
	Yes	205	74.5	224	72.5	40	25.5

To address LNT Principles two through seven, 29 items were asked of respondents utilizing a seven-point anchor. The anchor ranged from 1=never to 7=every time as well as a 'Not Applicable' category which was excluded from analysis (for frequency results tables). Frequency results from responses to these 29 items are presented in Tables 39 – 44 and descriptive results in Tables 45 – 50.

LNT Principle #2: Travel and Camp on Durable Surfaces

Table 39 below details results specific to LNT Principle #2 – Travel & Camp on Durable Surfaces. As evident in the Table, a large portion of respondents indicated hiking primarily on the trail (see item #3). Behaviors regarding muddy spots on the trail were widely divergent. The data suggest that while individuals do not hesitate to walk around muddy spots (item #1) they are less likely to walk entirely off the trail to avoid such spots.

Table 39  
Frequencies (N & %) of behaviors regarding LNT principle #2: travel and camp on durable surfaces

Item	Unit	N	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time	NA
<i>I walked around muddy spots on the trail.</i>	GNP	271	4.8	12.2	19.2	15.5	15.9	21.0	7.0	4.4
	ONP	306	2.9	11.4	18.6	21.6	19.0	18.3	4.6	3.6
	CINS	154	8.4	11.0	14.9	6.5	11.7	17.5	14.3	15.6
<i>I cut corners on trail switchbacks.</i>	GNP	277	89.9	8.7	1.1	0.4	0.0	0.0	0.0	0.0
	ONP	312	87.8	7.7	1.0	0.6	0.0	0.0	0.3	2.6
	CINS	160	70.0	11.9	2.5	3.8	1.9	0.6	1.9	7.5
<i>When traveling off trail, the group hiked single file.</i>	GNP	279	13.0	5.8	3.6	5.4	1.1	6.1	16.2	48.7
	ONP	305	5.2	2.6	3.0	7.2	3.9	13.1	15.1	49.8
	CINS	157	7.0	1.9	3.8	5.7	4.5	10.8	12.1	54.1
<i>I walked off the trail to avoid wet or muddy spots.</i>	GNP	274	27.7	29.6	15.7	14.2	4.0	3.6	0.7	4.4
	ONP	308	23.4	30.2	15.6	13.6	5.5	5.8	1.6	4.2
	CINS	159	32.7	18.2	7.5	9.4	6.3	8.8	1.3	15.7
<i>I placed my tent on bare soil, rock, gravel, or sand.</i>	GNP	275	3.3	1.1	0.0	1.1	2.9	9.1	81.5	1.1
	ONP	309	6.1	1.0	1.9	3.9	3.9	14.9	67.3	1.0
	CINS	158	18.4	2.5	1.3	0.6	3.8	9.5	62.0	1.9
<i>Camp was set-up in an open area like a meadow.</i>	GNP	272	58.1	6.6	3.7	5.1	1.8	1.1	3.3	20.2
	ONP	303	44.6	6.6	2.6	6.6	3.6	2.6	16.2	17.2
	CINS	156	42.9	5.1	1.9	3.8	3.8	1.9	16.1	24.4
<i>I moved small rocks and/or logs around to make my camp more comfortable.</i>	GNP	278	54.3	21.6	8.3	6.8	2.9	1.8	2.2	2.2
	ONP	311	27.3	14.5	18.3	15.8	8.0	4.8	9.0	2.3
	CINS	159	37.7	8.8	14.5	15.7	6.3	6.3	5.7	5.0
<i>While in camp, I ate meals in the designated food prep area.</i>	GNP	277	1.1	0.0	0.4	0.0	0.4	5.4	92.1	0.7
	ONP	310	3.2	0.6	1.6	2.9	4.8	14.2	45.5	27.1
	CINS	155	5.2	0.6	0.6	1.9	3.2	12.9	59.4	16.1
<i>Before leaving camp, I completed a final sweep of my campsite to make sure all trash was picked up.</i>	GNP	278	0.0	0.0	0.4	1.1	1.8	6.1	90.6	0.0
	ONP	310	0.0	0.0	0.0	0.0	1.0	6.5	91.9	0.6
	CINS	159	1.3	0.0	0.6	0.0	0.0	3.1	95.0	0.0

LNT Principle #3: Dispose of Waste Properly

Behaviors, as they relate to LNT Principle #3 – Dispose of Waste Properly, were explored through the 11 items depicted in Table 40.

Table 40  
Frequencies (N & %) of behaviors regarding LNT principle #3: dispose of waste properly

Item	Unit	N	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time	NA
<i>I buried my toilet paper.</i>	GNP	276	44.9	2.2	0.4	1.1	2.2	1.8	9.4	38.0
	ONP	308	31.2	2.9	1.6	1.6	1.6	4.2	27.6	29.2
	CINS	159	25.8	0.6	3.1	2.5	1.9	3.1	17.6	45.3
<i>I packed out my toilet paper if a toilet facility was not available.</i>	GNP	276	8.0	2.9	0.7	0.4	0.7	3.6	31.5	52.2
	ONP	311	27.0	3.2	1.6	1.3	1.3	5.5	24.4	35.7
	CINS	159	18.9	3.1	0.6	2.5	0.6	2.5	21.4	50.3
<i>I deposited human waste on top of the ground, in an 'out of the way' spot.</i>	GNP	276	75.4	2.9	2.9	0.7	1.8	0.4	1.4	14.5
	ONP	310	71.6	6.1	2.6	3.2	1.0	1.3	2.3	11.9
	CINS	158	56.3	4.4	2.5	0.0	1.9	1.9	1.9	31.0
<i>If an agency provided toilet facility was not available, I dug a small hole to deposit my human waste in.</i>	GNP	277	7.9	1.1	1.1	2.9	2.5	4.3	22.0	58.1
	ONP	310	3.2	2.3	2.3	2.6	1.9	8.1	47.4	32.3
	CINS	159	10.7	0.6	1.9	1.9	0.6	4.4	28.3	51.6
<i>I urinated on vegetation.</i>	GNP	276	29.3	19.6	20.3	17.0	8.3	2.5	1.4	1.4
	ONP	312	22.4	18.6	17.0	21.8	8.3	6.1	4.8	1.0
	CINS	158	37.3	12.0	13.3	9.5	10.8	7.6	5.1	4.4
<i>I discarded biodegradable waste (like apple cores) in the backcountry.</i>	GNP	277	66.1	13.4	3.6	5.1	2.9	3.6	2.9	2.5
	ONP	310	51.0	17.1	7.1	8.7	3.9	3.9	3.2	5.2
	CINS	156	55.8	12.8	4.5	2.6	4.5	5.1	7.1	7.7
<i>I disposed of leftovers away from my campsite.</i>	GNP	270	27.4	2.6	0.4	1.1	1.5	5.9	41.1	20.0
	ONP	306	32.7	3.6	2.0	0.3	2.0	3.6	32.0	23.9
	CINS	159	30.8	5.0	0.6	1.3	3.1	6.9	38.4	13.8
<i>I used soap in streams/lakes.</i>	GNP	227	81.5	6.1	6.1	2.9	0.4	0.4	0.4	2.2
	ONP	312	75.6	10.3	3.8	2.9	0.6	0.6	1.6	4.5
	CINS	159	81.1	1.3	0.0	0.6	0.6	0.0	0.0	16.4
<i>I strained dishwater through a filter/ screen before disposing of it.</i>	GNP	278	34.9	7.2	2.9	3.2	6.1	4.3	12.9	28.4
	ONP	309	53.1	8.4	1.3	2.6	1.6	1.6	2.9	28.5
	CINS	159	41.5	6.3	0.6	1.3	0.6	3.8	3.1	42.8
<i>I burned paper trash in the campfire.</i>	GNP	278	39.9	6.5	4.0	5.0	4.3	1.4	1.8	37.1
	ONP	312	29.2	8.0	7.7	5.1	6.1	4.5	10.9	28.5
	CINS	158	17.7	8.9	11.4	13.9	5.7	7.0	15.2	20.3
<i>I packed out other campers trash I found in the backcountry.</i>	GNP	276	3.6	4.7	7.6	7.2	8.7	13.0	29.7	25.4
	ONP	311	7.7	4.8	10.3	11.6	11.6	11.6	28.6	13.8
	CINS	159	8.2	3.8	13.2	12.6	11.9	10.1	13.8	26.4

LNT Principle #4: Minimize Campfire Impacts

Table 41 illustrates self-reported behaviors of respondents as they relate to LNT Principle #4 – Minimize Campfire Impacts. 63.2% of GNP respondents indicated never having a campfire compared to 47.6% of ONP and 26.7% of CINS respondents. The data suggests that respondents also are unsure of how to handle charred wood, with 18.1%, 32%, and 44.6% of GNP, ONP, and CINS respondents, respectively, indicating it was left contained in the fire ring. LNT Principles suggest that wood should be burned to ash, thus not leaving any charred wood contained in the fire ring.

Table 41  
Frequencies (N & %) of behaviors regarding LNT principle #4: minimize campfire impacts

Item	Unit	N	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time	NA
<i>I had a campfire.</i>	GNP	277	63.2	5.8	7.6	7.6	3.2	3.2	5.4	4.0
	ONP	309	47.6	4.9	7.8	11.0	6.1	6.1	15.9	0.6
	CINS	161	26.7	4.3	6.8	9.3	3.1	9.3	39.8	0.6
<i>Charred wood was left contained in the fire ring.</i>	GNP	277	15.2	2.9	2.2	2.2	1.4	3.2	18.1	54.9
	ONP	309	12.9	3.2	2.9	2.9	1.6	1.0	32.0	43.4
	CINS	157	8.9	3.8	5.1	7.0	1.9	6.4	44.6	22.3
<i>If a rock fire ring was not present, I built one to contain a campfire.</i>	GNP	278	37.4	1.1	0.4	0.7	0.0	0.0	1.1	59.4
	ONP	311	30.5	3.9	0.3	0.6	1.0	2.3	9.0	52.4
	CINS	157	28.7	0.6	0.6	1.3	0.0	1.9	3.8	63.1

LNT Principle #5: Leave What You Find

The items below in Table 42 reflect respondents' behavior as they relate to LNT Principle #5 – Leaving What is Found.

Table 42  
Frequencies (N & %) of behaviors regarding LNT principle #5: leave what you find

Item	Unit	N	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time	NA
<i>I picked up a 'souvenir' (rock, feather, etc.) so I could have something to remember the trip by.</i>	GNP	277	73.6	17.3	3.6	1.8	1.8	0.7	0.7	0.4
	ONP	312	58.7	23.7	6.7	4.2	1.6	2.6	1.6	1.0
	CINS	160	51.9	13.8	6.9	8.8	6.3	2.5	8.1	1.9
<i>I kept something I found in the backcountry.</i>	GNP	276	76.8	13.0	1.4	2.9	0.7	0.4	1.4	3.3
	ONP	311	64.3	16.4	5.5	3.5	0.3	1.9	5.1	2.9
	CINS	160	65.0	8.8	3.1	1.9	1.3	0.6	3.1	16.3

LNT Principle #6: Be Considerate of Other Visitors

Table 43 provides results relating to LNT Principle #6 – Be Considerate of Other Visitors.

Table 43  
Frequencies (N & %) of behaviors regarding LNT principle #6: be considerate of other visitors

Item	Unit	N	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time	NA
<i>When hiking, I took breaks out of sight of the main trail.</i>	GNP	277	62.1	18.8	9.4	4.3	2.9	0.4	0.7	1.4
	ONP	307	57.0	16.9	6.5	10.1	1.6	0.7	1.0	6.2
	CINS	155	61.3	18.1	7.7	5.8	0.0	0.0	3.2	3.9



LNT Principle #7: Respect Wildlife

LNT Principle #7 – Respect for Wildlife is explored via the 3 items listed below in Table 44. At all three NPS Units, the majority of ranger staff briefing visitors make a point to ask overnight campers to secure food before setting up camp. Most respondents seem to follow this advice; 83.6% of GNP respondents, 83% of CINS respondents, and 84.5% of CINS respondents indicated they placed food in containers or hung in air almost every time or every time before setting up camp.

Table 44  
Frequencies (N & %) of behaviors regarding LNT principle #7: respect wildlife

Item	Unit	N	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time	NA
<i>Before setting up my camp, I placed food in agency provided containers or hung in the air.</i>	GNP	275	7.3	1.5	1.1	3.6	2.2	11.6	72.0	0.7
	ONP	311	8.4	1.3	0.6	2.9	1.3	8.7	74.3	2.6
	CINS	161	7.5	0.0	0.6	1.9	5.0	8.1	75.8	1.2
<i>I fed small wildlife food scraps while in the backcountry.</i>	GNP	276	92.8	3.3	1.1	0.4	0.0	0.0	0.0	2.5
	ONP	312	93.3	1.9	0.6	0.6	0.3	0.0	0.3	2.9
	CINS	159	89.3	1.9	0.0	0.6	0.0	0.0	0.0	8.2
<i>I approached wildlife so I could get a good view and/or take a picture.</i>	GNP	277	55.6	20.6	11.9	6.1	3.2	0.0	0.7	1.8
	ONP	311	50.8	15.4	14.8	10.6	3.2	0.3	1.0	3.9
	CINS	159	23.3	27.0	19.5	15.7	6.9	5.0	1.9	0.6

*Descriptive Statistics*

In an attempt to provide a more simplistic picture of self-reported behaviors as they relate to promoted LNT Principles, mean values were created for items by treating the various scales as a continuous variables. In order to calculate mean scores for each item, the ‘Not Applicable’ (NA) category was excluded from the analysis. In essence, those respondents who answered NA were now viewed as missing by the software program so to not unduly influence measures of central tendency (means & standard deviations). 19 of the original 29 items were included in this phase of the data analysis. The ten variables excluded from analysis had greater than 26% of respondents indicate ‘NA’ and thus were eliminated from further analysis. Keeping these items would have resulted in too few respondents per item to provide reliable mean estimates of behavior. Dropping these items left seven items for LNT Principle #2 (Travel & Camp), five items for LNT Principle #3 (Dispose of Waste Properly), one item for LNT Principle #4 (Minimize Campfire Impacts), two items for LNT Principle #5 (Leave What You Find),

one item for LNT Principle #6 (Consideration of Other Visitors), and three items for LNT Principle #7 (Respect Wildlife).

LNT Principle #2: Travel and Camp on Durable Surfaces

Table 45 provides descriptive information (means, standard deviations, ranges) regarding 7 items that explore compliance with LNT Principle #2 – Travel and Camp on Durable Surfaces. CINS respondents reported walking around muddy spots on the trail slightly more than their ONP and GNP counterparts however, ONP respondents indicated they walked off the trail more often to avoid mud than those individuals reporting from GNP and CINS. The item ‘I moved small rocks and/or logs around to make camp more comfortable’ solicited wide variation across NPS Units. ONP respondents indicated they moved rocks with the highest frequency (m=3.13; ‘occasionally’) followed by CINS respondents (m=2.85) and GNP respondents (m=1.94, ‘almost never’).

Table 45

Means, standard deviations, and ranges regarding LNT principle #2: travel and camp on durable surfaces

Item	Unit	N	Mean <sup>1</sup>	SD	Range
<i>I walked around muddy spots on the trail.</i>	GNP	259	4.22	1.7	1-7
	ONP	295	4.20	1.5	1-7
	CINS	130	4.32	2.0	1-7
<i>I cut corners on trail switchbacks.</i>	GNP	277	1.12	0.4	1-4
	ONP	304	1.14	0.5	1-7
	CINS	148	1.54	1.2	1-7
<i>I walked off the trail to avoid wet or muddy spots.</i>	GNP	262	2.49	1.4	1-7
	ONP	295	2.71	1.6	1-7
	CINS	134	2.64	1.8	1-7
<i>I placed my tent on bare soil, rock, gravel, or sand.</i>	GNP	272	6.56	1.3	1-7
	ONP	306	6.15	1.7	1-7
	CINS	155	5.50	2.4	1-7
<i>Camp was set-up in an open area like a meadow.</i>	GNP	217	1.78	1.6	1-7
	ONP	251	2.89	2.4	1-7
	CINS	118	2.87	2.5	1-7
<i>I moved small rocks and/or logs around to make my camp more comfortable.</i>	GNP	272	1.94	1.4	1-7
	ONP	304	3.13	1.9	1-7
	CINS	151	2.85	1.9	1-7
<i>Before leaving camp, I completed a final sweep of my campsite to make sure all trash was picked up.</i>	GNP	278	6.86	0.5	3-7
	ONP	308	6.92	0.3	5-7
	CINS	159	6.87	0.8	1-7

<sup>1</sup> - Means based on a 7-point Likert scale (1=never, 2=almost never [<10%], 3=occasionally [30%], 4=sometimes [50%], 5=frequently [70%], 6=almost every time [90%], 7=every time [100%])

### LNT Principle #3: Dispose of Waste Properly

As evident in Table 46, scores ranged slightly regarding compliance with LNT Principle #3- Dispose of Waste Properly. For instance, urinating on vegetation received a mean score of 3.13 for ONP respondents and a 2.87 and 2.68 from CINS and GNP respondents, respectively. GNP respondents averaged a 5.29 ('frequently') on the variable 'I packed out other campers' trash I found in the backcountry' compared to 4.9 and 4.38 at ONP and CINS (respectively).

Table 46

Means, standard deviations, and ranges regarding LNT principle #3: dispose of waste properly

Item	Unit	N	Mean <sup>1</sup>	SD	Range
<i>I urinated on vegetation.</i>	GNP	272	2.68	1.5	1-7
	ONP	309	3.13	1.7	1-7
	CINS	151	2.87	2.0	1-7
<i>I discarded biodegradable waste (like apple cores) in the backcountry.</i>	GNP	270	1.85	1.6	1-7
	ONP	294	2.18	1.7	1-7
	CINS	144	2.25	2.0	1-7
<i>I disposed of leftovers away from my campsite.</i>	GNP	216	4.61	2.8	1-7
	ONP	233	3.97	2.8	1-7
	CINS	137	4.34	2.8	1-7
<i>I used soap in streams/lakes.</i>	GNP	272	1.33	0.9	1-7
	ONP	298	1.44	1.1	1-7
	CINS	133	1.07	0.4	1-5
<i>I packed out other campers trash I found in the backcountry.</i>	GNP	206	5.29	1.9	1-7
	ONP	268	4.90	2.0	1-7
	CINS	117	4.38	1.9	1-7

<sup>1</sup> - Means based on a 7-point Likert scale (1=never, 2=almost never [<10%], 3=occasionally [30%], 4=sometimes [50%], 5=frequently [70%], 6=almost every time [90%], 7=every time [100%])

LNT Principle #4: Minimize Campfire Impacts

Scores presented in Table 47 illustrate campfire practices (LNT Principle #4) across the three NPS Units under investigation. Campfires were built, on average, 50-70% of the time by CINS respondents (mean=4.46) but ‘almost never’ (mean=2.1) by GNP respondents and ‘occasionally’ (mean=3.05) by ONP respondents.

Table 47

Means, standard deviations, and ranges regarding LNT principle #4: minimize campfire impacts

Item	Unit	N	Mean <sup>1</sup>	SD	Range
<i>I had a campfire.</i>	GNP	266	2.10	1.8	1-7
	ONP	307	3.05	2.3	1-7
	CINS	160	4.46	2.6	1-7

<sup>1</sup> - Means based on a 7-point Likert scale (1=never, 2=almost never [<10%], 3=occasionally [30%], 4=sometimes [50%], 5=frequently [70%], 6=almost every time [90%], 7=every time [100%])

LNT Principle #5: Leave What You Find

Table 48 provides descriptive information regarding LNT Principle 5 – Leave What You Find, for two items. Keeping souvenirs’ was reported by CINS respondents as something they did, on average, almost never to occasionally (mean=2.43). Conversely, GNP and ONP respondents ‘picked up a souvenir’ less than 10% of the time (means=1.45 and 1.79, respectively).

Table 48

Means, standard deviations, and ranges regarding LNT principle #5: leave what you find

Item	Unit	N	Mean <sup>1</sup>	SD	Range
<i>I picked up a 'souvenir' (rock, feather, etc.) so I could have something to remember the trip by.</i>	GNP	276	1.45	1.1	1-7
	ONP	309	1.79	1.3	1-7
	CINS	157	2.43	2.0	1-7
<i>I kept something I found in the backcountry.</i>	GNP	267	1.39	1.0	1-7
	ONP	302	1.82	1.6	1-7
	CINS	134	1.57	1.4	1-7

<sup>1</sup> - Means based on a 7-point Likert scale (1=never, 2=almost never [<10%], 3=occasionally [30%], 4=sometimes [50%], 5=frequently [70%], 6=almost every time [90%], 7=every time [100%])

LNT Principle #6: Be Considerate of Other Visitors

Respect for Other Visitors, LNT Principle #6, illustrates self-reported behavioral compliance (descriptive statistics) with the item ‘When hiking, I took breaks out of sight of the main trail’. The LNT Principles would suggest that to limit your impact on the experience of other visitors it is best to take a break just out of sight of the main trail. CINS and GNP respondents were nearly identical on scores for this item, indicating breaks were taken out of sight of the main trail ‘almost never’ (means=1.69 & 1.66, respectively). ONP visitors were slightly more compliant with taking breaks out of sight of the main trail (mean=1.81). Results are below in Table 49.

Table 49

Means, standard deviations, and ranges regarding LNT principle #6: be considerate of other visitors

Item	Unit	N	Mean <sup>1</sup>	SD	Range
<i>When hiking, I took breaks out of sight of the main trail.</i>	GNP	273	1.69	1.2	1-7
	ONP	288	1.81	1.3	1-7
	CINS	149	1.66	1.1	1-5

<sup>1</sup> - Means based on a 7-point Likert scale (1=never, 2=almost never [<10%], 3=occasionally [30%], 4=sometimes [50%], 5=frequently [70%], 6=almost every time [90%], 7=every time [100%])

LNT Principle #7: Respect Wildlife

LNT Principle #7 – Respect Wildlife, is explored via the three items presented in Table 50. As evident in the mean scores, the mean for CINS respondents is slightly higher than their GNP and ONP counterparts (m=6.28 vs. 6.17 and 6.19, respectively). Overall, respondents indicated a high degree of respect for wildlife as evidenced by their responses to the three questions.

Table 50

Means, standard deviations, and ranges regarding LNT principle #7: respect wildlife

Item	Unit	N	Mean <sup>1</sup>	SD	Range
<i>Before setting up my camp, I placed food in agency provided containers or hung in the air.</i>	GNP	273	6.17	1.7	1-7
	ONP	303	6.19	1.8	1-7
	CINS	159	6.28	1.7	1-7
<i>I fed small wildlife food scraps while in the backcountry.</i>	GNP	269	1.08	0.5	1-7
	ONP	303	1.09	0.5	1-7
	CINS	146	1.04	0.3	1-7
<i>I approached wildlife so I could get a good view and/or take a picture.</i>	GNP	272	1.82	1.2	1-7
	ONP	299	2.01	1.3	1-7
	CINS	158	2.78	1.5	1-7

<sup>1</sup> - Means based on a 7-point Likert scale (1=never, 2=almost never [<10%], 3=occasionally [30%], 4=sometimes [50%], 5=frequently [70%], 6=almost every time [90%], 7=every time [100%])

*Composite Behavioral Measures by LNT Principle*

In order to create meaningful composite scores for behavioral constructs (LNT Principles), positively worded items were recoded so that lower scores represent higher compliance with promoted LNT Principles. For example, the statement “I placed my tent on bare soil, rock, gravel, or sand” is positive. A respondent indicating a ‘7’ for this statement (every time) is highly compliant with promoted LNT Practices. Stronger (or higher) levels of compliance in the following tables within this section are represented by lower scores. Note: all such instances of recoding are clearly marked with a footnote in the following tables.

Table 51 displays results from the creation of composite scores across LNT Principles by NPS Unit and Figure 42 visually depicts mean scores across NPS units.

Table 51  
Means and standard deviations for composite measures of LNT behaviors by LNT Principle <sup>1</sup>

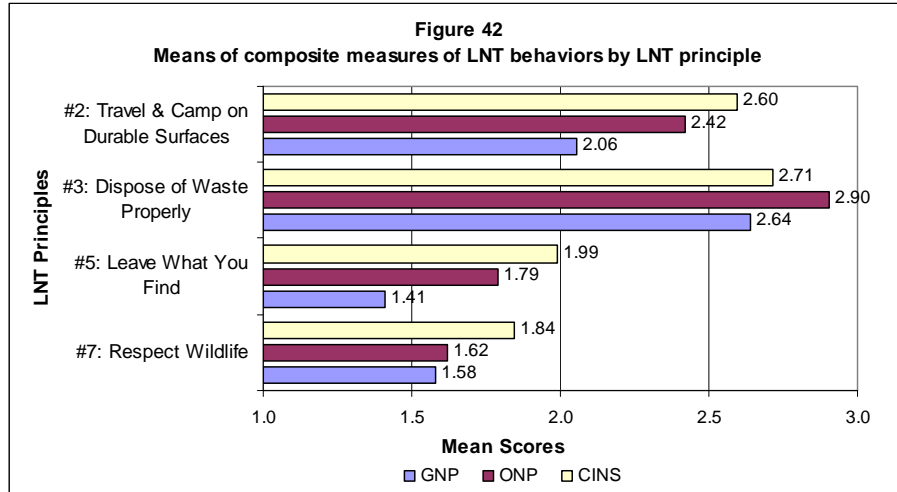
Composite Measure <sup>3 4</sup>	Unit	N	Mean <sup>2</sup>	SD
LNT Principle #2: Travel & Camp on Durable Surfaces	GNP	190	2.06	0.56
	ONP	223	2.42	0.74
	CINS	84	2.60	0.76
LNT Principle #3: Dispose of Waste Properly	GNP	160	2.64	1.04
	ONP	187	2.90	0.98
	CINS	75	2.71	0.88
LNT Principle #5: Leave What You Find	GNP	267	1.41	0.94
	ONP	301	1.79	1.34
	CINS	131	1.99	1.51
LNT Principle #7: Respect Wildlife	GNP	257	1.58	0.74
	ONP	285	1.62	0.78
	CINS	144	1.84	0.77

<sup>1</sup> - Composite measure of items in Table 45 - 50

<sup>2</sup> - Lower mean score reflects behavior more congruent with LNT Principle

<sup>3</sup> - Composite created by summing items and dividing by total number of items

<sup>4</sup> - LNT Principles 4 & 6 - not included as each construct is only represented by one item



*Global Composite Measure of LNT Behaviors*

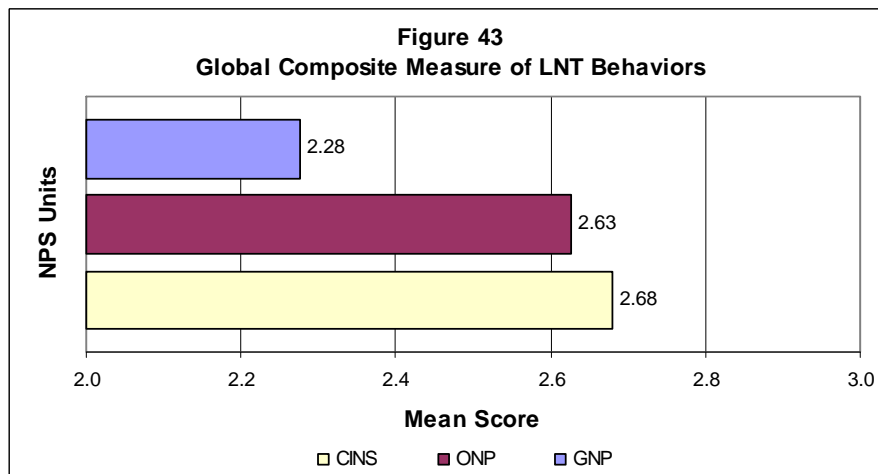
A global composite score was created by summing the 19 behavioral items in Tables 45 – 50. Note that positively worded items were again reverse coded to provide meaningful and interpretable scores. Results are depicted in Table 52 with a visual representation of mean scores in Figure 43.

Table 52  
Means and standard deviations for global composite measure of LNT behaviors

Composite Measure	Unit	N	Mean <sup>2</sup>	SD
Composite Measure of Global Behaviors re: LNT Practices <sup>1</sup>	GNP	105	2.28	0.46
	ONP	130	2.63	0.57
	CINS	40	2.68	0.49

<sup>1</sup> - Composite measure of 19 items presented in Tables 45 - 50

<sup>2</sup> - Lower score reflects behavior more congruent with LNT Principles



## **SECTION VI – BIVARIATE RELATIONSHIPS AMONGST STUDY VARIABLES**

### **Introduction to the Section:**

This section of the report examines bivariate relationships between primary study variables utilizing a correlation matrix with significant correlations flagged (asterisk). Results contained herein follow the same presentation order as univariate results in the previous section. The intent of this section is to illustrate simple relationships amongst study variables that NPS Staff may find helpful in designing more effective LNT dissemination strategies and education efforts. The complete correlation matrix of primary study variables is available below in Table 53. The matrix is designed to view the relationship between select primary study variables against two composite measures likely of greatest interest to NPS program managers; A composite measure of specific LNT Attitudes (comprised of 23-items presented in Tables 20 – 25) herein known as LNT Attitudes and composite measure of specific LNT Behaviors (comprised of 19-items presented in Tables 45 – 50) herein known as LNT Behaviors. Note: the lack of statistically significant correlations amongst study variables for the CINS sub-sample of the data is likely due to a combination of smaller sample size (hindered even further by the creation of composite measures which ignores entire cases missing even one value) and power (Tabachnick & Fidell, 2001).



Table 53

Correlations between global composite LNT attitudinal and behavioral measures and other primary study variables

Category	Variables		GNP		ONP		CINS	
			Global Composite Measure of LNT Attitudes	Global Composite Measure of LNT Behaviors	Global Composite Measure of LNT Attitudes	Global Composite Measure of LNT Behaviors	Global Composite Measure of LNT Attitudes	Global Composite Measure of LNT Behaviors <sup>3</sup>
Demographics	Age	Correlation N	-.134 * 241	-.226 * 101	ns <sup>1</sup>	ns <sup>1</sup>	-.195 * 141	ns <sup>1</sup>
Trip Characteristics	Group Size	Correlation N	.196 ** 246	.220 * 105	.136 * 272	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Total Miles Traveled	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	-.142 * 272	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Length of Stay (nights)	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
Experience Use History	Self-reported Backcountry Skill Level	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	-.156 * 271	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Years of Backcountry Camping Experience	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	-.236 * 131	ns <sup>1</sup>
	Average Number of Backcountry Trips / Year	Correlation N	ns <sup>1</sup>	-.147 * 241	ns <sup>1</sup>	ns <sup>1</sup>	-.207 * 139	ns <sup>1</sup>
Global Perceptions of the LNT Program	Global Perception (composite) of the LNT Program	Correlation N	-.312 ** 238	-.206 * 100	-.194 ** 266	-.249 ** 128	ns <sup>1</sup>	ns <sup>1</sup>
Diffusion of Innovations Theory	Self-reported knowledge of LNT	Correlation N	-.188 ** 239	-.270 ** 101	-.215 ** 265	-.311 ** 125	-.217 141	ns <sup>1</sup>
	Length of Time Aware of LNT	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Info from Ranger	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	.167 * 145	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Info from Video	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	NA <sup>2</sup>	NA <sup>2</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Info from Literature	Correlation N	ns <sup>1</sup>	-.191 * 170	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	Info from Webpage	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
Theory of Planned Behavior	Group Norms (composite)	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	.343 ** 264	.330 ** 127	ns <sup>1</sup>	ns <sup>1</sup>
	Individual Norms (composite)	Correlation N	-.361 ** 242	-.288 ** 101	-.358 ** 267	-.367 ** 125	-.309 ** 142	ns <sup>1</sup>
	PBC - Control (composite)	Correlation N	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>	ns <sup>1</sup>
	PBC - Difficulty (composite)	Correlation N	-.284 ** 242	-.292 ** 104	-.333 ** 268	-.314 ** 127	-.354 ** 142	ns <sup>1</sup>
	Behavioral Intentions (composite)	Correlation N	-.373 ** 243	-.410 ** 104	-.144 * 269	-.352 ** 129	-.286 ** 142	ns <sup>1</sup>
	Global Composite Measure of LNT Attitudes	Correlation N	-- --	.607 ** 94	-- --	.650 ** 117	-- --	.469 ** 37
	Global Composite Behavioral Measure	Correlation N	.607 ** 94	-- --	.650 ** 117	-- --	.469 ** 37	-- --

\* p&lt;.05; \*\* p&lt;.01

<sup>1</sup> - nonsignificant correlation<sup>2</sup> - not applicable (ONP does not use video to disseminate LNT information)<sup>3</sup> - CINS Behavior measure suffered from small sample size which likely caused nonsignificant correlations amongst study variables

### **Select Demographics – Attitude & Behavior Correspondence**

Age correlated significantly with both LNT Attitudes and LNT behaviors amongst GNP respondents and with LNT Attitudes amongst CINS respondents. The correlation was negative; interpreted: as age increases LNT Attitudes and LNT Behavior becomes more compliant with recommended LNT Practices (recall a lower LNT Attitude & Behavior score reflect Attitudes/Behavior more congruent with LNT Principles). Age did not correlate significantly with either measure at ONP.

### **Trip Characteristics – Attitude & Behavior Correspondence**

Group size was correlated (significantly) with LNT Attitudes in both GNP and ONP. Group size also correlated (significantly) with LNT Behaviors at GNP. These relationships were all positive meaning that as average group size increased, both LNT Attitudes and LNT Behavior lessened (or got worse) (higher scores for LNT Attitude/Behavior reflect less compliant Attitude/Behavior).

Total miles traveled only correlated significantly with LNT Attitude in ONP. The relationship was negative; interpreted: as mean length of trip increases, LNT Attitude becomes more compliant with recommended LNT Principles.

Total length of stay did not correlate significantly with either LNT Attitudes or LNT Behavior in any of the NPS Units.

### **Experience Use History – Attitude & Behavior Correspondence**

Total years of backcountry experience (EUH construct) only correlated significantly with LNT Attitudes with CINS respondents. The relationship was negative which is interpreted as total backcountry experience increases, LNT attitude improves.

LNT Behaviors correlated significantly with average number of backcountry trips/year for GNP respondents. Interpreted, this means that as respondents take more trips/year to GNP, LNT behaviors improve (become more in-line with recommended practices). At CINS, LNT Attitude correlated significantly and in a negative direction with average number of trips per year. Interpreted this indicates that as respondents make more overnight trips to the island in a year their LNT Attitude improves.

### **Global Perceptions of LNT – Attitude & Behavior Correspondence**

Global perceptions of LNT (composite measure) did not correlate with either LNT Attitude or LNT Behavior at CINS. This was not true for GNP or ONP where Global Perceptions of LNT were found to correlate significantly and negatively (a good thing) with LNT Attitudes and LNT Behavior. This means that as respondents' perceptions of LNT as a program become more positive, so does their attitude regarding LNT Attitudes and LNT Behaviors (both increase in a desired direction).

## **Diffusion of LNT – Attitude & Behavior Correspondence**

There were nonsignificant correlations across NPS Units between the variable ‘when respondents first heard of LNT’ and either LNT Attitude or LNT Behavior.

One significant correlation existed with ONP respondents between variables ‘information learned from ranger’ and LNT Attitude. This relationship was positive, indicating that as perceived amount of information gained from NPS Ranger increased, LNT Attitude got worse (recall that lower LNT Attitude score reflects attitude more congruent with LNT Principles).

There were zero statistically significant correlation between LNT Attitude/Behavior and variables perceived amount learned from video and info learned from webpage.

At GNP, one significant correlation was found to exist between amount that a respondent perceived learning from printed literature and LNT Behaviors. Interpreted; the more an individual perceives learning from GNPs printed park literature regarding LNT, the more their behavior improves (in the desired direction).

## **Theory of Planned Behavior – Attitude & Behavior Correspondence**

### ***Subjective Norms***

Group Norms were found to correlate at a statistically significant level with both LNT Attitudes and LNT Behavior within ONP respondents. Both correlations were positive. This means that as group normative pressure increases (measured via a composite measure comprised of items exploring camping close to water, having campfires, carrying out litter/trash, and insistence that LNT Principles are followed) both LNT Behavior and LNT Attitudes gets worse (score increases). Group norms had nonsignificant correlations with LNT Attitudes and LNT Behaviors at GNP and CINS.

Individual norms were found to correlate significantly and in a negative direction (again, a good thing) with respondents from GNP and ONP on both LNT Attitudes and LNT Behaviors and with CINS respondents on the variable LNT Attitudes. All correlations were in a negative direction, which interpreted, means that as individual normative pressure increases (measured via a composite measure available in Table 31) both LNT Attitude and LNT Behavior get stronger (score decreases).

### ***Perceived Behavior Control***

Perceived Behavioral Control – Control was found to have nonsignificant correlations with both LNT Attitude and LNT Behavior in all three NPS Units investigated.

Perceived Behavioral Control – Difficulty was found to correlate at a statistically significant level with both LNT Attitudes and LNT Behaviors amongst GNP and ONP respondents and with LNT

Attitudes amongst CINS respondents. All relationships were negative, which interpreted means that as respondents perceived the actions in question are easier to carry out, LNT compliant Attitudes and Behaviors both get better (scores on these two variables decrease).

### ***Behavioral Intentions***

LNT Attitudes and LNT Behaviors were found to correlate at a statistically significant level with the composite measure Behavioral Intentions to comply with recommended LNT Principles in both GNP and ONP and with LNT Attitudes at CINS. All correlations were negative (the expected direction). This finding means that as intentions to comply increase, LNT Attitudes and LNT Behavior get stronger (scores decrease).

### ***Attitude – Behavior Correspondence***

Not surprisingly, LNT Attitudes and LNT Behaviors correlate in a positive and at a statistically significant level across all three NPS Units. For NPS program managers and other, this finding suggests strongly that *to influence LNT compliant behaviors, LNT Attitudes need to be targeted.*

## SECTION VII – SUMMARY, CONCLUSIONS & MANAGEMENT IMPLICATIONS

### Summary & Conclusions

The Leave No Trace message is a powerful educational initiative designed to help effectively manage backcountry visitors and protect valuable resources. The discussion that follows provides NPS program managers and others charged with the dissemination of the LNT message ‘food for thought.’ That is this section provides general summary information and conclusions regarding what seems to work, things that could be improved, and describes the psychological constructs that should be targeted if developing compliant LNT behaviors is the desired outcome of the LNT program.

As a program, our data suggests that awareness of the LNT message is highly diffused amongst backcountry travelers in the three NPS Units investigated. Over 90% of total respondents indicated having heard of LNT and a predominance of respondents have a positive general attitude toward the LNT program. However, awareness of the LNT program does not necessarily equate to positive attitudes toward specific recommended LNT behaviors or predict compliant LNT backcountry behaviors.

At its core, the LNT message is designed to help instill an environmental ethic amongst human powered outdoor recreationalists. Promotion agents (NPS and otherwise) should remember that attitude and behavior change are likely not to be affected by short rote information sessions in backcountry offices. Information alone does not influence behaviors.

National Park Service managers and others who utilize the LNT message to help protect resources and meet management objectives should consider the theoretical frameworks used in this study as a road map for understanding and predicting visitor behaviors. For example, if, toilet paper ‘blooms’ are a problem that management wishes to address through the LNT message, then we recommend a progression similar to the following: Utilizing the TPB framework, managers should identify salient attitudes regarding disposal of toilet paper at the area in question, the normative attitudes (peer pressure) toward the disposal of toilet paper, and finally the perceived control an individual feels toward performing a preferred behavior. If the management finds that disposing toilet paper is viewed as acceptable by visitors then messages can be created and delivered (face to face, signage, webpage, video, and/or other) that address the ‘why not’ of this behavior as well as providing examples of preferred alternative behaviors that protect park resources. Such messages can and should target salient attitudes, normative influence (peers) and/or perceived control (with a focus on difficulty) regarding compliance.

## Management Implications

1. *Most respondents are highly supportive of the LNT idea* – Global perceptions of the LNT message are very positive. In short – the overnight backcountry travelers surveyed responded very favorably to items measuring global perceptions of the program. This suggests they are not only open to the message but also quite willing to change behavior if they learned their current actions were not acceptable (see Table X).
2. *Awareness of LNT does not necessarily equal LNT compliant behavior.* Many individuals, even those who claim to have ‘written the book’ on LNT principles, have attitudes toward current recommended practices and actual behaviors that stray far from what management would prefer. As a case in point; ONP respondents, which were the most experienced backcountry visitors, routinely reported less compliant attitudes and behaviors than their GNP counterparts. The LNT principles have remained constant but the specific recommended behaviors have undergone considerable changes through the mid to late 1990s. It is likely that respondents with many years of backcountry experience are familiar with the broad principles and learned specific backcountry practices one way and are simply ‘not up to speed’ with current promoted practices. Therefore, LNT outreach and programming should not only focus on the broad principles but should provide considerable effort explaining the SPECIFIC recommended practices and WHY they are important to perform (protection of resources, etc.). Backcountry travelers are both open to education and highly supportive of the LNT idea. However, compliance has been demonstrated to vary widely. It is our contention that future LNT education efforts must target that ‘why’ portion of the equation in an effort to influence salient attitudes toward the behavioral outcome in question. From a theoretical perspective, messages that serve to make the audience think in-depth about a subject are likely to be particularly effective (Petty, McMichael, & Brannon, 1992).
3. *Target salient attitudes and beliefs or why theory matters.* Educating visitors (aiming to increase their knowledge) is generally viewed as an *ineffective* strategy for behavior modification (Ajzen, 1991). Instead, those charged with promotion of the LNT effort would be well served to target the belief structures that underpin human behavior (Ajzen, 1991; Iozzi, 1989). The utilization of relevant and applicable theory is essential for behavioral modification strategies to be effective (Ballantyne & Uzzell, 1999). As stated above, messages that are designed to engage audience members through direct or central means which motivate people to think about an action rather than blindly follow instructions (peripheral route) are likely to be more effective (Petty & Cacioppo, 1986). In addition, strategic communication that intends to influence behaviors needs

to target salient belief structures that underpin our attitudes, norms, and levels of control. The notion of targeting the underlying salient beliefs of individuals rests within the theoretical framework of the Theory of Planned Behavior (TpB) (Ajzen, 1991). The first step in the construction of a message, therefore, requires a decision about the relevant primary beliefs, a process that cannot be left to intuition but must be guided by a model of the target's determinants" (Manfredo & Fishbein, 1992, p.21). In short, targeting salient beliefs is of "paramount importance" (Ham & Krumpal, 1996, p. 18). Minimum-impact / LNT messages need to target salient attitudes and/or beliefs regarding appropriateness of behaviors in question.

4. *Park education strategies are important* – Park outreach strategies, including personnel, educational talks or videos, kiosks, and/or printed literature are for a substantial number of individuals surveyed their primary source of LNT information. Our data suggest individuals use a combination of informational sources when planning backcountry trips. Thus, a multi-pronged diffusion strategy to disseminate best practices should utilize a variety of different media (video, face to face, signage, literature, web). The role of popular media should also not be ignored for future dissemination of the LNT message. This type of media campaign is frequently described as 'social marketing' (Kotler & Zaltman, 1971). This could include links on webpage's such as [www.recreation.gov](http://www.recreation.gov) , [www.gorp.com](http://www.gorp.com) and others. Additionally, popular written media including Backpacker, Climber, Paddler and others could reserve space to assist in promotion of the message.
5. *Park outreach strategies should be thought of as reinforcing and refining existing and previously held knowledge and attitudes* – The four park outreach strategies investigated; speaking with a ranger, video, printed literature, and visiting the webpage, showed few if any significant correlations with composite measures of LNT Attitudes or LNT Behaviors. While certainly important for the dissemination of the LNT message, these strategies listed above should not be viewed as the 'end all be all.' Instead, a combination of various promotion strategies, both internal and external to the park, is likely to be most beneficial.
6. *Move from education to strategic communication* – Move LNT from a general education program to a strategic communication effort. Strategic communication was described by Ham as taking environmental communication (here promotion of the LNT message) from what he described as a 'loving/respecting nature' to a full-fledged systematic and planned persuasive communication effort (1997). A strategic communication effort rests on the ability of communication to target

explicit behaviors (Byers, 1996). It moves what can be regarded as general environmental communication (like a ranger reciting the LNT steps) to a full-fledged persuasive communication effort designed to target specific behaviors and to change or modify them to help meet management objectives. Undertaking a persuasive communication effort necessitates the explicit acknowledgement of desired outcomes – once these outcomes are established then a variety of mechanisms can be utilized to help reach them. Under a strategic communication effort, specific outcomes could include behavioral, cognitive, and attitudinal components.

Why change the promotion of LNT from where it is now, which is a generally rote learning strategy utilizing a variety of formats, to a strategic communication effort? Firstly, research has continually proven the lack of a linear relationship between knowledge and behaviors.

Individuals may know what the correct behavior is – however, they often fail to exhibit it.

Secondly, environmental education has been criticized as lacking specificity (Kohl, 2005). A strategic effort to explicitly promote the LNT message can help overcome this potential shortcoming by focusing attention on specific goals and objectives. Thirdly, a strategic communication effort can help move audiences from rote learning to meaningful

learning/elaboration. Meaningful learning is typified by the promotion of transfer, when “a

person uses knowledge from previous experience to help learn something new” (Mayer, 2002, p. 5). Meaningful learning can help individuals to create meaning from their experiences, analyze

information to understand its many parts, evaluate, and finally take what they have learned to create something new (Mayer, 2002). By explicitly recognizing a number of targeted goals,

environmental communicators can help design messages that elicit elaboration by provoking the audience to think rather than just presenting facts (Ham, 2007). Finally, implementing a strategic communication effort can assist in evaluating the outcome of that effort. Because implementing a

strategic communication effort relies on the explicit stating of goals and objectives, we can design measurement strategies to ascertain if selected outcomes are actually being met.



**APPENDIX I:**  
**POWERPOINT PRESENTATION OF RESULTS TO FACILITATE**  
**DISSEMINATION OF FINDINGS**



Preliminary Evaluation of Recreational Skills and Ethics Training Programs Occurring on Public Lands: *The Leave No Trace Visitor Education Program*

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Brett A. Wright, Ph.D.  
Wade M. Vagias  
Department of Parks, Recreation and Tourism Management  
Clemson University  
June 4th 2008



- Section I: Background information
- Section II: Research purpose, objectives & questions
- Section III: Conceptual foundation
- Section IV: Methods
- Section V: Select results & findings:
  - Visitor characteristics
  - Trip characteristics
  - Experience use history
  - Diffusion of the LNT message
  - Global perceptions of the LNT program
  - Theory of Planned Behavior
  - Relationships amongst primary study variables
- Section VI: Summary & conclusions
- Section VII: Management implications





### Section I: *Background Information*



- **Funding:**
  - Wilderness Stewardship & Recreation Management Division; National Park Service
  
- **Support:**
  - South Atlantic Coast Cooperative Ecosystem Studies Unit
  - Leave No Trace Center for Outdoor Ethics, CO
  
- **In-kind support provided by personnel at:**
  - Glacier National Park, MT
  - Olympic National Park, WA
  - Cumberland Island National Seashore, GA





## Section I: Leave No Trace (LNT)



EXPERIENCE  
YOUR  
AMERICA

- Set of seven recommended guidelines for responsible and ethical human powered recreation:
  1. Plan ahead & prepare
  2. Travel and camp on durable surfaces
  3. Dispose of waste properly
  4. Leave what you find
  5. Minimize campfire impacts
  6. Respect wildlife
  7. Be considerate of other visitors
- Formally adopted in 1994 by the NPS via a Memorandum of Understanding
- LNT, Inc. (now Leave No Trace Center for Outdoor Ethics), not-for-profit organization (501-c-3)
  - *“Promote and inspire responsible outdoor recreation through education, research and partnerships.”*



## Section II: Research Purpose, Objectives and Questions



EXPERIENCE  
YOUR  
AMERICA

### Section II: *Research Purpose, Objectives and Questions*





## Section II: Research Purpose & Objectives



EXPERIENCE  
YOUR  
AMERICA

The purpose of this study is to develop and pilot test a method for evaluating the effectiveness of the *Leave No Trace* outdoor skills and ethics visitor education program within a selection of National Park Service administered lands.

This project will provide the necessary foundation for the development of a larger scale research effort to fully assess the effectiveness of recreation skills and ethics training that occurs on public lands to inform management decisions regarding the future direction of the program and improve existing educational tools to reach a broader segment of the recreating public and enhance both enjoyment and resource protection.



## Section II: Research Questions



EXPERIENCE  
YOUR  
AMERICA

- Diffusion of the LNT Message:
  - How aware are visitors of the LNT message?
  - What are visitors initial and primary sources of LNT information?
  - What are visitors attitudes regarding the perceived effectiveness of various LNT education strategies utilized in National Parks?
  - What are visitors global attitudes regarding the effectiveness of the LNT program?





## Section II: Research Questions, cont.



EXPERIENCE  
YOUR  
AMERICA

- LNT Attitudes and Behaviors
  - What are visitors' attitudes regarding recommended LNT practices (appropriateness, etc.)?
  - What is the influence of the social group on NPS visitors' LNT practices?
  - What are visitors levels of perceived behavioral control regarding following recommended LNT practices?
  - What are visitors intentions to follow recommended LNT practices?
  - What are backcountry visitors' self-reported levels of compliance with specific LNT practices?
  - What are the relationships (correlations) amongst primary study variables?



## Section III: Conceptual Foundation



EXPERIENCE  
YOUR  
AMERICA

### Section III: *Conceptual Foundation*





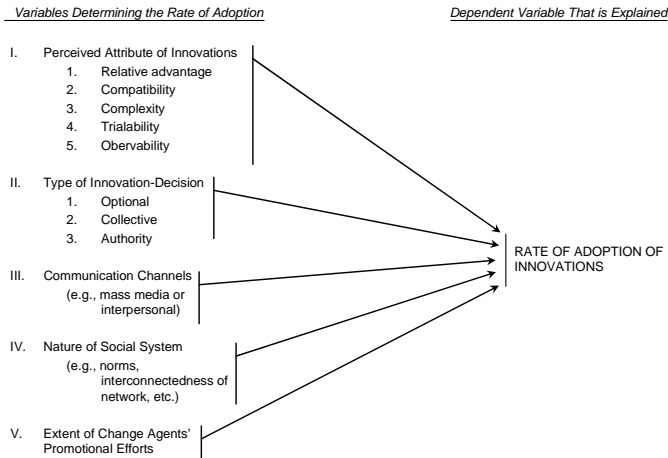
## Section III: Diffusion of Innovations Theory



EXPERIENCE YOUR AMERICA

- A theory exploring how innovations become adopted/not adopted into society and the rate at which they do so.

Variables Determining the Rate of Adoption of Innovations  
(Rogers, 2003, pg. 222)



## Section III: Diffusion of Innovations Theory

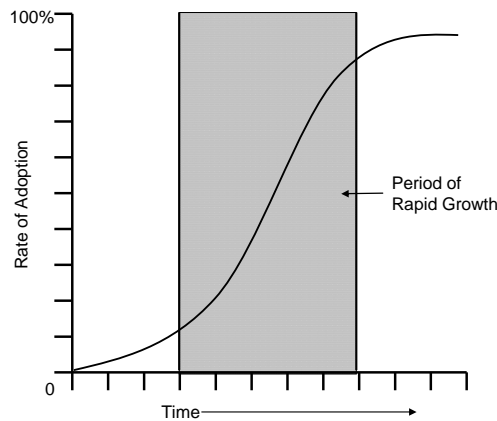


EXPERIENCE YOUR AMERICA

- Diffusion (if the innovation is adopted) is recognized to take place in a traditional 'S' shaped curve.

Adoption of an Innovation Over Time

(Rogers, 2003, pg. 344)





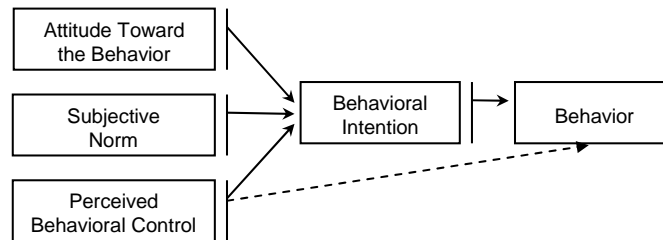
## Section III: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

- The Theory of Planned Behavior contends that:
  - Intention to act is the best predictor of actual behavior
  - Intention is a function of:
    - Salient attitudes regarding the behavior in question
    - The influence of others (norms)
    - Perceived levels of control over the behavior in question

Theory of Planned Behavior (Ajzen, 1991)



## Section IV: Methods



EXPERIENCE  
YOUR  
AMERICA

### Section II: *Methods*







## Section IV: Variable & Questionnaire Development



EXPERIENCE  
YOUR  
AMERICA

- Variables were developed based on comprehensive review of literature
- When necessary, new items & questions were developed and pre-tested
- Questionnaire was pre-tested at Clemson University (April 2007)
- NPS Social Science review (May 2000)
- Office of Management and Budget (OMB) review (May/June 2007)
- Cognitive interviews with Glacier National Park backcountry visitors (n ~18) regarding attitudinal and behavioral measures



## Section IV: Site Selection Criteria & Study Areas



EXPERIENCE  
YOUR  
AMERICA

- Site selection criteria:
  - Large contiguous backcountry area
  - Limited number of intercept points (lessen sampling error)
  - Willingness of park staff/in-kind support
- Study areas (dates):
  - Glacier National Park, Montana (June/July 2007)
  - Olympic National Park, Washington (July/August 2007)
  - Cumberland Island National Seashore, Georgia (November 2007 & March 2008)





## Section IV: Sampling Procedures, Data Collection & Response Rate



EXPERIENCE  
YOUR  
AMERICA

- Sampling procedure involved systematically intercepting individuals/group as they registered/picked-up camping permits in the three NPS Units.
- Data collected via mail-back surveys

Response rates

Park	Initial Contact		Mail-back Procedure		
	N Asked to Participate	N of Addresses Collected	N of Valid Addresses	N of Valid Returns	Adjusted Response Rate
GNP	430	425	408	279	68.4
ONP	450	432	428	314	73.4
CINS - Fall '07 <sup>1</sup>	172	145	141	89	63.1
CINS - Spring '08 <sup>1</sup>	--	109	108	73	67.6
<b>Totals</b>		<b>1111</b>	<b>1085</b>	<b>755</b>	<b>69.6</b>

<sup>1</sup> - t-test indicated nonsignificant differences between samples on five variables

- Nonresponse bias check indicated minimal to nonsignificant differences between respondents and nonrespondents.



## Section V: Select Results and Findings



EXPERIENCE  
YOUR  
AMERICA

### Section V: *Select Results & Findings*





## Section V: Visitor Characteristics



EXPERIENCE  
YOUR  
AMERICA

Demographic characteristics of the sample

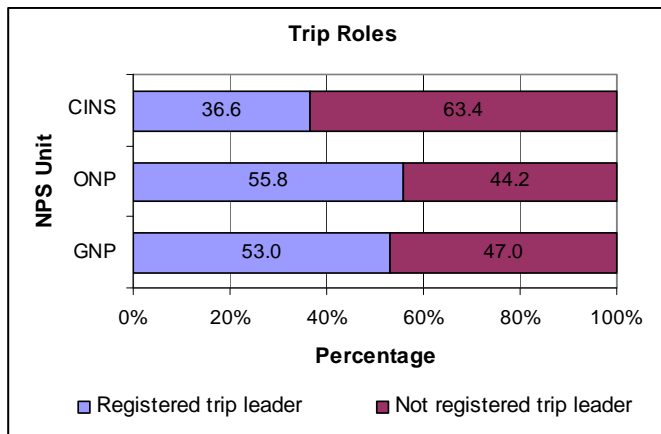
	GNP		ONP		CINS	
	N	Percent	N	Percent	N	Percent
<b>Gender</b>						
Male	176	63.3	187	59.9	99	61.5
Female	102	36.7	125	40.1	62	38.5
<b>Age Profile (years)</b>						
Mean age (sd) for unit	36.2	(12.4)	41.6	(12.3)	40.3	(11.7)
<b>Race</b>						
White, not of Hispanic descent	263	98.5	287	97.0	154	95.7
Black, not of Hispanic descent	0	0.0	0	0.0	1	0.6
Hispanic	1	0.4	2	0.7	4	2.5
Asian	2	0.7	7	2.4	1	0.6
American Indian / Pacific Islander	1	0.4	0	0.0	1	0.6
<b>Education</b>						
High School or less	25	9.2	11	3.6	12	7.6
College or higher	248	90.8	298	96.4	145	92.4
<b>Total Household Income (2006)</b>						
Less than \$39,999	74	27.9	50	16.9	31	20.7
\$40,000 - \$79,999	97	36.6	99	33.6	51	34.0
Greater than \$80,000	94	35.5	146	49.5	68	45.3



## Section V: Trip Characteristics



EXPERIENCE  
YOUR  
AMERICA



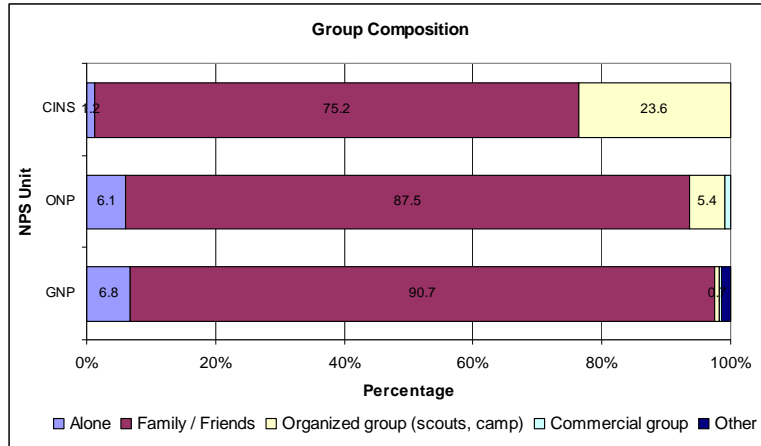


## Section V: Trip Characteristics



EXPERIENCE  
YOUR  
AMERICA

Which of the following best describes the type of group you were with?



21



## Section V: Trip Characteristics



EXPERIENCE  
YOUR  
AMERICA

Tripographic characteristics of the sample: continuous data

Unit	Variable	N	Mean	SD	Min-Max
GNP	Group Size	279	2.8	1.3	1-9
	Total Miles Traveled	274	31.3	19.8	1-125
	Length of Stay: Nights Out	279	2.7	1.8	1-14
ONP	Group Size	312	3.8	2.7	1-19
	Total Miles Traveled	312	20.6	14.4	1-90
	Length of Stay: Nights Out	312	2.6	1.6	1-10
CINS	Group Size	160	7.4	6.3	1-28
	Total Miles Traveled	157	20.0	12.4	2-60
	Length of Stay: Nights Out	161	2.4	1.3	1-7



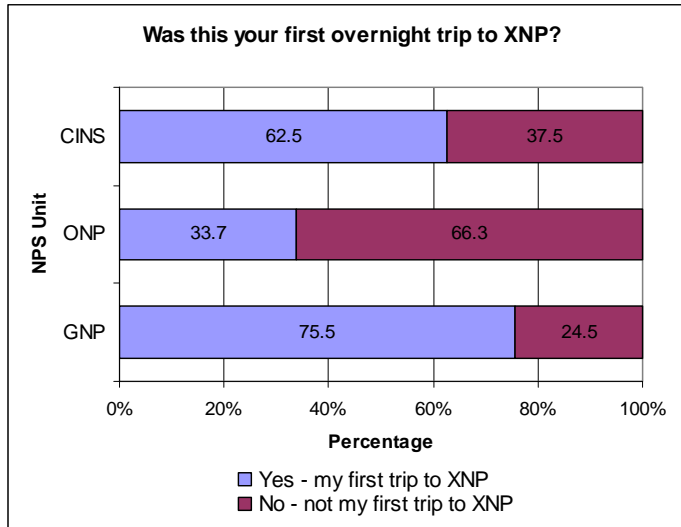
22



## Section V: Experience Use History



EXPERIENCE YOUR AMERICA



## Section V: Experience Use History



EXPERIENCE YOUR AMERICA

Backcountry / wilderness overnight camping experience use history of respondents

Unit	Variable	N	Mean	SD	Range
GNP	About how many different wilderness/backcountry areas have you camped in?	270	11.4	15.7	0-100
	In what year did you first overnight camp in a wilderness/backcountry area?	273	1993.6	12.0	1955-2007
	On average, how many overnight wilderness/backcountry trips do you take in a year?	272	2.9	4.3	0-30
ONP	About how many different wilderness/backcountry areas have you camped in?	291	14.7	21.8	0-200
	In what year did you first overnight camp in a wilderness/backcountry area?	302	1985.3	14.4	1950-2007
	On average, how many overnight wilderness/backcountry trips do you take in a year?	307	2.7	2.9	0-25
CINS	About how many different wilderness/backcountry areas have you camped in?	152	10.4	20.2	0-200
	In what year did you first overnight camp in a wilderness/backcountry area?	146	1991.5	13.1	1954-2007
	On average, how many overnight wilderness/backcountry trips do you take in a year?	154	2.7	3.7	0-25



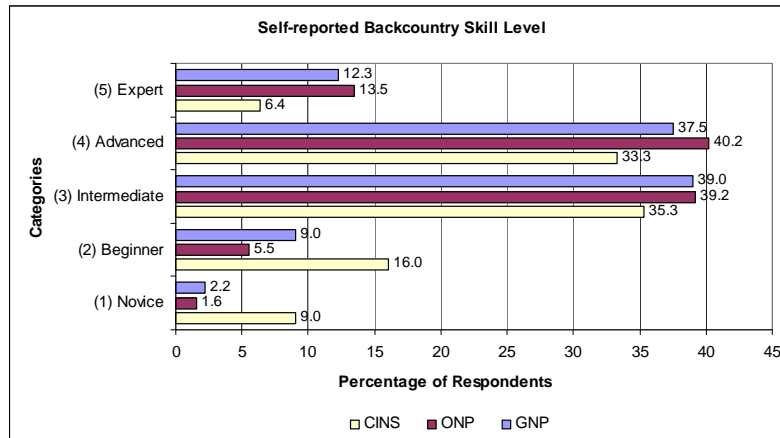


## Section V: Experience Use History



EXPERIENCE  
YOUR  
AMERICA

Regarding the skills necessary for backcountry travel, I consider myself an:



25

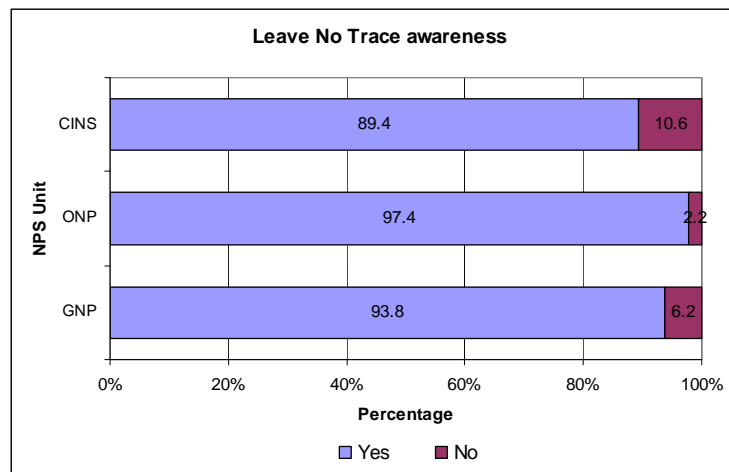


## Section V: Diffusion of the LNT Message



EXPERIENCE  
YOUR  
AMERICA

Have you ever heard of Leave No Trace?



26

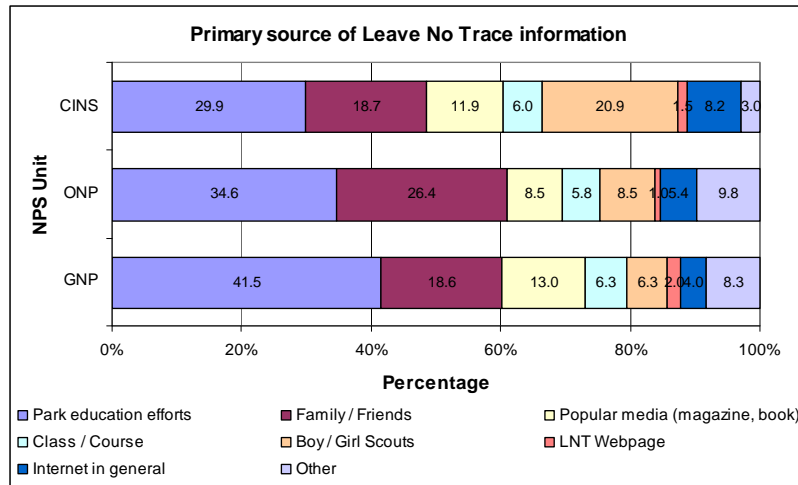


## Section V: Diffusion of the LNT Message



EXPERIENCE YOUR AMERICA

What has been your primary source of Leave No Trace information?

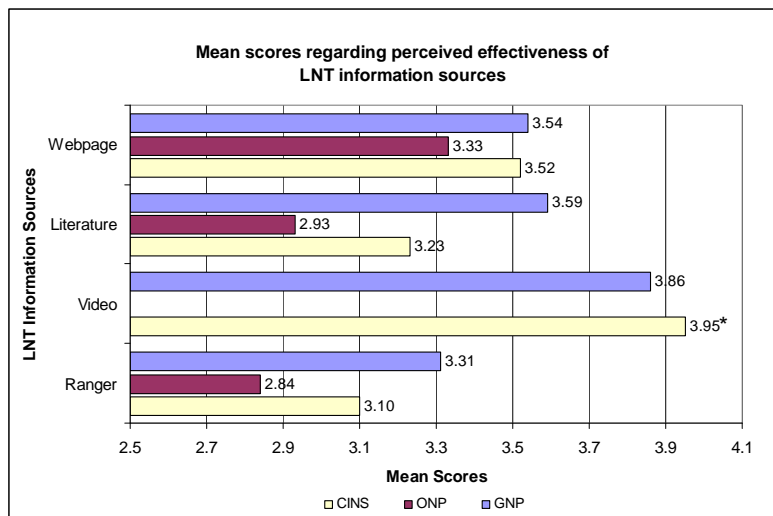


## Section V: Diffusion of the LNT Message



EXPERIENCE YOUR AMERICA

How much did you learn about minimum-impact / LNT from:



7-point scale: 0=nothing to 6=extensive amount  
\* CAUTION!: mean based on n=20 respondents



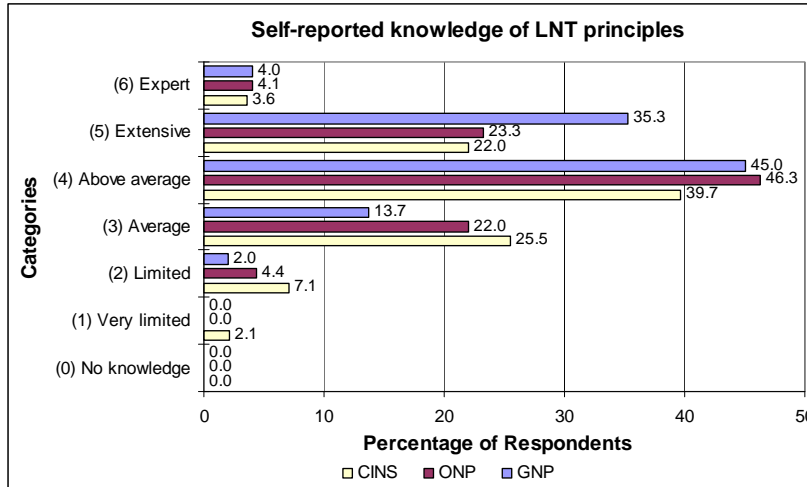


## Section V: Diffusion of the LNT Message



EXPERIENCE YOUR AMERICA

How would you describe your current knowledge of Leave No Trace practices?

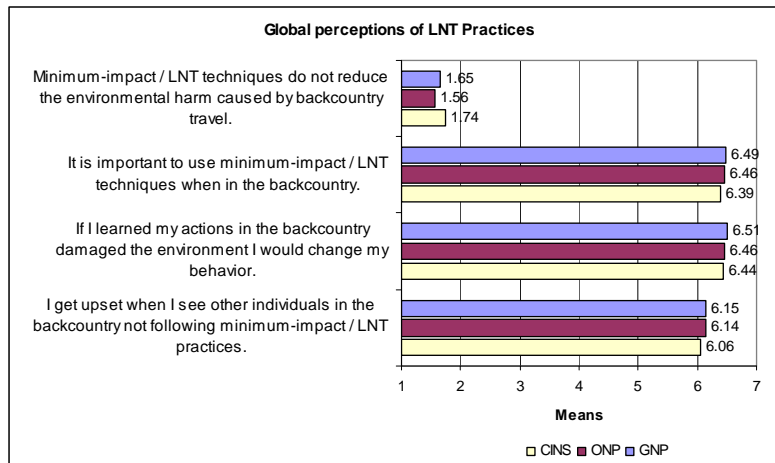


## Section V: Diffusion of the LNT Message



EXPERIENCE YOUR AMERICA

Please rate your level of agreement with the following statements:



7-point scale: 1=strongly disagree, 4=neutral, 7=strongly agree





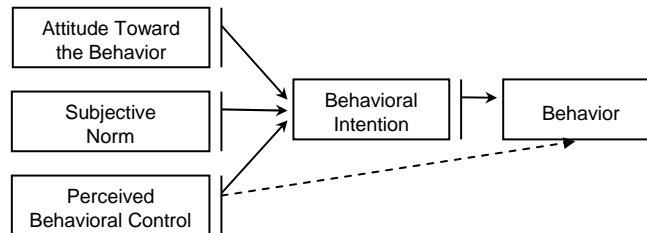


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

Theory of Planned Behavior (Ajzen, 1991)



31



## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

- Attitudes toward the behavior measured via 7-point scale (1=very inappropriate to 7=very appropriate) anchoring 23-items covering LNT Principles #2-7
  - \*\*\*Lower scores reflect stronger attitudes regarding LNT behavior in question
- Key attitude findings:
  - Certain attitudes regarding specific practices ranged widely within specific LNT principles
  - Attitudes regarding specific practices ranged widely depending on NPS Unit
  - Educational messages should focus on attitudes toward specific behaviors (rather than global messages) to address variability in attitudes



32

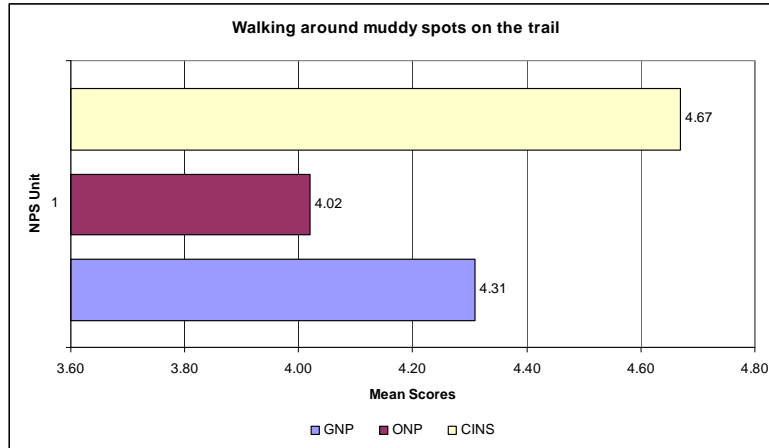


# Section V: Theory of Planned Behavior



EXPERIENCE YOUR AMERICA

## Attitudes



\* 1=very inappropriate, 4=neutral, 7=very appropriate

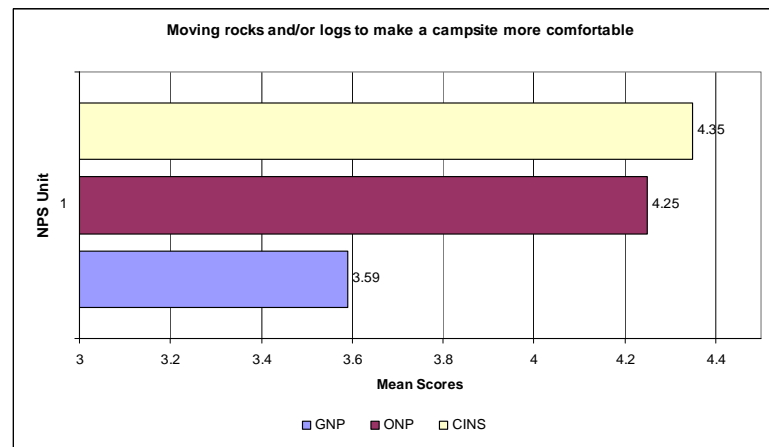


# Section V: Theory of Planned Behavior



EXPERIENCE YOUR AMERICA

## Attitudes



\* 1=very inappropriate, 4=neutral, 7=very appropriate



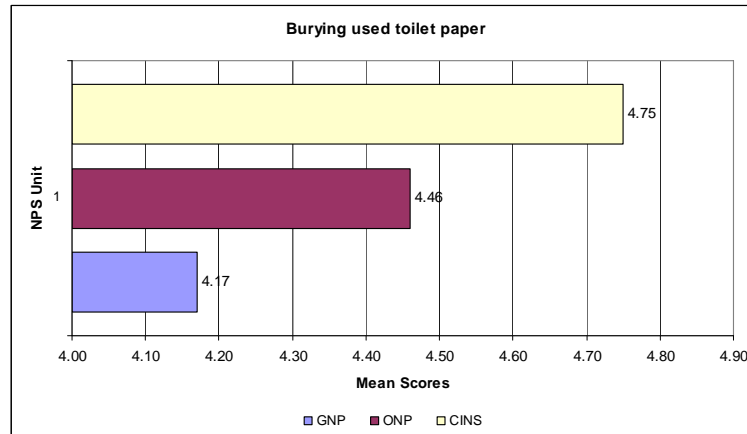


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Attitudes



\* 1=very inappropriate, 4=neutral, 7=very appropriate



35

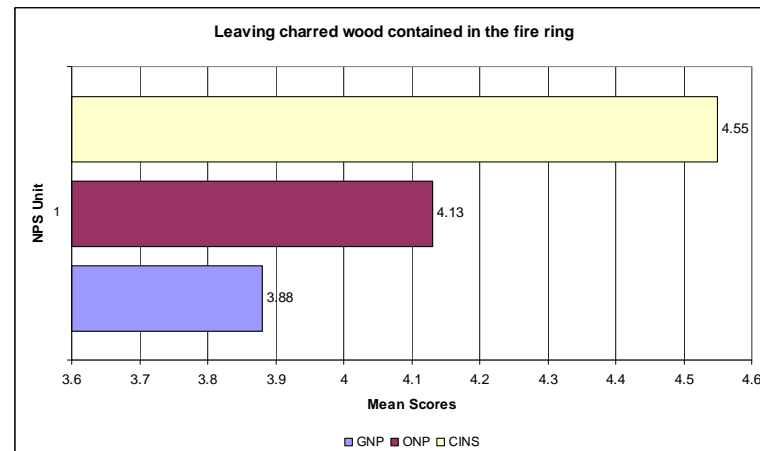


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Attitudes



\* 1=very inappropriate, 4=neutral, 7=very appropriate



36

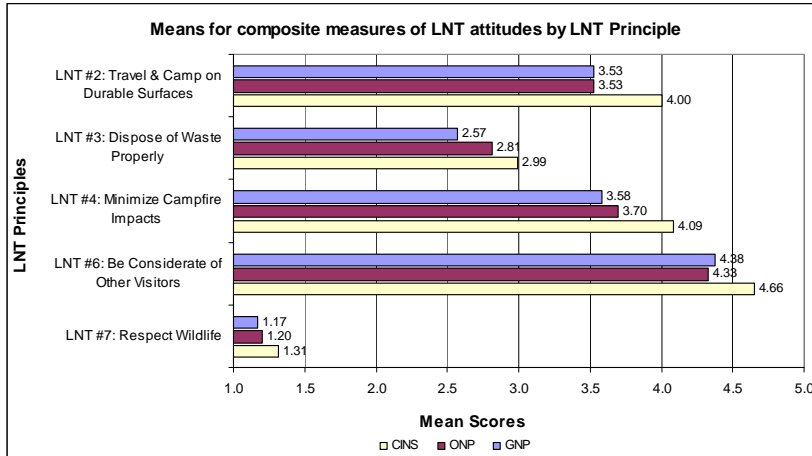


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### LNT Composite Attitudes by LNT Principle



\* Lower score reflects stronger LNT attitude (more inline with recommended LNT principles)

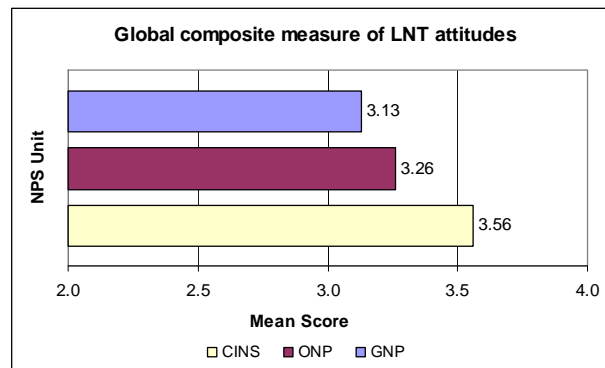


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Global composite measure of LNT attitude



\* Lower score reflects stronger LNT attitude (more inline with recommended LNT principles)



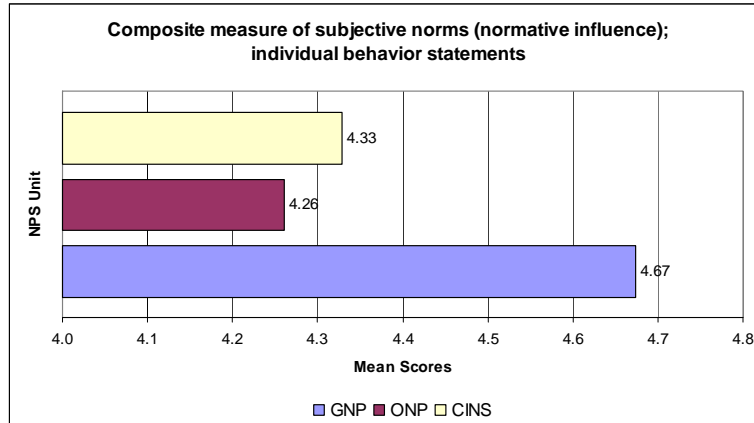


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Subjective Norms: Individual Measures



\* 1=strongly disagree, 4=neutral, 7=strongly agree

Higher score reflects stronger normative pressure to follow recommended LNT Practices



39

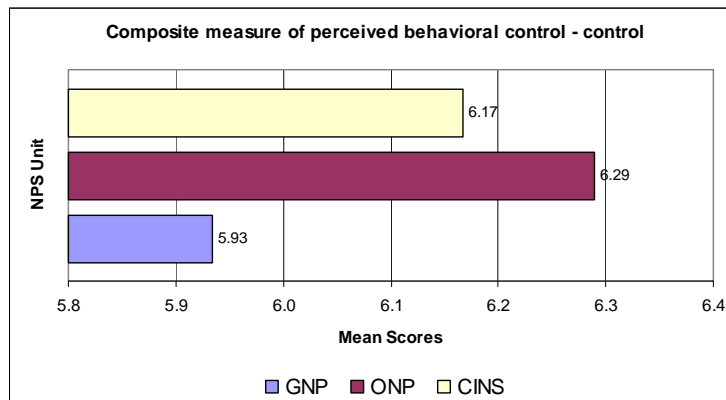


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Perceived Behavioral Control: Control



\* 1=not at all under my control, 4=neutral, 7=completely under my control

Higher score reflects higher levels of perceived behavioral control – control (i.e. – respondents feel more 'in control' of their actions)



40

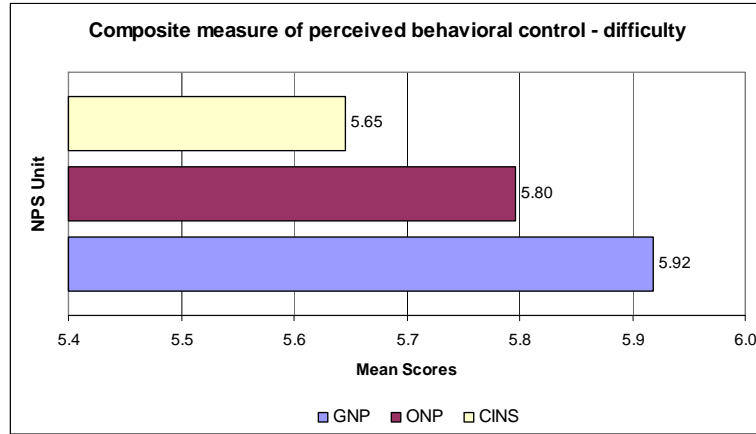


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Perceived Behavioral Control: Difficulty



\* 1=very difficult, 4=neutral, 7=very easy

Higher score reflects higher levels of perceived behavioral control – difficulty (i.e. – respondents feel the behavior in question is more easily undertaken)



41

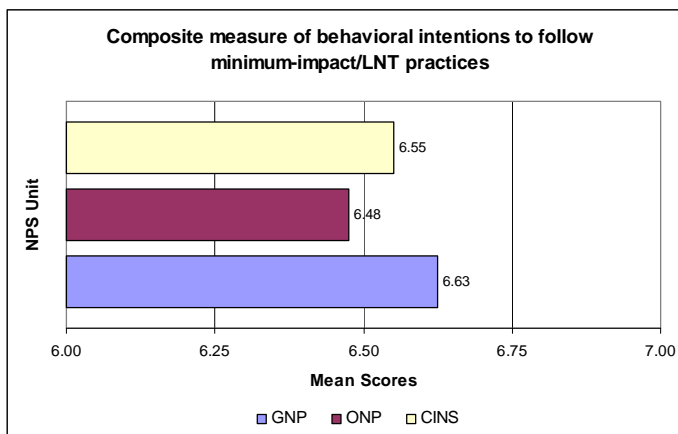


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Behavioral Intentions



\* 1=strongly disagree, 4=neutral, 7=strongly agree

Higher score reflects stronger intention to follow recommended LNT Practices



42



## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

- Behaviors regarding LNT Principle #1
  - Measured with 4-questions with dichotomous anchor
  
- Behaviors regarding LNT Principles #2-7
  - measured via 7-point scale (1=never, 2=almost never, 3=occasionally, 4=sometimes, 5=frequently, 6=almost every time, 7=every time) anchoring 29-items
  - **\*\*\*Lower scores reflect behaviors more congruent with recommended LNT Practices**
  
- Key behavior findings:
  - The majority of respondents reported conforming to promoted and recommended LNT practices
  - Future education efforts need to target specific behaviors in specific contexts
  - Management strategies (like campfire bans and providing backcountry privies/toilets) seem to affect behaviors in the desired direction.

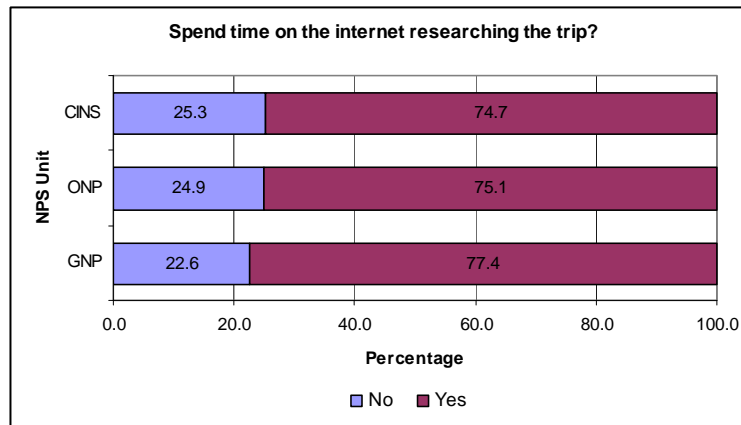


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Self-reported behaviors



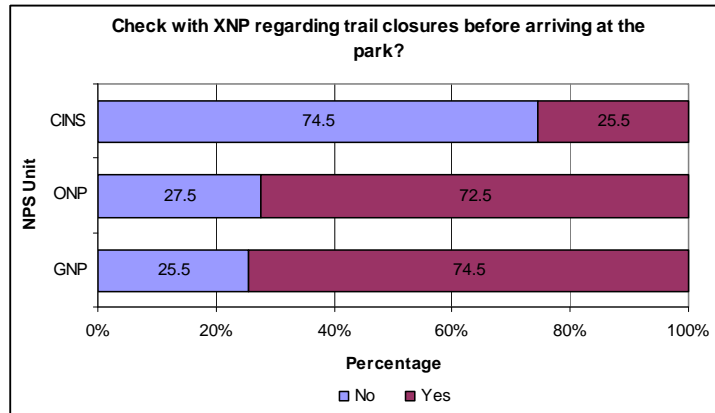


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Self-reported behaviors

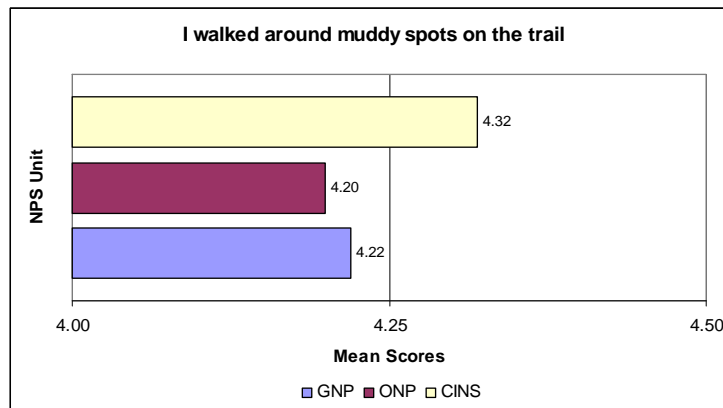


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Self-reported behaviors



\* 1=never, 2=almost never, 3=occasionally, 4=sometimes, 5=frequently, 6=almost every time, 7=every time

Lower score reflects behaviors more congruent with recommended LNT Practices





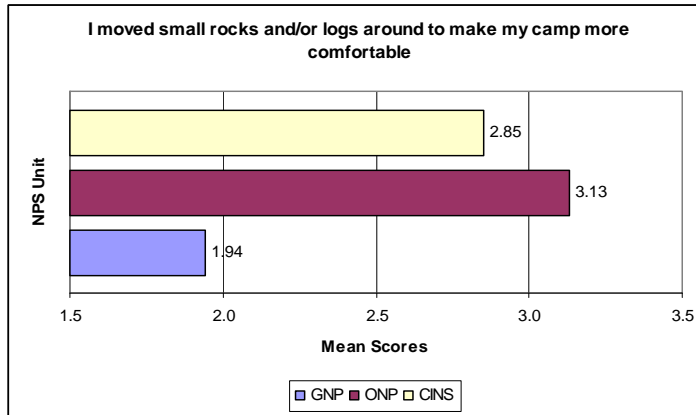


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Self-reported behaviors



\* 1=never, 2=almost never, 3=occasionally, 4=sometimes, 5=frequently, 6=almost every time, 7=every time

Lower score reflects behaviors more congruent with recommended LNT Practices



47

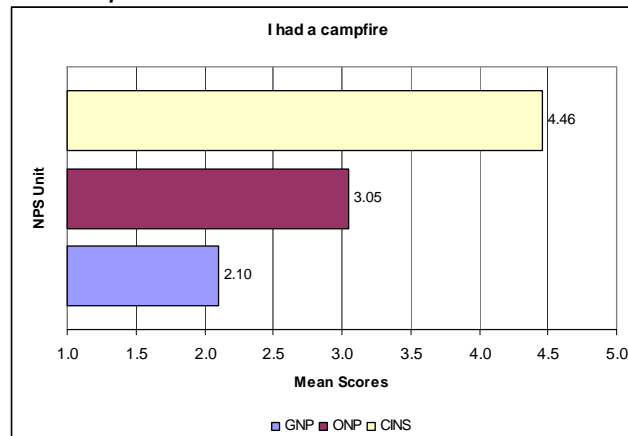


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

### Self-reported behaviors



\* 1=never, 2=almost never, 3=occasionally, 4=sometimes, 5=frequently, 6=almost every time, 7=every time

Lower score reflects behaviors more congruent with recommended LNT Practices



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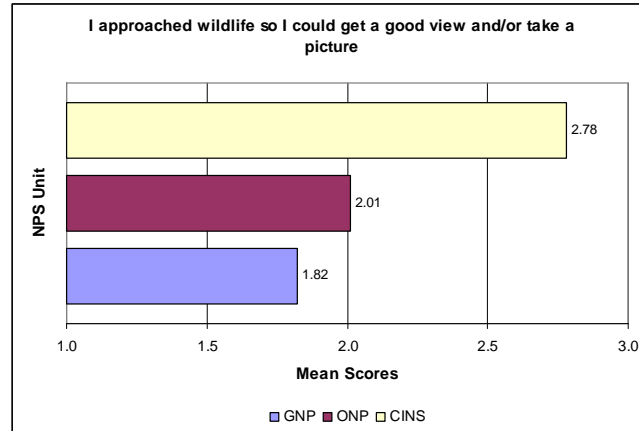


## Section V: Theory of Planned Behavior



EXPERIENCE YOUR AMERICA

### Self-reported behaviors



\* 1=never, 2=almost never, 3=occasionally, 4=sometimes, 5=frequently, 6=almost every time, 7=every time

Lower score reflects behaviors more congruent with recommended LNT Practices

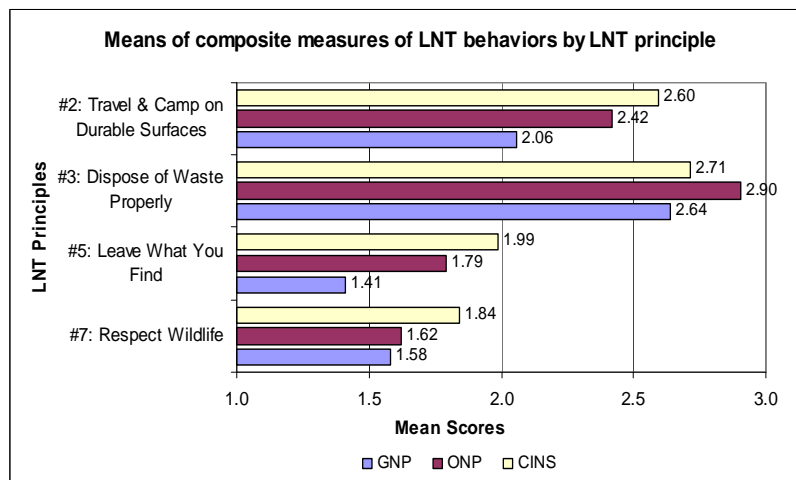


## Section V: Theory of Planned Behavior



EXPERIENCE YOUR AMERICA

### Self-reported composite measures (LNT Principles 2, 3, 5, & 7)



\*Lower score reflects behaviors more congruent with recommended LNT Practices



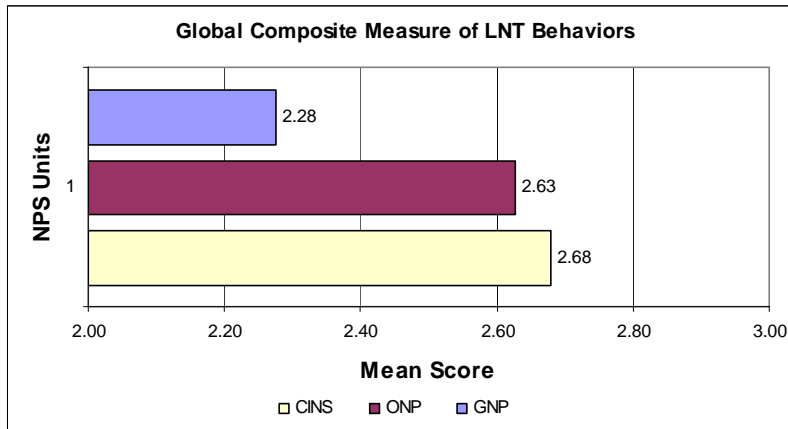


## Section V: Theory of Planned Behavior



EXPERIENCE  
YOUR  
AMERICA

Self-reported composite measure of behaviors (LNT Principles 2-7)



Lower score reflects behaviors more congruent with recommended LNT Practices



## Section V: Relationships amongst Primary Variables (all relationships [correlations] statistically significant at $p < .05$ level)



EXPERIENCE  
YOUR  
AMERICA

- **Demographics**
  - *Age*
    - GNP: as age increases, LNT Attitudes and LNT Behaviors get stronger (become more congruent with LNT Principles)
    - CINS: as age increases, LNT Attitudes get stronger (become more congruent with LNT Principles)
- **Trip Characteristics**
  - *Group size*
    - GNP: as group size increases, compliance (both attitudinal and behavioral with LNT Principles) decreases
    - ONP: as group size increases, attitudinal compliance with LNT Principles decreases
  - *Total miles traveled*
    - ONP: as total miles traveled in the backcountry increase, LNT Attitudes become more congruent with recommended practices





Section V: Relationships amongst Primary Variables  
(all relationships [correlations] statistically significant at  $p < .05$  level)



EXPERIENCE  
YOUR  
AMERICA

- Experience Use History
  - *Self-reported skill level:*
    - ONP: as self-reported backcountry skill level increases, LNT Attitudes get stronger (more congruent with LNT Principles)
  - *Years of backcountry experience:*
    - CINS: as years of backcountry experience increase, LNT Attitudes get stronger (become more congruent)
  - *Average number of backcountry trips/year:*
    - GNP: as average number of backcountry trips/year increase, LNT Behaviors become more congruent with recommended practices
    - CINS: as average number of backcountry trips/year increase, LNT Attitudes become stronger (more congruent)



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Section V: Relationships amongst Primary Variables  
(all relationships [correlations] statistically significant at  $p < .05$  level)



EXPERIENCE  
YOUR  
AMERICA

- Global Perceptions of the LNT Education Program
  - GNP & ONP: as global attitudes regarding the efficacy of the LNT program increase, LNT Attitudes and Behaviors become more congruent with recommended practices



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Section V: Relationships amongst Primary Variables  
(all relationships [correlations] statistically significant at  $p < .05$  level)



EXPERIENCE  
YOUR  
AMERICA

- Diffusion of the LNT message
  - *Self-reported knowledge of LNT*
    - GNP & ONP: as self-reported knowledge of LNT principles increases, LNT Attitudes and Behaviors get stronger (become more congruent with recommended practices)
    - CINS: as self-reported knowledge of LNT principles increases, LNT Attitudes get stronger (more congruent)
  - *Amount learned from ranger re: LNT*
    - ONP: as the perceived amount of information learned from a ranger increases, LNT attitudes decrease (become less congruent with recommended practices)
  - *Amount learned from printed park literature re: LNT*
    - GNP: as the perceived amount of information learned from printed park media increases, LNT attitudes become stronger (become more congruent with recommended practices)



Section V: Relationships amongst Primary Variables  
(all relationships [correlations] statistically significant at  $p < .05$  level)



EXPERIENCE  
YOUR  
AMERICA

- Theory of Planned Behavior
  - *Specific LNT Attitudes*
    - GNP, ONP, & CINS: as LNT Attitudes get stronger (more congruent with recommended practices) LNT Behavior becomes more compliant
  - *Group Norms*
    - ONP: as group normative pressure increases, LNT Attitudes and Behavior become worse (less congruent with recommended practices)
  - *Individual Norms*
    - GNP & ONP: as individual normative pressure increases, LNT Attitudes and Behaviors become more congruent with recommended practices
    - CINS: as individual normative pressure increases, LNT Attitudes become stronger (more congruent)





## Section V: Relationships amongst Primary Variables (all relationships [correlations] statistically significant at $p < .05$ level)



EXPERIENCE  
YOUR  
AMERICA

- Theory of Planned Behavior, cont.
  - *Perceived Behavioral Control – Difficulty*
    - GNP & ONP: the easier an individual perceives the LNT behaviors, the more likely they are to hold positive LNT attitudes and comply with recommended LNT behaviors.
    - CINS: the easier an individual perceives the LNT behaviors, the more positive their LNT Attitudes are toward recommended practices
  - *Behavioral Intentions*
    - GNP & ONP: the stronger an individuals intention to follow recommended minimum-impact practices, the more positive their LNT Attitudes and Behaviors
    - CINS: the stronger an individuals intention to follow recommended minimum-impact practices, the more positive their LNT Attitudes (regarding LNT principles)



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## Section VI: Summary and Conclusions



EXPERIENCE  
YOUR  
AMERICA

### Section V: *Summary and Conclusions*



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## Section VI: Summary & Conclusions



EXPERIENCE  
YOUR  
AMERICA

- Leave No Trace is highly diffused amongst overnight backcountry visitors in the three NPS Units investigated
- Awareness of the LNT Message does not necessarily equate to stronger/more compliant attitudes regarding promoted LNT practices
- Attitudes toward LNT are positively correlated with LNT behaviors. Educational efforts should focus on these attitudes.
- Individual norms (influence of group on individual actions) correlate with positive Attitudes and Behaviors. Therefore educational efforts should target the whole group, and especially the trip leader.



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## Section VI: Summary & Conclusions



EXPERIENCE  
YOUR  
AMERICA

- The easier an individual perceives the behavior in question, the more likely they are to be compliant with a recommended LNT practice. NPS management should attempt to remove *perceived* barriers to performing appropriate actions.
- Promotion agents should remember that attitude and behavior change are likely minimally affected by short rote information sessions in park backcountry offices. A multi-pronged diffusion strategy appears most successful.
- At least at GNP and ONP, individuals in larger groups are less likely to hold appropriate LNT attitudes than those in smaller groups.
- LNT education efforts should be:
  - Context specific
  - Utilize all or parts of the theoretical frameworks used in this research
  - Address both the 'why' of LNT as well as the 'what'



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### Section VII: *Management Implications*



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1. Most respondents are highly supportive of the LNT idea
  - Data suggests overnight backcountry visitors are both open to the message and willing to change behavior if presented with a 'why' type of persuasive message.
2. Awareness of LNT does not necessarily equal LNT compliant attitudes or behaviors
  - Education and outreach strategies should focus on the broad LNT principles as well as spend considerable effort explaining the SPECIFIC recommended practices and WHY they are important to perform.
3. Target salient attitudes and beliefs
  - Educating visitors with a focus simply on knowledge gain is generally viewed as ineffective. Instead, those charged with promotion of LNT would be well served to target the belief structures that underpin human behavior (utilization of relevant theoretical frameworks).



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## Section VI: Management Implications



EXPERIENCE  
YOUR  
AMERICA

4. Park education strategies are important
  - Park education strategies, for a substantial number of visitors, are their primary source of LNT information. Data suggests individuals utilize a variety of information sources when trip planning; thus, a multi-pronged diffusion strategy to disseminate best practices is likely warranted.
5. Park outreach strategies should be thought of as reinforcing and refining existing held knowledge and attitudes
  - A combination of various promotion strategies, both internal and external to the park, is likely to be most beneficial.
6. Move from education to strategic communication
  - Move LNT from a general education program to a strategic communication effort. Strategic communication moves general environmental education (like a ranger reciting the LNT Principles) to a full-fledged systematic and planned persuasive communication effort targeting explicit behaviors.



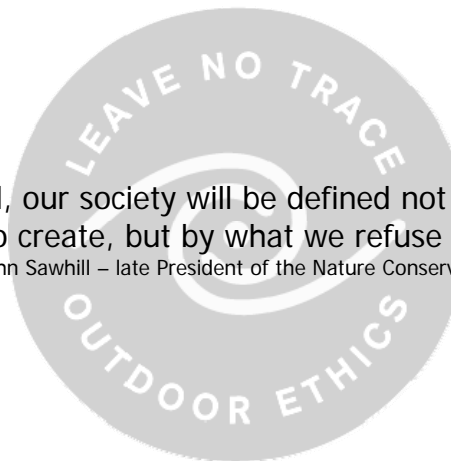
## National Park Service



EXPERIENCE  
YOUR  
AMERICA

In the end, our society will be defined not by what we  
choose to create, but by what we refuse to destroy.

John Sawhill – late President of the Nature Conservancy



**APPENDIX II:**  
**THE QUESTIONNAIRE & SUPPORTING MATERIAL**

Summer 2007

Dear Glacier National Park Backcountry Visitor:

Thank you for your willingness to participate in this important study. Many individuals enjoy backcountry experiences within Glacier National Park, and we would like for these to remain high quality. For this reason, the National Park Service and researchers from Clemson University are interested in finding out more about your recent overnight backcountry trip.

The enclosed questionnaire is only being distributed to a select number of backcountry visitors, so your participation is essential. All responses are confidential and the information collected will only be reported in aggregate form to assist us in better managing the backcountry resources of Glacier National Park. The questionnaire should take approximately 15 minutes to complete. When you are finished, please place the questionnaire in the enclosed postage-paid envelope and drop in any mailbox. After we receive your questionnaire we will remove your name from our list.

*While this survey is voluntary, your response is very important to the National Park Service.* We ask you to complete the enclosed survey independently. If you have any further questions about this study or need a replacement, please call Wade Vagias at (724) 355-0985, email: wadev@clemson.edu or Dr. Bob Powell at (864) 656-0787, email: rbp@clemson.edu. Both can also be reached at:

Department of Parks, Recreation and Tourism Management  
263 Lehotsky Hall  
Clemson University, Clemson, SC 29634

Thank you in advance for your participation.

Sincerely,

Rick Potts  
Chief – Wilderness Stewardship and Recreation Management Division  
National Park Service  
Washington D.C.





**National Park Service  
U.S. Department of the Interior**

## **Glacier National Park Backcountry Visitor Study**



### **Summer 2007**

Department of Parks, Recreation & Tourism Management  
Clemson University  
Clemson, South Carolina 29634

This questionnaire deals with your attitude and opinions regarding backcountry travel Glacier National Park. There are no “correct” or “incorrect” answers in this questionnaire so please feel free to express your candid views and opinions. Your answers **will be compiled with other backcountry visitors and will only be reported in broad statistical terms** to help us better manage the Glacier National Park Backcountry. This survey should take approximately 15 minutes to complete.

**Section A: Your Recent Trip**

We would like to know about the specifics of your recent overnight backcountry trip within Glacier National Park. We are referring to the trip you took after being contacted for participation in this study.

1. Did you camp overnight in the backcountry of Glacier National Park during the summer of 2007?  
*(please check one answer)*  
 Yes  
 No *(if NO, please skip to Section G: Background Information)*
  
2. The backcountry permit from Glacier National Park was registered: *(please check one answer)*  
 Under my name (I was the registered trip leader)  
 Under another person’s name
  
3. How many individuals, including yourself, were on your recent backcountry trip to Glacier National Park? \_\_\_\_\_
  
4. Approximately how many total miles did you travel in the backcountry during your trip to Glacier National Park? \_\_\_\_\_
  
5. What type of backcountry campsites did you use? *(check all that apply & fill in a number)*  
 National Park Service designated site/area → how many nights? \_\_\_\_\_  
 Undeveloped / Primitive area → how many nights? \_\_\_\_\_
  
6. Which of the following best describes the type of group you were with? *(please check one answer)*  
 Alone – by myself  
 Family/Friends  
 Organized group (scouts, summer camp, college group, etc.)  
 Commercial Group (i.e. you paid for guide services)  
 Other *(please describe)* \_\_\_\_\_
  
7. What was your primary mode of transportation while in the backcountry of Glacier National Park?  
*(please check one answer)*  
 Foot (hiking)  
 Boat (kayak, raft, canoe, etc.)  
 Stock (horses, mules, llamas, etc.) 148  
 Other (please describe) \_\_\_\_\_

8. Think back to your recent backcountry trip in Glacier National Park and select the response that most closely corresponds to your behavior. This is very important for the National Park Service! We have provided space for comments if you would like to clarify what you did or explain why you did it. Again, your candid and honest answers are essential to the success of this survey.

**Response Categories**

- 1 – Never
- 2 – Almost never, in less than 10% of the chances when I could have
- 3 – Occasionally, in about 30% of the chances when I could have
- 4 – Sometimes, in about 50% of the chances when I could have
- 5 – Frequently, in about 70% of the chances when I could have
- 6 – Almost every time, in about 90% of the chances I could have
- 7 – Every time
- NA – Not applicable/Does not Apply

*(please circle one number per statement)*

	Never	Almost Never (<10%)	Occasionally (30%)	Sometimes (50%)	Frequently (70%)	Almost Every Time (90%)	Every Time (100%)	Not Applicable
I placed my tent on bare soil, rock, gravel, or sand.	1	2	3	4	5	6	7	NA
I walked around muddy spots on the trail.	1	2	3	4	5	6	7	NA
I discarded biodegradable waste (like apple cores) in the backcountry.	1	2	3	4	5	6	7	NA
I picked up a 'souvenir' (rock, feather, etc.) so I could have something to remember the trip by.	1	2	3	4	5	6	7	NA
I had a campfire.	1	2	3	4	5	6	7	NA
Before setting up my camp, I placed food in agency provided containers or hung it in the air.	1	2	3	4	5	6	7	NA
I cut corners on trail switchbacks.	1	2	3	4	5	6	7	NA
When traveling off trail, the group hiked single file.	1	2	3	4	5	6	7	NA
Charred wood was left contained in the fire ring.	1	2	3	4	5	6	7	NA
Camp was set-up in an open area like a meadow.	1	2	3	4	5	6	7	NA
I walked off the trail to avoid wet or muddy spots.	1	2	3	4	5	6	7	NA
I buried my toilet paper.	1	2	3	4	5	6	7	NA
I kept something I found in the backcountry.	1	2	3	4	5	6	7	NA
I disposed of leftovers away from my campsite.	1	2	3	4	5	6	7	NA
I packed out my toilet paper if a toilet facility was not available.	1	2	3	4	5	6	7	NA

*Comments:*

**Response Categories**

- 1 – Never
- 2 – Almost never, in less than 10% of the chances when I could have
- 3 – Occasionally, in about 30% of the chances when I could have
- 4 – Sometimes, in about 50% of the chances when I could have
- 5 – Frequently, in about 70% of the chances when I could have
- 6 – Almost every time, in about 90% of the chances I could have
- 7 – Every time
- NA – Not applicable/Does not Apply

*(please circle one number per statement)*

	<i>Never</i>	<i>Almost Never (&lt;10%)</i>	<i>Occasionally (30%)</i>	<i>Sometimes (50%)</i>	<i>Frequently (70%)</i>	<i>Almost Every Time (90%)</i>	<i>Every Time (100%)</i>	<i>Not Applicable</i>
I burned paper trash in the campfire.	1	2	3	4	5	6	7	NA
If a rock fire ring was not present, I built one to contain a campfire.	1	2	3	4	5	6	7	NA
I fed small wildlife food scraps while in the backcountry.	1	2	3	4	5	6	7	NA
When hiking, I took breaks out of sight of the main trail.	1	2	3	4	5	6	7	NA
I moved small rocks and/or logs around to make my camp more comfortable.	1	2	3	4	5	6	7	NA
I deposited human waste on top of the ground, in an 'out of the way' spot.	1	2	3	4	5	6	7	NA
I approached wildlife so I could get a good view and/or take a picture.	1	2	3	4	5	6	7	NA
If an agency toilet facility was not available, I dug a small hole to deposit my human waste in.	1	2	3	4	5	6	7	NA
I used soap in streams/lakes.	1	2	3	4	5	6	7	NA
While in camp, I ate meals in the designated food prep area.	1	2	3	4	5	6	7	NA
I urinated on vegetation.	1	2	3	4	5	6	7	NA
Before leaving camp I completed a final sweep of my campsite to make sure all trash was picked up.	1	2	3	4	5	6	7	NA
I packed out other campers trash I found in the backcountry	1	2	3	4	5	6	7	NA
I strained dishwater through a filter/screen before disposing of it.	1	2	3	4	5	6	7	NA

*Comments:*

This section asks questions concerning your past experience in Glacier National Park and other wilderness/backcountry areas and your attachment to such places.

9. Was this your first overnight trip in the backcountry of Glacier National Park?

\_\_\_ Yes (if YES, please skip to Question #10)

\_\_\_ No

→ How many previous overnight backcountry trips have you made to Glacier NP? \_\_\_\_\_

→ What year did you first overnight camp in the backcountry of Glacier NP? \_\_\_\_\_

→ In an average year, how many overnight backcountry trips do you take at Glacier NP? \_\_\_\_\_

10. About how many different wilderness/backcountry areas have you camped in? \_\_\_\_\_

11. In what year (for example 1998) did you first overnight camp in a wilderness/backcountry area? \_\_\_\_\_

12. On average, how many overnight wilderness/backcountry trips do you take in a year? \_\_\_\_\_

13. Regarding the skills necessary for backcountry travel, I consider myself a: (*please circle one number*):

1 Novice                  2 Beginner                  3 Intermediate                  4 Advanced                  5 Expert

14. Please indicate your level of agreement with each of the statements listed below using the scale '1' Strongly Disagree to '5' Strongly Agree.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

(*please circle one number per statement*)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Glacier National Park means a lot to me.	1	2	3	4	5
I enjoy backcountry travel in Glacier National Park more than in any other park.	1	2	3	4	5
I am very attached to Glacier National Park.	1	2	3	4	5
I feel no commitment to Glacier National Park.	1	2	3	4	5
I identify strongly with Glacier National Park.	1	2	3	4	5
I get more satisfaction out of visiting Glacier National Park than from visiting any other wilderness or backcountry area.	1	2	3	4	5
Backcountry travel in Glacier National Park is more important than backcountry travel in any other place.	1	2	3	4	5
I wouldn't substitute any other backcountry/wilderness for the type of backcountry travel I do in Glacier National Park.	1	2	3	4	5



This section is to determine your general opinions concerning backcountry travel in Glacier and your interactions with members of your group.

15. Please rate your level of agreement with the following statements using the scale '1' Strongly Disagree to '7' Strongly Agree.

<i>(please circle one number per statement)</i>	Strongly Disagree		Neutral			Strongly Agree	
	↓			↓			↓
The people who travel with me on backcountry trips think it is important to camp close to bodies of water.	1	2	3	4	5	6	7
Early in life I spent time hunting.	1	2	3	4	5	6	7
I intended to follow minimum-impact practices during my backcountry trip in Glacier National Park.	1	2	3	4	5	6	7
The other members of my group believe I should not keep any items I may find in the backcountry.	1	2	3	4	5	6	7
In general, the opinions of others has little effect on what I choose to do in the backcountry.	1	2	3	4	5	6	7
Early in life I spent time in the outdoors enjoying nature.	1	2	3	4	5	6	7
I made every effort to follow Glacier National Park recommended minimum-impact practices.	1	2	3	4	5	6	7
The opinions of other members of my group have no effect on where I choose to camp in the backcountry.	1	2	3	4	5	6	7
Other members of my group think it is important to have a campfire during our backcountry trips.	1	2	3	4	5	6	7
Other members of my group believe all litter and trash should be carried out.	1	2	3	4	5	6	7
I did not plan to follow recommended minimum-impact practices in the backcountry.	1	2	3	4	5	6	7
Early in life I spent time engaged in mechanized recreational activities such as four wheeling, snowmobiling, and/or boating.	1	2	3	4	5	6	7
Other members of my backcountry group would find it acceptable for me to bathe in a stream or lake.	1	2	3	4	5	6	7
Other members of my backcountry party would approve of me moving a few rocks or logs around to make camp more comfortable.	1	2	3	4	5	6	7
I was determined to follow recommended minimum-impact practices during my backcountry trip in Glacier NP.	1	2	3	4	5	6	7

This section explores your thoughts regarding backcountry travel as well as how satisfied you were with your backcountry experience in Glacier National Park.

16. Please rate your level of agreement with the following statements using the scale '1' Not at all under my control to '7' Completely under my control.

<i>(please circle one number per statement)</i>	Not at all under my control		Neutral			Completely under my control	
	↓	↓	↓	↓	↓	↓	↓
How I act while in the backcountry of Glacier National Park is...	1	2	3	4	5	6	7
The way I act while in the backcountry of Glacier National Park is...	1	2	3	4	5	6	7
My choosing to have a campfire in the backcountry of Glacier National Park is...	1	2	3	4	5	6	7
Walking around muddy areas on the trail while in Glacier National Park is...	1	2	3	4	5	6	7
My backcountry camping practices in Glacier National Park are...	1	2	3	4	5	6	7

17. Please rate how difficult you feel the following actions would be to take while in the backcountry of Glacier National Park using the scale '1' Very difficult to '7' Very easy.

<i>(please circle one number per statement)</i>	Very Difficult		Neutral			Very Easy	
	↓	↓	↓	↓	↓	↓	↓
If I wanted to, carrying all of my litter out of the backcountry of Glacier National Park would be:	1	2	3	4	5	6	7
Carrying used toilet paper out of the backcountry of Glacier National Park would be:	1	2	3	4	5	6	7
Depositing my human waste in a small hole in the soil:	1	2	3	4	5	6	7
Walking around a muddy portion of the trail is:	1	2	3	4	5	6	7
I find following Glacier National Park recommended minimum-impact/LNT camping guidelines to be:	1	2	3	4	5	6	7

18. Overall, how satisfied are you with your backcountry trip within Glacier National Park?

*(please circle one number)*

Not at all satisfied	Slightly satisfied	Moderately satisfied	Very satisfied	Extremely satisfied
1	2	3	4	5

19. We would like to know more about your opinion regarding various backcountry practices. Please rate each statement on the 7-point scale using '1' **Very Inappropriate** to '7' **Very Appropriate**. For example, if you feel that "Taking my pet into the backcountry" is a **slightly appropriate** backcountry practice then you would circle #5.

(please circle one number per statement)	Very Inappropriate		Neutral			Very Appropriate	
	↓			↓			↓
Camping along the edge a stream or lake.	1	2	3	4	5	6	7
Moving rocks from where I plan to place my tent.	1	2	3	4	5	6	7
Burying used toilet paper.	1	2	3	4	5	6	7
Having a campfire.	1	2	3	4	5	6	7
Keeping a single small item like a rock or feather as a souvenir.	1	2	3	4	5	6	7
Cooking over a fire in the backcountry.	1	2	3	4	5	6	7
Taking a break along the edge of the trail.	1	2	3	4	5	6	7
Urinating on vegetation.	1	2	3	4	5	6	7
Moving rocks and/or logs to make a campsite more comfortable.	1	2	3	4	5	6	7
Burning paper trash in the campfire.	1	2	3	4	5	6	7
Walking around muddy spots on the trail.	1	2	3	4	5	6	7
When camping in heavily used areas, placing the tent in an undisturbed spot.	1	2	3	4	5	6	7
Using soap in streams as long as there are currents to help dilute the suds.	1	2	3	4	5	6	7
Dropping food on the ground to provide wildlife a food source.	1	2	3	4	5	6	7
Building a fire ring if one is not present.	1	2	3	4	5	6	7
Hiking side by side with my friends on existing backcountry trails.	1	2	3	4	5	6	7
Depositing human waste on top of the ground so it will decompose quickly.	1	2	3	4	5	6	7
In popular backcountry areas, camping where no one has camped before.	1	2	3	4	5	6	7
Disposing of dishwater in streams or lakes.	1	2	3	4	5	6	7
Swimming in streams/lakes.	1	2	3	4	5	6	7
Camping two nights in a pristine campsite.	1	2	3	4	5	6	7
Feeding wildlife.	1	2	3	4	5	6	7
Camping with large groups (8 or more people) in the backcountry.	1	2	3	4	5	6	7
Leaving charred wood contained in the fire ring.	1	2	3	4	5	6	7

The NPS and other land management agencies promote various minimum-impact skills and ethics training programs. Please answer the following questions regarding minimum-impact messages.

20. Have you ever heard of minimum-impact backcountry ethics/practices? *(please check one answer)*

- No
- Yes → I first heard of *minimum-impact practices* in \_\_\_\_\_ (Year)

21. Have you ever heard of *Leave No Trace*? *(please check one answer)*

- No (If NO, please skip to Question #25)
- Yes → I first heard of *Leave No Trace* in \_\_\_\_\_ (Year)

22. Where or from whom did you **first hear** of *Leave No Trace*? *(please check one answer)*

- Family / Friends
- Information kiosk / Park literature
- Popular media (magazines, books)
- Class / Course
- Other (please describe) \_\_\_\_\_
- Park personnel / Park education talk
- Boy/Girl Scouts
- Leave No Trace Webpage
- Internet in general

23. What has been your **primary source** of *Leave No Trace* information? *(please check one answer)*

- Family / Friends
- Information kiosk / Park literature
- Popular media (magazines, books)
- Class / Course
- Other (please describe) \_\_\_\_\_
- Park personnel / Park education talk
- Boy/Girl Scouts
- Leave No Trace Webpage
- Internet in general

24. Please rate your level of agreement with the following statements using the scale '1' Strongly Disagree to '7' Strongly Agree.

<i>(please circle one number per statement)</i>	Strongly Disagree		Neutral			Strongly Agree	
	↓		↓		↓		↓
Minimum-impact/LNT techniques do not reduce the environmental harm caused by backcountry travel.	1	2	3	4	5	6	7
It is important to use minimum-impact/LNT techniques when in the backcountry.	1	2	3	4	5	6	7
If I learned my actions in the backcountry damaged the environment I would change my behavior.	1	2	3	4	5	6	7
I get upset when I see other individuals in the backcountry not following minimum-impact/LNT practices.	1	2	3	4	5	6	7
I insist that minimum-impact/LNT practices are followed by all members of my backcountry party.	1	2	3	4	5	6	7

25. Did you do any of the following before your recent trip?:

Using a scale of '0' (nothing) to '6' (an extensive amount), how much did you learn about minimum-impact/LNT from this experience?

	Please circle one			Nothing							Extensive Amount
	No	Yes	If yes ->	0	1	2	3	4	5	6	
Speak with a ranger regarding minimum-impact/LNT practices?	No	Yes	If yes ->	0	1	2	3	4	5	6	
Watch a video regarding minimum-impact/LNT practices?	No	Yes	If yes ->	0	1	2	3	4	5	6	
Review any printed park literature regarding minimum-impact/LNT practices?	No	Yes	If yes ->	0	1	2	3	4	5	6	
Visit the Glacier National Park website to learn about minimum-impact/LNT practices?	No	Yes	If yes ->	0	1	2	3	4	5	6	

26. How would you describe your current knowledge of Leave No Trace practices?  
(please circle one number)

<i>No knowledge</i>	<i>Very Limited</i>	<i>Limited</i>	<i>Average</i>	<i>Above Average</i>	<i>Extensive</i>	<i>Expert</i>
0	1	2	3	4	5	6

27. Did you do any of the following before your recent trip?:

(please circle one number per statement)

	No	Yes
Spend time on the internet researching the trip?	1	2
Check with Glacier National Park regarding backcountry regulations?	1	2
Carry a topographic map and a compass?	1	2
Check with Glacier National Park regarding trail closures before arriving at the park?	1	2

To finish this study we need a profile of our study population to make sure it is representative of typical backcountry visitors to Glacier National Park. None of the information in this or other sections will be associated with your name.

28. What is your sex? *(please check one answer)*

Male  Female

29. What is your age? \_\_\_\_\_ YEARS

30. Please provide the zip code of your primary residence or country of residence if not USA:

\_\_\_\_\_

31. Are you Hispanic or Latino? *(please check one answer)*

Yes

No

32. What is your race? *(please check one or more)*

American Indian or Alaska Native

Black or African American

White

Asian

Native Hawaiian or other Pacific Islander

33. What is the highest education level you have attained? *(please circle one number)*

Elementary

High School

College

Graduate Study

5 6 7 8

9 10 11 12

13 14 15 16

17 18 19 20+

34. Which of the following income levels best describes your total household income, before taxes (2006)? *(please check one answer)*

Less than \$20,000

\$60,000 - \$79,999

\$20,000 - \$39,999

\$80,000 - \$99,999

\$40,000 - \$59,999

\$100,000 or more

35. Did you experience any emergencies or severe weather (snow, heavy rain, ice, etc.) during your trip in the backcountry of Glacier National Park?

No

Yes → If YES, did this situation force you to do anything you normally would not?

No

Yes *(please describe)* \_\_\_\_\_

## Concluding Comments

Is there anything else you would like to tell us about backcountry camping or Leave No Trace in Glacier National Park? Please include any additional thoughts or comments you may have below.

**Thank you for your participation in this important study!**

Please return your completed questionnaire in the pre-paid reply envelope provided as soon as possible so we can remove your name from our mailing list.

This form should be returned in the enclosed self-addressed stamped envelope to:

**Department of Parks, Recreation and Tourism Management  
263 Lehotsky Hall, Box 340735  
Clemson University  
Clemson, South Carolina 29634-9980**

PRIVACY ACT and PAPERWORK REDUCTION ACT statement:

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Your name is requested for follow-up mailing purposes only. When analysis of the questionnaire is completed, all name and address files will be destroyed. Thus permanent data will be anonymous. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Burden estimate statement: Public reporting for this form is estimated to average **15** minutes per response. Direct comments regarding the burden estimate or any other aspect of this form to:

Rick Potts, 1201 Eye (I) Street, 10<sup>th</sup> Floor Room 1047, Washington D.C., 20005; Rick\_Potts@nps.gov

Reminder post-card:

Glacier National Park a Dear Glacier National Park Backcountry Visitor –

Recently we sent you a questionnaire. If you filled it out, thank you. If not, this card is a friendly reminder and appeal to ask that you please fill out and return the Glacier National Park Backcountry Visitor Study.

Your response is very valuable to the success of this study and we hope you will take the time to participate. If you misplaced the survey and would like another copy please email me at [wadev@clemson.edu](mailto:wadev@clemson.edu) or call (724) 355 – 0985. I hope to hear from you soon.

All the best,

Wade Vagias  
Clemson University



Dear Glacier National Park Backcountry Visitor,

Several weeks ago, we sent you a questionnaire. To the best of our knowledge, you have not yet responded. If you completed and mailed your questionnaire within the last few days, thank you. Otherwise, this letter is an appeal to ask that you please fill out and return the enclosed questionnaire, which will provide useful information to Glacier National Park for improving visitor experiences within the backcountry of the park.

Your responses to this survey are very important because you are one of a select group of people who were chosen to represent the attitudes and opinions of Glacier National Park backcountry travelers. We recognize that your time is valuable, but we hope that you will agree to take part in this voluntary survey. Your responses will be only reported in broad statistical terms. We are very interested in your answers, so please try to answer every question.

Finally, we hope you find the enclosed survey interesting to fill out. When you have completed the survey, please place it in the postage paid envelope and drop it in any mailbox. If you have any questions regarding the survey or would like information on the studies' results, please contact me at [wadev@clemson.edu](mailto:wadev@clemson.edu) or at 724/355-0985.

Thank you very much for your help with this valuable study.

Sincerely,

Wade Vagias  
Glacier National Park and  
Clemson University, Department of Parks, Recreation, and Tourism Management



**APPENDIX III:  
VISITOR COMMENTS BY NPS UNIT**

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Female	26	It was a wonderful trip. Rangers were friendly and knowledgeable --> Pole bridge was fantastic, such good cookies. We had a great time, thanks a lot!
GNP	Female	39	It is typically difficult to obtain backcountry permits in Glacier National Park. Therefore, we typically do long day hikes of 20 miles. Just last weekend we did the 'dash'; from Logan Pass to Goat Haunt in one day. It would be nice if the backcountry overnight opportunities were expanded in GNP.
GNP	Female	37	Out backcountry camping trip was fantastic! The park website was very thorough and educational. Park rangers were very helpful through the planning and preparation. We encountered a group of two who seemingly dumped leftover food and we questioned how to best engage these individuals regarding their behavior.
GNP	Male	62	As a British visitor to Glacier NP, I was very impressed by the advice and information available from the rangers. It was clear and accurate, encouraged hikers to act responsibly and to be alert to risks of all kinds. They facilitated access to marvelous places while adhering to LNT practices.
GNP	Female	47	I thought the park was beautiful but hard to get permits for some of the trails I would like to hike.
GNP	Male	38	Maybe make trail markers a bit easier to see but otherwise...a trip of a lifetime. And have fun with the stats from this one!
GNP	Male	47	My LNT guilt centers around washing (me) in Lakes. I typically use 1 ounce or so of low suds biodegradable soap to get clean at the end of a day's hiking. This really does leave no visible impact but I'm no biologist... I'm afraid if I had to go 4-5 days getting sweaty and dirty without any cleanup I'd just find some other sort of vacation. By the way, the pit toilets are a great idea, other NPs should build these to prevent copious toilet paper blooms around campsites.
GNP	Male	51	Our designated campsite was about 20 feet from the edge of Quartz Lake so I assume that it is ok to next to a lake
GNP	Female	24	I used biodegradable soap when washing dishes and quick dissolving TP when burying feces. Many people have taboos regarding carrying out used TP and find this an effective alternative.
GNP	Female	28	The person I went camping with was very experienced. I learned mostly from him.
GNP	Male	24	LNT is important especially with all the morons there trundling around out there. LNT "Nazis", however are quite annoying. Bear Bells are a horrible annoyance; quite ineffective and dumb. L.E. officer (2 med) Matt Stadler is an incompetent dreadful waste of a human being. Don't tell your friends about GNP; if you must, tell them "it sucks."
GNP	Male	50	Pack animals cut switchbacks, urinate and defecate on trails much more than humans. Do not worry so much about hikers walking around mud holes when the pack animals do this. In addition, they walk off trail and make double trails. More damage than hikers.
GNP	Female	35	Park ranger discussion when getting our permits was very informative. Ranger was very knowledgeable and helpful. That was incredibly helpful information when preparing for our trip.
GNP	Female	35	Presence of pit toilets made poop burying unnecessary. Very important! Also very glad to have poles to hang bear bags/food.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Male	52	My campsite was on winter status meaning that only one party would be given a permit at a time. But the party could be one person at to the capacity of the campground. The logic of this was not self-evident. My campsite on winter status could easily have accommodated multiple parties without environmental damage. In fact, even though I had the one permit for the night, when I arrived there was already another party encamped there (presumable w/o a permit). I didn't know if should feel annoyed since I was supposed to be the only party permitted or forgiving since it seemed like there was space enough for us all.
GNP	Female	56	I found your wilderness/backcountry (section B) to be confusing. Here in the west we're seeing the emergence of a new definition of the term backcountry. It's certainly more remote than the front country and less primitive than wilderness and less restrictive.
GNP	Male	49	I've spent over thirty years in the backcountry of Glacier. The park service does an excellent job at what they do. Fundraising is always a problem but that's the way things always are. We love Glacier and respect the Leave No Trace attitude. It truly is a special place.
GNP	Female	46	Where campfires are allowed in the park backcountry, metal fire rings (like the frontcountry sites) would be safer and less fire danger than using a rock ring.
GNP	Male	39	I agree with minimum impact yet I fear it can get a bit out of hand. Animals leave tracks and make trails and as such so will humans. I did feel it was very important and was happy to see well-organized and maintained campsites with toilets which made it very easy for people who don't care about their impact to actually have a minimum impact.
GNP	Male	33	We chose campsites that allowed wood fires. Convincing people to pack out used toilet paper would be a very tough sell especially when you have a pit toilet. Until a Ranger told us we weren't aware that the park discourages the used of camp soap for bathing in streams and lakes. We obeyed this.
GNP	Male	30	We never left established trails and toilet facilities were located along entire route. Toilet paper was deposited in those facilities.
GNP	Male	26	Overall very impressed with the condition of trails and backcountry campsites at GNP. I hope to be back again and would strive to preserve the natural beauty of the park.
GNP	Male	43	I'm not a tree hugger but I do believe in minimum impact practice and leave no trace. Some people just don't belong in the backcountry but they always give me someone to laugh at. I had a great trip. I'm not sure if I had more fun in Glacier or Rocky Mt NP. I haven't yet seen Yellowstone because we can't find any info on backcountry camping there. I was surprised that there were no questions about wildlife or fishing.
GNP	Female	30	Sorry this is so late! I was away from home most of the summer and fall, and I just got this a few days ago. Glad you all are doing this survey.
GNP	Male	35	Remember minimum impact practices can differ between countries and not all of us are Americans! Making the effort to learn and abide by the backcountry guidelines of each park/region or country is an important ingredient in each trip for me. Practices do change over the years but common sense hopefully prevails. We greatly enjoyed our first backcountry trip in Glacier.
GNP	Female	30	Sometimes when camping we'll swim/bathe in streams, lakes but we never use soap. Also, we do leave the trail to urinate in private. I only just learned in the Glacier backcountry video about urinating on rocks instead of vegetation...honestly, though when no rocks were around I do go on vegetation. TP always packed out of course.
GNP	Female	28	I am fighting to offset global warming to save the glaciers, I love GNP
GNP	Female	28	it was a fantastic experience

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Male	44	More emphases needs to be placed on how to properly dig a cathole and dispose of human waste when no pit toilet is available. I don't recall seeing this in the backcountry video.
GNP	Male	24	In my fairly extensive experience, camping/hiking/fishing etc I find that is it good to promote above ideology but having rangers who act like cops and give out extensive fines for minimal violations tend have a negative impact on visitors. Make sure people realize the necessity of these regulations to ensure Glacier stays beautiful but don't act like (rangers) people are breaking the law when they make a simple mistake.
GNP	Male	27	Too many mosquitoes. Trip was beautiful!
GNP	Female	24	We backpacked Ohokome to the lake. The hike was beautiful and enjoyed that. The set up at camp was also great, the lake was beautiful. However, the mosquitoes were there in swarms. It was unreal, like a plague, seriously! That would have been nice to know. We probably would have chosen a different overnight trip had we known 'cause it made that evening miserable. We were unable to associate with the other campers there as we all just sat in our separate tents. Also didn't walk at the lake either. If it is always like that put up a large net at the eating area. Let us know! So we can bring lots of bug spray and appropriate clothing.
GNP	Female	49	Thank you for a great experience; you do an awesome job in the backcountry office.
GNP	Male	25	To eliminate impact eliminate cars trucks motorcycles boats and RVs. Provide waste receptacles. Pit toilets were great! Thanks.
GNP	Male	38	The staff were very helpful and friendly, wonderful park!
GNP	Male	58	I would appreciate more comfortable toilet seats at Ole campground and Fielding Trail Crossing.
GNP	Female	27	We really tried to be as low impact as possible. When I talk about moving things in a campsite, I mean small things. Also, I don't think we moved anything because all the campsites we visited were well setup. As far as taking a swim in a lake or splashing water on your face I didn't but I also didn't think it would have been a big deal. What I understand would be a problem is soap. Oh and Glacier is hands down the cleanest park ive ever visited.
GNP	Female	19	We really enjoyed our Glacier adventure and were very impressed by the awesome staff very friendly and helpful, therefore making our trip very enjoyable. We had gorgeous weather. No rain. We had to drive 2 hours around the park to east Glacier because of going to the sun road being closed but we still enjoyed it. Thanks.
GNP	Female	20	I really enjoyed the awesome scenery at Gunsight Lake.
GNP	Female	19	One creek we crossed had no bridge b/c it had washed out. All that we had was a cable to hang onto as we waded through knee-deep water. That was fun! That's what I call hiking!
GNP	Female	51	Food storage metal boxes are fantastic! Wish they could be at more campsites. There needs to be more communication about campsite etiquette/behavior guidelines. Can you put up a tarp at the food prep area and leave it up for others to use? Can you leave out your stoves/pots/pans (non-food items)? Perhaps a suggestion to stagger meal prep times in the campsite is full. Would it be possible to have a group camp/tent site, one large enough for 8 people (3 tents) and located a distance from the other tent sites?
GNP	Male	69	Most recent trip was atypical. Never planned to hike or have campsite, via kayak. Never hike alone in park b/c of bear threat.
GNP	Male	48	no fires, no horses, no soap, no toilet paper, no groups larger than 4 people, and carry out you own feces should be mandatory

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Male	54	Fires should be all used in a limited number in controlled sites. There is so much wood available at Lake Elizabeth. Fires will decrease wild fire damage and add to the experience.
GNP	Male	50	Park needs more backcountry campsites and more backcountry campgrounds. There should not have to be so much jockeying for position to get a campsite in a campground that fits a travel itinerary that one wants to take.
GNP	Female	32	On the campfire question, you should be more specific about areas that are designated as no campfires. If a campfire is not allowed that, a person must obey that rule. If it is allowed some of the questions are valid and should be answered according to how the individual feels.
GNP	Male	28	I was upset about the trash and the way the people camping next to us behaved. I have spent a lot of time in GNP and never saw anyone act the way these kids did by leaving trash and food out. I was upset about that because of bears. We protect them but some people have no care if they are killed, hurt or relocated as long as they have fun. They don't care about the animals in a park or other backcountry participant's health.
GNP	Female	22	I saw many people washing with soap in the lakes, very sad. Admittedly, I did take some rocks from the summits but other than that no deliberate LNT violations. Thanks for keeping Glacier a great park!
GNP			This seems to be one of the dumbest surveys I've ever taken - and its ten pages. Not only did you waste a lot of paper (something many nature lovers would probably disapprove of) when this could have conducted online, but the questions are repetitive and completely obvious. Why don' you just ask one question: "did you want to follow the backcountry rules?" Also, my want trip was over 5-months ago--so maybe you should have just asked people to go back to the station. This was a huge waste of time.
GNP	Female	49	I worked in burned areas. Tried to find a campsite to minimize impact on vegetation. The was hard in a 4-year old fire, new growth everywhere
GNP	Male	27	I would like to thank the rangers at the backcountry office for their advice and friendly nature. The gentleman who took my name for this survey was also very nice and helpful. My campsite was pristine and I did my best to leave it a little better when I left. The NPS has done a great job with the backcountry in GNP. Thank you and I hope to return next summer!
GNP	Male	46	thank you for not having fire in (?) people of manage the container service areas and to make reservations
GNP	Female	43	Section E was difficult to answer because the question can be vague. Along the edge - how close is that? 10 yards, 20 yards, 6 inches? Having a campfire? Depends on how down wood is available, air quality, how much usage of area. I prefer a campfire, but will use a stove if required. I prefer to backcountry camp where you chose your own path and site (no designated trails or designated developed campsites) & trails or designated developed (campsites) & fewer people. With as many visitors as 61 acres has I do understand the need for different management practices to handle the volume of people.
GNP	Female	29	Just as important as LNT in the backcountry is a philosophy of leave less trace in the front country or in our modern lives. To disregard the footprint we leave on our environment thought consumer lifestyles and only focus on good etiquette in the backcountry is short sited and misdirected. What's the carbon footprint involved in providing a [?] stove and white gas, this should be equally important to wilderness
GNP	Male	62	Great trip and help from check-in ranger station.
GNP	Male	23	2 of my 6 days of travel I was high on psychedelic mushrooms to invoke deep thought and heighten my Glacier experience to levels not experienced by the average backcountry enthusiasts.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Male	69	LNT is excellent in Glacier. Makes sense and is essential.
GNP	Male	20	The mosquitoes in the alpine zone were the worst I have ever seen in my entire life. Other than that, it was a really good experience. I would be more likely to follow LNT if I knew the specific reasons behind them.
GNP	Female	37	We appreciated the info available & the helpfulness of backcountry rangers and the park is ensuring low impact backcountry use. We were disappointed to see substantial helicopter traffic over backcountry areas. We also would have liked to have seen garbage cans at trailheads along Going to the Sun Road to help alleviate trash, especially from day hikers.
GNP	Male	63	it was a terrific trip with a super companion in unspoiled wilderness environment with opportunities to see more wildlife
GNP	Male	54	This survey is much too long. I conduct surveys on a regular basis & this survey violates the cardinal rule of being much too long & involved. Plus, you ask the same questions a half-dozen times. Making surveys too long strongly biases the results & makes them meaningless because only hard-core people will take the time to fill them out.
GNP	Male	43	This more than 15 min. read too much into each question's, approx 1 hr I did it twice. I left remarks under some questions. I have been intereste4d in camping hiking since childhood. So I have watched a lot of TV on it the practices seem to have changed in the last few yrs, so I'm concerned about how to interact in the BC. Thank you to saving our parks. I only hope my small part helps
GNP	Male	47	Section D is ridiculous. The first 2 questions are the same and of course everyone's actions are under their control unless they are such mindless robots that they can only do what they are told. I know many people who refuse to hike Glacier because of all the controls. It's also the best place to be attacked by bears because they know there are protected there.
GNP	Male	40	LNT for the most part is a great practice. I do believe that it does go to far sometimes to the point of worship nature rather than the Creator of nature. One has to dispose of waste somewhere. It is really no better disposed of where man lives than where nature is. There are areas than say to pack out human waste also. That is carrying it too far!!!
GNP	Male	21	I was a little frustrated with the fact that horses were allowed on many of the trails I was on. Having to watch your step got old and the smells of the stock took away some of the natural beauty. I visited areas that were just being freed up from snow so it was hard to tell how much impact there was present from humans.
GNP	Male	28	This study is very black and white. Would have helped if you talked w/people as your questions don't get to the root of what I am thinking whiled checking boxes. I understand the need for large samples though so good luck with it.
GNP	Male	48	Some questions unclear to me. If a backcountry practice was allowed it was done. Ranger instructions prior to camping were followed.
GNP	Female	41	We found a lot of garbage candy wrappers on the trail that we picked up and brought out w/us when we returned. We had a really fabulous time look forward to next summer!
GNP	Female	56	I did not know the reservation policy for overnight backcountry sites or I would have reserved a site higher up. We were bugged heavily and this reduced our party's enjoyment considerably.
GNP	Male		I would like to see less people swimming and throwing rocks in lakes. It was very annoying.
GNP	Male	51	I was impressed with the park rangers. There were informative and nice people. They were very helpful on my trip plan.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Female	56	Glacier park is beautifully maintained. It does not appear to be over visited or abused in the slightest. We thoroughly enjoyed our trip and will be back as soon as our schedules allow. We have friends in Big Fork now so I'm sure we will do a trip with them. Thanks for a terrific vacation in nature!
GNP	Female	27	#14 has some odd questions. This was my first trip to Glacier (after 20 yrs of hiking in Rocky Mt NP) so don't talk it as apathy if I haven't yet become deeply attached to Glacier.
GNP	Female	51	Would like to have been warned about the mosquitoes. One of our campsites was uninhabitable due to the mosquitoes. Overall, it was a wonderful experience and we plan to make backcountry camping at Glacier an annual event.
GNP	Male	32	I thought it was great albeit crowded...summertime in Nat'l park, I guess...
GNP	Female	47	I wish I would have asked the park service which area had the more severe mosquito population, east or west Glacier. Our trip was cut short a day due to the intensity of bugs & bites (suffered by my daughter).
GNP	Male	27	The public campgrounds that I stayed in Apgar & Rising Sun both needed more recycling bins. I saw a lot of recyclable in the trashcans. More bins would reduce the amount of waste the park produces each year by tons.
GNP	Male	30	Good luck w/your report! Thanks for the hard work in keeping Glacier wild!
GNP	Female	26	I had a wonderful time. Loved it. However, I was shocked when camping at Gunsight Lake. We were sharing the campground with some GNP employees. They did a horrible job at respecting the park, when they washed dishes in the lake, leaving a large pile of food in the water. It surprised me that an employee would be so negligent.
GNP	Male	34	The campfire questions were confusing. I have only camped in sites that do not allow fires so we've never had a fire
GNP	Male	39	We received great help from a ranger at Polebridge station. I would like to thank her and leave feedback but couldn't find a website to do so
GNP	Male	48	I really am thankful for privy use in the backcountry. Not a big fan of packing out used toilet paper.
GNP	Female	28	The food hanging stations should be easier to use for less experienced or ill-equipped b/c users who may otherwise practice sloppy hanging techniques or none at all at b/c developed campsites. Some survey questions too broad and require more specific scenarios
GNP	Male	29	Trails were very well maintained. Employees friendly and helpful. Great experience.
GNP	Male	28	Sorry it took so long. I have been gone most of the summer. Good luck with your studies. Any questions? Adam Wagner 307 258 2219
GNP	Female	29	Thank your for your work, good luck!
GNP	Male	26	Thanks for doing this.
GNP	Male	26	It was our first trip and were not prepared well enough with amount of food. Website should help with that. For LNT camping the campgrounds were very highly trafficked. Trails were very obvious and sites close together. I expected it to be more remote. Beautiful park.
GNP	Female	39	I was very impressed with your backcountry sites. How organized your system was and of course how beautiful, your park was. I will definitely come back. I do feel I did my best to practice LNT.
GNP	Female	23	As an employee inside GNP, I feel a strong connection with the park. This combined with the NPS orientation required of employees has made me take leave no trace more seriously.
GNP	Male	24	You should put elevation numbers in USA feet not just in km. this is America we want US numbers.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Female		thank you for a wonderful experience of a lifetime
GNP	Male	50	I struggle with a few concepts: when hiking I usually urinate along the trail, 10-20 ft from trail, should I do it closer to reduce trampling on brush. Does urine harm plants? What is recommendation? Swimming and dipping in rivers and lakes--if not using soap is that a problem? Depends on size of lake and river and stream. Washing/rinsing dishes. After washing w/biosuds away from the river I rinse in river, if large steam. Not in small creeks or lakes. The most difficult part of min impact/LNT camping is being "forced" to stay in a certain campsite. While I agree with the idea (and do it) what makes it difficult is the following: 1) not camping near water (usually lakes), 2) camping near other people, 3) not being able to select campsite based on weather/environmental conditions, i.e. Camp lower in trees if windy/stormy etc. camp high for views when weather is fine and to get away from bugs. Thanks.
GNP	Male	55	At Fifty Mt, the tent sites should be moved, as there is no shade. The sites are located in dead (burned) trees. I did not know there were primitive areas available. How do I find out about them? Danny in permit office is great!
GNP	Male	55	Great backpack trip! Love GNP
GNP	Female	47	The questions about moving rocks are a bit ambiguous. It would only be rocks in the designate campsite area where you would place the tent. And campfires would be only if they were allowed. So some questions should have qualifiers
GNP	Male	33	There are particular aspects of minimum impact camping that I disagree with such as not burning organic waste in a fire. This view did affect my responses to several questions. All the best, Adam
GNP	Male	47	While in the backcountry, many groups did not follow their itinerary. As a result, large groups were camping in undisturbed areas. This happened for 2 reasons: 1) poor communication between trip leader and backcountry ranger setting itinerary. 2) Inexperienced of trip leader. In almost all cases, poor planning and little regard to environment came from hikers under 25-years of age. <u>A very strong correlation between age and backcountry ethics.</u>
GNP	Male	41	Include more information on why the LNT practices are advocated. I think I for most people when I say I like to know why I am being asked to do something. We burned our combustible trash in campfires even though we were asked not to because we did not know, and still don't, why this practice is frowned on.
GNP	Male	37	Please no pets on trails. I do believe in carrying everything out but having a fire in a designated area is fine if properly managed. You will most likely burn all wood down. I am a firefighter, use common sense with fire keep water nearby and do not burn close to vegetation. Your questions seem to imply you shouldn't swim in lakes or streams. That should be okay. Glacier needs to make trails better.
GNP	Male	47	The backcountry rules involving food and bears seem to vary from park to park. I think that some people don't pay attention to the different rules in the parks.
GNP	Female	46	backcountry camping here was different from my other National Park experiences, in there was no pit toilet & common eating area/food prep area for all campers to use. It was a very pleasant backcountry experience with spectacular scenery.
GNP	Female	30	We had a great time!
GNP	Male	28	Great to see you are doing research in this area--good luck!
GNP	Male	35	1) Like the location of the campsites designated by Glacier National Park 2) strongly believe in the rights of backpackers to carry firearms for protection from wild animals. This would only be for backpackers who have undergone proper training.



<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
GNP	Male	43	More designated fire rings would be nice. Camping is not camping unless you have a campfire. Ability to stay longer at a campsite.
GNP	Male	60	I've hiked well over 3000 miles including a hike of the AT and most trail (70%) in GNP. While I know LNT includes packing out TP, I'll never do it. Otherwise, LNT is good advice.
GNP	Male	26	Overall, I think we were extremely successful following leave no traces ethics in Glacier although I feel it pertinent to include that at one point I had to take an emergency backcountry poop. We were near a body of water and the brush was thick. I scrambled through the least dense of growth trying to step on only logs and rocks. I dug a hole with my hands and buried my waste. I used leaves no toilet paper. However, I was probably 100-150 feet from the nearest water source, not recommended 200. Sorry but it was that or poop in my pants and I felt it was more environmentally responsible to not ruin my underwear and not have to throw them away. If you have further questions regarding my poop please call 434 409 9036
GNP	Male	32	While I understand the rationale of forcing visitors into camp in designated areas (i.e. LNT), I was disappointed with the lack of a "wilderness type" of experience this created. I understand the benefits of site concentration but in a wilderness area of over 1,000,000 acres, I feel there is enough space to spread out the tent sites within the camping areas more. Spreading out the sites would provide more privacy for visitors & give us the true wilderness experience we are looking for. Thank you!
GNP	Male	43	Too many horseflies at Snyder Lake! Impressed to see a ranger visit us early morning at the campfire.
GNP	Male	54	1. Would have liked the campsites to have had a nice view of the beautiful lakes we hike into. 2. I worried about that middle of the night trips to outhouses some of them were quite far from the campsite and I worried a bit about crossing paths with a bear. I'm not sure what could be done about it though
GNP	Male	63	On my trip, there was a no campfire ban in our campsite which we followed. Last year fires were permitted at Upper Kintla Lake. I was amazed but figured the park service makes the rules and I follow them.

#### OLYMPIC NATIONAL PARK COMMENTS

ONP	Male	33	It would be a good idea to warn backpackers heading to the Ozette River that the sections marked on maps a "round at low tide" really mean low tide. We barely got around them an hour or tow after low tide. Also the ways around these points were very dangerous.
ONP	Female	52	We had a great time. I was disappointed the trail from Lake Osette to Cape Alava was listed as flat but there were many stairs. We had chose this trip because of the flat grade--I have arthritis in my hip. It turned out OK though. Also, the fire ring was the beach instead of at the campsite. We saw others make a new ring in their campsite but we did because we weren't sure we were allowed to.
ONP	Female	51	We experienced heavy rains on this trip and the trail became a river. For safety reasons we did walk around the trail in most places--it was just too slippery.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Male	55	Section 16 was confusing. It was not clear if under my control means I can disregard park rules such as having a campfire in a no fire area or if it means that others in my group were making the decisions and I had no control over their actions. An example question would help. I would prefer to see the 12-person group limit so that larger groups can be in the same general area while still controlling local campsite pressure. Our group of 16 split up and needed to camp several miles part yet the area we were at (cape alava) had many empty campsites. Restricting each campsite to 6 to 9 campers would allow the group to maintain contact without overstressing the sites. It could even reduce pressure in beach areas. I would like to see campfires continue to be allowed at areas such as cape alvara (subject of course to weather conditions, etc.)
ONP	Male	48	I believe more prepared fire rings and education on gathering wood at the ocean sites make more sense than a ban (Sandpoint). These sites already have fire rings-years worth. People seem to burn anyway.
ONP	Male	56	The addition of privies simplifies the toilet paper/poop problem on major trails. Did the Elwha for the first time in years. Interesting to see all the new infrastructure assume very heavy use. As we were up in the rain it was nice as no one else so wires in place, privies, etc was very luxurious
ONP	Female	48	In addition to having minimum/LNT techniques described in the Olympic National Park literature, perhaps having the rangers review the LNT practices with each party when they check in to pick up their permit and have them sign a form that they understand & intend to follow LNT practices would be good. It's all about education. Once I/we become aware of the consequences my actions may cause to something, I cherish (nature/ONP) I change my ways.
ONP	Male	51	1) Charging for backcountry permits should NOT be done! I have seen lots of low-income families turned away at the Hoh Ranger Station because they could not afford the fees. This is just plain wrong! A National Park should be available for ALL citizens to visit and enjoy, regardless of economic status. Charging backcountry fees is, in my opinion, simply of lack of leadership and integrity at the upper levels of both the NPS and Dept. of Interior. 2) Just because I am professional guide, I should NOT be REQUIRED to carry bear containers. Many of my trips are 8 or more days long. That quantity of food will not fit in a single canister anyhow. When I am already carrying upwards of 70 pounds in my pack (including technical rock and ice climbing gear), adding another 7 pounds for an awkwardly shaped and difficult to pack canister when there are plenty of trees to hang food from is needless. While generally a good idea, there are many extenuating circumstances. Bear canisters for food are voluntary for private parties; they should NOT be required for guides.
ONP	Male	32	Please switch to Wag Bags. The blue bags provided are hard to use and are more likely to result in human waste being left behind.
ONP	Male	51	I've backpacked 40 years in the park and everything has always been very good.
ONP	Male	59	We love our Olympic parks. Thanks for caring and for all you do.
ONP	Female	33	The black tail deer were out of control at Beard Lake. They came right into our campsite and had no fear. I threw rocks at them to defend my space- we have a 1-year-old baby with us and it was uncomfortable with them so close. They did not get any of our food or gear - but it took constant vigilance. We had a wonderful time in Olympic! My in-laws never backcountry camped before and had a very positive experience. We had to totally watch them all the time to teach them what to/not to do but it worked!
ONP	Male	51	We encountered many washed up buoys trash items; and non-natural debris on beaches between Rialto Beach and Cape Alava. This detracted a bit for the wilderness beach experience. Can the park service develop a program to clean-up these wilderness beaches?

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Female	55	We enjoyed our hike on the beach. Even though I have not read your material on "Leave No Trace" I strongly am motivated to leave "no trace" of my visit.
ONP	Male	34	I would like to learn more about current LNT practices - sorry for the delay
ONP	Male	38	Provide better directions to the bathrooms at the beach. We saw a sign bug couldn't find the bathroom. I understand making them blend in so they aren't noticed but if you can't find them they won't get used.
ONP	Female	30	Despite the rain--had a great trip!
ONP	Female	47	With our most recent trip, there are a few things that need to be addressed to make Leave No Trace camping more successful. We hike the Tired Beach to Oil City Hike. The pit toilets in the higher used camping areas (to leak point and mosquito creek) "need" to be maintained. There would also be less damage if the ropes and ladders of some of the headland trails were repaired. Some are barely non-existent and very dangerous. I know that is a difficult area to maintain due to topography and local weather conditions but maybe a little extra TLC might help. At least there is one good thing on your side it not a heavily traveled route. Most people turn back way before Hoh Head.
ONP	Female	82	I traveled with my daughter who is very experienced. She knows the ONP well. She is knowledgeable about LNT and strict.
ONP	Male	56	although I moved a few logs and rocks at the designated campsite to make room for my sleeping bag, I moved them back before leaving
ONP	Female	51	The questionnaire was based on a beach camping trip (shish) and some of my answers would have been different if it would have been a mountain hike such as campfires and toilet practices! (there are pit toilets at shish)
ONP	Female	43	Olympic national park is a national and worldwide treasure.
ONP	Male	48	This was only our second visit to Olympic and we hope to return again. The camping by the ocean especially is unlike anywhere else and we really enjoyed it. Sound's like I should learn a bit more about low impact camping next time though.
ONP	Female	33	I found some of the questions confusing--for example--is it ok/appropriate to camp along the edge of a lake? We camped in a designated spot right beside a tiny stream and pond at Deer Lake--so I think that was appropriate but it wouldn't be ok atom find your own spot on the bank of a lake.
ONP	Male	60	I'd like to see stepped up education/promotion of LNT. If the rationale for various LNT guidelines is given e.g. packing out used toilet paper - then others might be more likely to adhere to those practices. Also, tell us how to do this nasty practice!
ONP	Male	58	The minimum impact initiatives in Olympic National Park are a good thing and have been very successful in minimizing damage due to human visits. We miss having fires up high, but realize that the lack of firewood makes the no-fires policy necessary. Some observations from our trip this year: 1. we got mixed signal regarding camping outside of designated camp spots. When reserving campsites, we were essentially forced to select among a limited number of sites. In our case, this was Heart Lake, some sites down the hill from Heart Lake and Lunch Lake. Over the phone, a ranger told use we could camp oat Ocarin Lake which is between Heart Lake and Cat Peak. When we registered at WIC they told use to forget it. The impression was left that we could not camp anywhere but the well-know and designated spots. Yet we saw many designated camping sites along the trail as we hike to Heart Lake. We also saw one at the top of the ridge above Heart Lake. Can these spots be used or not? It seems to me that rangers need to make some allowed for unique backcountry objectives when approving campsite plans. We planned to camp at Ocarina Lake to make our plans to climb Mt. Carrie feasible. The mixed messages and occasional inflexibility were not impressive. It would be very

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
			helpful to have detailed maps of acceptable sites available to hikers, especially on the internet. 2. The shelter at Lunch Lake has disappeared since our last visit. It appears that there is some movement in the direction of eliminating shelters. We would not agree with this. A few shelters in selected areas are a real blessing to hikers. We have many fond memories of waiting out bad weather in a shelter and they don't materially detract from the wilderness experience. 3. The condition of the camping areas at Lunch Lake and Heart Lake were super-good. The Park Service deserves high praise for their management of these spots. Our ranger was friendly and professional. 4. We never saw a single scrap of litter over 30 miles of hiking. That was impressive.
ONP	Male	45	Having a campfire has been an important part of backpacking for me since the early eighties. Besides benefits such as warmth, light, feeling of safety, mosquito repellent, cooking, etc it adds a spiritual and aesthetic quality to the experience. I use a camp stove for most cooking but don't want to give up the campfire. Mostly I support Leave No Trace but don't think in absolutes. Taking one rock from a beach full of rocks has no significant impacts.
ONP	Female	47	1. Happy to have campfires only where allowed 2. Happy to use privies when provided 3. Learned LNT during 20 yrs camping/hiking/canoeing in Canada not USA 4. Started kids in backcountry age 6 due to our disgust at camper behavior in state and federal campgrounds; lack of respect for environment, other people and wildlife. 5. ONP is a fabulous park--every trip is better than the one before. I highly commend the knowledgeable rangers I have meant and the trail workers who clearly up in tons of hours. A precious national resource 6. Because I have hiked through much of Canada and Europe, I cannot say that ONP is absolutely the best park.
ONP	Male	58	some ambiguous or conflicting information about used t.p. disposal
ONP	Male	44	There are numerous floats and debris that wash up on the beach where we camp. My boys and I hike out floats. We feel we are helping clean the area and my kids feel they are bringing home a memento from our trip.
ONP	Male	47	Great time! We had two groups which was a bit difficult given the desire to see friends during the trip. Ran into each other briefly a couple of times but did not stay together (impact on beach sand is pretty minimal). Great experience!
ONP	Female	46	park rangers (port angeles and Hoh river) were extremely helpful both on the phone and took plenty of time to discuss tides, hazards, descriptions of campground that would better suit larger groups of 9 & 10 -- extremely helpful--friendly--LOVED the availability of bear cans and drop off points at various places. Our group had a blast! Coastal hike was much more strenuous and campsites recommended by rangers were appreciated. Love the rain forest. Deluge coming back! Our group - Scouts-trained in LNT frequently-but occasionally had to "re-fresh" a few memories.
ONP	Male	58	I think that that in some efforts to "lessen" the impact on wilderness the park service's role has focused too much on intervention and has left me feeling I was under surveillance with the impression it is their park not mine. I go into the backcountry to try to contact the wild. Sadly, it does not exist in our lower 48.
ONP	Female	45	I think current management is great. I like & respect the pre-registration required. The wilderness staff at Port Angeles was excellent. The toilets are wonderful and well-managed. I have no problem with fees required to maintain the services. I respect ranger visits on trails and comments by them at campsites regarding LNT.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Male	64	Trip was to climb tm. Olympus so used Ho trail. Suggest added toilets at "developed" or well used campsites-not all had them. Use common sense with LNT; carry out trash, bury waste if no toilets, use existing campsites. Campsites should be near water for drinking cooking. Carryout waste from glacier area (glad to see waste deposit station above glacier meadows to support this), moving rocks/logs in established campsites no big deal (as not really impacting anything). Walking around muddy areas on trail - I do as I want to keep boots as clean as possible and I don't believe it really significantly impacts the environment even though it may widen the trail in places. Developed (designated) campsites with access to water and pit toilets would go a long way to keeping the environment "clean"- and good trail maintenance is important.
ONP	Male	53	I donated entirely too much blood to the local insect population.
ONP	Male	44	On this trip I noticed many more families and daily foot traffic. Kids were very noisy and disturbed (chased) wildlife. More trash on beach than I've seen before. Next time I will camp much further down the beach.
ONP	Male	50	The only time we have had a fire on a backcountry trip has been @ the ocean with an appointed site and because we had kids with us. The only thing we really don't do is pack out used toilet paper. We bury it with fecal matter (and use sparingly) in very dispersed and covered "cat holes" is a problem to change that behavior. This was the first trip I've had a medical emergency and the rangers were very professional and helpful. The possibility of medical emergencies and the lack of complete protection is also part of the wilderness experience.
ONP	Female	53	1. Bear wires are an important method of assuring bears don't get into trouble, more wires added to camps without wires a good goal 2. I'd encourage ONP to have a van for dropping off and picking people up to lessen car use in the park and facilities across Olympic hikes. 3. Fires are allowed <3500 elev. We recently camped at a location where a campfire over 200 ft away in the woods caused smoke at our site. I encourage campfires to largely be phased out in the park. 4. Roads in unstable terrain should be removed: costs to taxpayers and stream resources to keep repairing and restoring the roads (e.g. the Dosewallips) are very high. 5. Park rangers are great and supportive, a tremendous asset.
ONP	Male	54	We have never had any bear problems in ONP, which we attribute to the park services effort to educate campers, provide canisters and construct bear wires. The trail crews do a great job in spite of continual storm damage, wind throws, etc. many muddy spots have been addressed during trail improvement projects. Construction of the outhouses/pot toilets at heavily used campsites seems to be an effective means of controlling pollution from human waste. I think the public education efforts on low impact practices is having an effect on backcountry behavior over time.
ONP	Male	49	I like the way ONP is run. I appreciate what seems to be a strong campaign of education and visitor management. I see reclamation efforts paying off. For my part, the rigor of my ethical assessment is greatest in areas of "high visitation": I try not to leave footprints. When I'm 5 miles past the end of the train, leaving footprints is unavoidable, I've never yet been where no one else has been or will be following (I will keep trying). And an appreciation of impact is the key to my ethical behavior.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Male	66	I am generally a rule-follower, especially when I can see the effects of crowding and heavy use. I accept as necessary the permit system. I regret the loss of the old-time freedom of the wilderness, but realized it's necessary. As general practices change, my behavior changes. I build no fires, pack everything out, pick up other people's trash, but occasionally discard small amounts of food (apple core, spilled beans) use local rocks to weight my tent-stakes, occasionally dodge deep mud-holes on trails. I never cut switchbacks and am conscious of preserving vegetation and wildlife. I appreciated the beauty of wilderness and wish to pass through with minimal harm. No swagger here! No perfection either!
ONP	Female	46	I love bringing my nephew to Olympic national Park and am looking forward to including my niece next year. I want both kids to grow up learning to backpack and to practice LNT so that we make as little impact on the environment. It's important that their children and future generations be able to have the same wonderful experiences that they are able to enjoy.
ONP	Female	45	We put all leftovers and wet ones used to clean pans in Ziploc's and the bear canister and packed them out. This was the first time we were in the backcountry of Olympic. We loved it and hope to spend much more time there in the future. We packed out toilet paper.
ONP	Male	65	If biodegradable soap is inappropriate, you need to so indicate. I use "camp suds" sparingly for me and underwear. I use sand for dishes. The wild flowers were fantastic and the brook trout tasty. If you want to see wildlife, go to Yellowstone. I am glad to have park patrol in this survey: I will be more diligent to ensure I leave no trace in future, and I learned a thing or two.
ONP	Male	42	We are fairly careful campers. Survey is kind of long, but I understand why you would want it lengthy. Will deter some from completing.
ONP	Male	56	the trail I hiked was extremely muddy
ONP	Male	31	I really appreciate when rangers and park personnel review Leave No Trace practices so that everyone hears the message and follows the guidelines. Thank you.
ONP	Female	57	I believe that groups (campers) should be required to attend a short video regarding accepted practices in the area they are camping as minimum impact is different in different areas and some practices are acceptable in some areas and not in others. Even though I consider myself an "expert" some practices surprise me i.e. urinating in rivers while boating in the S.W. and my friends consider themselves low impact campers and still urinate in the meadow at night even though the deer tore up the area every time they did and I informed them they weren't to do so.
ONP	Male	49	I found the survey to be "black/white" whereas response would depend on the specifics of the situation. For example- disposing of toilet paper would be a function of how busy the area was. If it was seldom used, whole have no issue with burying. However, if really busy would be prepared to pack it out. Did not understand why packs could not be hung from food wires/cables--??
ONP	Female		Attn: Rick Potts I'm sending back this survey sent out by your department. I appreciate and think it's great that the National Park Service of Washington D.C. cares enough about public opinion. I however gave up after an hour of this survey. It is way too long. This much time to fill out. I felt the questions were redundant.
ONP	Male	38	Great time! Overall impacts result more from numbers of people as opposed to practices. Thanks!
ONP	Male	37	While filtering water into a water bottle the bottle fell from my grip and washed downstream in the Hoh River. I tried to catch it but the current was too fast.
ONP	Male	35	No more snowmobiles or 4-wheelers in NPs for recreation!

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Male	37	Thanks!
ONP	Male	31	Olympic National Park is a treasure. Please close the Dosewallips Road, return backcountry rangers fulltime to Grand Valley. Thank you for conducting this survey and providing this important service.
ONP	Male	53	This park is unique among the wilderness areas that I have visited throughout the western US, Alaska and across the globe in that, there are no roads "cutting" through it at any point. In general, I think visitors to the ONP backcountry are quite good at LNT technique. In my opinion, the biggest threat to the backcountry environment is increasing pressure to further develop it for the motoring public.
ONP	Male	45	Would like clearer guidelines on what to do when camping at a seldom-used off-trail backcountry destination: --camp on lightly use spot (having one site receive impact? --camp on a pristine spot (having multiple sites receive impact?
ONP	Male	60	I don't understand #16
ONP	Male	62	I was pleased to see the success of the recent cleanup work along the beaches. It was to see the trash collect into piles. Now we have to figure out how to get the piles removed.
ONP	Male	49	I am unclear on the applicability of some LNT principle in developed sites. We spent 4 nights at Olympus Ranger Station camp. It did not seem like an LNT issue to move around the logs that were cut and placed in our campsite for use as "chairs" and "tables," nor to use the rock enclosed fire ring we found. I would not move logs/rocks extensively in a true backcountry area.
ONP	Male	43	volunteer ranger at campsite was exceptionally friendly and helpful
ONP	Male	46	Many duplicate questions. Takes way too long to fill out. Should have been one page questionnaire.
ONP	Female	46	This study was very redundant and ridiculously long. A waste of grant monies for this graduate student. Hope he does well otherwise. I was honest to oblige his questions.
ONP	Male	57	We camped at the beach in an area with lots of driftwood for a campfire. Hike was on a boardwalk till we reached the beach.
ONP	Male	51	We had a fantastic experience in a beautiful setting. This questionnaire has been quite helpful in identifying LNT practices to following-up on and adopt in future visits. Thank you.
ONP	Female	43	It would have been nice to have more large gallon buckets to hang on the wires, store extra things in (not all perishables could fit in the bear canisters we had).
ONP	Male	24	Excellent high-use backcountry camping! But it was irritating that we had to register and pay! Necessary evils!
ONP	Female	27	We value our experience in the park very much. Thank you for all that you to help preserve it and teach others to do the same!
ONP	Male	48	Campfires allowed on beach - guidelines re: charred logs, etc., are clear - though not all follow them
ONP	Male	51	There is a fine line between keeping the park as unspoiled as possible but yet keeping it open and enjoyable to the public. People enjoy campfires, swimming and camping beside (not next to) a lake or stream. To deny them this would be wrong. Need to replace foot logs across streams at the start of the season. River crossings can be dangerous and access to trails are restricted.
ONP	Female	54	We could not find the outhouse at Shi Shi Beach (we found the beach marker that marks it) The trail was very muddy making it difficult to hike through. Going down the trail to the beach (the descent) was poorly marked & unsafe. The rope to get back up the hill was helpful, still didn't feel very safe.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Female	46	Yes, I think exceptions should be made to allow larger groups if they involve children. I.e. perhaps kids count for 1/2 a person. The group sides on 19-mile divide trail are not as nice nor are there as many, and this really effect the hiking experience. There should be more beautiful, high altitude group sites or allow larger group sites if it involves kids. Thanks!
ONP	Male	46	This survey is too long. Would like to be able to have fires in more campsites- especially beach sites such as Sand Point.
ONP	Male	26	It would have been nice if more attention / communication regarding leave no trace was communicated when permits are given out at the ranger station. I hope my info helps.
ONP	Female	26	Ya, I totally feel bad now for having a fire (to celebrate my friends birthday)... I could have found a different thing to do, its just that he loves fires. So, although I knew I shouldn't, I was tempted to do so because I wanted him to enjoy the night instead of falling asleep in the tent.
ONP	Male	26	I love your / our park. If I knew the actual human impact, I would take greater care.
ONP	Male	48	Thanks for doing this survey on LNT at ONP. Sorry I made such a mess of the questions about muddy trails... I was a bit confused whether you meant leaving the trail tread to avoid mud or avoiding the muddy middle. I spent about 12 years as a seasonal / volunteer in ONP's Four Lakes Areas. Its primarily sub alpine / alpine and its proximity to Pugetropolis makes it really vulnerable to impact. I wrote, posted, and distributed reams of LNT/minimum-impact info and was especially diligent about erasing fire rings. Overall, group size as seen as the factor in the greatest impacts. I have thought that a max group size of 12 is WAY to big.
ONP	Female	29	Thanks for caring for our nature!
ONP	Female	29	My friend, a male, pees everywhere - he even attracted the mountain goats who got very aggressive with us! Please educate males about this because the goat ate up all of the vegetation. I also get concerned when people step all over the vegetation when they have someone coming at them from the opposite direction. Yes, it's courteous but sustainable?
ONP	Female	52	After taking this survey I feel like my level of education regarding LNT is not as good as I thought. Maybe people should sign a checklist that they must read through before their permits (maybe my husband did - I don't know). I hadn't thought about the impact fire-rings or building fires in an open area like a beach. I get it now - we always try and respect the environment. Impact. These are things we didn't know about. Not removing things, pack it in & pack it out, how to handle food, distance from wildlife, human waste...
ONP	Male	31	You should send out a LNT brochure / quick datasheet with this questionnaire! Thanks and keep up the good work.
ONP	Male	57	I'm retired from the NPS and have professional experience in backcountry waste management. Carrying out TP is a bad idea. Park managers need to get away from the "my way or the highway" attitude and engage users in a dialogue. Requiring container use is also way overdone, in my experience; animal assaults on food are minimal, except mice. Hanging is a good idea but shouldn't be a regulation.
ONP	Female	29	I think that is important to provide pit toilets (ones are clean, usable) near campsites. Camping in other wilderness areas has led me to think the availability/practicality of pit toilets in ONP is poor.



<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Male	53	From the implications of the questions, I guess I have a few disagreements with the minimum-impact / LNT guidelines. 1) Large groups: Annually I do a backpacking trip with 7 other people and we camp only in designated areas (using reservations when required). I don't see any problem with that. 2) Fires: If I'm in a small group (2-3 adults) we don't make a fire. In the family group (8 people) having a fire brings the group together. We keep it small, keep an eye on it, make it within a fire ring made by others previously, and try to burn what wood we bring to the fire. If this is an activity (behavior) that you want to discourage, you have a big challenge before you. 3) Swimming: This is another tough one to swallow. I certainly don't advocate swimming or wading around in small streams & small lakes or rivers. But where a designated campground is near to a large lake or river, it is unreasonable to expect people not to enter the water. Perhaps you should establish behavior guidelines for low-impact behavior for different size or types of water bodies.
ONP	Male	58	More upkeep on stream crossings, one stream had no logs, or bridge type crossing. It made it a little hard to do (and wet)
ONP	Female	58	1) I would like to see more locations for campfires. Of course, 'fire danger season' should eliminate all fires, but early in the season there is plenty of storm fall that could be used. 2) We need outhouses at every trailhead. People are obviously not doing what they know they should. We also need outhouses at each campground. People need to go (to the bathroom), and they have a very hard time digging holes in them there mountains - to control that problem - we need outhouses!
ONP	Male	27	We should be allowed to have FIRES! SERIOUSLY!
ONP	Female	57	Where is appropriate to have a fire I would rather see fire charred rocks left in a ring rather than have every camper that comes along start over and redistribute the charred rocks around the area. Ditto for charred wood.
ONP	Male	44	Access fees too high! Area seemed well cared for. Most people seemed to be following basic LNT principles.
ONP	Male	52	Keep up the good work & keep preaching the message!
ONP	Female	32	It would be nice to have more information on LNT available at ranger station, trailhead (maybe make it part of buying permit). I just recently learned not to brush my teeth in a river... now that I know I won't do it... but I didn't think of it before... I was uninformed.
ONP	Female	28	Prior to this survey, I did not think about the impact of urinating on plants or about moving rocks/logs in order to make camp. Thanks for making me think about those issues! I will keep them in mind next time that I do any backcountry camping.
ONP	Female	60	We camp at Sand Point near Lake Ozette and will be very happy when fires are allowed again. While I disagree with taking plants, etc., from the parks I must admit I have no problem with taking a few small rocks or feathers from the beach.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Female	60	I believe in LNT camping and will always follow the rules however I think the park has become way to restrictive and is no longer fund. The rangers seem more like policemen than interpretive rangers. I come from a generation who is very adept at backcountry travel and miss the comfortable campsites, campfires and camaraderie. I miss the old Adirondack trail shelters; they were very helpful in bad weather. Trails that are no maintained and no trail signs aren't helpful. We used to take two week hiking rips through the Olympics but it is no fun and too hard to arrange anymore. Also the group size is hard to work with we had family who had to apply for vacation time 6 mo. ahead of the trip. There was only one group site and we couldn't get it for the whole time so our vacation was cut short. We had 14 people who wanted to go and we were told we could not split up and could not have over 12 and were threatened with trouble if we did use different campsites. How unfriendly! The total number of people in the area would not have changed- 3 of our party had to cancel their vacation! I have hiked and climbed in the Olympics for 45 yrs with mountain rescue, girl scouts, and family and find the new park unfriendly and over regulated.
ONP	Female	25	The soap we used was biodegradable and not supposed to impact the environment. We burned our toilet paper in our campfire.
ONP	Female	52	We camped at the beach with a party that included 3 adults and 2 children, ages 3 & 9. We had fires because they are permitted at the coast. In areas away from the coast, I would no have a fire. I'm confused about walking thru muddy areas of the trail I always assumed it was better to walk thru the mud then create a new trail around the muddy are. Is this true?
ONP	Female	55	Install a privy @ Gladys Lake (Grand Valley). I was recently in North Cascade NP and even the 2 site camp areas had privies.
ONP	Male	31	1) Camped in a meadow only when that where designated campsite was. 2) Had a campfire only when permit said it was allowed and a fire ring already existed. 3) Initially urinated on rocks, then deer just dug around the rocks, which seemed to be worse, so tried to urinate sort of 'out of the way.' 4) Moved some rocks to make camp more comfortable, then moved them back when done. 4) I don't generally widen the trail by walking around muddy spots, but I did when a boot-deep stream was running down the trail.
ONP	Male	53	A couple of observations based on 30 years of living in the PNW and enjoying its state and national parks: 1) Conservation techniques are not cut and dried. Experts disagree, for example, on whether it is better to bury human waste or leave it exposed. I think people (most at least) tend to use their judgment as well as convenience in deciding what to do in the backcountry. 2) Some human activities are less essential (campfires) than others (human waste disposal). I think, with education, you can and should expect to have more success guiding peoples' behavior on the former than the latter. 3) All animals have an impact on parks, including humans. I think it is unreasonable to accept that humans, in manageable numbers, will and should be able to down what animals do in the backcountry if there is no practical alternative.
ONP	Male	38	It was a great trip! Let's keep it preserved.
ONP	Male	46	Raising the entrance fee to \$25 is making the park only accessible to the upper middle class and above lower income, families are the one who are being hurt by this increase. The backcountry should be open to levels of income.
ONP	Male	39	go Auburn. Just kidding.
ONP	Male	38	Go Dawgs!
ONP	Female	55	1) It would be great to carry out all of the plastic (on the beach) - have a work party / park management 2) The overland portions of the trail were not always clearly marked. Please address.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
ONP	Female	37	please send a copy of the results: Ron & Heather Eshleman 4 Shelby's Path Apt. C Sparks, MD 21125
ONP	Male	56	I hate all people who don't respect nature!
ONP	Female	27	Accurate backcountry camping area maps would be helpful. The maps we were given did not agree with reality. For example, our maps provided by NPS showed many more bear wires in the camp found them there were. As a result we spent unnecessary times tramping around the campground looking for bear wires that didn't exist. The trail closed for rehabilitation was very difficult to read. The vault toilets while a good idea were general so full it was disgusting and highly unsanitary to use them. There were lots of rangers to answer questions, that was great
ONP	Male	59	Privies at heart lake and lunch lake were full-overflowing. Signs a sol du falls and sol du park could have been clearer.
ONP	Male	26	Send us results! pschleym@gmail.com
ONP	Male	65	I have lived almost my entire life in the Puget sound area. I love the Olympic mtns. I hunt fish home camp and climb extensively throughout this wonderful area. Things have changed (and practices) since I was a boy scout and explorer. We used to cut fresh limbs for bedding and bury everything including glass and cans which I shudder at now but that is what we were taught to do. Our beautiful mountains and area are a gift from god. I believe in taking care of our land the best way possible. Keep up the good work.
ONP	Male	46	This is the first time I've heard about packing out "used toilet paper"! This is going too far. I've been a hunter all my life and have always buried my pt. I don't plan on ever packing out my used TP. That is unhealthy and gross. Properly buried, it will decompose.
ONP	Female	28	We were impressed by the organization of ONP. Before each of our overnights hikes we spoke to rangers who emphasized Leave No Trace. At the heart lake campsite on the high divide trail we were visited by a ranger at dinnertime. ONP is the best organized national park I've ever visited.
ONP	Female	32	I would go to the Olympic national park more if I could bring my dog. As a thoughtful dog owner, I resent that Im no allowed to bring hear- I would stay on trails with her on a leash. Pick up after her etc. more than what many humans do. Her impact would be much less than the group of boy scouts I saw in a campground. I would be willing to buy an extra permit for her, pay a fee, etc.
ONP	Male	50	I would like to get results of this survey. Greg Worwell. Gregerottdog.com
ONP	Female	53	If possible, I am interested I am interested in the results of this study: Cathy Drner 4824 SE 139th Portland, OR 97236 or dornerch@msn.com. One other thing: the rangers and personnel are very informative about Leave No Trace as they issue permits.
ONP	Male	44	we used biodegradable soap and nondirectly in the streams or creeks when cleaning dishes
ONP	Female	51	Section E: appropriateness depends on the setting. For example, staying on the trail is much more important in an alpine meadow than in a lowland forest where salmonberry is about to engulf the trail. Overall: someone who was able to fill out this questionnaire in 15 minutes probably did not give very thoughtful responses.

#### CUMBERLAND ISLAND NATIONAL SEASHORE COMMENTS

CINS	Male	60	Though I've not been trained in this program, I know if's impossible for any creature to "leave no trace." And like and zero tolerance program, it's unrealistic. I do my best.
CINS	Male	46	Great place!

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
CINS	Female	66	Perhaps a checklist of appropriate practices - expectations of campers would assist.
CINS	Male	28	The large tank north of the beach at Yankee Paradise appears to have been there for a long time. The tides have had time to create a deep wash on the beach. Can this tank not be removed?
CINS	Female	27	I had a wonderful backpacking experience at CINS and would definitely return. I was impressed by how clean the island was and how well maintained almost all of the trails were. (LNT is crucial for those trails!). I am just a beginner backpacker and am trying to expand my wilderness experience, so CINS is a location I will certainly revisit with a canoe or kayak. Thank you for preserving such a treasured place and protecting it from development. It is nice to know that visitors and residents of the island all take pride in protecting the landscape, trails, dunes, and wildlife.
CINS	Male	56	If you want a no impact or no trace, make the practice for everyone. The people that live on the island do anything + everything they please including riding 4x4s, cars, motorcycles up and down the beach. Let them ride bikes like everyone else. This would help more than anything else I saw on the island.
CINS	Male	50	There was so much trash (mostly plastic) on the beach. There should be someone to go up and down the beach picking it up - me! I would LOVE that job. Bill LaVeque. Athens, GA.
CINS	Female	56	From this survey, I learned that some of our practices may not be appropriate with LNT. We will adjust accordingly. Thank you.
CINS	Male	39	Ranger Dennis Curry was extremely helpful & knowledgeable. He is an asset to the island & the NPS. I enjoyed speaking with the person from Clemson as well.
CINS	Male	47	Loved it!
CINS	Female	43	CINS knees to be kept as is and respected. It is a sanctuary of beauty.
CINS	Female	46	LNT needs to define latest accepted waste practices (smearing, bury, on top, etc.). This policy has changed many times in recent years. Also - please listen and speak peoples names correctly - it gives the impression of 'not listening' and your approach was somewhat arrogant (re; permit issuing by ranger).
CINS	Female	47	We (our family) absolutely loves CINS and plan to visit often! Nancy Crawford. Thanks Wade!
CINS	Male	48	CI has become an annual event for our family. Park personnel and accommodations are exceptional.
CINS	Male	48	Turn off lights in back country (Stafford)
CINS	Male	54	I think there should be a limit of one backpack per camper. It would make ferry trip a lot easier.
CINS	Male	45	I think that if a less-than-perfect practice that I do (eg - not packing out used toilet paper or urinating on vegetation) could be shown to me to be damaging - I would change my behavior - I won't do anything that I think will do harm. (thanks for your efforts)
CINS	Male	42	Some of the questions didn't work of the response options given. Unsure how to answer. Do we get results? R Ribbe1543 Dan RdEagle River, WI54521Thanks
CINS	Male	47	Continue to allow groups to come in and if we need to carry ALL trash out that will be fine with me. It will be much better than loosing the opportunity to camp on the Island.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
CINS	Male	27	Good luck with your research. I will be hiking the Florida trail later this year or the first of next, and just wanted to say that if you all need any help give me a shout or send me an email.  mattgallagher@hotmail.com
CINS	Male	36	That is of course if yall are going to be in Florida. We were asked to carry maps. These maps could carry more LNT info
CINS	Female	31	The carts provided near the dock were wonderful and made me feel that our large group could carry on and carry off everything we brought so easily and conveniently. The park staff were very friendly and helpful.
CINS	Male	18	In my Osprey backpack, I found a small tag that contained the Leave No Trace points and thought that was very cool. I think that including them in all camping gear would be a great way to spread the word. Cumberland Island was fantastic! I'm definitely planning on going back and hiking to the backcountry camps.
CINS	Female	18	I went with the Science Club at Savannah Arts Academy and all of us really enjoyed our time on Cumberland. It was amazing! I love the horses, ruins, and the millions of Portuguese Man-of Wars!!
CINS	Male	39	This survey asked some questions multiple times.
CINS	Male	43	We had a great time!
CINS	Female	32	We enjoyed the trip - the rangers, esp. the female ranger working @ thanksgiving was very informative. She loaned us a kid's bike that allowed us to be able to walk with our daughter (biking) above Plum Orchard and back. It was a life saver!
CINS	Male	33	Noticed much less (or no) issues with the raccoons vs. the last trip ate my bag through the cage.
CINS	Male	59	Thanks for the opportunity to visit the Island.
CINS	Male	48	As a scout leader, I spend 20-25 nights per year camping in backcountry with a group of 5-20 others. We strive to practice LNT in all areas, and teach this mindset to the next generation of campers.
CINS	Male	48	Spend more time explaining what is expected when arriving at muddy/muck spots on the trail. Consider issuing special 'pack-out' containers/bags for TP to better avoid soiling or containing one's gear/food/water supply
CINS	Male	48	Campsite for 6 did not have but one food/trash box. It was not big enough for food/trash for 6 people for 2-3 nights. Raccoons got into trash hung on poles every night. I wish there was a central trash deposit to keep animals from spreading trash all over campground at Sea Camp. I am also tired of NPS employees (mostly male) having a bad attitude and usually a smart ass when you try and talk to them. Not just a CINS but in parks around the country.
CINS	Female	51	All in all Sea Camp is a great experience for families. It is a great place to spend time. I'd like to do a more serious backcountry; however its hard I think to get a permit, due to so many people going.
CINS	Male	62	My first visit to the island (two days backcountry) was great. It appears that all visitors obey LNT. The island was spotless even in the more populated areas, such as sea camp. I will soon be making plans for a return trip next year. Hats off to staff and volunteers on the Island for a great, safe adventure.
CINS	Male	46	It would be great if you could reserve a particular campsite in the backcountry at CINS. It is unusual to not know where you are going to be camping. Several boys in our group (Boy Scouts) did not go because they thought they might have to hike too far (because we didn't know where we would be camping). Thanks for the work you do for "Leave No Trace."

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
CINS	Male	54	Many of these questions seem applicable to a mountain environment, not the heavily-vegetated environment at Cumberland Island. Question 16 is particularly idiotic. I refuse to answer question 32; there is no justifiable reason for asking it.
CINS	Female	42	We camped with others that have been camping at Cumberland Island for more than 10 years. We very much enjoyed the island and it is likely we will be back.
CINS	Male	36	Only camped at Sea Camp this trip (1 night) - limited backcountry experience.
CINS	Female	58	CINS remains for me one of the most unique places on earth. I had only been at Sea Camp & the research centers. I went further up the island than ever before. It is important to preserve & maintain such special places.
CINS	Male	44	Ticks were extremely bad in the backcountry. This has caused us to only want to enter the backcountry of Cumberland during the winter months. We removed roughly 80-100 ticks if a 4 day span.
CINS	Male	41	The ticks were very bad. When I bent over to tie my shoe on the trail, I could see ticks crawling on the ground. One day my husband pulled approximately 30 ticks off me. We went down that trail again. The island was beautiful but wearing high concentrations of DEET to keep ticks off was hard.
CINS	Female	50	In the ranger introduction - I know she discussed the specifics of "leave No Trace." I have known of the practice since participating in Outward Bound and other outdoor education programs in the 70's.
CINS	Male	43	The 10 AM check in time at the ranger station is a bit unrealistic when camping at more remote sites. This needs to be changed to allow a more relaxed return speed on foot. I would like to see a 2 PM check in time for departures.
CINS	Female	44	Yes - I'd like to know precisely the acceptable rules that are being referred to in this survey regarding LNT. I. E., Toilet paper buried? Small rocks moved for tent? Stepping around mud puddles? Taking a break on the edge of the trail? Locking up food before setting up tent (lying on picnic table ok at that point?) ?
CINS	Male	48	Excellent place. Excellent rangers and staff.
CINS	Male	33	I was impressed by the fact there was no trash anywhere in the backcountry. I didn't think to have a trowel with me hiking away from the campsite and once left a pile of human waste on top of the ground away from the trail without digging a hole and burying it. I don't remember any discussion of where or how to leave human waste.
CINS	Female	31	We encountered two fire rings in the BC in fire prohibited areas. We scattered the charred wood and raked over the rings. We also saw some TP that was not buried.
CINS	Male	45	My brother was good with his little stove - we were surprised to see campers building fires at Stafford Beach. Nice bathrooms! Our treated water tasted fine. The animals didn't bother our hanging food-pack. We had a small bag of trash we took on the ferry. We wanted to rent bikes but missed the ferry.
CINS	Male	42	Our practices would have differed if we had camped in the backcountry. It would have been nice to have more projects to perform on the island. I suggest posting a 'wish list' of projects on the website. We would come prepared with tools if needed to perform conservation and beautification projects for groups spending several nights on the island - groups such as youth groups/scouts, etc. Could you host seminars with conservationists sharing LNT in practice and show results to kids of what happens when conservation is not practiced? We'll be back. Thank you.
CINS	Male	18	CINS was a great place to camp. I will definitely be back in the future.
CINS	Male	62	Great place - It needs to remain as is - with limited impact from too many people on the island.

<u>Unit</u>	<u>Gender</u>	<u>Age</u>	<u>Comments:</u>
CINS	Female	57	We camped at Sea Camp the entire time. The orientation session for campers needs to be much more thorough about LNT behaviors, including the reasons for LNT. Explicit instructions about scraping off dishes into the food scrap garbage can and not the outdoor sink need to be given and better signs posted with these instructions.
CINS	Female	53	Thanks for a wonderful unexpectedly fine experience!!! Consider more trails along the west side of the island. We would have liked to view the salt marsh closer to the north & central island. Also - backcountry sites Hickory Hill and Yankee Paradise are too far from a water source to attract hikers. By supplying water there, you would make it easier to use these remote sites.
CINS	Male	54	Automobiles on the beach - not appropriate. Closer water to Yankee Paradise & Hickory Hill campsites, Signage for trails needs maintenance - it appears they are being maliciously removed.
CINS	Female	36	There is little information at CINS regarding low-impact techniques. It's a strange combination of backcountry & settled housing, cars on the beach and what - showers at the campsite? Why this at Stafford Beach - if you want to reduce impact why put in showers? And electricity? Confine the developed campers to Sea Camp and use composting pit toilets if you need to consolidate wastes. Dishwashing advice?
CINS	Female	52	Other parks (Everglades) have porta potties at BC campsites. Could CINS have composting or other similar facilities? Would that be better than burying waste in a hole? Especially since not everyone does that? Other campers were washing dishes right at the water source. UGH!!! Thank you for letting me participate!!!
CINS	Female	33	I don't remember our ranger giving use instructions that she said were related to LNT. She was great and have helpful suggestions, but would have love to hear or receive literature about LNT.
CINS	Female	24	I feel it is very important for the preservation of our world's wildlife that more people are educated about these practices. Best.
CINS	Male	25	Beautiful island, although lots of ticks.
CINS	Male	22	I would consider primitive restroom facilities in close range to the further backcountry campsites so waste can be more easily disposed of and decompose.

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