

NORM ACTIVATION THEORY AND HUMAN WASTE EDUCATION IN RECREATIONAL SETTINGS

A
THESIS

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Abstract

The purpose of this study is to examine how the public perceives human waste impacts in natural areas and the effects it has on recreation experiences. The study will utilize Shalom Schwartz's Norm Activation Theory (1968) to assess relationships between peoples' values, attitudes, norms, intentions, and behaviors related to human waste disposal in wildland settings. Understanding these cognitive processes will help determine the likely success of persuasion methods to reduce the impacts of human waste in wildland settings.

The research for this study included a few key components to assess human waste impacts. First was the administration of surveys to user groups camping and recreating along a popular beach site on Kenai Lake in Cooper Landing, Alaska. Piles of excrement were counted and recorded bi-weekly in the woods surrounding the research area. Posters were put in place midway through the study to determine if indirect education influenced users' awareness of consequences of the behavior or condition (AC) and the extent that they ascribe responsibility for the behavior or conditions (AR). Initial results have shown that the poster had a small effect on user's behavior and awareness of waste management issues, and that the distribution of human waste followed a pattern of accumulation. The significance is that a norm for human waste disposal in front country settings has not been fully developed and has room for improvement.

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Preface

The story of this study starts in 2012, when I decided to join AmeriCorps, a National Service Organization. I applied for the position under the Rural Alaska Village Environmental Network (RAVEN) AmeriCorps Program. The program was administered through the Rural Alaska Community Action Program, Inc. an Anchorage non-profit and grantee of the AmeriCorps program. My position, as was the case with 19 other members who had been selected, statewide, was based on placement within the community where I was a resident. Among my first duties as a member was to conduct community surveys to assess concerns community member's had about the environment in the area surrounding Cooper Landing, Alaska. My older brother, my sister-in-law, and my first employer in Cooper Landing were the first to take the survey. They suggested on the survey that I look into the issue surrounding human waste on the river banks of the Kenai. As I gained a sense of grounding in my new community, I surveyed other community members, and low and behold they had the same concerns about the amount of human feces that was being deposited in popular recreation areas on the banks of the Kenai River.

In order to find a solution, I presented clean waste ideas at community meetings, hosted education days, and worked in numerous ways to gain community support. In 2013, I formed a partnership with Kathleen Meyer, the author of the international best-selling outdoor guide, *How to Shit in the Woods: An Environmentally Sound Approach to a Lost Art*. Together we formed the creation of the POOSTER. The Pooster is an educational tool designed to instruct individuals on proper sanitation practices used in outdoor recreation settings. These posters were designed for placement at trailheads, businesses, outdoor stores, bathroom stalls, and

other public areas. We created a website (www.thepooster.com) as a conduit to make the poster widely available. Digital files for printing the 11" X 17" Poosters have since been offered for free and currently has gained worldwide recognition and implementation. Widespread usage has resulted in two versions, one tailored for forested areas (used in this study) and the other for use in desert areas. Interested parties can inquire about customizing or adding official regional logos to the poster. Requests have come from three other countries Argentina, Canada and New Zealand as well as in several other states including: Arizona, California, Colorado, Idaho, Illinois, Michigan, Montana, Nevada, North Dakota, Oregon, and Utah.

In 2014, I attended the Sustainable Summits Conference hosted by the American Alpine Club in Golden, Colorado to spread awareness regarding the Pooster. While I attended the conference I met several individuals, including my current mentor, who suggested further exploring this area of concern through administering graduate research and study. The project was launched in 2015, during my fourth and final year with AmeriCorps.

Introduction

Every day millions of Americans visit the bathroom with the assumption that they will find a porcelain throne, an ample supply of toilet paper, and a sink with running water--the essentials for completing this bodily function with the highest degree of personal hygiene. Every day millions of users visit public lands, but, not all public lands offer organized bathrooms. Some have permanent outhouses that supply a toilet and toilet paper, while others are portable and only maintained throughout busy seasons, and some places offer nothing at all.

So what happens when the bathroom infrastructure we take for granted is not there? Do we know how to complete our bodily functions and maintain hygiene while still having consideration for the environment?

The study will be conducted within a very popular recreation and camping area located on Kenai Lake, in Cooper Landing, Alaska. The study investigates the attitudes, norms, and behaviors of recreational users who are faced with the reality of having no public bathroom. First we will cover the current conditions of the area, including why the study is needed, what is already known about human waste in the area, and lastly the hypothesis about the study.

Current Conditions of the Area

Cooper Landing, Alaska is located on the Kenai Peninsula, 100 miles south of Anchorage. The town of roughly 357 year-round residents sits at the confluence of the Kenai Lake and the Kenai River ("Our Town", n.d.). Kenai Lake is a glacier-fed natural reservoir of approximately 14,500 acres and runs 22 miles in length ("Kenai River Comprehensive Management Plan", 1997, p. 16), which supplies water to the Kenai River year round. Ownership of the shoreline

consists primarily of public land that is owned by the Chugach National Forest, Alaska State Parks, the Kenai Peninsula Borough, along with private property holdings near the towns of Cooper Landing and Moose Pass (KPB Parcel Viewer, n.d.). The Kenai Lake and River corridor are home to an abundance of fish and wildlife species that thrive throughout the area.

The Cooper Landing area is “rich in native and pioneer history...the gold rush to Cooper Creek and the northern Kenai Peninsula between 1896 and 1912 brought an influx of people” (Johnson, 2005, p. 99). Commonly called the “Gem of Kenai”, tourism and recreation are the main economy base (Spot Light on Cooper Landing, 2010).

Tourism and recreational activities in the area range in variety from fishing to hiking to kayaking to camping. As the *Kenai River Comprehensive Management Plan* explains, “Fishing is by far the primary recreational activity along the Kenai River” (p.25). The Alaska Department of Fish and Game (ADF&G) offers this description:

This area supports the largest and perhaps most diverse freshwater sport fishing opportunities in the State of Alaska. Kenai River fisheries for king, sockeye and coho salmon are the largest freshwater sport fisheries for these species in Alaska. Resident species such as rainbow trout, Dolly Varden/Arctic char, Arctic grayling, lake trout and steelhead trout also provide popular fishing opportunity in lakes and flowing waters (ADF&G, n.d.)

The first run of Sockeye Salmon arrives in June, and fishing for the species continues through early August.

The town of Cooper Landing bustles with activity during the salmon season. Though the specific number of visitors to the area is currently unknown, recent data from ADF&G estimates

that 513,122 angler-days of participation were recorded for the Kenai and Russian River in 2014; an angler-day is one person fishing for any part of the day (ADF&G Survey Database). Despite the areas' popularity among recreational users, users will find a very limited number of public restrooms. Only three outhouses have been constructed along 18 miles of the Upper Kenai River located only at boat launch facilities. One particular location, the Russian River's confluence with the Kenai River, receives substantial impact each year. Anglers fish from the riverbank, shoulder-to-shoulder on a section of river accessed either by foot or by a three-minute ride on the Russian River ferry. In 2009, at peak times during the first Sockeye Salmon run, a reported 1,300 anglers used the Russian River Ferry system per day (Whittaker & Shelby, 2010, p. 27). There is no bathroom facility located on the side of the river where the majority of the anglers spend the day.

Guide permits for scenic floating and fishing on the Kenai River state "The permittee agrees to use the restrooms and take his/her clients to the public restrooms. If the restrooms are not available, the permittee must COLLECT and PROPERLY dispose of all SOLID human waste and refuse generated by themselves or their clients within the permit area. All solid human waste will be disposed of in an appropriate facility outside of the permit area (Kenai River Special Management Area, 2012, p. 2)." Nowhere does it define what an appropriate facility would be.

The *Kenai River Comprehensive Management Plan (1997)*, states in Table 5-1 Indicators, Actions, Standards, and Monitoring that in order for a quality recreation experience to be maintained the accumulation of human waste and litter should be addressed. The standard of no more than six piles of toilet paper and/or feces should be met and the management action

to be taken should include increasing information materials and education programs, promote pack-it-in-pack- it-out voluntary programs, install additional toilets at primary access points, and require users to pack-out solid human waste (p.111). The issue is revisited in the 2010 *Kenai Recreation Study* where over 75% of users, landowners, and guides stated litter and human waste were an extremely important management issue (Whittaker & Shelby, 2010, p. 73). The culmination of the user groups, the management plan, and the recreational study is a prime place to test for norms in the disposal of human feces.

Need for study

Local recreation areas along the Kenai Lake and River corridor that are visited by numerous recreationalists during the summer season undergo substantial impacts. Human feces is visible at a majority of all road side pull offs, river banks, lakes, and parking lots. “There are two primary concerns with the disposal of human waste in the backcountry; human health problems as a consequence of either direct contact or contamination of drinking water, and aesthetics concerns of visitors who find improperly disposed of human waste” (Cilimburg, Monz, & Kehoe, 2000,p.1). Human health is always a priority, but is there a negative aesthetic impact as well?

While there has been work conducted on human waste disposal, it has mostly focused on the ecological impacts rather than social impacts of how people respond to disposal methods. “At this time the magnitude of problems related to human waste disposal in wildlands is unclear...few studies have analyzed the aesthetics of human waste disposal” (Cilimburg, 2000, p.1). The goal of this project is to determine the attitudes and norms of

recreational users as they relate to human feces left along the shores of a popular camping and recreation area. “By investigating and describing social norms, researchers can characterize group agreement about appropriate use conditions or impacts levels for a particular recreation experience and thus provide the evaluative information needed to establish management standards” (Whittaker, & Shelby, 1988, p. 262). This study differs from others as it will examine the intentions of human behavior as they relate to improperly disposed feces in wildland settings.

Hypothesis

Seven hypotheses fall subject to examination in the study:

1. Most recreation users will have pro-environment attitudes in general.
2. Most recreation users will have negative attitudes toward improper disposal of human waste in backcountry settings.
3. Pro-environment attitudes and human waste attitudes will be correlated.

General and specific attitudes will be weakly or inversely correlated with actual human waste practices (e.g., people with negative attitudes toward human waste may still not practice human waste disposal properly). Potential moderating reasons include peer pressure, decisions made under the influence of alcohol, lack of preparedness, and lack of concern.

4. Human waste impacts will be moderately correlated with use levels at the site (weeks with higher use should have higher human waste impacts).

5. Human waste impacts will be spatially distributed in forested areas in close proximity to campsites delineated by fire rings.
6. Human waste impacts will be slightly lower during the second half of the season after the mid-season clean-up and post education program have been implemented.
7. The human waste education program will become a target for vandalism; predict two out of three of the Poosters will be vandalized or burned throughout the study period.

Literature Review

Background

Humans have grown accustomed to modern flush toilets since the mid-1800s when, British plumber, Thomas Crapper perfected them. He did not invent the flush toilet, but based his ideas off of the Sir John Harington's water loo. Around 1596 "The queen's godson, Sir John Harington, even [built] a flushing water closet, with a stone bowl and a brass sluice, at his house...The queen also [had] a flushing loo, built for herself" (Mortimer, 2012, p. 268). These devices were built as a way to disguise the fact that they ever went. Where did this need for secrecy come from?

Many of our perceptions about human waste stem from the 1500's. In Ian Mortimer's *The Time Traveller's Guide to Elizabethan England* he explains that during this time toilets, or privies, were typically found in the corner of a room. They "consisted of a twelve-foot shaft full of several hundred gallons of decomposing excrement and urine that had been lying there, seeping into the clay, for two or three years. Privies [were] situated some distance from the living quarters behind a closed door" (p. 267 & 268). The stench of these rooms were said to be unbearable and during this period people did not understand diseases and infections. Popular belief holds that "if something smells bad, the air is putrefied; breathe in the air and you will fall ill" (p. 265). Therefore, a great deal of effort was made to diminish smells including "having a draught blowing through the chambers to carry away the smell of people and keeping fires burning in the chambers to take away dangerous smell lurking there. Personal hygiene ranked high in importance to social classes." Personal cleanliness is less a health-related issue than a

social one. Cleanliness serves as a marker to distinguish between those that are cultured and sophisticated and those that are not. (p. 264-275)

Following in our ancestors' footsteps, we are still trying to find ways to disguise the smell and obfuscate attention to the bodily process at all. Now we typically flush our excrement down the drain without any thought into where it ends up. A connection to our natural body process has been lost. "People have lost touch with the animal digestive system, including their own" (Logsdon, 2010, p.1). We no longer think about the effects our excreta have on the people around us or the environmental impact it can cause. The toilet has become a crutch that we depend on. So what happens when a toilet is not available? In many recreational areas toilets are a luxury placed in the most popular areas. Even outhouses can be hard to come by when you are not near a trailhead or campground. While there is variation between individual parks, the bottom line is that human waste is becoming an increasingly difficult issue to deal with in recreational settings.

Every year millions of Americans seek recreational opportunities within park and protected areas. Outdoor recreation use has experienced rapid increases in visitation since the end of World War II (Taff, 2012). National Parks Service Units alone have seen an increase from an estimated 15 million recreational visitors within 109 parks in 1939 to nearly 300 million recreational visitors within 370 parks in 2013 (United States, National Park Service. n.d.). With increasing recreational opportunities and ease of transportation comes the unintended consequence of resource damage. Robert Manning explains that "Recreation use can cause change in the recreation environment, including resource conditions, the quality of the experience provided, and/or management actions" (2005, p. 79). Users can cause severe

ecological impacts such as soil degradation through compaction and erosion, water pollution through litter and human waste, wildlife disturbances through vehicle use and noise, and can produce social impacts like crowding, conflict and aesthetic degradation, as well as changes to the managerial environment (Taff, 2012). One issue that fits all of these categories is human waste disposal.

Improper human waste disposal has both an ecological and social impact. As Geoff Hill (2013) explains:

Risks of mismanaged human waste include: visual impacts (open defecation); olfactory impacts (smell of fecal matter or ammonia from urine); contamination of drinking water, ground water, and recreation water with pathogens and/or nutrients; and disease transmission to toilet operators or to visitors through direct contact with fecal matter or indirect contact through a vector. (p. 20)

Improperly disposed feces have the potential to affect several organisms. The average person in a developed country excretes roughly 180 pounds of waste a year, 0.51 pounds per day (Leffel, 2010). Rose George explains in her book *The Big Necessity, The Unmentionable World of Human Waste and Why It Matters* that “A gram of feces can contain 10 million viruses, 1 million bacteria, 1,000 parasite cysts, and 100 worm eggs” (George, 2008, p. 2). All of which can be spread by coming into direct contact with bacteria or through vectors. Four of the most common ways exposure occurs are: absorption, inhalation, injection, and ingestion (Leffel, 2010). Absorption exposure is caused by the bacteria passing through the skin or eyes; inhalation is passed by breathing the bacteria into one’s lungs; injection is passed through opens wounds (i.e. stepping on broken glass); while ingestion is the main concern and is

absorbed through the gastro-intestinal tract from eating, drinking, or smoking (Leffel, 2010). Vectors spread bacteria by carrying it from one place to another. As Kathleen Meyer states in her book *How to Shit in the Woods, An Environmentally Sound Approach to a Lost Art* "... the saddest commentary on...disease is that humans might play a substantial role in spreading it around the world... What animal other than *Homo sapiens* can swallow *rogani gosht* in India or *Kaylya e Khaas* in South Africa and shit it into the Colorado countryside?" (p. 22).

Rose George (2008) explains that roughly, 2.6 billion people in the world lack sanitation and four in ten people have no access to any latrine, toilet, bucket, or box (p.2). Diarrhea is 90 percent caused by fecally contaminated food or water and is the cause of death for 2.2 million people—mostly children (p.2). "The number of children who have died from diarrhea in the last decade exceeds the total number of people killed by armed conflict since the Second World War (p. 2)." In the poor world, proper disposal of human excreta—the process which is given the modern euphemism of "sanitation"—can reduce diarrhea by nearly 40 percent (p.3). Currently, there is little evidence to suggest that there is a health hazard to humans great enough to require regulations in recreation areas; however, very few people report their illness, and most outbreaks are only reported if multiple individuals are infected from a common source (Cilimburg, et al, 2000, p. 4).

Social impacts are another concern for human waste disposal. Geoff Hill states that "The absence of sewers and roads at backcountry sites makes the management of human excreta offensive, intensive, and expensive" (p.3). As people turn to the backcountry as a place to recreate and escape the city we realize that we are so conditioned to the toilet that we do not know what to do without one. Meyer explains that "We are now many generations potty-

trained on indoor plumbing and accustomed to our privacy, comfort, and convenience. To a person brought up on the spiffy, silenced, flush toilet hidden away behind the bolted bathroom door, elimination in the backcountry can degenerate rapidly into a frightening physical hazard, an embarrassing mess, or, incredibly, a weeklong attack of avoidance constipation” (p. xvii.). We spend so much time doing what comes naturally that “The average human being spends three years of life going to the toilet” (George p. 6). This could be part of the reason that recreationalists simply do not know what to do when the urge hits them while in the backcountry.

To combat such problems, park and protected area managers often establish a management method based upon carrying capacity. Managers and policy makers usually consider three dimensions of user capacity decisions—the features of the resource, the managerial components, and the experiential factors (Manning, 2005). An example of this can be seen in Grand Canyon National Park where human waste was once a major issue.

Every year the Colorado River accommodates 20,000 plus visitors down a route that stretches 277 miles from Lees Ferry to Lake Mead (Grand Canyon National Park). Some trips lasting up to 25 days. While on these trips:

The average person will produce an ounce of excrement for every 12 pounds of body weight each and every day; the river-running industry generates more than 100,000 pounds of human waste per year. Inside a narrow canyon that receives less than nine inches of annual rainfall and endures summer daytime highs in excess of 110 degrees, it doesn't take much to imagine how ugly things could get if waste weren't handled with extreme care” (Fedarko, 2008).

In order to do this the Grand Canyon National Park has strict guidelines for managing human waste. As of 1979 all river runners are required to carry out their solid human waste using approved toilet systems... These systems must provide for secure containment and adequate volume of storage” (Meyer, p. 38). Human waste must be deposited directly into the container. The main river trip toilet system and system used at camps must be the washable and reusable type allowing for the sanitary transfer of waste materials to septic vaults or sewage treatment facilities. For day hikes and when the river trip is in progress between camps, trips must use an alternative use toilet system of the type that uses dry chemical/enzymes to render solid human waste into nonhazardous products acceptable for disposal in permitted landfills" (Grand Canyon National Park, 2013). As a result the canyon banks and beaches are free of debris to the point that one feels like the first visitor to ever view the sandy beaches.

Theoretical Framework

This study tested the effect of an education variable in relation to the thought process of user groups. Park managers often use management strategies to handle impacts to resources. “Management strategies are basic conceptual approaches to management that relate to achievement of desirable objectives” (Manning, 2005, p.238). There are two types of management practices relating to how managers interact with the public—indirect and direct. Indirect management attempts to guide users to choosing the correct behavior through educational strategies. Direct management uses enforcement strategies to achieve a desired behavior. Information and educational programs are generally supported by users, but the effectiveness may depend on the type of problem addressed, the attitudes, beliefs, and norms of users, and the way in which the message is delivered” (Manning, 2005, p.276).

Attitudes are a person's view about a particular object or idea; and how a person feels about something. Attitudes influence people's behavior by thriving on emotion. Favorable or unfavorable they can predict and influence behavior (Vaske, 2008, p. 27). Even though they are difficult to pin down and perhaps even harder to change, attitudes are fundamental to environmental solutions (Heberlein, 2012, p.5). Beliefs are the cognitive component of attitudes and encompass the objects that attitudes focus on. It is important to take into account what a person believes about a subject as well as how he/she feels about it. Vaske clarifies that "beliefs are what we think are true, but are not necessarily facts." A person may believe wolves to be dangerous and feel fear about them; whereas, another person may feel excited (Vaske, 2008, p.27).

In connection with attitudes are norms. "The big difference between norms and attitudes is that you can see norms...we can see them expressed in behavior "(Heberlein, p.92). Attitudes are things people say; whereas, norms are what people do. Norms are thought of in many different ways, but for this research norms are being utilized as "standards that individuals use for evaluating behavior, activities, environments, or management proposals as good or bad" (Shelby, Vaske, Donnelly, 1996, p. 116). Norms exist throughout society and often end up with legal mandates for noncompliance (Vaske, Convey, Donnelly, 1994, p. 3).

The Norm Activation Theory, formulated by Shalom Schwartz, is utilized in this study to better understand users' attitudes and behaviors towards human waste (1963). Norm Activation Theory was a development in sociology and social-psychology that suggests that personal norms are motivating factors in social actions, where people feel motivated to act based on their perceived obligation to act (Brennan, et al., p. 100). Schwartz describes the

decision of moral choice as a two part condition 1) the person must have some awareness that his potential acts may have consequences for the welfare of others; 2) the person must ascribe some responsibility for these acts and their consequences to himself" (Schwartz, 1968, p. 356). The initial model focused on an individual's willingness to help others based on morality (Vaske, 2008, p. 20). Awareness of consequences (AC) defines the individual's level of understanding for the repercussions relating to an action. Ascription of responsibility (AR) takes into account the level at which an individual feels personally accountable for the consequences. This model can explain why individuals often fail to act in accordance with the moral norms they presumably endorse (Liere & Dunlap, 198, p. 175). In the absence of AR and/or AC, people either do not realize that a moral choice exists or because other obligations/considerations (costs, time, hassle) people may not comply (Liere & Dunlap, 198, p. 175). "The usefulness of normative approaches lies in their ability to characterize group agreement about appropriate use conditions or impact levels for a particular recreation experience, thus providing the evaluative information needed to establish management standards" (Vaske, et al, 1993, p. 642).

Methods

Overview

This study examined people's attitudes and behaviors related to human waste impacts in outdoor recreation settings. It investigates how people react to the sight of human feces in the areas where they were camping, fishing, and relaxing; how they themselves handled their own human waste; and how they thought land managing agencies should address human waste problems. This study aims to assess if people noticed the feces, felt anything about the feces, and if they cared enough to do anything about it. It tested their attitudes, norms, intended behavior and actual behavior relating to human feces along the shores of Kenai Lake.

The study had three components: First, it monitored human waste levels at the site as they accumulate throughout the summer. Second, the study introduced an education element at the site to assess whether such information changed attitudes or behavior compared to the earlier "control period" when no educational information was present. Third, the short survey portion of the study assessed users' values, attitudes, and norms as they apply human waste issues throughout the study period. The survey targeted recreational users who camp, fish, and picnic in the study area.

Specific objectives of the project included:

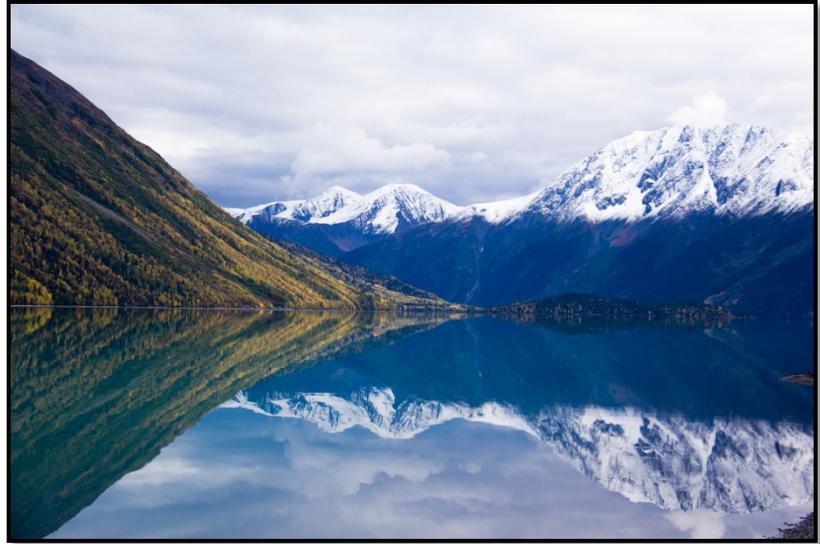
1. To investigate the attitudes and beliefs recreational users hold towards human waste impacts within natural areas.
2. To compare recreational users' intended behavior to their actual behavior.
3. To test the effects of an educational poster that explains proper sanitation practices.

Location

The location of the study area is approximately 60°26'N 149°42'W on the west shore of Kenai Lake (accessible from Snug Harbor Road) in Cooper Landing, Alaska. The area is popularly known as Waikiki Beach. This

location is well known for its superb beach with road access and was chosen for its known popularity among weekend recreational users. It is an unhardened site that has no facilities. The study area encompasses 5.44 acres within a

Figure 1 View from the beach in fall



3,582 foot perimeter. The area is composed of primarily three types of mixed forest communities: spruce-birch, spruce-cottonwood, and spruce-aspen (HDR Alaska, 2004, p. 16). The landscape has a downward slope from the access point on Snug Harbor road to the water's shore. The popular camping locations are on the flat land areas. Historically, there has been large amount of improperly disposed human waste in the area. A view from the beach looking towards Porcupine Island is shown in Figure 1.

History

This beach has been used by a wide variety of users for at least the last fifty years. Snug Harbor Road was completed to Cooper Lake in the late 1950's for the construction of the Cooper Lake Dam. In 1961 commercial electricity was provided for the Cooper Landing

residents and the road was easier to access (Painter, 2009, p.81). Local community members used to refer to the beach as the Snail-a-thon Beach and starting in 1980 would hold an annual picnic there every year. The picnic still occurs in May and was titled the Snail-a-thon to emphasize that it was not a race to get to the beach. The activities have changed slightly, but historically people would walk five miles from the Catholic Church on Snug Harbor road and pick up litter along the roadside. A barbeque celebration would be held at the end of the litter clean up at the beach. Mayme Ohnemus, the founder of the event, explained that when she first organized the activities they used an old Forest Service Outhouse that they hauled to the beach. It had a metal bucket below a toilet seat that they could dump out after use. "After a few years we got tired of hauling of the outhouse, so someone in the community built a wooden structure and dug a pit close to the road; that way we would always have an outhouse at the beach" (M. Ohnemus, personal communication, March 1, 2016).

In 1986, Mayme passed the event to Mona Painter, now the Cooper Landing Historian. She explained that "The beach used to be a wooded area with lots of big, beautiful trees. It was a very special place to the community. However, one year we went to prepare the beach for the Snail-a-thon and we arrived only to find pieces of the outhouse in a fire pit. The hinges from the door were laying there torched. Glass and bullet cartridges were everywhere. After that we had to go back to hauling the outhouse." (M. Painter, personal communication, February 25, 2016). A view of what the Snail-a-thon site looked like historically and now is shown below in figures 2 and 3.

Figure 2 Snail-a-thon (Then) Photo used with permission from Mayme Ohnemus



Figure 3 Snail-a-thon (Now)



In the early 90's another event started taking place on the beach every year called the Pow Wow. People from outside of the community attended and it gained lots of outsider attention (Terry E "Chief" Hook's Obituary, 2013). In addition to local use, the beach has become popular among some anglers from other parts of the Kenai Peninsula, Anchorage, and the Mat-Su Valley. These anglers tend to use the beach for camping during the popular sockeye salmon seasons on the nearby Upper Kenai River and Russian River. The first run occurs in late June; the second run occurs from late July through late August.

Timing

The proposed project spanned a four-month period (May 18th through October 1st) to target the summer user groups. The educational poster, The Pooster, was distributed midway through the study on July 17th.

The initial baseline human waste count was conducted on May 18th. The amount of waste in the area of study was measured by establishing a trail pattern across the 5 acres at

the site. The already-existing social trails were used as the basis for the monitoring path. On the initial study date, the protocol was to walk the designated path through the study area and count: 1) the number of toilet paper / waste piles and 2) fire pits existing in each quadrant. Any visible toilet paper or feminine products were counted the same as a visible pile of human waste (many piles had both). Fire pit counts helped indicate levels of use and spatial distributions of camping groups, as well as a possibly related “signs of use” impact. During the initial walk, all waste piles were removed and disposed in a Clean Waste Portable toilet kit, then placed in a dumpster facility offsite. No fire pits were disassembled or consolidated.

Human Waste Monitoring Sessions

Monitoring occurred every two weeks on Monday evening after the initial baseline count; monitoring occurred along the same trail and used the same protocols to count the number of waste/toilet paper piles. Monday evening was chosen as it was the day of the week most likely to have the lowest amount of use after weekend campers have left, minimizing the chance that monitoring would disturb visitors’ recreation experiences. During each counting session, piles were marked on a map using transparencies and permanent marker overlaid on a copy of the map. All waste piles and fire pits were digitally coded for four different time periods using waypoints in Adobe Photoshop, Aeronautical Reconnaissance Coverage Geographic Information System (Arc GIS), and Google Earth; illustrating the spatial distribution of waste.

Monitoring also noted the creation of any new user-created or social trails that might be used to access new or more private areas that people might use as toilet areas. Monitoring looked for cut down trees, moved or smashed vegetation to indicate these trails. Monitoring also noted the movement or creation of fire rings. During the initial baseline count, a

homemade toilet was discovered. It was made from wood and painted black. There was a white toilet seat on top and a wooden side holder for presumably toilet paper. However, the one thing the toilet was lacking was a place for the feces to go. There was no pit underneath, so everything just fell straight on the ground. Monitoring also took into account the activity around the toilet's placement. A small piece of flagging was put up in a tree behind the toilet to verify its original location as well as marking it with as a GPS waypoint.

Figure 4 The Home-made Toilet



Use monitoring

During each visit to the study area, monitoring also counted the number of people, cars, groups, recreational vehicles (RV), boats, and portable toilets present at the site. The information was also placed on the transparencies overlaid on the base map to identify their distribution relative to fire rings and human waste impacts.

Survey Protocols

Throughout the entire study period, behavioral surveys were administered at random intervals during the week. The sampling schedule consisted of late afternoon and evening time periods to catch people as they were recreating during leisure hours. The proposed participant pool was any English speaking adult over the age of 18. All participants in the survey location were recreation users camping, fishing, picnicking, etc. The majority of users traveled at least 50 miles, or more than an hour's time, to get to this location.

The survey technician approached user groups wearing attire that represented AmeriCorps and greeted them in a professional manner. The introduction emphasized that the survey was confidential and that they would not be asked to provide their name. If the party agreed to take the survey, a member from their group was selected at random (asking for the person with the birthday closest to the survey date). Prior to June 23rd only one person per group was asked to complete the survey; when it became clear that current levels of use and response rates might not be sufficient to reach target sample sizes, the protocol changed to asking up to two members of each party to complete the survey.

Participants completed a letter of consent prior to starting the survey (Alaska Pacific University human subject's requirement, see Appendix A). When the survey was completed, the participant placed it in the manila folder to assure confidentiality. Surveys were not reviewed until they were entered into the database.

Of the 191 individuals observed at the beach, 106 people completed the survey. Some users either avoided the survey technician or refused participation in impolite ways, and ultimately about 45% of groups refused to participate. When a group refused, they were politely thanked for their time and told to enjoy the remainder of their evening.

Control Period versus Treatment Period

The control period took place from May 18th through July 17th. No information about alternative pack it out systems or appropriate human waste disposal was provided, and users were simply requested to complete the survey.

Midway through the study, on July 17th, a group of volunteers helped pick up all of the waste in the study area. Waste was collected in buckets and transferred to Clean Waste

Portable Toilet Kits. This would “reset” the area as a “clean” site with no human waste impacts where an educational treatment could be tested. Monitoring and surveying continued as normal during the control period. This included bi-weekly Monday human waste impact monitoring along the same trail, and surveying on a sampling schedule two to three evenings per week.

The Treatment Period consisted of three legal size (11-by-17-inch) educational posters, called The Pooster that were laminated and mounted on wooden plaques screwed to metal poles. The Pooster includes information about appropriate human waste disposal (including carry-out systems) in natural areas. They were put at popular locations along the beach (see map for specific location). Pooster Number One was placed near the juncture of the beach access road and Snug Harbor Road, Pooster Number Two was near where the access road meets the water line at the edge of the most popular camp site, and Pooster Number Three where the beach curves approaching the creek to the West of the site. The educational treatment remained in place for the rest of the study.

The reasoning behind a mid-season waste removal effort was to assess if 1) a no-waste environment helps establish a descriptive norm that cues people to dispose of their waste properly; and 2) if the Pooster has any effect on actual waste disposal behavior of recreation users.

Statistics for Measuring Norms

In this study the International Business Machine (IBM) Statistical Package for the Social Sciences (SPSS) software was used to conduct the statistical analysis.

Safety

Safety was an important component of the study. The technician always visited the site with a companion, informed emergency contacts of the schedule, and carried Counter Assault Bear Deterrent Spray and a two-way radio. Cellphone reception is not available at the site (the closest cell phone reception is roughly a mile away).

As part of the survey and monitoring process, the technician was careful to assess whether any group on site was likely to be cooperative before approaching them or asking for their help on the study. If the group or any of its members appeared to be intoxicated, under the influence of other substances, or belligerent in any way, they were avoided or thanked and left alone. The companion's responsibility was to provide security and deter any disruptive behavior.

Accompanying volunteers completed a liability form before participating. (See Appendix A for liability forms). The volunteers were informed prior to the study as to the potential risks and were instructed as to the emergency plan.

There were several anticipated hazards that could have occurred during the testing periods. Table 17 in Appendix B shows the potentially hazardous situations and how an event should be handled. In the end, four of these problems had to be addressed. Groups firing guns at the beach deterred one survey session; uncontrolled angry dogs were present at several camps and were avoided. The technician's car got a flat tire on one occasion leaving the beach, and three groups were avoided for alcohol consumption.

Results

Results are organized into two sections -- on-site monitoring and survey results. On site-monitoring includes mapping of site impacts, counts of human waste impacts and related signs of use impacts; and use monitoring. Survey results include frequency distributions and summary statistics for all questions (organized by topic), and statistical tests of thesis hypotheses.

On-site Monitoring

Mapping of Site Impacts

Figure 5 provides a base map that outlines the boundaries of the study area. Natural features helped to establish the perimeter. On the south side, a ravine limits access during times when the water level in the lake is too high. On the north side, there is a perennial creek that likewise limits access. The map also shows the primary road access coming from Snug Harbor Road along with a network of user-created trails and where the Poosters were located.

Figure 6 shows the base map with individual human waste impacts (piles) that had accumulated by the 29th of June (starting from no piles after the initial base line count/clean up in May). The initial pattern of impacts indicates that piles were more abundant close to the main campsites and social trails.

Figure 7 shows the base map with all piles from June and July impacts shown on the map. The pattern indicates increased density in the number of piles close to camps and trails, but with additional waste impacts farther away from the camping areas. The pattern in waste

distribution suggests that as areas become unacceptable for use based upon users' standards for aesthetics or safety, users move farther away to create additional spatial impacts.

Figure 8 shows the amount of piles that accumulated almost a month after the clean-up period. On August 10th patterns remained consistent with waste accumulating near popular camps and trails. Most waste was congested near the areas closest to the beach and in areas that previously had been popular during the control period.

Figure 9 demonstrates that waste accumulation follows a similar pattern as it did during June and July. Piles are surrounding the most popular campsites with waste fanning out from there. The least amount of waste being found in the South West portion as that is the hardest area to get to in relation to the rest of the beach. Figure 10 shows the accumulation of piles throughout the season.

Figure 5 Base Map of Study Area

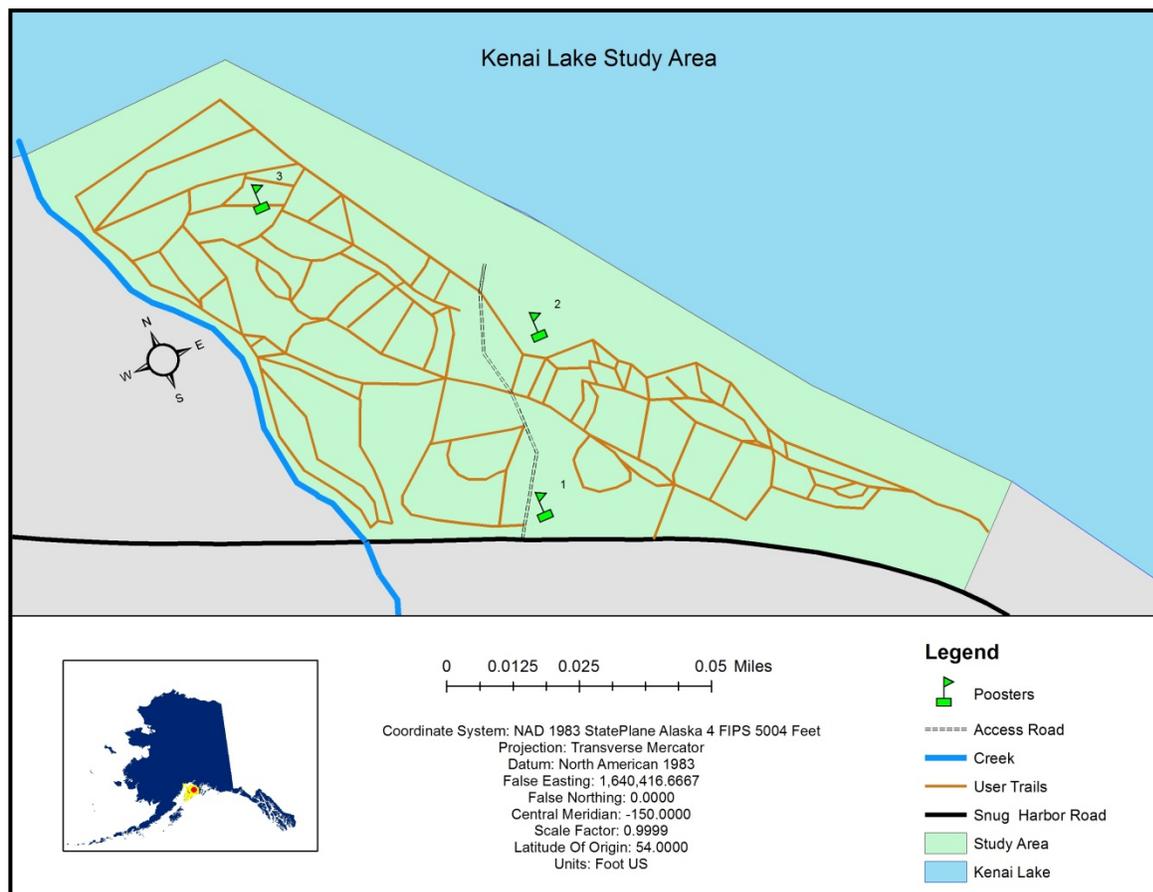


Figure 6 June Map with Accumulation of Piles

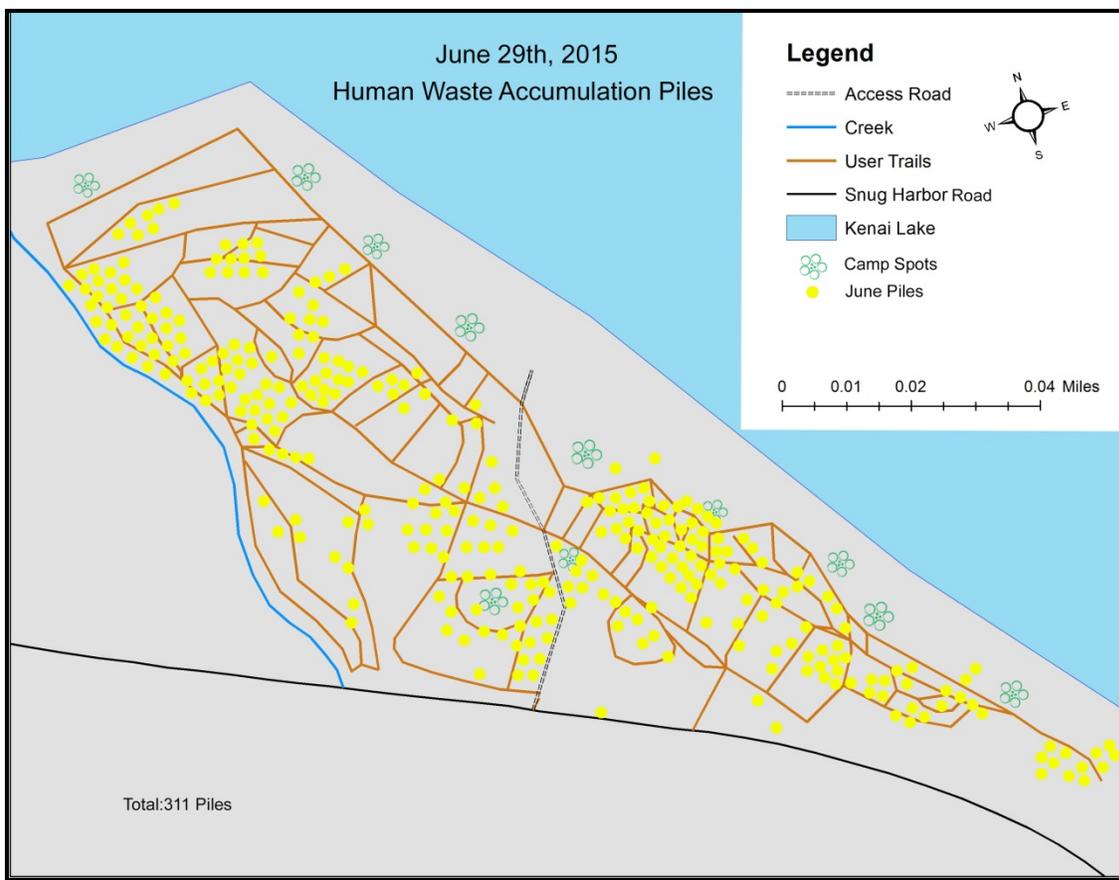


Figure 7 July Map with Accumulation of Piles

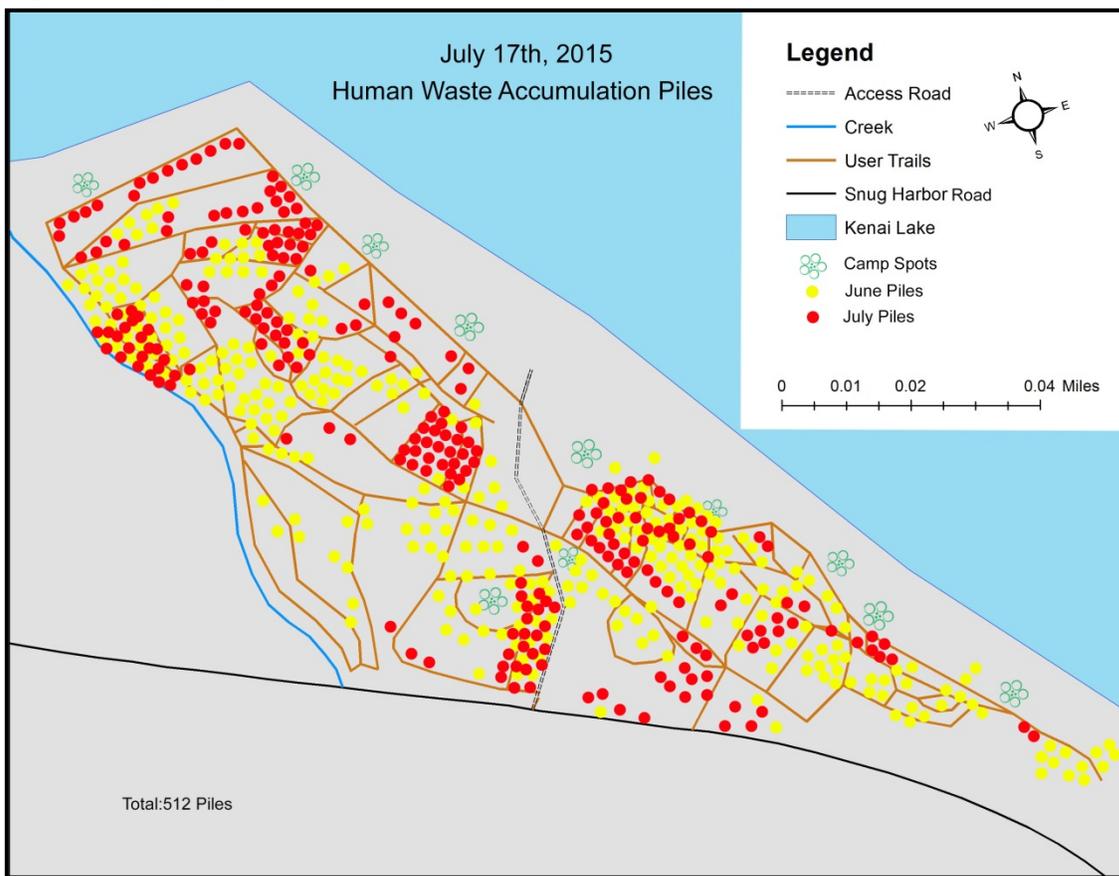


Figure 8 August Map with Accumulation of Piles

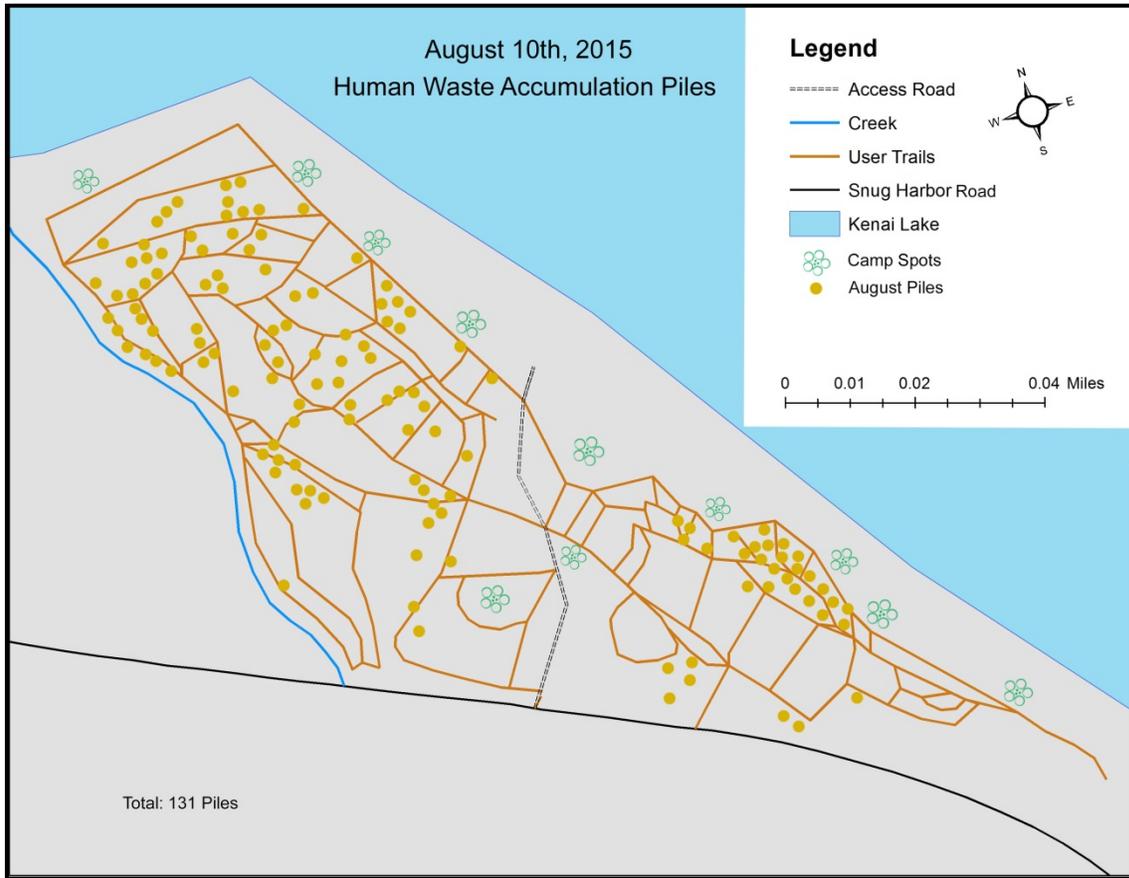


Figure 9 September Map with Accumulation of Piles

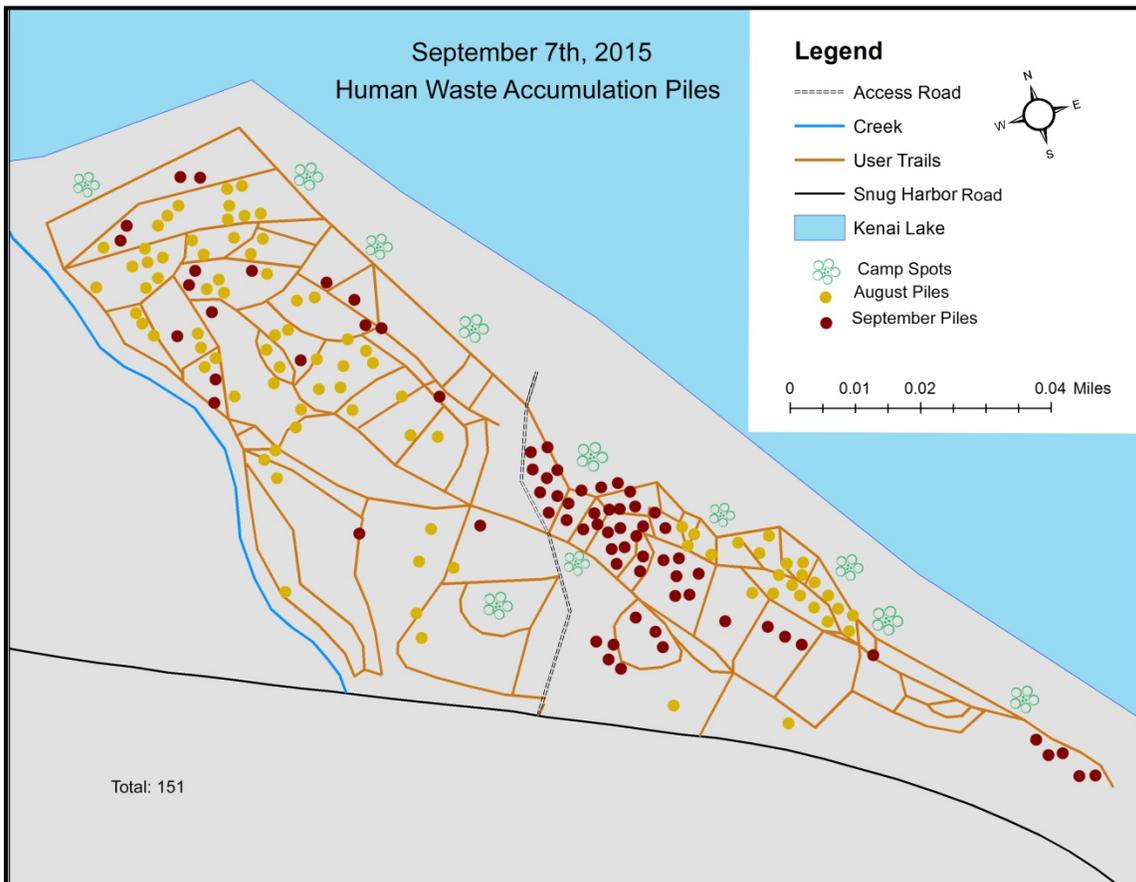
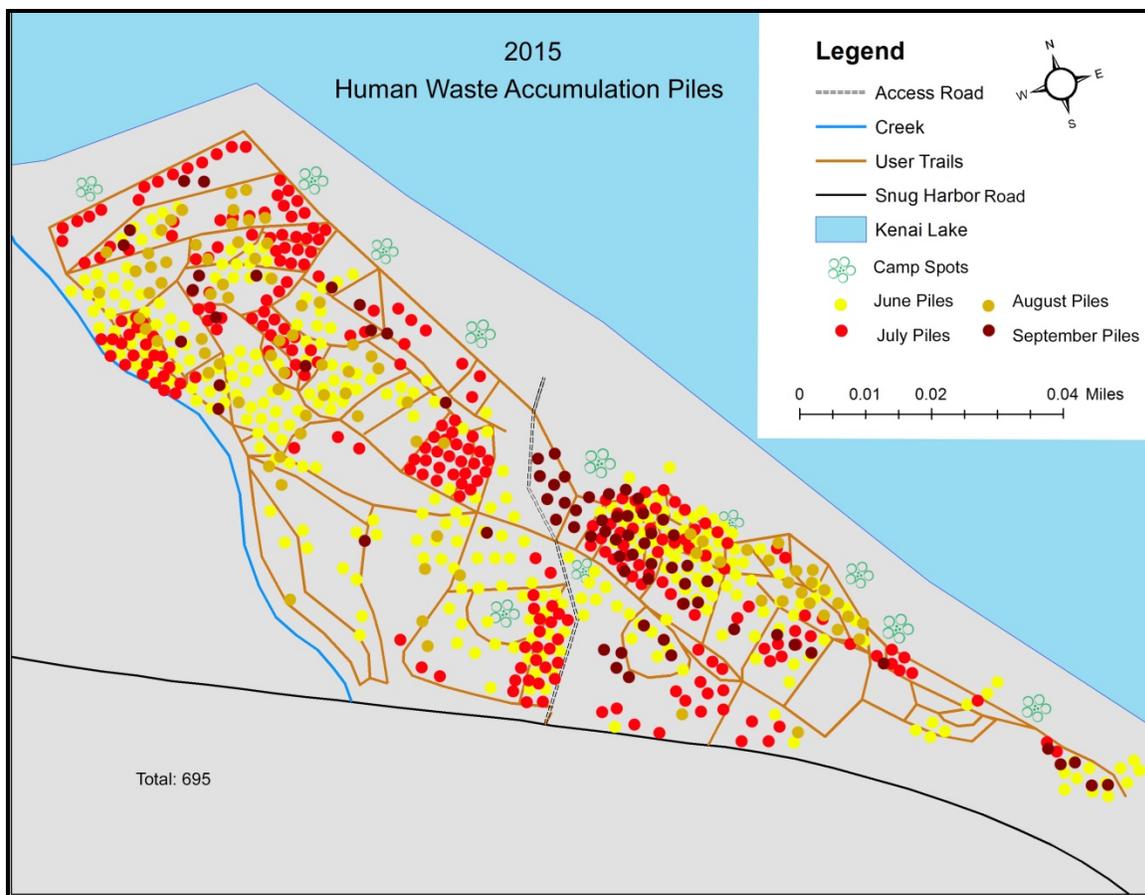


Figure 10 Accumulation of Waste Combined throughout Study Period



Human waste monitoring

Actual counts of piles and fire rings from monitoring have been provided in Table 1. Piles appeared to accumulate steadily after the initial and mid-season clean ups. While some biodegraded, few piles vanished, given the relatively cool soil temperatures during the short Alaskan summer. Toward the end of the control period at (mid-summer), the abundance of piles made them challenging to count. The highest concentrations occurred along user-created trails and near campsites. Initially the piles formed clusters in specific areas, suggesting that their owners chose locations based on their privacy from camps or the beach. Over time, however, the gaps between clusters began to fill in. There were always piles near the popular campsites with patterns of impact fanning out from them.

Piles were usually present behind trees, bushes, tall vegetation again suggesting that campers or visitors picked areas of greater privacy; however, some piles were also found in open areas while very few piles were found on the beach or in the campsites themselves. In some cases piles were found stuffed in stumps, cracks between trees, and under rocks. On a couple of occasion's underwear, feminine products, and toilet paper had been deposited in branches of trees.

In the relative warmth of summer (2015), areas with the heaviest impact emitted potent odors. The smell of urine and feces radiated out from the campsites and the highly-impacted clusters. Clusters of waste served as attractants for insects (e.g., buzzing flies), which highlighted their presence. After rainy days, these odors and insects would dissipate.

During the treatment period, an increased number of piles had been partially covered by soil, moss clumps, sticks, or leaves, indicating attempts to bury their waste (as instructed on the Pooster). However, few of these visible piles were sufficiently buried to eliminate their odor, unsightliness, or potential ecological impact. During both the control and treatment periods, piles that were sufficiently buried or effectively covered did not appear in visual plot surveys.

Late June and July presented a greater challenge in cataloging some piles due to the tall foliage. Maintaining accuracy in the surveys mandated stepping carefully through tall grass and parting stems and twigs of the understory grasses and shrubs to ensure accurate counts. In many cases, it became obvious where people were pioneering new toilet sites (disturbed vegetation).

Near the end of the study in September, pile counts became more inaccurate as leaves from the deciduous trees fell and covered some piles. Visitation by the user groups to the beach during this month was also noticeably lower than the rest of the summer (where use was relatively similar – see below). This is consistent with hypotheses 4 and 6—human waste impacts will be moderately correlated with use levels at the site (weeks with higher use should have higher human waste impacts) and human waste impacts will be slightly lower during the second half of the season after the mid-season clean-up and post education program have been implemented. Cooler weather and the beginning of the school year reduced users to the area, and runoff from heavy rains around Labor Day weekend raised lake levels high enough to leave standing water in all of the popular campsites.

A total of 695 human waste piles accumulated in the study area over the course of the summer. This includes 512 piles throughout the control period and 183 throughout the treatment period.

The number of fire pits varied, but there were never fewer than eleven. Users frequenting the area appeared to relocate existing fire pits and build new ones. Broken glass and nails (from burned pallets) were scattered throughout the beach near fire pits. The maximum number of fire pits during one count was 18. This is consistent with hypothesis 5—Human waste impacts will be spatially distributed in forested areas in close proximity to fire rings as waste was found to fan out from campsites.

Table 1 Number of human waste piles and fire pits by monitoring date

Date	Number of waste piles	Number of fire pits
5/18	121	18
6/01	182	11
6/15	264	14
6/29	311	11
7/13	420	11
7/17	512	12
7/27	111	12
8/10	131	12
8/25	183	13
9/07	151	12
9/21	89	12

Use Monitoring

During each visit to the study area, technicians tracked the number of people and groups, recorded their method of transportation, and assessed whether groups appeared to have a portable toilet. Only five out of the 84 groups had a visible portable toilet system. Assuming that all recreational vehicles (RV's) were equipped with portable toilets, only 17 out of 84 groups (20%) had an obvious carry out system (11% via RVs and while 9% via pack out systems). This is substantially less than the 34% of survey participants who reported having portable toilet systems. Table 18 in Appendix B shows the number of people and groups observed during each visit to the beach. As a caveat, the counts or surveys could have missed some groups with portable toilets who use the beaches at other times (particularly early morning, mid-day and late night).

User groups varied in age, ethnicity and demographics. Group structures included families, teenagers, seasonal employees, and college students while the age composition was comprised of Millennials, Generation X, Baby Boomers and seniors. The majority of groups

appeared friendly and approachable. Some groups expressed interest in the study, though others were incurious or made palpable efforts to avoid participation. Several people mistakenly assumed technicians were associated with the Alaska State Troopers (and these groups were much less likely to agree to complete the survey).

Technicians noted groups' activities during the study. In some cases, fishing poles were noticeable on the beach, dogs roamed free, and fires burned; these observations aided in categorizing types of activities. Some groups had guns, fireworks, and alcohol bottles strewn about their campsites. Others were found playing games (e.g., washers and bean bag toss). On a few occasions, large piles of wood and pallets were stacked on the beach, indicating that groups planned to build bonfires. Many groups had tarps stretched between trees over their sites.

As expected, motor vehicles were the most popular method of travel to the beach, and tents were the most popular mode of overnight camping (as opposed to RVs). In some cases, no people were visible at camps, but tents or vehicles indicated that groups were using the area (see figure 11 and 12). For example, on June 25th, two groups were counted by the presence of

Figure 11 Vehicles parked at one of the most popular campsites



Figure 12 Tent Campers on the North side of the area.



four tents, but no people were listed as they were absent from the camp at the time of the survey. These same tents were separate from another set of tents at a different location.

Often groups had small water craft which included canoes, kayaks or paddle boats. These were not counted in the boat tally. Only boats that were used as a method of transportation or had been powered by outboard motors were counted in the boat column.

User-created trails and other depreciative behavior impacts

User-created trails in the study area largely stayed the same through 2015, although trails in the southwest section near the road showed some changes. During the initial base line count, that area had low use. The upper area closest to the stream showed few signs of human waste or foot traffic (there was an old path following the stream, but a tree had blown down and lay across the trail, blocking access). As expected, there was an absence of piles in this area during the base line count. Over time however, that began to change. By July 17th the piles had increased to 17 and the limbs on the downed tree had been cut to make an “all-natural” toilet

Figure 13 Birch Tree with Bark Stripped



seat, which apparently attracted users, who contributed to an increased concentration of piles. Eventually, the tree was cut and a section removed, making the path accessible. That led to even more use.

In the same upper section, close to the access road, technicians found negligible signs of use; only two piles were counted early in the year. However, by June 1st this section had been completely altered. The vegetation showed signs of tent

use and tire tracks in a circular drive pattern. Trees had been cut completely to make way for a new campsite, with the cuttings designed to screen the camp from others and provide a semblance of privacy. There was a new fire ring and overturned soils. At least ten birch trees eventually died from this campsite expansion (their bark had been stripped through the epidermis layer with widths up to 12 inches around the girth of the tree; graffiti was also present on some trees; see figure 13). By the third monitoring session, on June 15th, the piles in this area had increased to 37, illustrating the symbiosis between the presence of a campsite and human waste impacts.

In the lower North West section close to the stream, a large green spruce tree was cut on August 10th; it remained through the rest of the study. Ropes and fishing line were tied to other trees near the fire pits in this section.

Education treatment: The Pooster

On July 17th, the mid-point of the season, the treatment component of the study began with installation of three human waste education posters (i.e., the “Pooster”). All three Poosters were installed in locations to maintain high legibility, and remain physically intact throughout the study (no water or sun damage). See figure 14. One Pooster was vandalized (Number Three, located in the Western most part of the study area) within the first week of installation. The vandals twisted the pole until the metal collapsed (see figure 15), and there were numerous piles of feces directly below the

Figure 14 Pooster number two



pole's location – apparently a “protest response” to the study. However, the Pooster itself was left unharmed. A metal pole of greater wall thickness and diameter was installed as a replacement, but its added weight required moving it to better soils, which are present farther up the hill where user-created trails enter the woods, close to its initial location. Surprisingly, no other Poosters were vandalized, which provided little support for hypothesis 7—frequent depreciative actions would be directed toward the education effort).

Many participants made positive comments about the Poosters as they completed their surveys. Many wondered if the study technicians had seen the posters, and did not seem to recognize them as part of the study. These same participants opined that the Poosters were great pieces of information and asked why they were not present in previous years. Some users mentioned seeing Poosters in other locations around Cooper Landing and appeared to recognize their value.

Figure 15 Pooster number three's twisted pole



Handmade toilet

During the initial visit to the study area, technicians discovered a homemade toilet stand and seat. They decided to leave it at the site and monitor it for any movement and use through the year. The makeshift toilet stayed in its original location for four weeks, and was used extensively based upon the number of piles it attracted. Several other people appeared to ignore the homemade toilet itself, but chose to defecate in the woods and understory nearby. If the toilet did not attract specific use, it may have established a norm to use the area as a “bathroom.” This was one of the highest use and most odiferous sites in the early summer.

On June 15th the toilet was moved roughly six feet to the West by users. The new location became a new epicenter of waste concentration as evidenced by a large pile of feces. On July 17th during the mid-season clean-up, technicians removed the waste piles around the toilet, but left one pile immediately under the toilet in its new location. Continued monitoring revealed that the toilet was not moved, but new concentrations of feces accumulated in the areas peripheral to the toilet as before. Eventually, the number of feces near the toilet increased in density, and grew so pungent that it became difficult to get near it.

Survey Results: Descriptive Statistics

As discussed in the methods section, the survey includes several questions about users, their trips, and attitudes toward human waste impacts, associated behaviors, and management strategies to address them. Descriptive statistics for each question are summarized below.

Respondents' experience visiting the study area

Visitors traveled to the beach an average of three to four times a year, and they tended to stay a little over two days. Control period visitors tended to come to the beach more often, but stayed about the same amount of time (t-test comparisons of means showed no statistically significant difference). Table 2 shows the amount of trips people took in relation to the amount of time they stayed at the beach. Table 3 shows the frequency with which people visit the beach. From the table, 2.4 % of the respondents reported zero trips (i.e., they were first-time users).

About 75% discovered the beach via word of mouth, friends, and/or family while 23% said that they simply stumbled upon it. Table 4 shows the breakdown of how people discovered

the beach.

Table 2 Frequency of visits to Kenai Lake study area

	How Often (trips per year)	Length (in hours)
Mean for all respondents	3.8	57.84
Median for all respondents	2	48
Average before July 17th	5.0	58.4
Average after July 17th	2.7	57.3

Table 3 Frequency of respondents' visits to the beach

Number of previous trips	Number of respondents	Percent of respondents
0	4	2.4
1	33	19.6
2	23	13.7
3	7	4.2
4	8	4.8
5	8	4.8
6	3	1.8
7	1	.6
10	8	4.8
20	2	1.2
30	2	1.2
Total (N)	99	58.9

Table 4 How People Heard About the Beach

	Number of respondents	Percent of respondents
Friends/Family	64	75.3
Found it on their own	20	23.5
Other	1	1.2

Trip length

Table 5 shows the length of time (hours) that people tend to stay at the beach. The majority of respondents stay overnight, but 8.4% of users stay fewer than 8 hours. Most of those who said they stayed more than 10 hours traveled from outside of the Cooper Landing Area (78%). About 54% who stayed for more than 10 hours said they visited the beach more than once per year; 30% of users came to the beach just once per year and stayed for more than 10 hours. Tables 6 and 7 provide information about trip lengths.

Table 5 Length of Stay in Hours

	1 to 10	11-48	49-143	144+	Mean	Median
Percent of Users Who stayed	8.4%	25%	21.5%	2.4%	57.84	48

Table 6 Length of Stay in relation to Distance Users Travelled

Hours	Percent of Users
Cooper Landing Area >10 hours	4%
Cooper Landing Area < 10 hours	9%
Out of Town > 10 hours	78%
Out of Town < 10 hours	7%
Out of town Unlisted hours	2%
Total	100.0

Table 7: Amount of times a year users visited the beach

Length of stay in hours per number of times	Percent of Users
Once > 10	30
Once < 10	4
More than Once > 10	54
More than Once < 10	10
First Time > 10	2
Total	100.0

Respondents' residency

Respondents were asked to report where they lived. The largest numbers of respondents were from Anchorage (41%) with 19% residing in other Alaska communities such as Palmer and Wasilla (often considered suburbs of Anchorage). About 24% resided outside of Alaska (10 different states and two countries, with the highest number from Colorado, Oregon, and New York; the foreign tourists were from Australia and Taiwan. Table 8 shows the percentage of respondents from different areas.

Table 8 Locations Respondents Live

Cooper Landing	Kenai	Seward	Anchorage	Other Alaska	Outside Alaska
13%	2%	2%	41%	19%	24%

Respondents' recreation activities

Respondents reported how many days per year they participated in different recreation activities. The highest proportions report using undeveloped campgrounds (like the study area) and fishing. Backcountry camping and hunting were less popular. This suggests that most users are primarily front country participants that gravitate toward camping areas that offer easy road access (but not necessarily higher development levels and associated fees). Table 9 shows the percent of recreational activities people participate in during the year.

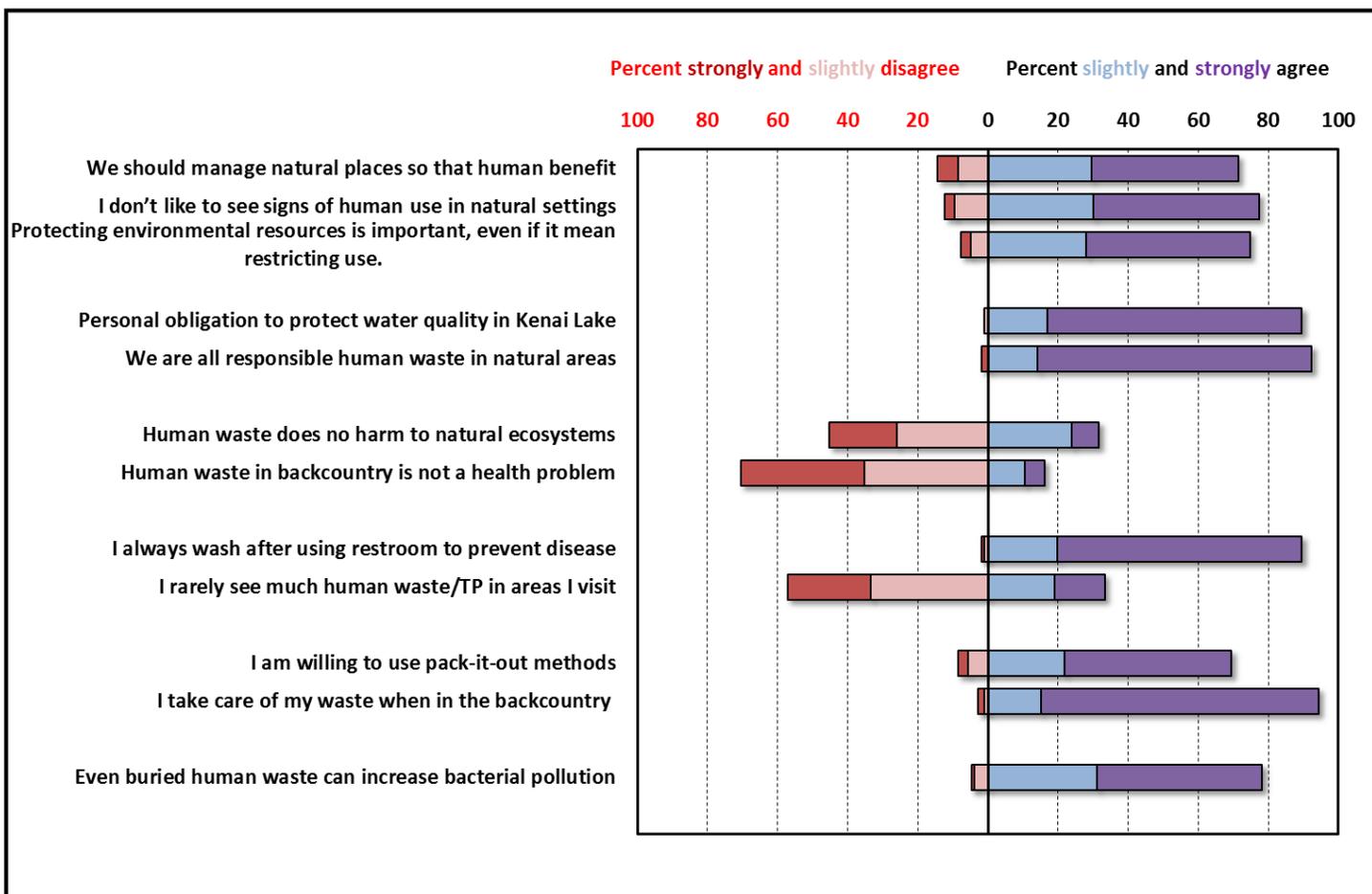
Table 9 Percent of respondents who participate in different outdoor recreation activities (number of days per year).

Number of days per year participating...	0	1 to 5	6 to 10	11 to 30	30+	Mean	Median
Developed Campgrounds	10%	35%	34%	14%	7%	11.8	6.0
Undeveloped campgrounds	3.2%	29%	25.8%	36.6%	5.4%	14.0	10.0
Backcountry camping	23%	39%	25%	12%	1%	6.7	5.0
Fishing	21.3%	27%	12.4%	28.1%	11.2%	15.4	10.0
Hunting	58%	15%	13%	11%	2%	5.4	0

Respondent’s General Environmental Attitudes and Norms

Respondents were asked to agree or disagree with eleven different general attitude or norm statements on a five point Likert-scale (see methods for description; Appendix A has the precise survey item wording). Frequency distributions are depicted in Figure 16, organized by type of statement, which are discussed by sub-headers below. Table 19B in Appendix B shows the exact breakdown by percent.

Figure 16 Agreement with 11 different attitude/norm statements regarding the environment and human waste issues



Value orientations and general attitudes

Three statements measured general attitudes or value orientations toward the environment and human management of natural settings:

- We should manage natural places so that humans benefit
- I don't like to see signs of human use in natural settings
- Protecting environmental natural resources is important, even if it means restricting use.

They suggest several findings:

The majority, between 70 and 80%, appear to have generally pro-environmental attitudes, consistent with Hypothesis 1: Most recreation users will have pro-environment attitudes in general. These users are spending their free time in a natural setting, and it makes sense that they would want to see those areas generally protected and without considerable signs of human use.

In particular, nearly half (47%) strongly agreed that they do not like to experience signs of use impacts in such natural settings, and that they would generally support restrictions on use to protect such places. As a group, these users appear positively inclined toward natural environments and human management to maintain them.

However, nearly 70% want such places to be managed for human benefit, which embodies the principle of use-based management. This is not a group of strong "preservationists" that consider humans to be outside of the ecosystem. They are likely to value their own access to such natural areas, and support consumptive outdoor recreation use

such as hunting and angling (Manfredo, Teel, Bright, 2003). Recreation participation information would further support this idea, with most respondents reporting that they fish and hunt, notably spending an average of 15 days per year fishing.

Norm activation theory: Ascription of responsibility

Survey respondents were also asked to indicate their personal preference in their understanding and ranking of Ascription of Responsibility (AR) and their Awareness of Consequences (AC) towards human waste in natural settings, two concepts developed in Schwartz's social Norm Activation Theory. Two items measured the "ascription of responsibility" or AR variable:

- I feel a strong personal obligation to protect the water quality in Kenai Lake.
- We are all responsible for the human waste impacts we have in natural areas.

Findings suggest:

Respondents expressed considerable agreement with these two statements. Over 90% agree they have a personal obligation to protect water quality in the lake and feel they have a collective responsibility to take care of human waste impacts in natural areas. These are largely people who care about the place where they are visiting and recognize they may have a role in keeping it clean and healthy.

The two variables are correlated at $r = 0.41$ and can be combined to create a scale variable to represent "responsibility" in a test of the norm activation hypothesis (a higher sense of responsibility should predict a stronger norm that human waste impacts are unacceptable). The reliability of this AR scale variable, as measured with Cronbach's Alpha, is

0.58, which is considered acceptable (although low) for a two-item scale (Vaske, 2008).

Further discussion of this variable and Norm Activation Theory is given below.

Norm activation theory: Awareness of Consequences

Two items measured users' awareness of consequences:

- Human waste, like animal waste, breaks down and does no harm to natural ecosystems.
- Human waste in the backcountry is not a health problem.

Findings suggest:

Well over half of the respondents believe human waste contributes to health problems in the backcountry, but less than half of those respondents believe it does harm to ecosystems. This suggests that a plurality of respondents recognize potential consequences, but there are many others that do not. The variation is useful for the study, which will explore the extent that awareness of consequences affects a human waste norm.

The two variables are correlated at $r = 0.47$ and can be combined to create a scale variable to represent "consequences" in a test of the norm activation hypothesis (a higher awareness of consequences should predict a stronger norm that human waste impacts are unacceptable). The reliability of this AR scale variable, as measured with Cronbach's Alpha, is 0.64, which is generally considered acceptable (although low) for a two-item scale (Vaske, 2007).

Specific human waste norms

Two items measured users' specific norms related to human waste in public and natural areas. The first attempted to assess individual's concern with avoiding human waste contact and disease (their "cleanliness" norm), while the second assessed the amount of attention they pay to human waste impacts in natural areas.

- I always wash my hands after using a public restroom to prevent disease.
- I rarely see much human waste/toilet paper in the natural areas I visit.

Findings Suggest:

Over two-thirds the respondents strongly agreed that washing after going to the bathroom was a behavioral norm, confirming that this is a near-universal norm for our society. Only half of respondents report seeing human waste in recreation areas, suggesting they either do not pay much attention to this impact or that the place they visit have few impacts. These two variables were weakly correlated ($r = 0.06$) and a reliability test reveals that they would not make an effective two-item scale (Cronbach's Alpha was only 0.01).

Human waste impact behavioral intentions

The final two items measured users' intentions regarding human waste disposal in natural areas without developed facilities. The items included:

- I take care of my waste when in the backcountry.
- I am willing to use pack-it-out methods.

Findings suggest:

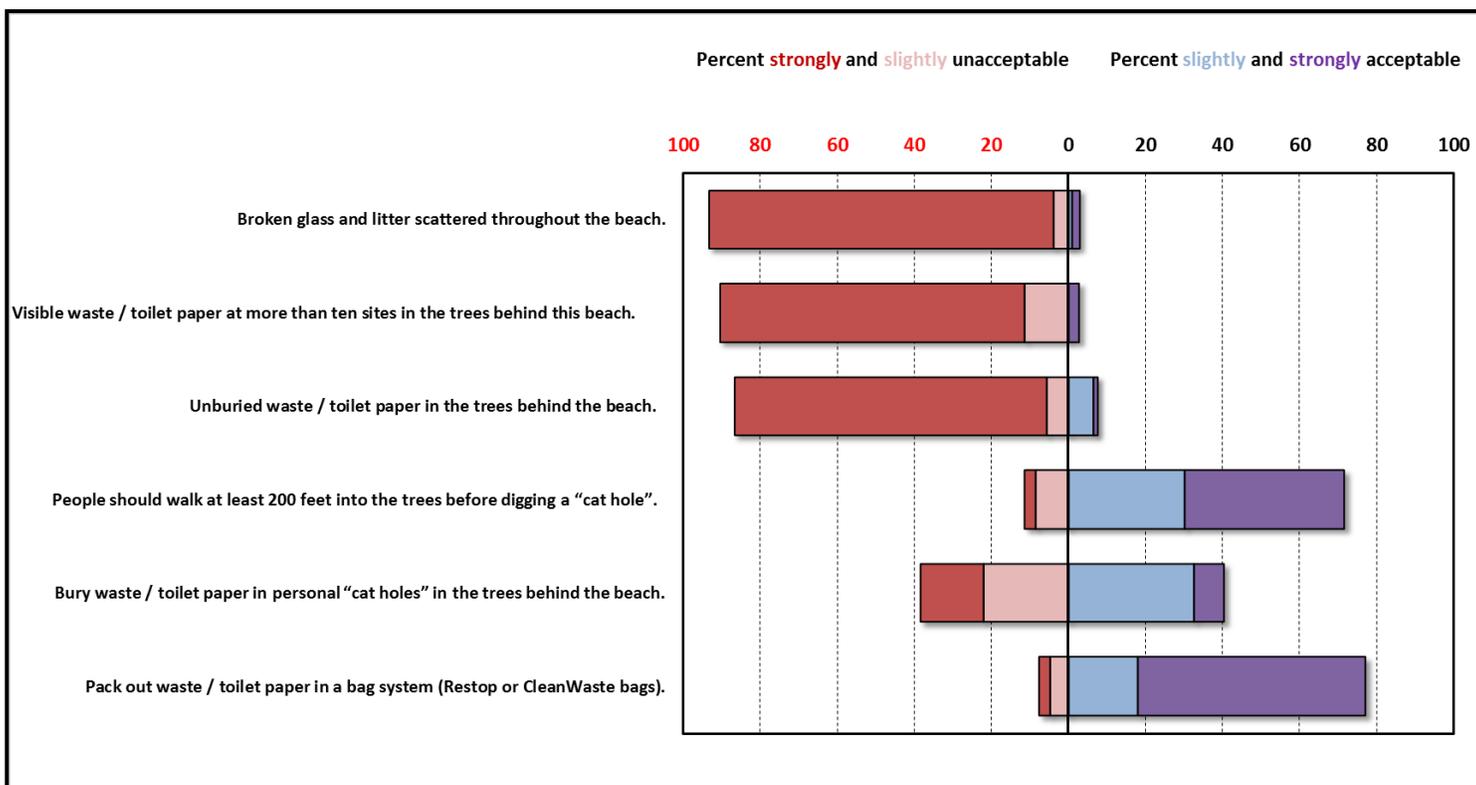
Most users strongly agree (79%) that they take care of their waste in the backcountry, and almost half say they are willing to use pack-it-out methods (48%). Results suggest that users have pro-environmental behavioral intentions regarding human waste in natural settings. Consistent with their environmental attitudes, ascription of responsibility, and awareness of consequences (discussed above), one would expect that most users find human waste impacts unacceptable and would be willing to act in ways to reduce them.

These two variables are weakly correlated ($r = 0.35$), and are probably not sufficiently reliable to create an effective two-item scale (Cronbach's Alpha was only 0.5). This suggests that these two intention variables may not "run together" well, which makes some intuitive sense. If users already believe they are taking care of their waste (e.g., but burying it effectively), they may not see the need for pack-out-methods. We treated these variables separately in subsequent analyses.

Acceptability of Human Waste Conditions/ Behaviors

Respondents were asked about the acceptability of three behavior and three condition norms regarding human waste impacts and practices. Responses were on a five point Likert-scale from totally unacceptable to totally acceptable (with a neutral mid-point). Frequency distributions are depicted in Figure 17 below, organized by type of statement, which are discussed by sub-headers below. Table 20B in Appendix B shows the exact breakdown by percentages.

Figure 17 Acceptability of Human Waste Condition by percent



Condition norms

The majority of respondents have strong norms that find litter and human waste impacts are unacceptable. Most agreed that they did not like to see unburied waste/toilet paper in the trees (81%) or at more than ten sites in the trees (79%), while broken glass / litter was unacceptable for an even higher percentage (90%). Consistent with general attitudes and norms described above, respondents' specific human waste norms clarify that they value a clean environment in the natural areas they visit.

Behavior norms

Similarly, respondents generally have behavior norms consistent with their condition norms: they find two of the human waste disposal behaviors to be acceptable, while being more divided over a third. The stronger norms were for packing out waste (60% totally acceptable) or burying waste in catholes at least 200 feet away from the beach or waterfront (42% totally acceptable). In contrast, only about 40% consider simply burying waste in the trees behind the beach acceptable (with 9% totally acceptable) versus 39% who consider this unacceptable (18% totally unacceptable). This finding suggests that although users do not like to see signs of human waste, they are uncertain about at least one typical method of dealing with it. This finding tends to support Hypothesis 2—most recreation users will have negative attitudes toward improper disposal of human waste in backcountry settings. It is consistent with several variables in showing that people view human waste impacts negatively and want them to be disposed of appropriately.

My group's Human Waste Practices

The survey asked respondents to report their actual human waste disposal practices on this trip. Results are given in Table 10. Survey respondents were asked to make note of how their group took care of its waste and if they cleaned up human waste left by others. Of the 69% of respondents stating that they stayed overnight, fewer than half reported that their group used a portable toilet system or buried their waste. This is curious, given that 79% reported agreement with an earlier attitude statement generally related to taking care of their waste in the backcountry. The inconsistency could be related to uncertainty in how to appropriately dispose of their waste or different definitions of how to dispose of waste, both indicators that a strongly held norm has not yet evolved (unlike a “no litter” norm, for example).

Table 10 Reported human waste disposal practices

My group's human waste practices during this visit to this area	Total (n)	Our group did not do this	Our group did this some of the time	Our group did this every time
We used a bag or portable toilet system and will carry-out and dispose of our waste when we leave.	97	34%	32%	34%
We buried our waste / toilet paper in personal cat holes.	94	43%	28%	30%
We used a shovel to bury human waste.	93	45%	20%	34%
We cleaned up human waste left by other groups.	95	78%	16%	6%
We stayed overnight.	98	15%	15%	69%

Education Awareness

The survey asked several yes/no questions about respondent's awareness of human waste or Leave No Trace education concepts and materials. Results are given in Table 11. The majority of the respondents had not been exposed to any information about human waste carry-out systems, nor had they seen a Leave No Trace presentation. However, more than half of the respondents stated that they had seen Leave No Trace posters or pamphlets, suggesting that several respondents were at least somewhat aware of some impact educational resources. A primary purpose of the study was to assess whether on-site exposure to this information (through the Pooster) would have an effect on respondents' attitudes, norms, intentions, or behaviors (discussed further below).

Table 11 Percentage of people who have seen waste disposal or LNT education information.

Type of human waste or "Leave No Trace" education	Yes	No
Leave No Trace posters or pamphlets	57%	43%
The Pooster (poster about proper disposal of human waste)	42%	58%
Information about human waste carry out systems	29%	71%
Leave No Trace presentation.	18%	82%
Leave No Trace guidelines from a friend	23%	77%

Support for Management Actions

A final section of the survey assessed support or opposition to management actions that might be used to address human waste impacts. Results are given in Figure 18; responses were on a five-point Likert scale from strongly support to strongly oppose. Table 21B in Appendix B shows the exact breakdown by percentages.

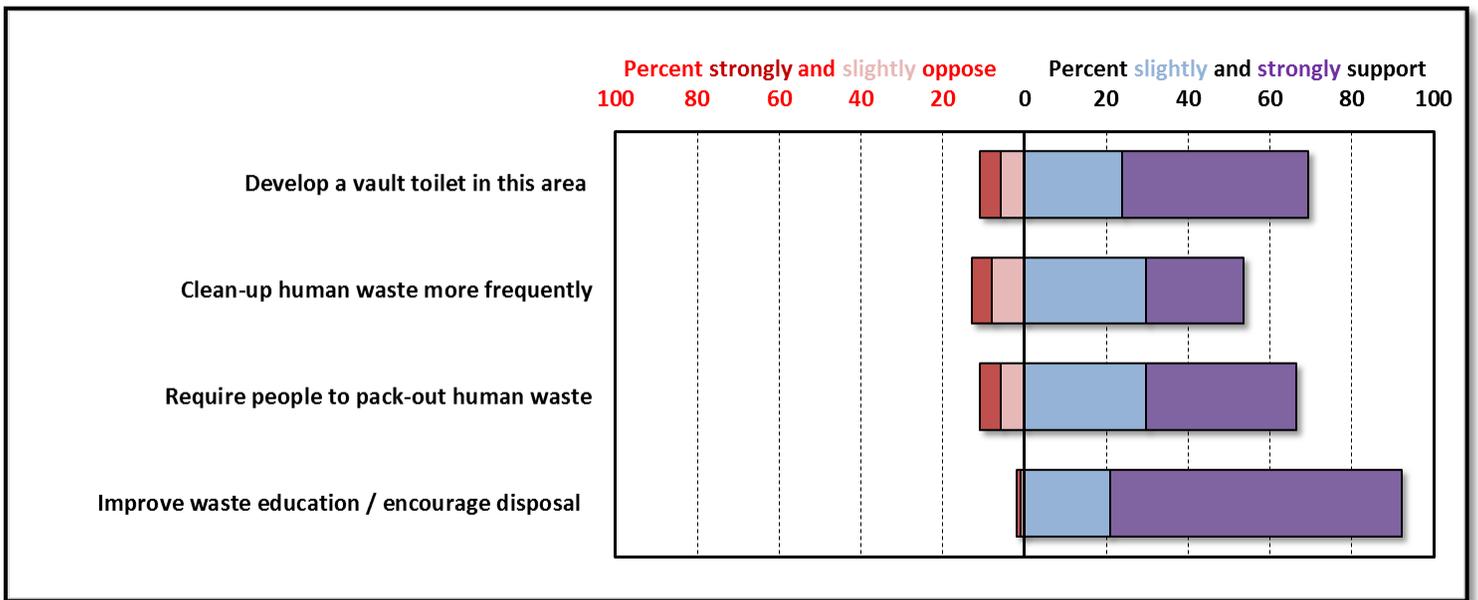
Findings suggest majorities of respondents support three of the four management strategies. The strongest support was for improving human waste education to encourage responsible waste disposal (95% support; 71% strongly support). But more than 65% also support agency development of a vault toilet or regulations requiring human waste carry-out systems; clearly they are interested in more intensive agency responses to the problem. Opposition to any of these initiatives was miniscule (under about 10%). Taken together, these findings suggest that respondents are supportive of governmental initiatives to reduce human waste impacts in the area through several strategies. This is consistent with their general pro-environmental attitudes and norms toward human waste (addressed in greater detail below).

The lowest rated strategy was more frequent agency clean-up activities, with about 30% support (24% strongly), and 5% opposition. Many users may recognize that this is a challenging project, and likely to be subject to budget constraints. In general, solutions that prevent a problem (education, regulation, or development of a toilet) appear to be more strongly supported than the one to address the problem after it has occurred.

The relatively high support for pack-out waste regulations is curious in light of other data that indicates only 34% of the same respondents said they currently packed out all of their waste all of the time (see table 10).

Verbal comments from those who oppose vault toilets indicated some fear that such development would reduce the naturalness and freedom of the beach (which has a long history as a place with little active management).

Figure 18 Percent of users supporting management actions to address human waste



Norm Activation Theory Hypotheses

Social Norm Activation Theory suggests that norms (the acceptability of a behavior or condition) should be dependent (correlated) with the “awareness of consequences” (AC) and “ascription of responsibility” variables described above. The study tested this model through a review of simple bivariate (Pearson) correlations between the AC and AR variables and the six condition and behavior norms. Results are shown in Table 12.

Table 12 Perceived AR and AC

	Ascription of responsibility scale		Awareness of consequences scale	
	r	p	r	p
Condition norms				
Unburied waste	-0.30	.002	0.34	.000
Broken glass and litter	-0.26	.007	--	--
Visible waste in trees	--	--	--	--
Behavior norms				
Pack it out	0.23	.017	-0.33	.001
Bury in cat holes	-0.21	.026	0.28	.004
Walk 200 feet before burying	--	--	--	--

-- Not statistically significant.

AR findings

Results suggest that AR affects some but not all condition and behavior norms; when there is an effect, it was generally in the hypothesized direction (although relatively weak with correlations about 0.2 to 0.3).

- Increased responsibility scores predict greater unacceptability of human waste impacts or litter.
- Increased responsibility scores predict higher acceptability of “pack it out” behavior.

Surprisingly, there was one exception. Increased responsibility scores predicted burying waste to be less acceptable (the negative correlation). However, this makes some sense in review of one of the two responsibility variables, which was related specifically to health effects from human waste pollution, which may not be addressed by a “bury waste” practice (the bacteria can still migrate to the lake).

AC findings

Results suggest that AC affects some but not all condition and behavior norms; when there is an effect, it was generally in the hypothesized direction:

- Increased consequence scores predict greater unacceptability of unburied waste.
- Increased consequence scores predict “pack it out” behaviors as more acceptable.

Mirroring the AR results, increased consequence scores predicted that burying waste was more unacceptable. Again, from a health perspective, many respondents may consider this behavior to be part of the problem.

Social norm activation regression model

Several linear regression models were used to formally test relationships between AR, AC, and human waste condition and behavior norms (for those with statistically significant bivariate correlations discussed above). They evaluated the null hypothesis that human waste practices cannot be predicted by a user's AR or AC. For each model, AR and AC were the independent variables, and the different condition and behavior norms were the dependent variables. Results are given in Table 13.

Table 13: Linear Regression of Human Waste Practices

	AR		AC		Full model		
	r	p	r	p	R ²	F	p
Unburied	-0.21	.028	0.30	.002	0.18	10.7	<.001
Pack it out	0.15	.006	-0.28	.006	0.13	7.2	.001
Bury in cathole	--	--	0.24	.019	0.01	5.2	.007

-- Not statistically significant.

Findings generally support the Norm Activation Theory for two of the three norms (condition norm for unburied human waste and behavior norm for packing waste out). Responsibility (AR) and awareness of consequences (AC) taken together explain about 13 to 18% of the variance in the two norms. In the third case, only AC was statistically significant, and the total model only explained 1% of the norm – a very small effect size. In general, AC is slightly more relevant than AR in the two significant models.

Do AC or AR predict exposure to education materials?

The study examined whether consequences or ascription of responsibility beliefs might be related to education materials. Linear Regression models were used to test for these relationships; the null hypothesis was that AC and AR would not be related to human waste or LNT education mechanisms. For each model AR and AC were the independent variables; the dependent variables were the different education mechanisms. Results are shown in Table 14.

Table 14: Relationships between education mechanisms and AR/AC

	AC		AR		R ²	Full model	
	r	p	r	p		F	p
LNT Posters/Pamphlets	-0.35*	<0.001	0.28*	0.004	0.15	8.703*	0.000
The Pooster	-0.31*	0.002	0.002	0.986	0.11	6.13	0.003
Information about Carry-Out Systems	--	--	0.24*	0.018	0.06	3.016	0.054
LNT Presentation	--	--	--	--	0.014	1.68	0.193
LNT Guidelines from Friend	--	--	--	--	0.041	2.071	0.132

*Correlations significant at the 0.05 level (2-tailed)

Three of the five models had at least one statistically significant independent variable, two explained over 10% of the variance in education materials, but none were very strong relationships. They offer limited evidence to reject the null hypothesis stated above.

The strongest relationships were for LNT posters/pamphlets and the Pooster. In both cases, AC was the stronger independent variable. It suggests that knowledge of human waste impact consequences was partly related to exposure to education materials. LNT and Pooster information arguably make individuals more aware of the consequences of human waste in natural settings, which should ultimately influence their norms about whether waste is

acceptable (or how people should dispose of waste). This makes sense as the Pooster provides side-by-side images demonstrating landscapes with and without human waste, providing a strong visual contrast of the aesthetic impact of poor disposal.

In contrast, AR was only related to education for information about human waste carry-out systems ($r=.24$). Although information about personal responsibility is present in some LNT materials, this result suggests it is more central for information specific to carry-out systems, which makes some sense. These systems allow a person to completely eliminate human waste impacts, but require considerable personal effort (and cost) to execute them.

LNT presentations or LNT information from friends does not appear to be related to measures of AR or AC. One possible explanation is that these mechanisms were not as frequently mentioned by respondents, or overlap with other mechanisms (that explain AC and AR better).

Do AC and AR help predict support for management actions?

The study examined whether consequences or ascription of responsibility beliefs might be related to support for management actions. Linear Regression models were used to test for these relationships, evaluating the null hypothesis that support for management actions cannot be predicted by a user's AR or AC. For each model AR and AC are the independent variables. The dependent variables are the different management actions. Table 15 shows a breakdown.

Table 15: Relationships between AC and AR and support for human waste management actions.

	AR		AC		Full model		
	r	p	r	p	R ²	F	p
Develop a Vault Toilet	0.44	0.06	--	--	0.07	0.34	<.70
Frequent Clean Ups	--	--	--	-	0.01	0.23	0.8
Require Pack-Out methods	0.28*	0.004	-0.36*	<0.001	0.16	9.1*	.000
Improve Education	--	--	--	--	0.16	1.3	0.29

* Correlation is significant at the 0.05 level (2-tailed).

Results suggest that only the model for regulations that require human waste pack-out methods was statistically significant. In this model, both responsibility and consequences variables are related to support for these regulations (with AC slightly stronger than AR). When people recognize the negative impacts of human waste and feel a personal responsibility for reducing them, they are more likely to support regulations that make everyone follow them. However, the model is still relatively weak, explaining only 16% of the variance in support, suggesting other factors also influence their support. Cost, handling of waste bags and ultimate disposal of the bags are possible concerns.

For the other possible agency responses to human waste problems, AR and AC are apparently not very important. Although beliefs about consequences or personal responsibility may help respondents understand the need for proper waste disposal, there are likely to be many other factors involved in whether they would support actions such as a vault toilet (e.g., they may object to a change in the level of development at this primitive beach), increased waste clean-up by an agency (which would be costly for government), or improved education.

Do education levels affect human waste disposal norms?

The study assessed the effectiveness of educational materials to predict norms for human waste disposal. Linear Regression models were used to test for relationships between reported awareness of education materials (the Pooster and general LNT materials) and three human waste norms (the condition norm of unburied human waste, and two behavior norms, burying waste and carrying out waste). Of these three models, only one was statistically significant (for the condition norm), although the correlation between Pooster information and burying waste in a cathole norm was also significant. For the significant model, both information from the Pooster and LNT materials were significant, but they only explained 13% of the norm related to unburied waste conditions.

Findings suggest that reported LNT education levels by themselves do not appear to affect respondents' norms toward human waste practices (the non-significant models), and only slightly predict whether respondents consider unburied waste to be an unacceptable condition. Educational materials may still affect norms, but simple reported exposure to such materials is not likely to be sufficient to change such norms. This makes sense given that education was only weakly correlated with AR and AC, the theorized antecedents of strong norms. Results are shown in Table 16.

Table 16: Relationships between education materials and various human waste norms.

Norm	Information from the Pooster		Information about Leave No Trace		Full Model		
	r	p	r	p	R ²	F	p
Unburied waste condition	-0.25*	0.012	-0.34	0.001	0.13	7.1*	0.001
Behavior: Bury in cathole	-0.23*	0.022	--	--	0.05	2.7	0.713
Behavior: Pack it out	--	--	--	--	0.03	1.2	0.295

* Correlation is significant at the 0.05 level (2-tailed).

Effects of a Human Waste Education Mechanism – The Pooster

The study assessed whether the presence of the Poosters at the site affected respondents' reported education awareness, their condition and behavior norms, and support for management actions. All were tested by comparisons of mean scores for the respondents from the first half of the summer (with no Poosters present) vs. those from the second half (with Poosters in place) via independent sample t-tests. Results are organized by type of variable below, and summarized in Table 17.

Table 17: Comparison of means between early and late respondents (those who saw and did not see the Pooster education treatment).

	Before	After			
	(did not see Pooster)	(saw Pooster)			
	mean	mean	t	p	Effect size
Condition norm					
Unburied human waste	1.64	1.20	2.44	0.017	0.01
Behavior norms					
Bury waste in catholes	2.96	2.91	0.19	0.84	--
Pack out waste	4.24	4.27	-0.15	0.88	--
Bury waste 200 ft behind	4.04	3.95	0.44	0.66	--
Education materials					
LNT brochures	0.45	0.69	-2.52	0.013	0.01
Pooster	0.20	0.62	-4.6	0.000	>0.14
Support for management actions					
Vault toilet	3.90	4.08	-0.77	0.44	--
Frequent clean ups	3.63	3.56	0.35	0.73	--
Require pack-out	3.84	3.90	-0.30	0.77	--
Improve Education	4.57	4.63	-0.43	0.67	--

--not statistically significant

Effect on acceptability of human waste conditions (condition norm)

There was a statistically significant difference between the acceptability of unburied waste mean scores for respondents who visited the lake before the Poosters (n=50, M=1.64, SD= 1.12) and after the treatment was in place (n=56, M=1.2, SD=0.67), $t(78.33) = 2.44$, $p=0.017$. This suggests the Pooster had an effect on respondents' acceptability of unburied waste, although the effect was small.

Effect on acceptability of human waste practices (behavior norms)

There was no statistically significant difference between respondents who came to the lake early and later in the season (after the Poosters were in place) regarding the acceptability of human waste practices. Although reported education awareness had small effects on the carry-out norm (discussed above), the presence of the Pooster on-site was apparently not responsible for that relationship. Likewise, the Pooster had no discernible effect on reported acceptability of digging catholes or burying waste at least 200 feet behind the trees on the beach (the two other behavior norms).

Effect on reported human waste and Leave No Trace education awareness

The Pooster did have a small effect on reported levels of human waste or Leave No Trace education awareness. Respondents during the treatment period were significantly more likely to report having seen Leave No Trace posters/pamphlets and the Pooster itself. For the Leave No Trace posters/pamphlets before (n=49, M=.45, SD= 0.50) and after (n=52, M=.69, SD=0.46), $t(97) = -2.52$, $p= 0.013$. The Pooster also experienced a statistically significant

difference in those prior to the treatment period ($n=49$, $M= 0.20$, $SD= 0.41$) and those after ($n=52$, $M=.62$, $SD=0.49$), $t(97) = -4.6$, $p= 0.000$.

Effect on support for management actions

The Pooster had no statistically significant effects on support for any management action, including regulations that would require waste carry-out systems. Although the Pooster addresses such issues, the message did not apparently have major effects on support for various management strategies to address the problem.

These results are consistent with the suggestions noted in *A Norm Activation Model of Responsible Environmental Behavior*, Vaske, et al, (1994) "where the norms for appropriate behavior are evolving (e.g., knowledge of rules and regulations pertaining to the dumping of human waste), AC and AR may sensitize individuals to the emergence of such norms.

Awareness of negative consequences and/or acceptance of personal responsibility thus become prerequisites to initial awareness of a new norm rather than conditions necessary to activate existing norms" (p. 6). It could be said that human waste is an emerging norm instead of an established norm. Emerging norms are evolving with the times as many resource issues didn't exist 20 years ago, these often carry less sense of obligation and expectations (Shelby et al, 1996, p. 117).

Discussion

Previous sections of this thesis have addressed several aspects of human waste impacts in wildland recreation areas. After introducing the issue and providing background on how researchers and agencies have conceptualized the problem, the thesis described a study that would examine the amount and distribution of human waste impacts at an Alaskan recreation area, and recreation users' attitudes and norms toward waste impacts and waste disposal. Results provided in the previous chapter show that impacts are substantial, noticeable, and that recreation users have some consistent responses to them. The following discussion summarizes the major findings of the study, its implications for management, and avenues for future research.

Amount and Distribution of Human Waste Impacts

Consistent monitoring of a regularly used camping and picnicking beach on Kenai Lake suggests that human waste impacts accumulate rapidly through a use season. The amount of unburied waste (as many as 695 piles in total in 2015) probably reduces water quality (increased water born-pathogens in the lake) and may create health concerns (e.g., unacceptable levels of *Giardia* and *Cryptosporidium* in lake waters, requiring visitors to properly treat water before use). Just as importantly, the human waste impacts produce a substantial aesthetic or social impact that is inconsistent with a primitive Alaskan recreation setting. In addition, the study shows that waste impacts are distributed unevenly through the site and concentrated in areas near camps (even as most users go into the taller vegetation/forest to gain some sense of privacy). In essence, visitors to the lake have largely chosen to go to the

bathroom immediately adjacent to their temporary kitchens, living rooms, and bedrooms; over time, it clearly reduces the quality of the experience of camping at such a beautiful location.

Attitudes and Normative Beliefs

In general, users visiting the Kenai Lake beach site had pro-environmental attitudes, even if they also largely participated in consumptive recreation (fishing and hunting). These groups indicated that they care about the location and worry about its impacts, but also enjoy their freedom to use it without fees, intensive management, or substantial recreation infrastructure that might detract from its primitive setting.

Visitors clearly notice and consider unburied human waste unacceptable (they exhibit a strong condition norm), and this largely supports management actions that would address these problems. However, they also appear to care about maintaining open access and do not support intensive management that might substantially increase the level of development (turn it into a formal campground) or prohibit their wide-ranging activities (including driving vehicles onto the beach, having fires, etc).

Visitors also appear to be developing some behavior norms regarding human waste, reporting the acceptability of going to the bathroom some distance from their camps, burying waste when they go, or use carry-out systems. However, visitors appear to have some uncertainty about whether burying waste solves human waste problems, and very few have taken the steps to consistently use carry-out systems. In general, without stronger norms, they appear unable to adopt personal behaviors that would eliminate noxious human waste impacts on their own.

Norm Activation Theory

The study explored possible antecedent beliefs that theoretically explain the strength of norms. Schwartz's Norm Activation Theory (1968) suggests that a person's norm will be related to the extent that a person is aware of the consequences of the behavior or condition (AC) and the extent that they ascribe responsibility for the behavior or conditions (AR). "Activation of moral norms requires both awareness of consequences and ascription of responsibility to the self" (Schwartz, 1968, p.367).

Results supported these theorized relationships (although only weakly) for one condition norm (acceptability of unburied human waste) and two behavior norms (acceptability of packing out waste and burying waste in catholes). In supporting an enduring social psychological idea, results can help explain why some users do not actually follow these norms (as evidenced by the amount of feces at the site through the year), and suggest ways to increase them through education. Education messages need to target the consequences for visitors (e.g., they might get sick, they will see unsightly waste), and convince them that it is everyone's personal responsibility to clean-up waste (or carry it out). It is clear that many visitors currently are unaware of the possible consequences or do not see themselves as connected to the problem.

Current education methods are relatively good at delivering the AC message, so the responsibility component probably needs more attention. "If a person thinks it is someone else's responsibility, not their responsibility, or that someone else will step in and do the job, then they will not undertake the required action" (Brennan et.al, 2014, p. 100). The slightly stronger AC than AR relationships towards pack-out behavior supports this position. Similarly,

the strong support for agency development of a vault toilet or clean-up efforts suggests that many current visitors don't see their own role in reducing human waste impacts.

Effectiveness of the Educational Treatment

Comparing results from the pre- and post-treatment periods revealed that the *Pooster* had a small effect on the users' behaviors and awareness of the issues. The survey showed that users saw the *Pooster* and recognized its relevance for addressing human waste impacts. In a surprise, the education infrastructure was also treated relatively well, with only one *Pooster* being vandalized (probably in an act of anti-agency protest). This further suggests that visitors considered the message worthy, which is shown by general positive comments about the *Pooster*.

Human Waste Distribution finding: Waste Attracts Waste

Comparing pre-and-post treatment periods also showed an interesting waste distribution patters where waste attracted waste. In conditions where the site had been cleared of feces, new piles in the post-treatment period accumulated in clusters – they became de facto bathrooms. If waste was present, visitors seemed to assume that this was an acceptable place to leave more feces, while relatively cleaner areas did not attract new piles at first. After a certain point, however, clusters became so concentrated, reaching an apparent aesthetical saturation point, and piles began spreading out.

Improving the Pooster

The *Pooster* provided increased education about human waste disposal methods and there is some evidence from the study that its information can help increase or strengthen a

norm (if not directly, then by improving visitor's AC and AR). The Pooster can be customized to specific locations or regions while maintaining consistency with recommendations outlined in the Leave No Trace (LNT) program. The Pooster carries a unique message and style of presenting LNT's seven principles in a single visual article that can be placed at trailheads, public restrooms, and other points of entry to wildlands. Widespread availability of the Pooster could increase enthusiasm for behavior norms or by raising awareness of human waste disposal options when facilities are absent.

The study probably underestimated the percent of visitors who saw and understood the Pooster's message. Although the survey asked whether visitors had seen the Pooster, many may have not understood that this label referred to the posters on the beach (only a small logo in the bottom right corner identified it as such). Some respondents commented about the posters, even if they did not report having seen the Pooster, while others may have confused the message of the Pooster with LNT information (the Pooster contains references to LNT practices).

Future ideas for the Pooster include modifying the language to increase awareness of consequences, particularly emphasizing the health aspects with statements along the lines of "your feces will make OTHER people sick." This could include messages from experts (e.g., "experts say that packing out waste eliminates 100% of fecal coliform"), which will fortify their beliefs (Ajzen, 1992, p. 14). Convincing visitors that others are doing their part may also help encourage norm formation. Because no one really knows what others are doing when nature calls, statements about others' behavior may help reinforce good practices such as "75% of campers pack-out their waste" (Heberlein, 2012; Cross, 2013).

Other educational messages and channels

Ultimately, the study suggests that a single message (e.g., how to handle your human waste) via a single channel (the Pooster at a site where camping occurs) may not be sufficient to develop long-lasting and strong human waste disposal norms. This sort of education information (and not just about human waste, but outdoor ethics in general) won't work by itself from static bulletin boards or posters at a trailhead or campground. Leave No Trace education probably needs to be available in many more locations and through multi-media and channels. In Alaska there are not many ways to learn about LNT without actively seeking it out.

Some LNT practices are also misinterpreted and poorly understood by visitors, while others have deep-seated negative attitudes towards other practices (Lawhon, 2013, p. 56). As an illustration, many Kenai Peninsula trailhead kiosks have 3 x 5 plastic removable cards with the seven LNT principles printed on them. Free to anyone and designed to encourage education ideas throughout a trip, these cards are sometimes found littered along the trail.

In both instances education alone is not the answer. Providing education can increase user awareness of consequences, but it is more challenging to use information to encourage a sense of responsibility. Although going to the bathroom is an unavoidable action and users "can learn to dispose of wastes in a manner causing least impact," poor human waste disposal is a kind of "careless action" that may require consistent and regular reminders (Roggenbuck, 2007, p. 163). One of the major challenges with human waste impacts is that behavior is conducted in private, so it is hard for other visitors to externally sanction or enforce norms. The taboo of discussing human waste in public adds to the challenge. It is much easier to get away with the incorrect behavior if no one is going to know and give you a reason to feel guilty about it (an

internal sanction). “Increased knowledge does not necessarily equate to changes in behavior” (Lawhon, 2013, p.57). We have established that user groups do not like to see signs of human waste and are willing to pack it up, but need perhaps more help with turning those attitudes and beliefs into actions.

As Heberlein explains in *Navigating Environmental Attitudes* (2012), “We try to fix environmental problems by changing the environment directly (the technological fix), relying on people to change themselves in response to information (the cognitive fix), or changing human behavior by changing the context (the structural fix)... but often all three fixes are required simultaneously” (p. 164). We come from a society that is lucky enough to have access to potable water and flushing toilets in our developed settings, but have developed norms where we don’t do anything with our waste in more primitive settings. This may be fine in backcountry areas where use levels are very low, and the woods are very large. But in a concentrated use location along a popular lakeside beach, the accumulation of waste is a real problem – not unlike the ones experienced in rural undeveloped villages in the third world parts of the globe. For an educated public who values the pristine conditions of natural settings, it’s time to change those norms. Good education that discusses the options, and makes good practices a part of our everyday lives will be crucial to this task.

Other management options besides education

In addition to increased education, two other possible management solutions to human waste problems include installation of a vault toilet and pack-out requirements. Installing a vault toilet at this site and at highly populated areas along the Kenai River would probably go a long way toward solving the human waste problem. If there was a toilet on the beach, we

suspect many would use it (if well maintained). It would be an immediate solution that would concentrate waste in one area, but it also increases agency responsibility to keep it maintained, pumped, and located in places where people can see and use it. As in our developed settings, the availability of a toilet is normal and prevents the problem.

Establishing a pack-out requirement is the flip side to an education approach, but it also reinforces any educational messages. Having a rule that required people to pack out their waste (under penalty of a fine), would show that agencies were serious about the problem, but places equal responsibility on the user. Of course it would require enforcement for people to take such regulations seriously, and privacy issues would still make enforcement difficult. But agencies that manage rivers (at least 30 multi-day rivers in the west require carry out systems) and high use climbing summits (including Denali, Mount Whitney, Mount Shasta) have implemented such regulations and they have been very successful at reducing or eliminating the problem (Exit Strategies conference, 2010). In many cases, a regulation in one setting may lead to spill over into other areas (that don't have the regulation). Once a system becomes part of a visitor's repertoire, the norm becomes internalized and is strengthened. Eventually, it simply becomes "the way things are done," just like the way western societies use indoor restrooms to eliminate waste in their developed settings. If agencies implement this strategy, they might consider trying to develop regulations for all of the similar high use popular undeveloped hiking and camping areas in the Kenai River Corridor (e.g., Fuller Lakes, Russian River trail, Resurrection Pass trail, etc.)

Assessing the study: Opportunities for improvements

There were several unforeseen issues that arose throughout the study. Counting waste piles was challenging especially as they increased. It was difficult to count piles after a rain storm as toilet paper piles would clump together; potentially altering the accuracy of the count. Other counting challenges concerned people occupying sites and making it difficult for technicians to follow the full counting route.

If the study were to be extended, there would be outstanding opportunities to assess the effect of a Pooster or similar treatment in a second year. In many cases, visitors only come once a year, and the Pooster could arguably encourage a change for future years more than they could affect change with the initial exposure.

Likewise, the study could not control for the type of visitors who come in the first part vs. the second part of the season. An interesting methodological twist would be to try the Pooster treatment in the first half of the year and remove it for the second. It is possible that this might alter the response rate and/or vandalism rate.

Other areas for future research

This study is a single application of Norm Activation Theory and collected data from users at single location about a single recreation signs of use impact, human waste. It would be interesting to study AC, AR, and other condition and behavior norms at other locations and with other users groups. Open questions include:

- 1) Differences between consumptive and non-consumptive users
- 2) Differences between people from different parts of Alaska or the Lower 48
- 3) Differences for different socio-demographics (e.g., income, education, or age).

4) Differences between different locations (e.g., Kenai Lake vs. Cooper Lake, a lower density location).

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Appendices

Appendix A: Survey Instruments

General values, beliefs, and attitudes (Circle one number for each row)

A		Strongly disagree	Slightly disagree	Neutral	Slightly agree	Strongly agree
1.	We should manage natural places so that humans benefit. Abene	1	2	3	4	5
2.	I don't like to see signs of human use in natural settings. Ahuman	1	2	3	4	5
3.	Protecting environmental natural resources is important, even if it means restricting use. Aprot	1	2	3	4	5
4.	I always wash my hands after using a public restroom to prevent disease. Ahands	1	2	3	4	5
5.	I feel a strong personal obligation to protect the water quality in Kenai Lake. Aoblig	1	2	3	4	5
6.	We are all responsible for the human waste impacts we have in natural areas. Aresp	1	2	3	4	5
7.	I take care of my waste when in the backcountry. Aback	1	2	3	4	5
8.	Even buried human waste can increase bacterial pollution in lakes and streams. Abact	1	2	3	4	5
9.	Human waste, like animal waste, breaks down and does no harm to natural ecosystems. Animal	1	2	3	4	5
10.	I realize that other people use this beach and don't want to see or smell human waste. Aoth	1	2	3	4	5
11.	Human waste in backcountry areas is <u>not</u> a health problem. Anot	1	2	3	4	5
12.	I am willing to use pack-it-out methods. Awill	1	2	3	4	5
13.	I rarely see much human waste/toilet paper in the natural areas I visit. Arare	1	2	3	4	5

Acceptability of human waste conditions / behaviors in this area (Circle one number for each row)

B		Totally unacceptable	Slightly unacceptable	Neutral	Slightly acceptable	Strongly acceptable
1.	Unburied waste / toilet paper in the trees behind the beach. Bunbur	1	2	3	4	5
2.	Bury waste / toilet paper in personal "cat holes" in the trees behind the beach. Bcat	1	2	3	4	5
3.	Pack out waste / toilet paper in a bag system (Restop or CleanWaste bags). Bpack	1	2	3	4	5
4.	Broken glass and litter scattered throughout the beach. Blitter	1	2	3	4	5
5.	Visible waste / toilet paper at more than ten sites in the trees behind this beach. Bvis	1	2	3	4	5
6.	People should walk at least 200 feet into the trees before digging a "cat hole". Bdista	1	2	3	4	5

Figure 19A Survey Instrument with Code Labels

My group’s human waste practices during this visit to this area (Circle one number per row)

	C	Our group did not do this	Our group did this some of the time	Our group did this every time
1. We used a bag or portable toilet system and will carry-out and dispose of our waste when we leave. cport		1	2	3
2. We buried our waste / toilet paper in personal cat holes. cperson		1	2	3
3. We used a shovel to bury human waste. cshovel		1	2	3
4. We cleaned up human waste left by other groups. cleaned		1	2	3
5. We stayed overnight. cover		1	2	3

Please check each type of human waste or “Leave No Trace” education you’ve seen/experienced... (Check all that apply)

- D** Leave No Trace posters or pamphlets. **dlnt** Leave No Trace presentation. **dpres**
 The Pooster (poster about proper disposal of human waste) **dpooster** Leave No Trace guidelines from a friend **dfriend**
 Information about human waste carry out systems **dinfo** Other: _____ **dother**

Support for management actions to address human waste impacts in this area (Circle one number per row)

	E	Strongly oppose	Slightly oppose	Neutral	Slightly support	Strongly support
1. Agencies should develop a vault toilet in this area. evault		1	2	3	4	5
2. Agencies should clean-up human waste more frequently from places like this. efreq		1	2	3	4	5
3. Agencies should require people to pack-out human waste from places like this. ereg		1	2	3	4	5
4. Agencies should improve human waste education to encourage responsible disposal. encou		1	2	3	4	5

Questions about you

- F**
1. About how many days per year do you spend...
 ...camping in developed campgrounds (with toilets, tables, etc.) **fdev**
 ...camping in undeveloped but road-accessible areas (like this) **fundev**
 ...backcountry camping **fback**
 ...fishing **fishing**
 ...hunting **fhunt**
2. About how often do you visit this beach? **foften** (trips per year)
3. About how long do you stay at the beach? _____(days) or _____(hours) **flength all in hours**
4. Where do you live?
 Cooper Landing area **fcooper**
 Kenai, Soldotna, Sterling area **fkenai**
 Seward **fseward**
 Anchorage **fanch**
 Other Alaskan location (specify) **fak**
 Other location (specify) **foth**
5. How did you hear about this beach? **fhow**

Figure 20A Volunteer Risk Waiver Form to participate in study

This form is intended to be signed by all students, guests and non-employees participating in APU supervised volunteer work programs.

Back Country Sanitation and Human Waste Education Research Project

RELEASE AND WAIVER OF LIABILITY, ASSUMPTION OF RISK

AND INDEMNITY AGREEMENT

I, _____ ("Participant"), hereby acknowledge that I have voluntarily elected to participate in the following Back Country Sanitation and Human Waste Education Research Project, to be held at Waikiki Beach on the west shore of Kenai Lake (accessible from Snug Harbor Road) in Cooper Landing, Alaska, from May 15th through October 1st, 2015. **In consideration for being permitted by Alaska Pacific University ("APU") to participate in the Program, I hereby acknowledge and agree to the following:**

ELECTIVE PARTICIPATION: I acknowledge that my participation is elective and voluntary.

RULES AND REQUIREMENTS: I agree to conduct myself in accordance with APU policies and procedures. I further agree to abide by all the rules and requirements of the Program. I acknowledge that APU has the right to terminate my participation in the Program if it is determined that my conduct is detrimental to the best interests of the group, if my conduct violates any rule of the Program, or for any other reason in APU's discretion.

INFORMED CONSENT: I have been informed of and I understand the various aspects of the Research Program, including the dangers, hazards, and risks inherent in volunteer activities. I understand that I could sustain serious injuries, including death, and/or property damage as a result of my participation in the Program, which may include, but are not limited to, activities such as working with people, participating in sports and recreation activities, cleaning and maintenance projects, preparing and serving food, and other service activities, transportation to and from volunteer work sites via private vehicles, APU owned vehicles and common carriers, and any independent research or activities I undertake as an adjunct to the Program. I understand that as a Participant in the Program I could sustain serious personal injuries, illness, property damage, or even death as a consequence of not only APU's actions or inactions, but also the actions, inactions, negligence or fault of others, conditions of equipment used, facility conditions, weather conditions, negligent first aid operations and procedures and that there may be other risks not known to me or not reasonably foreseeable at this time. I further understand and agree that any injury, illness, property damage, disability, or death that I may sustain by any means is my sole responsibility, except for those occurrences due to APU's negligence or intentional acts.

RELEASE AND WAIVER OF LIABILITY: I, on behalf of myself, my personal representatives, heirs, executors, administrators, agents, and assigns, **HEREBY RELEASE, WAIVE, DISCHARGE, AND COVENANT NOT TO SUE** APU, including its governing board, directors, officers, employees, agents, volunteers, and any students (hereinafter referred to as "Releases") for any and all liability, including any and all claims, demands, causes of action (known or unknown), suits, or judgments of any and every kind (including attorneys' fees), arising from any injury, property damage or death that I may suffer as a result of my participation in the Program, **REGARDLESS OF WHETHER THE INJURY, DAMAGE OR DEATH IS CAUSED BY THE RELEASEES, UNLESS THE INJURY DAMAGE OR DEATH IS CAUSED BY THE RELEASEES' NEGLIGENCE OR INTENTIONAL ACTS, AND REGARDLESS OF WHETHER THE INJURY DAMAGE OR DEATH OCCURS WHILE IN, ON, UPON, OR IN TRANSIT TO OR FROM THE PREMISES WHERE THE ACTIVITY, OR ANY ADJUNCT TO THE ACTIVITY, OCCURS OR IS BEING CONDUCTED.** I further agree that the Releases are not in any way responsible for any injury or damage that I sustain as a result of my own negligent acts.

ASSUMPTION OF RISK: I understand that there are potential dangers incidental to my participation in the Program, some of which may be dangerous and which may expose me to the risk of personal injuries, property damage, or even death, I understand that these potential risks are incidental to my participation in activities which may include, but are not limited to: working with people, participating in sports and recreation activities, cleaning and maintenance projects, preparing and serving food, and other service activities, transportation to and from volunteer work sites, including via a private vehicle, APU owned vehicles, and common carriers, and in any independent research or activities I undertake as an adjunct to the Program. Furthermore, I acknowledge that there are other potential dangers incidental to my participation in the Program due to weather conditions, volunteer facility conditions, equipment conditions, negligent first aid operations or procedures of Releases, and other risks that are unknown at this time. **I KNOWINGLY AND VOLUNTARILY ASSUME ALL SUCH RISKS, BOTH KNOWN AND UNKNOWN, EVEN IF ARISING FROM THE ACTS OF THE RELEASEES, UNLESS THEY ARISE FROM THE RELEASEES' INTENTIONAL OR NEGLIGENT ACTS,** and assume full responsibility for my participation in the Program.

INDEMNITY: I, on behalf of myself, my personal representatives, heirs, executors, administrators, agents, and assigns, agree to hold harmless, defend and indemnify the Releases from any and all liability, including any and all claims, demands, causes of action (known or unknown), suits, or judgments of any and every kind (including attorneys' fees), arising from any injury, property damage or death that I may suffer as a result of my participation in the Program, **REGARDLESS OF WHETHER THE INJURY, DAMAGE OR DEATH IS CAUSED BY THE RELEASEES OR OTHERWISE, UNLESS THE INJURY DAMAGE OR DEATH IS CAUSED BY THE RELEASEES' NEGLIGENCE OR INTENTIONAL ACTS.**

NON-EMPLOYEE STATUS: I understand and acknowledge that in participating in the Program, I am doing so independently as a volunteer and that I am not an employee or agent of APU or the Program site. I understand and agree that as a volunteer that I am not entitled to receive compensation or any other employee benefit for my participation in the Program.

PERSONAL MEDICAL INSURANCE. I agree to purchase and maintain during the term of the Program personal medical insurance. I further acknowledge that I am responsible for the cost of any and all medical and health services I may require as a result of participating in the Program, except that APU assumes responsibility for medical expenses for injuries directly related to my participation in the program. I understand and agree that APU shall not in any way be responsible for other contingent losses arising from any injury I sustain that is not the result of APU's negligent or intentional acts, including but not limited to loss of wages.

MEDICAL CONSENT: I understand and agree that Releases may not have medical personnel available at the location of the Program. In the event of any medical emergency, I (initial one) do ___do not___ authorize and consent to any x-ray examination, anesthetic, medical, dental or surgical diagnosis or treatment, and hospital care that APU personnel deem necessary for my safety and protection. I understand and agree that Releases assume no responsibility for any injury or damage which might arise out of or in connection with such authorized emergency medical treatment.

CHOICE OF LAW: I hereby agree that this Agreement shall be construed in accordance with the laws of the State of Alaska.

[OPTIONAL: I understand that I may seek legal counsel of my own choosing to fully explain any terms of this Agreement to me before I sign it.]

SEVERABILITY: If any term or provision of this Agreement shall be held illegal, unenforceable, or in conflict with any law governing this Agreement the validity of the remaining portions shall not be affected thereby.

I HAVE READ THIS AGREEMENT AND FULLY UNDERSTAND ITS TERMS. I AM AWARE THAT THIS AGREEMENT INCLUDES A RELEASE AND WAIVER OF LIABILITY, AN ASSUMPTION OF RISK, AND AN AGREEMENT TO INDEMNIFY THE RELEASEES. I UNDERSTAND I HAVE GIVEN UP SUBSTANTIAL RIGHTS BY SIGNING THIS AGREEMENT, AND SIGN IT FREELY AND VOLUNTARILY WITHOUT ANY INDUCEMENT. BY MY SIGNATURE I REPRESENT THAT I AM AT LEAST EIGHTEEN YEARS OF AGE OR, IF NOT, THAT I HAVE SECURED BELOW THE SIGNATURE OF MY PARENT OR GUARDIAN AS WELL AS MY OWN.

Signature of Participant

Date

Signature of Parent/Guardian for Participants under eighteen (18) years of age:

I certify that I have custody of Participant or am the legal guardian of Participant by court order. I HAVE READ THIS AGREEMENT AND FULLY UNDERSTAND ITS TERMS. **I AM AWARE THAT THIS AGREEMENT INCLUDES A RELEASE AND WAIVER OF LIABILITY, AN ASSUMPTION OF RISK, AND AN AGREEMENT TO INDEMNIFY THE RELEASEES.** I join with Participant in granting a release to Releases as set forth in detail above.

Signature of Parent or Guardian

Date



STATEMENT OF CONSENT TO PARTICIPATE

Back Country Sanitation and Human Waste Education

I am a student at Alaska Pacific University (APU) conducting a survey for a Master's Thesis Project over the summer months. I am requesting your voluntary participation in my research. You may choose to stop your participation at any time without penalty. I expect that your participation will take approximately five minutes to complete.

The purpose of this study is to evaluate Kenai Lake recreational visitor attitudes, specifically in regard to human waste and sanitation practices. The goal is to describe recreational user opinions about human feces impacts and problems, and their views on management actions that might be used to address problems. The survey questions will assess several issues related to human waste disposal and will be completely confidential. Once the study is complete all data will be compiled into one report.

This project has been reviewed and approved by APU's Institutional Review Board and the head of Alaska State Parks. There is no risk involved in participating in this study.

A copy of this letter is yours to keep. If you have any questions about how this investigation is to be conducted please contact me at: kroute@alaskapacific.edu. You may also contact my Faculty Advisor: Karen McCain mccain@alaskapacific.edu or 907.564.8243.

If you agree to participate in this study please proceed with the questionnaire portion. Once you complete the questions please place your answers in the attached folder. If you do not wish to participate thank you for your time and have a great day.

Thank you,

Kristine Route

Figure 21A Educational Treatment: The Pooster

When Nature Calls where will you go?



Which would you rather see on your outdoor adventure?

How to Poop in the Woods:

- When possible, use existing restrooms.
- Dig your cat hole 6–8 inches deep in rich soil and at least 200 feet (70 large paces) from water, trails, and camp.
- Or pack-it-out using an approved double bagging system with poo powder—a Cleanwaste Wag Bag, a RESTOP II, or a Biffy Bag.
- Toilet paper—pack-it-out, along with wet wipes and hygiene items.

Why Practice Proper Methods?

- Prevent the spread of diseases.
- Avoid polluting water sources.
- Keep wildlife and pets from being attracted.
- Maximize the speed of fecal decomposition.
- Be respectful of the visitors who will follow you.
- Leave the backcountry looking better than you found it.

★ *With increasing numbers of us clambering for the outback, it's critical we each take the responsibility to deal appropriately with our leavings . . .* ★



Plan ahead . . .

when leaping into the great beyond.

© 2013 Kristine Route and Kathleen Meyer

The Pooster
www.thepooster.com

Appendix B: Survey Tables

Table 17 Risk Management Table of Conducting Survey

Hazard	Evaluation of Risk	Control Measures
Wildlife Encounter	Low if proper precautions are taken	Wildlife Encounters including brown bears, black bears, moose, and coyotes are all possible in a summer wetland environment. Paying close attention to surroundings and maintaining appropriate distance from a sighted animal will be key to avoiding conflict. I will carry bear spray and look for signs of animal activity.
Drugs & Alcohol	High	Encounters with recreationalists that have been indulging in alcoholic beverages or drugs that are causing them to behave in a belligerent or inappropriate manner are possible. This area is well known for being easy to access and remote. I plan to avoid groups that appear this way. I will be carrying bear spray, a radio, and intend to have a volunteer with me at all times.
Transportation	Low	The testing area is accessed by driving along a dirt road. The possibility for having engine trouble or getting a flat tire is possible. I always carry a tool box, a spare tire, and jumper cables. If something were to happen beyond my knowledge base I will contact my emergency back-up person by calling them with my two-way radio.
Weapons	High	Encounters with recreationalists that are using guns or other weapons in the area will be avoided. If gun fire is heard I will vacate the premise, particularly if I am in the woods during a counting session. I will notify the State Troopers if the situation calls for it.
Uncontrolled Pets	Medium	Encounters with pets that are uncontrolled in the area are existent, but not a major threat. I will carry bear spray for use if this arises.
Bacterial Transmission	Medium	There are several ways bacterial diseases can be transmitted through human waste. I am most likely to come in contact with bacteria during monitoring sessions and when I clean up the beach area. I plan to use disposable rubber gloves, eye protection, and a respirator during the time that I pick up the site. I will place all waste into Restop II Kits designed for packing waste out of the backcountry, so that I can throw the bags safely into the dumpster afterwards.

Table 18 Detail listing of User Groups at Site

Date	People	Groups	Cars	Boats	RV	Tents	Portable Toilet
5/18	0	0	0	0	0	0	0
5/24	25	5	15	1	1	9	1
6/1	0	0	0	0	0	0	0
6/10	7	3	3	0	0	5	0
6/15	8	2	0	2	0	0	0
6/19	/	/	12	0	0	0	0
6/20	12	8	6	0	0	5	0
6/25	0	2	0	0	0	4	0
6/27	11	4	2	0	1	7	0
6/29	4	2	2	1	0	2	0
7/3	19	5	5	3	1	5	2
7/6	1	2	1	0	0	2	0
7/9	2	1	1	0	0	1	0
7/11	6	5	5	0	0	9	0
7/13	2	5	4	0	0	3	0
7/17	5	2	2	0	1	2	0
7/27	2	1	1	0	0	1	0
7/31	2	1	1	0	0	1	0
8/5	6	5	3	1	1	5	0
8/7	21	7	6	0	3	7	0
8/10	6	2	1	0	1	1	0
8/16	1	1	1	0	0	1	0
8/21	7	2	3	0	0	0	0
8/22	10	5	4	0	0	5	1
8/25	8	2	2	0	0	2	0
8/31	3	1	2	1	0	2	0
9/4	3	2	9	2	0	0	0
9/5	11	3	13	0	2	0	1
9/7	2	1	1	0	0	1	0
9/13	0	1	2	0	0	0	0
9/19	5	3	2	0	0	1	0
9/21	0	0	0	0	0	0	0
9/25	2	1	0	0	1	0	0
10/1	0	0	0	0	0	0	0
Total	191	84	109	11	12	81	5

Table 19B General Values, Beliefs, and Attitudes of Users Groups in Percentages

Questions: General values, beliefs, and attitudes	Total (n)	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
1. We should manage natural places so that humans benefit.	105	6%	9%	14%	30%	42%
2. I don't like to see signs of human use in natural settings.	106	3%	9%	10%	30%	47%
3. Protecting environmental natural resources is important, even if it means restricting use.	103	3%	5%	17%	28%	47%
4. I always wash my hands after using a public restroom to prevent disease.	106	1%	1%	8%	20%	70%
5. I feel a strong personal obligation to protect the water quality in Kenai Lake.	106	0%	1%	9%	17%	73%
6. We are all responsible for the human waste impacts we have in natural areas.	106	2%	0%	6%	14%	78%
7. I take care of my waste when in the backcountry.	106	2%	1%	3%	15%	79%
8. Even buried human waste can increase bacterial pollution in lakes and streams.	106	1%	4%	17%	31%	47%
9. Human waste, like animal waste, breaks down and does no harm to natural ecosystems.	106	19%	26%	23%	24%	8%
10. I realize that other people use this beach and don't want to see or smell human waste.	104	1%	0%	2%	12%	85%
11. Human waste in backcountry areas is <u>not</u> a health problem.	106	35%	35%	13%	10%	6%
12. I am willing to use pack-it-out methods.	105	3%	6%	22%	22%	48%
13. I rarely see much human waste/toilet paper in the natural areas I visit.	105	24%	33%	10%	19%	14%

Table 20B User Acceptability of Human Waste Conditions and Behaviors shown in Percent

Questions: Acceptability of human waste conditions / behaviors in this area	Total (n)	Strongly Acceptable	Slightly Acceptable	Neutral	Slightly Unacceptable	Strongly Unacceptable
1. Unburied waste / toilet paper in the trees behind the beach.	106	1%	7%	6%	6%	81%
2. Bury waste / toilet paper in personal "cat holes" in the trees behind the beach.	104	8%	33%	21%	22%	16%
3. Pack out waste / toilet paper in a bag system (Restop or CleanWaste bags).	105	59%	18%	15%	5%	3%
4. Broken glass and litter scattered throughout the beach.	105	2%	1%	4%	4%	90%
5. Visible waste / toilet paper at more than ten sites in the trees behind this beach.	106	3%	0%	7%	11%	79%
6. People should walk at least 200 feet into the trees before digging a "cat hole".	106	42%	30%	17%	8%	3%

Table 21B User Support for Management Actions to Address Human Waste Impacts

Questions: Support for management actions to address human waste impacts in this area	Total (n)	Strongly Support	Slightly Support	Neutral	Slightly Oppose	Strongly Oppose
1. Agencies should develop a vault toilet in this area.	101	46	24	20	6	5
2. Agencies should clean-up human waste more frequently from places like this	101	24	30	34	8	5
3. Agencies should require people to pack-out human waste from place like this.	101	37	30	23	6	5
4. Agencies should improve human waste education to encourage responsible disposal.	101	71	21	6	1	1