

Preparing for a Day Hike at Grand Canyon: What Information Is Useful?

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Abstract—Most parks are interested in conveying hiking safety and minimum impact techniques to visitors. At Grand Canyon National Park, providing such information to more than 2000 day use hikers per day has been a longstanding concern whose effort has increased in intensity over the past decade. This study evaluates aspects of the “Heat kills, hike smart” campaign that targeted day use hikers during summer, 1997. The park’s information campaign was able to reach most day use hikers, and affected the behavior of the majority of them. Among various media sources and locations used by the park to convey safety information to day use hikers, the two most effective sources were the Park Guide distributed upon entering the park (in newspaper-style) with its banner headline claiming “Heat kills, hike smart” and posters at each trailhead with the same “heat kills” information. Day use hikers of remote backcountry trails reported the highest probability for problematic behavior (e.g., no water, became sick or injured). Minimum impact information concerning the proper disposal of toilet paper and food scraps was widely unknown.

Day use hiking in parks, wilderness and related areas is an emerging issue that warrants research and management attention. Although monitoring of day use is often sketchy and difficult to interpret, it is apparent that day use accounts for the majority of visitation in many, perhaps most, park and related areas. For example, the National Park Service reported a total of nearly 279 million visits in 1995. However, only 14 million visits were reported as overnight stays (National Park Service, 1996).

Even in the backcountry and wilderness portions of parks, which are commonly associated with overnight use, day use

hiking accounts for a large percentage of total use, even a majority of use, in many areas. This is true across all four of the major federal land management agencies. Day visits, for example, are the most common length of stay in many small to medium size U.S. Forest Service wilderness areas (Roggenbuck and Lucas, 1987). Even in some large U.S. Forest Service wilderness areas, such as the Spanish Peaks and Selway-Bitterroot Wilderness Areas, day use accounts for about half of all visitors (Lucas, 1980). A recent study of backcountry areas in the national park system estimates that day use comprises 64% of total use (Marion and others, 1993; Manning and others, 1996). Earlier research estimated that day use represents 44% and 83% of all use on Bureau of Land Management and U.S. Fish and Wildlife Service wilderness areas, respectively (Washburne and Cole, 1983). In short, day use hiking is one of the most popular activities in backcountry areas and often receives inadequate managerial and research-based attention (Roggenbuck and others, 1994).

Day Use Hiking at Grand Canyon —

Compared to studies of other recreational uses at Grand Canyon, research on day use hikers has been scarce. There are general impressions that day use hiking is increasing throughout the Park, including many of the its backcountry trails. In recent years, Grand Canyon’s search and rescue (SAR) efforts and expenditures have increased dramatically, with most of these efforts involving day users who were not prepared for their hike. The trails and trailheads of the Park have become more accessible in recent years, and a proposed visitor orientation center along with a comprehensive transportation shuttle system, has the potential to control the times and places where visitors travel. Thus, Park staff is in need of basic information about day hikers. This paper presents results about the information visitors used to prepare for a safe day hike, and represents a portion of a larger project directed at understanding other aspects of day use hiking at Grand Canyon National Park (Manning and others, 1999).

Hiking at Grand Canyon has some unusual characteristics. At many other parks, minimum impact hiking is a more serious concern than hiking preparedness and safety. However due to extreme summer heat in the bottom of the canyon, lack of shade and water on most trails, and the steep

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uphill climb, which comes after the seemingly easy descent, many day hikers at Grand Canyon have had serious problems completing their hike. For most of their summer season, Park rangers find themselves focused on the safety of day hikers. During summer of 1997, the Park implemented a widespread information campaign to alert visitors to the dangers of day hiking. The "heat kills, hike smart" campaign alerted hikers to the importance of drinking water and eating food to replace electrolytes, avoiding the heat of the day, and knowing one's limits about hiking beyond one's ability. This study evaluated the campaign and, in doing so, provided insight to the frequency of problematic behavior among day hikers, information sources accessed for hiking preparation, what was learned from these sources and its effects on hiking behavior.

There are three kinds of trails at Grand Canyon which served to stratify the design and results of this study. The *rim trails* are well-developed, attract more than 1000 visitors on an average summer day and follow the rim of Grand Canyon, passing through most overlooks and other "front country" attraction sites. On the south rim, most of these trails are paved, and some provide access to water and restrooms. The *corridor trails* are also well-developed (though not paved) and wind their way down to the bottom of the canyon. The Bright Angel Trail is the most heavily used of the corridor trails, receiving more than 1200 day use hikers on an average summer day, and hikers have access to water, restrooms, Park rangers and other amenities such as campgrounds and interpretive signs. The *threshold trails* are poorly maintained trails going into the canyon, with comparatively remote trailhead access and lacking water and other amenities; during the course of this study, threshold trails received less than 20 day use hikers per day.

Methods

To survey a representative sample of day use hikers of the rim, corridor and threshold trails at Grand Canyon, an on-site interview, coupled with a mail-back questionnaire, was selected as the study technique. The on-site interview contained a series of questions related to hiking preparedness and safety. The follow-up mail-back questionnaire contained general items regarding descriptive information about respondents' day hike, their attitudes about minimum impact recreation and their knowledge of day hiking etiquette and rules, among several other topics not related to preparation for a day hike. A sampling plan was designed that stationed an interviewer at selected trails during the summer and fall of 1997. Of the day hikers selected to participate (in a systematic random fashion), more than 95% complied with the interview. There were 361 completed interviews with rim day hikers, 379 interviews with corridor day hikers and 118 interviews with threshold day hikers. All respondents were given a mail-back questionnaire to complete. Respondents with a U.S. residence were sent a postcard reminder and a second questionnaire if the original questionnaire had not been returned within three weeks. The response rate for the mail-back questionnaire was 48%.

Results

Hiking Preparedness

A primary objective of the Park's 1997 hiking preparedness information campaign was to change visitor behavior to promote safety. Questions were developed to evaluate the effectiveness of the hiking preparedness campaign and were organized in the following sequence: (1) Respondent identified the information used to prepare for a safe hike, (2) reported the location of information source, (3) specified what was learned from the information source, and (4) noted what behavior was changed due to learned information.

What Information Sources Were Used?—The first question asked respondents to identify the primary sources of information that helped them prepare for a safe day hike; respondents could indicate all sources used. In general, summer hikers were more likely to use information sources than fall hikers. Across both summer and fall, the most common information source used was the Park Guide, which is a newspaper-style brochure distributed to visitors as they enter the Park. During the summer months, the headlines on the Park Guide read "Heat Kills, Hike Smart" and depict a schematic pictorial of a tired hiker sweating from an apparently exhaustive hike. The traditional front page of the Park Guide features a scenic vista of Grand Canyon and portrays the beauty of the Park. In short, during 1997, the Park staff put hiking safety information up-front where all visitors would be exposed to it.

Over 90% of summer respondents on the corridor, threshold and rim trails reported using the Park Guide; at least 40% of fall respondents on the corridor, threshold and rim trails reported using it. The poster on hiking safety was the second most popular source of information. These posters were visible at many places throughout the Park and surrounding motels and restaurants. During the summer, 91% of corridor and 82% of threshold respondents reported using the poster to prepare for a safe day hike; during the fall, 49% of corridor and 34% of threshold respondents reported using the poster.

The message about "heat kills," which was contained in many brochures and post-its, also was popular during the summer months, with more than one-third of respondents on the corridor, threshold and rim trails reporting that they used this message as an information source. Respondents who hiked on the corridor trails in the summer were almost twice as likely to report using a Park ranger as an information source, compared to hikers of other trails and/or season; 33% of summer corridor respondents reported that a Park ranger was a helpful source of information, compared to 18% of fall corridor respondents; summer threshold respondents were the least likely to use a Park ranger, with 14% reporting use of one.

During the summer of 1997, stop signs were placed on trails at strategic locations, warning hikers not to proceed beyond the sign. These stop signs contained explicit information on problems with heat exhaustion and other maladies. Hikers of the summer corridor trails were most likely

to report the stop signs as an information source, with 36% of such respondents reporting use of stop signs on trails; next highest were the summer threshold respondents, with 18% reporting use of the signs.

There were three sources of information reported that were not directly administered by the National Park Service (NPS). Use of “guidebook, magazine or newspaper” was reported by a plurality of day hikers; about 45% of fall threshold and summer rim respondents indicated use of such sources. “Friends or relatives” were reported as a useful source and ranged from 12% of fall corridor to 3% of summer corridor respondents reporting use of friends or relatives. “Employees from store or lodge” were the least likely to be reported as a source of information, with less than 1% of summer respondents on the corridor, threshold and rim trails reporting use of this source.

Where Did They Find Information Sources?—Along with the sources of information that they used, respondents were asked the location of information sources for each source reported. For the Park Guide, the majority of respondents reported receiving it at the entrance station. For example, 70% of summer corridor respondents reported the NPS entrance station as the source of the Park Guide. The Visitor Center as a source was a distant second place; 17% of summer corridor respondents reported the Visitor Center as the source of the Park Guide.

About two-thirds of respondents on corridor and threshold trails reported the trailhead as the location of the poster on hiking safety. Rim trail respondents were split between two locations: the trailhead and visitor center. Thirty-seven percent of summer rim respondents reported the trailhead as the poster’s location, and 31% reported the Visitor Center.

Messages about “heat kills” were reported in a variety of locations, with the three most popular being the Visitor Center, hotel or restaurant and the trailhead. Other locations where respondents reported seeing this message include miscellaneous places inside and outside the Park, at the Backcountry Office and at the NPS entrance station.

Learning about hiking preparedness from Park rangers took place in a variety of locations. Fifty-six percent of summer corridor respondents reported the location as being on the trail. Of fall corridor and threshold respondents, 89% and 55%, respectively, reported the Visitor Center as the location. Other places where Park rangers were reported as an information source include Backcountry Office, hotel and restaurant, miscellaneous places inside the Park and guided programs.

What Was Learned From Information Sources?—Respondents were asked to identify the information they learned from each source. As a general finding, there were several things learned from each information source, there was not any information exclusively related to one source, and almost everyone learned something. The most common information learned to prepare for a safe day hike included: need adequate drinking water, need food and electrolyte replacement, need to know one’s limits and be prepared to rest, avoid the heat of midday, appropriate equipment, and trail conditions and lengths.

Summer threshold respondents were more likely to learn about the need for adequate drinking water and food/

electrolyte replacement from the overnight backcountry use brochure (called the Trip Planner) compared to other sources; they also were likely to learn about avoiding the heat of midday from stop signs on trails, compared to other sources. Both summer and fall threshold respondents were most likely to learn about altitude problems and weather/lightning from the Trip Planner, compared to other sources. Across most trails and seasons, respondents were likely to learn about trail conditions, lengths and the precaution about hiking to river and back in one day from a Park ranger, with the Park Guide being the second likely source for this information.

Was Behavior Affected by Information?—The information learned was effective in changing the *timing of the hike* for at least one-third of threshold and corridor respondents. Specifically, 35% of summer and 43% of fall threshold respondents changed the timing of their hike due to information they learned; and 55% of summer and 47% of fall corridor respondents reported changing the timing of their hike. The most typical change was to start the hike earlier or later to avoid the midday heat.

The information learned also was effective in changing the *length of the hike* for about two-thirds of summer threshold and corridor respondents. Specifically, 68% of summer threshold and 64% of summer corridor respondents changed the length of their hike due to information learned; and 44% of fall threshold and 56% of fall corridor respondents changed the length of their hike. The most typical change was to shorten the distance hiked.

The information learned also was effective in changing what respondents *brought with them on the hike*, as more than one-half of summer respondents reported such. The change in behavior most often reported was bringing more water. Specifically, about 63% of summer threshold and 69% of summer corridor respondents brought more water due to information they learned; and 33% of fall threshold and 48% of fall corridor respondents brought more water. The second most reported change in behavior was bringing food and electrolyte replacement on the hike. About 42% of summer threshold and 34% of summer corridor respondents brought food due to information they learned.

Problematic Behavior

The mail-back questionnaire contained a set of questions that asked about the amount of time spent day hiking. Respondents were asked “Did you spend more time (or less time) than you expected on your day hike?” About one-half of respondents who hiked the corridor in the summer reported hiking about what they expected; 37% reported less time than expected, and 12% reported more time than expected. Respondents who hiked the rim or primitive trails in the summer were the two groups with the largest proportion *reporting more time compared to less time* spent day hiking; compare 28% to 14% for respondents who hiked the rim trails in the summer, and 22% to 8% for respondents who hiked the primitive trails. The amount of time reported as more or less than expected averaged more than an hour across both seasons and all locations. Summer respondents were most likely to report trail conditions as the reason that

the length of their hike was different than expected, whereas fall respondents were most likely to report that fatigue, injury or physical fitness conditions affected their hiking time.

Another item on the mail-back questionnaire asked respondents if anyone in their group became sick, injured or lost on their day hike. The summer threshold and rim respondents were the most likely to report sickness, injury and/or being lost: 20% of summer threshold respondents reported that someone in their group became sick on their day hike, 10% of summer rim respondents reported this, as did 6% of respondents who hiked the corridor in the summer. In this sense, the *problem trails, where day hikers more often became sick, injured or lost in the summer, are the threshold and rim trails.*

As part of the on-site questionnaire, respondents also were asked “How much water (and/or fluids) did you and the rest of your group carry today?” On average, summer corridor respondents carried the most water per person at 4.9 quarts/person. On average, summer threshold respondents carried about half the water of their corridor counterparts; 2.6 quarts/person was the average water carried. As a consequence, summer corridor hikers were the least likely to report that they did not bring enough water. In fact, *respondents who hiked the threshold trails in the summer were more than twice as likely to report that they did not bring enough water, compare 5% and 2%, respectively.*

Respondents also were asked about the supplies and equipment that “you or someone in your group brought with you on your hike today.” Of respondents who hiked the corridor trails in the summer, 97% of the groups interviewed brought water with them, 27% brought electrolyte replacement, 79% brought food, 10% brought a map, and 25% brought toilet paper. Of respondents who hiked the threshold trails in the summer, 88% of the groups interviewed brought water, 19% brought electrolyte replacement, 68% brought food, 39% brought a map, and 37% brought toilet paper. Of respondents who hiked the rim trails in the summer, 69% of the groups interviewed brought water, 17% brought electrolyte replacement, 46% brought food, 68% brought a map, and 17% brought toilet paper. Threshold respondents were the most likely to bring along toilet paper and a trail map, and they appeared to be aware of trail amenities and had given thought to supplies they need on their day hike; yet *it is a concern that threshold respondents were less likely to bring water than their corridor counterparts.*

Two items on the mail-back questionnaire asked respondents about their level of physical fitness. The first question asked “How physically fit (for hiking) do you consider yourself to be?” Most respondents indicated being at least “somewhat fit.” The group with the lowest average self-reported fitness were the respondents who hiked the rim trails in the summer; respondents who hiked the primitive trails, averaged the highest fitness response. The second question asked respondents to report “how frequently do you get at least 20 minutes of physical exercise?” Again respondents who hiked the rim trails in the summer reported the least amount of exercise and respondents who hiked the primitive trails reported the most.

As part of the on-site interview, respondents also were asked the following open-ended question: “Is there anything else the National Park Service could have done to make you more prepared for a safe day hike at Grand Canyon?” About

two-thirds of respondents answered this question. The most common response, across both seasons and all locations, indicated that the NPS could provide more information about Grand Canyon trails, with several asking for a trail rating system. (Although the Park Guide contained a trail rating system, it was not highlighted on the front page and may have been missed by some visitors.)

Attitudes and Knowledge About Minimum Impact Hiking

The mail-back questionnaire contained a set of items that assessed day hiker attitudes about minimum impact issues. Their responses indicate that day hikers are clearly concerned about minimizing their individual impact on Grand Canyon and would like further information about low-impact hiking. In addition, respondents were asked for their agreement level on “if an accident happens to me on a Grand Canyon day hike, park rangers will be able to help me back to safety.” Respondents who hiked the primitive trails were most likely to agree with this statement, and respondents who hiked the corridor trails in the summer were most likely to disagree.

Respondents to the mail-back questionnaire indicated their knowledge of appropriate low-impact behavior by completing a set of true/false items. There were four items that respondents had difficulty with—they concerned toilet paper disposal, recommended quantity of water, temperature differential between rim and river, and food scrap disposal. Each is discussed in turn. Respondents were most likely to lack knowledge about disposing of toilet paper. Their lack of knowledge was indicated in response to the following statement “When disposing of human wastes in places where toilets are not available, park rangers recommend that visitors bury their toilet paper.” The statement is false; toilet paper, like other things, should be packed out. Corridor respondents were most likely to think this statement was true; 61% of summer corridor and 71% of fall corridor believed it was true. Half of the respondents of the threshold believed this statement was true, and half believed it was false.

In response to the statement “when hiking the Grand Canyon in warm weather, park rangers recommend that visitors take one quart of water per day,” 26% of respondents who hiked the corridor trails in the summer believed the incorrect response of “true,” as did 17% of respondents who hiked the threshold trails in the summer. Respondents who hiked the rim trails in the summer were the least knowledgeable, with 32% who indicated this statement was true. Park rangers recommend that visitors take four quarts of water per day per person.

In response to the statement “the air temperature at the bottom of Grand Canyon is usually about 5 degrees warmer than the air temperature at the rim,” 38% of respondents who hiked the corridor trails in the summer indicated the incorrect response of “true,” as did 31% of respondents who hiked the threshold trails in the summer. Forty percent of summer rim respondents indicated “true.” The temperature differential between the rim and the river is usually a minimum of 15 degrees.

In response to the item “food scraps should be scattered widely to avoid concentrating wild animals,” corridor and

rim hikers were the least knowledgeable. Of respondents who hiked the corridor trails in the summer, 14% reported the incorrect answer of “true,” and 15% of summer rim respondents answered “true.” Like toilet paper, food scraps should be packed out.

Conclusion

The information campaign at Grand Canyon affected the behavior of the majority of day use hikers during 1997. Among various media sources and locations used in the Park’s information campaign, clearly the two most effective sources and locations were the *Park Guide distributed upon entering the Park, with its banner headline* claiming “Heat Kills, Hike Smart,” and the *posters at each trailhead* with the same “Heat Kills” information. The segment of day use hikers with the *highest likelihood* of **not** bringing adequate water and of becoming sick, injured or lost are those on threshold trails. However, even though day use hikers on corridor trails have the *lowest likelihood* of problematic behavior, the absolute number of problematic day use hikers is still highest on corridor trails. In other words, 20% of 20 threshold hikers per day (that is, four 4 people) is less than 2% of 1,200 corridor hikers per day (24 people). Thus, even though threshold hikers are more at-risk for problematic behavior, management efforts should maintain their concentration on corridor trails. To change the managerial setting of threshold trails would effectively change the context of the threshold day hiking experience and, in doing so, could make less distinction between the threshold and

corridor trails as day hiking opportunities. Along with continuation of information aimed at hiking safety, minimum impact information on specific topics needs more visibility, particularly with corridor day hikers (who were the least knowledgeable segment).

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