







# PARK VISITOR AS KNOWN HAZARD

DESIGNING FOR IMPERFECT HUMANS  
TO COMBAT “HUMAN ERROR”



*a master's thesis*  
**BY EMILY ABELL**  
**CARNEGIE MELLON**  
**UNIVERSITY 2014**



# THANKS

to Andrew for all his support with this project, and always

to the Grand Canyon PSAR team for hosting me at the Canyon and providing so much valuable insight

to my classmates for participating in my research and sharing their own ideas and insights

and to Stacie for all her guidance and kindness throughout the process.



# TABLE OF CONTENTS

Introduction	1
<b>PART I</b>	<b>11</b>
<b>EXPLORATORY PHASE: UNDERSTANDING THE AS-IS</b>	
1. Who are the key players?	5
2. Why do visitor safety incidents occur so frequently?	21
3. What are the current visitor safety and information efforts?	61
4. How does visitor behavior really affect safety?	107
<b>PART II</b>	<b>123</b>
<b>GENERATIVE AND USER TESTING PHASE: ENVISIONING THE TO-BE</b>	
5. Creating and testing an initial concept	131
6. Design considerations	145
7. Final concepts	161
Epilogue	184
Notes	185
References	187







# INTRODUCTION

## THE PROBLEM

Each year people make about a billion recreational visits to US National and State Parks: over 280 million recreational visits to the US National Parks and about 750 million visits to US State Parks (National Association of State Park Directors, 2013).

For the overwhelming majority of these visitors a trip to the park ends without injury or death. Yet, despite numerous preventative measures, people do continue to require rescue, and even die, while visiting parks.

What is remarkable about these incidents is not so much their numbers; the vast majority of park visits occur without incident. It is that when incidents do occur, the surrounding circumstances can make the victims' actions seem not only ill-advised, but downright foolish.

One recent high-profile instance of this occurred in 2011 in Yosemite National Park. A group of visitors climbed over a guardrail alongside the Merced River just 25 feet above the edge of 317-foot Vernal Falls (see image on opposite page). They stood in the cold, rushing water to play around and take photos. Bystanders urged them to return to safety. Suddenly, one person lost their footing, and fell into the raging river. A second person tried to rescue the first victim, and fell in too. Then a third person went into the water as they tried to help the second. All three perished after washing over the falls (Mather, 2011).

A Chicago Tribune feature article after the Vernal Falls deaths declared in its headline: "How do you explain park deaths? You can't. Expert in Yosemite, Grand Canyon fatalities at a loss to explain 'stupid' behavior."

In the piece, Michael Ghiglieri, an experienced outdoor guide and co-author of books detailing the history of deaths in Grand Canyon and Yosemite National Parks, was asked about the recent Vernal Falls incident and similar events where people seem to have thrown commonsense to the wind and found themselves in deep trouble. His expert opinion? "It's so stupid it's beyond belief."

Mr. Ghiglieri's opinion echoes the collective reaction the public and press often has to these high-profile events: "How could people be so foolish? Clearly, they have only themselves to blame."

And park staff tends to agree that "human error" is a major contributing factor to injuries and deaths in the parks. In fact, it was cited by 100% of park staff surveyed from 30 National Parks as being a medium or high factor contributing to visitor accidents, making it the highest rated factor in the survey. Human error was followed by behavioral factors (such as playing, running), age, level of visitor preparedness, and level of visitor experience in activity (Tuler & Golding, 2002).



But is this type of behavior really beyond belief? Should we still be surprised, with all we know about human beings, that people sometimes do things that don't seem to make a lot of sense at first glance?

As stated in the recommendations of the NPS' Report: "Park staff responding to the inventory questionnaire often identified visitor characteristics as significant risk conditions. Staff rarely rated communication or infrastructural hazards as important conditions contributing to visitor accidents. Some factors perceived as problems related to visitor judgments and behaviors, however, could also be understood as failure in communicating relevant information successful to visitors" (Tuler & Golding, 2002, p. iii).

In other words, is attempting to reduce human error not a key responsibility of safety communications, rather than something that falls outside of it?

The Report goes on to state that there is a real gap between the staff perception of stumbling visitors, and the perception visitors have of themselves: "...park staff members believe that visitor preparedness and level of experience in a given activity are important contributors to visitor accidents. Most visitors, however, considered themselves experienced in their chosen activity and many indicated that they were prepared with appropriate shoes, clothing, water, etc" (NPS, A Comprehensive Study of Visitor Safety in the National Park System: Final Report, 69).

This difference could be a result of self-reporting bias, but it could be something much more troubling. Do visitors think that they are heeding warnings, being prepared for activities, when in fact they are not? And are park staff members dismissing this mismatch as human error, rather than recognizing a critical communications failure?

Whether accidents are due to miscommunications, or "human-error," if it is clear that visitors will err, should Parks not design with this in mind?

My project set out to investigate what can go wrong when fallible human beings are exposed to unforgiving natural environments and how design can help them avoid the common pitfalls inherent in these situations.

## **A FOCUSED CASE STUDY: DAY HIKING AT GRAND CANYON NATIONAL PARK SOUTH RIM**

Given the constraints of a one-person study over a single school-year, it was necessary to narrow the focus of my study on a specific subset of larger park visitor space. Focusing on the Grand Canyon National Park (GCNP) was a natural choice. The challenging environment combined with extremely high visitation — much of it from non-hikers — creates the perfect recipe for problems. Grand Canyon National Park leads the National Park Service in SAR incidents per year (Heggie & Amundson, 2009). With a very straight forward trail system, the vast majority of these cases fall under the primary mission of rescue, rather than search (Anonymous PSAR team member, personal communication, June 2, 2013).

In a review of NPS documents, Heggie & Amundson (2009) report that hiking was the most common activity requiring SARs, accounting for nearly



half of all SARs. He also summarizes that weekends are the busiest time for SARs, and that males 20-29 make up the greatest proportion of SAR recipients. This background information is helpful in establishing the reason why this is a problem worth tackling, and what sort of gains one might expect from reducing SARs.

Grand Canyon is also the leading innovator within the park system in trying to prevent rescues and deaths. It was the first unit in the system to establish a Preventative Search and Rescue (PSAR) program following a horrendous summer season in 2006 during which six visitors lost their lives in heat-related incidents. Today, GCNP's PSAR team is a nationwide example for other parks looking to better inform visitors in an attempt to curb incidents. The PSAR unit is led by a year-round director, the only such full-time position allotted to PSAR in the country (Anonymous PSAR team member, personal communication, June 2, 2013).

Working in a space where efforts are already in place to attempt to improve visitor communication and persuasion efforts ensured that my study would be building on the existing forefront of the field.

Within the Grand Canyon space I choose to focus specifically on the activity of backcountry day hiking. This includes anyone hiking below the Rim of the Canyon and not intending to stay out in the wilderness overnight. Day hikers make up the majority of rescue cases at Grand Canyon National Park (Ghiglieri & Myers, 2001). Day hiking is not an inherently high-risk activity and its danger can largely be mitigated if visitors know how to proceed safely.

Based on the findings Ghiglieri & Myers (2001) as well as the insights of the PSAR team, I choose to focus even more specifically on heat-related incidents, which are thought to be the cause of the majority of highly preventable rescues and deaths.

By focusing on the greatest need for change within the park system, and on the park where there exists a structure capable of putting into place the changes I suggest, I hope to maximize the potential impact of this study to help reduce incidents and perhaps even save lives.

## **A PROBLEM WORTH SOLVING**

Between 1992 and 2007, the National Park Service conducted 65,439 Search and Rescue (SAR) missions, involving 78,488 people and 2,659 fatalities. Without NPS search and rescue, it is estimated that fatalities would be 20% higher (Heggie & Amundson, 2009). Statistics on the number of injuries and illnesses that do not require professional rescue are not yet systematically compiled but based on anecdotal reports. Thus, many more people are likely affected than is represented in the data.

The financial cost of these incidents adds up as well. NPS SAR operations from 1992 to 2007 were calculated to cost over fifty-eight million dollars. And that is only the cost for the SAR agencies; it doesn't include medical evacuation or healthcare required after rescue. In a study of Search and Rescues within the Park system, researcher Travis Heggie found that without NPS assistance 1 out of 5 SARs could have been a fatality (Heggie &



Amundson, 2009). Even though it's not a Grand Canyon specific number, it's quite a harrowing statistic.

Of course these incidents affect more than just those individuals directly involved. Having an injury or illness in your group certainly decreases the enjoyment of the visit for everyone. In the case of serious and fatal incidents, friends, family, and even strangers who witness the event are all deeply affected by a tragedy.

In *Search and Rescue in Alaska's National Parks* (2008), Travis Heggie makes an evidence-based case that there is little published about the circumstances that lead to SAR incidents, and that with wilderness recreation growing in popularity, it is increasingly important to better understand what is going wrong so that these incidents can be prevented. Heggie also points out that even in this most demanding environment, people have to worry about more than just "dread" inducing external factors like avalanches: pre-existing medical conditions, the lack of experience, and a lack of ability was found to be a major contributor to SAR incidents in 20% of the cases examined.

He also cites a previous study (Leggat, Ross and Goldsmith, 2005) as finding that pre-departure education, such as additional information on the Park website, can help prevent incidents related to altitude sickness for mountaineers. It is unclear, though, if this principle carries over to Grand Canyon day hikers, since they may be less inclined to plan and research than those embarking on an major expedition trip.

## PROJECT PROCESS OVERVIEW

I viewed this project as a chance to use design methods to understand this particular problem of hiking safety in Parks better, and develop some possible ways to solve it. Through the process of tackling this specific problem I hoped to also better understand how design can be helpful both in unraveling a complex problem, and in solving problems through coaxing behavior change.

I began my project with an exploratory phase wherein I sought to understand the as-is state of visitor safety in parks and the nature of the problems specific to Grand Canyon day hiking. In this phase of my study I looked to answer four questions:

*What is the nature of the underlying safety problems?*

By reviewing key studies of accident information, including the NPS Comprehensive Report on Visitor Safety, as well as looking at narratives of the accident events themselves, I gained an understanding of what these incidents looks like and what people believe to be some of the contributing factors. I also gained insight into the people and places that make up this problem space by getting to know more about park visitors and staff, and their perspectives on the problem.

*What are the current safety communications approaches in parks?*

To understand the parks' current approaches to safety communications, I reviewed existing artifacts designed to encourage visitor safety such as on-site informational displays, signage, and Preventative Search and Rescue programs. I also conducted contextual inquiry with park staff



involved in developing and executing safety communications, and shadowed PSAR staff while they conducted their daily rounds.

Beyond the confines of the case study, I also completed a literature review to look at other current approaches to risk perception and risk communications in the outdoors.

#### What works and where is there room for improvement?

In addition to collecting and noting the current communications approaches, I wanted to evaluate, as much as possible, what was working well, and what showed room for improvement. While on-site I conducted extensive observations, watching and listening as visitors interacted with informational signage at the Visitor's Center and trailheads. I also spoke with Rangers at the Visitor's Center and interacted with the PSAR Rangers out on the trail.

Since I did not have a survey permit I could not survey visitors in a systemic way, but I did speak informally to visitors to see what they were taking away from the information provided and how they chose their hikes. Explaining the purpose of my study often elicited additional reactions and feedback on the topic as well.

#### What design and communications approaches could help?

Throughout this phase I also conducted a review of literature to put these issues into larger design, communications strategies, behavioral sciences, and risk-management contexts. In order to tackle such a pervasive and complex issue, I wanted to look at how park safety communications function as part of the larger systems, both of the visitor experience, and the park system.

The exploration and synthesis process did not occur in separate phases, but rather occurred in rounds. As I amassed a sizable amount of information I would pause and synthesize what I had found. These findings would then redirect or pivot the direction of my study. I would then seek out new information and understanding to further clarify my understanding.

Once I felt I had a handle on both the problem itself and the context in which it lies, I moved on to the generative phase. I relied on generative methods not only to create concepts for possible design interventions, but also to clarify and better understand the information I had collected thus far in the process. By creating diagrams and models, and communicating my findings in writing and verbally, I was able to better clarify my understanding of the problem, and the potential for intervention, helping to turn data into information and information into insights.

The latter third of my study focused on more specific generative work as I created prototypes for specific intervention concepts. The act of creating these prototypes helped spark new questions, as well as provided an opportunity to see if the proposed strategies could function as a springboard to creating realistic, meaningful interventions.

While limited in scope, the evaluative phase provided an opportunity to see which strategies and tactics might resonate most with visitors, and which had the best potential to succeed in moving visitors towards better decision making and safer outcomes.







PART I

# EXPLORATORY PHASE: UNDERSTANDING THE AS-IS





## EXPLORATORY PHASE INTRODUCTION

Before I could design interventions to try to improve visitor safety, I first needed to know more about the as-is situation. Unfortunately, no summary exists outlining the underlying circumstances of hiker rescues, nor does a document that explains the efforts to prevent these incidents from occurring. Therefore, the first stage of my study focused on piecing together a portrait of the as-is state from scratch using a variety of resources.

During this exploratory period I sought to learn as much about the problem and its context as possible and gain empathy for the stakeholders involved.

In Part I of this document I describe my exploratory findings: the nature of the incidents themselves, the context in which they exist, and the current efforts to intervene and prevent them.

I include within this section discoveries that could assist decision makers and researchers in the future regardless of the extent to which they contributed to my final proposed design interventions.



# EXPLORATORY PHASE RESEARCH METHODS

I combined past studies, reports of visitor incidents, and my own field research to develop an understanding of the current state of visitor safety in parks, and efforts to improve it.

## PRIMARY RESEARCH: FIELD RESEARCH

Unfortunately, due to a lengthy approval process, I was not able to gain clearance to conduct a formal survey of visitors at the Grand Canyon. Thankfully, the Preventative Search and Rescue team that oversees visitor safety efforts was kind enough to provide me with permission to conduct more informal research on-site at the Canyon in June of 2013.

## IMMERSION IN THE VISITOR EXPERIENCE

I was immersed in the Grand Canyon visitor experience, camping, traveling, and hiking in the park for eight days and nights. While I certainly had more background on visitor safety issues than most visitors, I had only visited the park once before for a short two-day visit, five years prior. Therefore I feel I was able to take in much of the experience as a general visitor would.

Much like my prospective users, I did not gather hiking information or directions in advance. I also felt some of the same time and transit constraints, yearning to fit as much as possible into my visit.

The heat was an unavoidably immersive experience. While I had gained some acclimatization during previous stops on my way to the Canyon, my body was not accustomed to the heat or the elevation when I first arrived. This experience helped me to gain empathy for visitors, and to allow me to contrast my visitor perspective with that of the Rangers with whom I spent time.

## OBSERVATION OF VISITORS' INTERACTIONS WITH INFORMATION POINTS

During my time at the park I was nearly constantly observing and noting what was happening around me. I conducted structured observation of things such as visitor use of signage and gear levels, tallying and categorizing what I witnessed. I also engaged in unstructured observation, watching and listening to visitors without a specific intent in mind, and then noting what they read, did, and said. The open air, desert environment made it possible to listen-in on visitors' conversations with each other, at times from quite a distance.

I focused my observations —beyond my time with Rangers —on watching and listening to visitors interact with safety and information interventions. I spent the most time observing visitors using the Visitor Center Information Plaza and interacting (or bypassing) trailhead signage. The high temperatures and lack of shade constrained my positioning, forcing me to keep a bit more distance than I otherwise would have preferred in order to obtain a shaded vantage point. I also conducted observations at the Visitor Center help desk, hotels and shuttles, on trail, and at viewpoints.



*The author's "office" at the Canyon: Mather Campground.*



*Observing unnoticed at the South Kaibab Trailhead.*



## PSAR RANGER CONTEXTUAL INQUIRY

I spent three days working directly with the Preventative Search and Rescue (PSAR) team at the park. I conducted five hours of directed storytelling and traditional interviews with a PSAR manager and team members. I was updated on their current efforts, their understanding of the problem, and their views on the underlying causes of visitor mistakes. I was also able to view visitor information artifacts currently in use, as well as campaigns that had been used in the past.

I was able to interview the PSAR team in their offices, and by spending the day there I also gained a glimpse into their working situation, how they interact with one another, and how they view their place within the NPS organizational structure.



*Shadowing a PSAR Patrol member while he speaks with visitors on the trail. Faces blurred to maintain anonymity.*

## SHADOWING PSAR RANGER PATROLS

I was also able to shadow and conduct guided observation with PSAR Rangers as they conducted patrols on the trails. I went out on the Bright Angel Trail with one Ranger, and the South Kaibab Trail with another Ranger on a second day. Each day I hiked alongside the Ranger to their “work” station, approximately 1.5 miles into the Canyon. Both days were weekdays with lower visitation than weekends, but they still provided plenty of opportunities to witness Ranger-visitor interactions. I was able to hear visitors discuss their run-in with the Ranger after the fact from as much as a half-mile away because of the way sound carries inside the canyon. This provided a privileged glimpse into how visitor really felt and reacted to the encounter.

There were also some downtime opportunities to probe Rangers a bit more to gain their perspectives on visitor safety issues, helping me to develop further an understanding of how Rangers approach visitor safety and how it may color their intervention choices and interactions with visitors.

I was offered the opportunity to fully immerse in the PSAR team, donning a uniform and radio for the patrol, as I would if I were a PSAR volunteer-in-training. However, I declined this opportunity. While I felt it would have increased my empathy and understanding for the PSAR patrol, I feared it would increase my profile, making it harder for me to observe and note visitor interactions. I also feared that it might affect my objectivity, hurting my ability to bring fresh eyes to the situation.

## INFORMAL INTERVIEWS AND OBSERVATION OF OTHER ON-SITE PERSONNEL

I also spoke with other Rangers and park staff. At the Visitor Center, there is an information desk staffed primarily by Interpretative Rangers and NPS Volunteers. I observed their interactions with visitors and spoke briefly with them about the kinds of questions visitors often ask and how they try to direct visitors’ behavior. I witnessed the challenging work conditions that Rangers work under in the busy and noisy environment, with visitors queuing up in line throughout much of the day waiting to speak with someone.



I also looked for insight from other on-site personnel who interact with visitors — what do they think of visitors and why they err? I was seeking both to gain information from these interviews as well as to gain an idea of the perspective of these influential but easily overlooked members of the park community.

I spoke with employees from park hotels including those who staff the front desks, the bell-hops, and the tour desk staffers about the sorts of questions visitors ask and how much information and preparation visitors seem to have prior to their park visit. I also talked to a salesperson in the outdoor gear section of the General Store about what sorts of gear people are looking to buy, how well they understand what their hike demands, and what he thought caused visitors so much trouble. I was also able to speak with a commercial hiking guide and observe interactions between paid guides and visitors on several occasions.

I was initially aiming to gather as much information about visitors and their preparations and information sources as possible, and saw these secondary actors primarily as information channels. Upon revealing the nature of my project, however, people were very forthcoming in sharing their perspectives on the situation, which was helpful in gaining a wider perspective to help offset the influence of the PSAR Ranger perspective I learned so much about.

## ONE QUESTION SURVEYS

In preparation for my visit I had created a free form one sentence fill-in-the-blank survey for visitors. I was curious to see if the open nature of the survey would elicit any unexpected viewpoints or insights.

<p>I found hiking at the Grand Canyon to be more _____ than I expected.</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>I'm (am) / (am not) <small>circle one</small> worried about my safety at the Grand Canyon because it's _____.</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>I'm (am) / (am not) worried about my safety at the Grand Canyon because I'm _____.</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>During my Grand Canyon visit I was surprised by _____.</p> <p style="text-align: right;"><small>(over, please)</small></p>
<p>5 words I'd use to describe Grand Canyon National Park are:</p> <p>_____</p> <p>_____</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>5 words I'd use to describe my Grand Canyon experience are:</p> <p>_____</p> <p>_____</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>If they wanted to make the Grand Canyon less safe, they could _____.</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>I would like safety information at the Grand Canyon to be more _____ and less _____.</p> <p style="text-align: right;"><small>(over, please)</small></p>
<p>I would like safety information at the Grand Canyon to be _____.</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p>I found Grand Canyon National Park to be more _____ than I expected.</p> <p style="text-align: right;"><small>(over, please)</small></p>	<p><input type="checkbox"/> This is my first visit to Grand Canyon NP <input type="checkbox"/> I've been here before. Visit # _____</p> <p>I'm a: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Age (optional) _____ must be over 18 to participate</p> <p><b>This GCNP visit has included:</b></p> <p><input type="checkbox"/> Views &amp; photos <input type="checkbox"/> Shopping</p> <p><input type="checkbox"/> Some walking around <input type="checkbox"/> Ranger talks</p> <p><input type="checkbox"/> Hiking below the rim more than 1 mile <input type="checkbox"/> Ranger guided hike</p> <p><input type="checkbox"/> Overnight hiking <input type="checkbox"/> Private guided tour or bus tour</p> <p><input type="checkbox"/> other: _____</p> <p><b>When I visit parks, I usually do:</b></p> <p><input type="checkbox"/> Views &amp; photos <input type="checkbox"/> other: _____</p> <p><input type="checkbox"/> Hiking / hiking easier trails <input type="checkbox"/> I don't visit parks often</p> <p><input type="checkbox"/> Moderate day hiking (2-4 hours) <input type="checkbox"/> Backpacking</p> <p><small>Student survey. Questions, comments? Contact Emily Abert, OSA Graduate Student abert@ornl.edu / 617-268-4387</small></p>	

*A variety of questions were featured on the one question survey prompts with basic demographic information request (bottom right) on the back of each.*





*Safety (and other) information is everywhere in the Park. This campground information sign includes a safety warning alongside a weather forecast, event listings and more.*

## SURVEY OF INFORMATION ARTIFACTS

I noted and recorded information available throughout the park, particularly hiking-specific information and safety information. I also collected portable information pieces and photographed display items at locations throughout the South Rim areas:

- Five Major Trailhead areas and the Rim
- Visitor Center Information Plaza
- Visitor Center interior, interactive kiosk and movie
- Dispersed bulletin boards - non-trail areas (such as near the General Store)
- In-store displays including contextual (i.e. information about dehydration alongside water bottles for sale)
- Hotel lobby, cafeteria and gift store information

I also was able to collect and photograph information from other parks to use for comparison and inspiration. Materials were collected from Mesa Verde NP, Carlsbad Caverns NP, Guadalupe NP, Lathrop SP (CO), Pedernales SP (TX), Village Creek SP (AR), Hot Springs NP, Smoky Mountains NP, with permission of each Park.

For a discussion of these items, see Chapter Three.



# SECONDARY RESEARCH: SCHOLARLY SOURCES

## LEARNING ABOUT VISITORS AND INCIDENTS

Much of the basic visitor statistics I used to ground my project came from *The Backcountry Day Hikers at Grand Canyon National Park* study by the Park Planning and Policy Lab at University of Illinois Urbana-Champaign (Backlund, Stewart, Schwartz, & McDonald, 2006).

It provides the most comprehensive collection of basic information on day hikers' backgrounds and hiking plans. It provides a baseline of quantitative data and comprehensive findings that helped me paint a more complete picture of hiker activities at Grand Canyon. It also provides a breakdown of where and when people hike, a glimpse into levels of preparedness, and hikers' expectation of services. It also makes specific recommendations of how the park could improve the day hiker experience, for both safety and visitor enjoyment gains.

While the survey data is incredibly helpful, it does come with the caveat of being self-reported rather than independently collected information, and dates back to 2004. According to PSAR findings, many hikers are unprepared, yet hikers in the study report being prepared. This contrast is a key finding, however it is impossible to glean whether hikers truly think of themselves as well-prepared, whether this is simply a reporting bias, or most likely some combination of the two. Since no independent verification of equipment carried, route taken, etc., was paired with the survey, one cannot compare visitors' belief of preparedness to "actual" preparedness, leaving uncertain how much of this gap is explained by self-reporting bias, and how much visitors and experts vary on what being *properly prepared* looks like.

I relied on *Over the Edge: Death in the Grand Canyon* (Ghiglieri & Myers, 2001) to collect the basic information about visitor safety incidents. It combines a catalog of all fatal incidents that have occurred at the Grand Canyon with detailed narratives of select events. The book, a best-seller, is result of extensive research efforts by the book's authors to collect records on all deaths occurring at the Canyon. Previously, even these most extreme instances were not collected in a comprehensive manner.

*The PSAR Impact Report* (2013), provided to me in draft form, attempts to outline both the problem of hikers needing assistance at Grand Canyon National Park, and demonstrates the success of the Preventive Search and Rescue (PSAR) program. It provides two example stories of hiker interactions with PSAR and statistics on the PSAR efforts. It also shows the results of their internal study, which found PSAR reducing the number of SARs and heat-related SARs required at Grand Canyon. This report provides an excellent baseline of the PSAR team's efforts and depicts the attitude and approach they take towards hikers. They feel that the unique challenges of the Grand Canyon are difficult for hikers to anticipate and grasp and do feel responsible to attempt to convince people that there is danger present. This report was augmented by additional institutional knowledge that was shared with me in discussions with the PSAR team.



I also browsed news articles that discuss visitor incidents and some online forum and blog entries written by visitors themselves to paint a picture of the visitor perspective.

## REVIEWING PAST STUDIES OF VISITOR SAFETY IN PARKS

Two existing studies focused on risk management in parks, focusing largely on the management responsibilities, and on the issue of attribution:

The *PhD dissertation of Stephen Espiner* (2001) looks at risk management in natural tourist attractions, focusing on the Fox and Franz Josef Glaciers in Westland National Park, New Zealand. His interest in his topic was sparked in a similar manner to mine: “at several nature-based tourist attractions in New Zealand, visitors were potentially exposed to a variety of natural hazards. At these sites, some visitors appeared to disregard warning signs and behave in ways that threatened their safety. These observations led to the formation of questions concerning the extent to which visitors were aware of the hazards and risk in such environments, the degree of willingness to accept responsibility for known risk...”

He also wondered what role the nation of origin of visitors had, and how the perception and actions of park managers affected the hazard awareness of visitors.

The *doctoral dissertation of Laura Rickard* (2012) focuses on risk management in National Parks, looking specifically at attributing risk. Her work provides an understanding of how park staff, and visitors perceive responsibility for park safety — in which cases is the visitor more responsible, or the park, and why might this be? A related article by Rickard, which was co-authored by NPS Risk Management Director Dr. Sara Newman (2011), discusses the extent to which the park and visitors are responsible for safety within Parks, and found support for the idea of a balance of responsibilities. In setting the scene of park safety, the article speaks of unintentional injury as dependent upon individual decision-making, organizational management and regulation (park rules), infrastructural conditions, and environmental conditions.

Focusing more broadly on risk in the US National Park system, the *Comprehensive Study of Visitor Safety in the National Parks* (Tuler & Golding, 2002) was an invaluable resource. It provides a great window into the NPS risk landscape and helped me understand the current safety approach and grasp the organizational attitudes and structure in which my project lies. The report takes a thorough look at visitor safety in parks, including an inventory and analysis of risks present, a survey of visitor perceptions of those risks, and recommendations for addressing these risks. This report establishes a baseline for the assessment of risk in parks as well as the NPS’s approach in addressing them.

The researchers who managed the Comprehensive Study also published an extensive literature review document. *A Review of the Literature for Comprehensive Study of Visitor Safety in the National Parks* contains a wealth of helpful information that guided my project early on. The report provides an overview of literature on risk communications, risk perception, and other relevant fields. The study was also extremely helpful in pointing out that very little



existing research has been conclusive or sufficient to provide practical and specific guidance to park managers, according to the study's authors.

Additional studies on dealing with risk in travel and in outdoor adventure were also reviewed; see the References section for the complete list of articles.

## **EXAMINING HOW PEOPLE MAKE DECISIONS**

In addition to looking at park-specific scholarly sources, I also delved into a wide variety of readings from judgment and decision making scholars.

Perhaps the most comprehensive resource on this topic is *Thinking Fast and Slow* (Kahneman, 2011). It provides an excellent overview of a huge swath of research around Prospect Theory and emotional decision making. More about these sources is discussed in the Part II section of this document.







UNDERSTANDING THE AS-IS

# CHAPTER ONE

## WHO ARE THE KEY PLAYERS?





## CHAPTER ONE INTRODUCTION

As I began my study, in order to understand the as-is situation, and gain empathy with the people involved, I needed to learn a lot about them.

First and foremost I needed to learn more about park visitors. Which visitors to the park hike? What motivates them? What types of visitors get into trouble the most? I needed to answer these questions, and more, to thoroughly understand the visitors whose behavior I aimed to modify.

While I intended visitors to be the main audience for my interventions, I also needed to understand the Rangers' role in supporting visitor safety. Who are they, and how do they approach the problems? What are their needs and perspectives? How might their personal characteristics affect how they address visitor safety issues?

Since I intended my interventions to exist within the National Park System, I also looked to understand the larger NPS organizational approach to visitor safety and how this institutional actor might contribute to or detract from safety efforts within the Park.

Lastly, I considered which other individuals at the park may influence visitors and their safety and hiking decisions.



# UNDERSTANDING VISITORS

## WHO ARE GRAND CANYON HIKING VISITORS?

It is of course a challenge to classify the many visitors to the Grand Canyon. With over 4 million visitors a year (“Grand Canyon National Park Park Profile,” 2013) from all over the world there is no “typical visitor.”

While my study focuses on day hikers — people not staying overnight at the lodge at the base of the Canyon, nor camping en route — many possible interventions could affect these groups as well since they share many of the trails with day hikers.

Since any intervention at the Canyon will reach a wide variety of visitors, it was important to capture as much as I could about the different people who would be engaging with them.



*Visitors heading up the Bright Angel Trail.*

## VISITORS COME FROM ALL OVER THE US AND THE WORLD

While some students and staff from Arizona universities make regular trips to the Canyon, other visitors come from across the country and even the world to visit the Park. The Backlund study (2006) found that 25% of day hikers hailed from countries outside the US.

People from different regions of the world can approach the management of the outdoors very differently depending on what they are used to. In some areas very little guidance is provided, while in others people are used to a very tightly managed park atmosphere. Cultural background can also influence how visitors approach risk and decision-making on the trails.

The influence of cultural background isn't limited only to country of origin, though. Elite trail runners, Crossfitters, and members of the military, for example, each have their own cultural norms and attitudes that may affect how they approach their Canyon hike.

## VISITORS VARY IN FITNESS LEVEL AND HIKING EXPERIENCE

As a heavily visited park, with front-country amenities like lodging and restaurants available a short stroll from some trails, the Canyon draws interest from visitors with a wide variety of fitness levels and hiking experience. Many people, whether they planned on hiking or not, are tempted by the allure of the trails to take a hike on their visit. Hiking is seen as one of the main activities at the Park and feels like a “must-do” for many visitors.

For some visitors, a Grand Canyon hike may be the first hike of their lives. I was even told by Rangers that more than one visitor has been spotted on the trails in high heels. Other visitors have countless hikes under their belts, and even expert hikers are drawn to the beauty of the Canyon.

Hiking experience, and specifically experience in backcountry-wilderness style trails with hazards not found in suburban parks, varies greatly amongst visitors. To add another layer of complexity, the desert environment is very different from the alpine (mountain) environment that many visitors have more experience with.



---

## A NOTE ON THE TERM “VISITOR”

The term “hiker” may seem like an easy term to refer to the audience for visitors safety interventions. However, early in the project I had a visceral reaction to my advisor referring to the actors in question this way because many visitors hiking at the canyon are not in fact “hikers.” This hike may be the first time they venture into wilderness on foot, and possibly the last.

Hikers to me implied some level of situational awareness and other skills that GCNP visitors may lack. So instead, in my writing I refer to them simply as “visitors” but it can be assumed that they are visiting participating in the activity of hiking.

When it comes to the unique environment of the Grand Canyon, most visitors have very limited experience: Backlund et al (2006) found that 47% of day hikers were on their first visit to GCNP, and 57% were on their first GCNP hike. The lack of previous exposure to the Grand Canyon, its environment, and its trails is critical, because PSAR Rangers and visitors themselves say that they view the Canyon and plan for a hike differently after their initial experience. With many visitors only making the trip once, however, many visitors don’t get a chance to learn from their initial mistakes.

## VISITORS HAVE DIFFERENT MOTIVATIONS AND GOALS FOR HIKING IN THE CANYON

Some visitors come to the Canyon for a sightseeing day trip, intending to take a few pictures and get back on the road, while others arrive with the intent to complete an epic hike during their visit.

When prompted to list priorities for their visit as part of the Backlund study, visitors named “relaxing” and “experiencing solitude” alongside “testing their skills.” Many visitors also wanted to spend time with family and appreciate nature (Backlund et al., 2006, p. 97). It’s important to recognize that visitors have different goals, hopes, and dreams built into their Canyon trip. For many it is a once in a lifetime trip, bringing additional importance and sometimes pressure to visitors’ plans. These ambitions and emotions can influence how they make choices and could contribute to why people make seemingly foolish decisions.

Visitors also come to the Canyon with different desired levels of risk. Some are only looking to explore and enjoy the scenery, while others want to push their limits. Simon Priest’s New Model of Risk Taking (1993) provides a helpful categorization of levels of risk which is discussed in greater detail in Chapter Four.

Recognizing these different goals may help the park better address the varying needs of visitors. It could also help visitors become more aware of their interests, i.e. a family with small children should not be seeking peak adventure and may need to be reminded of their limitations.

## MOST DAY HIKING VISITORS ARE PART OF A GROUP

Backlund (2004) found that only 14% of Grand Canyon day hikers were hiking alone. About 50% had a single partner, while the remaining 38% were part of a larger group.

Since most Canyon visitors are part of a group, group dynamics is certainly a consideration when designing for this audience. There are scenarios where intergroup dynamics could be contributing to making the problems worse or better. There are also practical considerations: how well can interventions be utilized by groups?

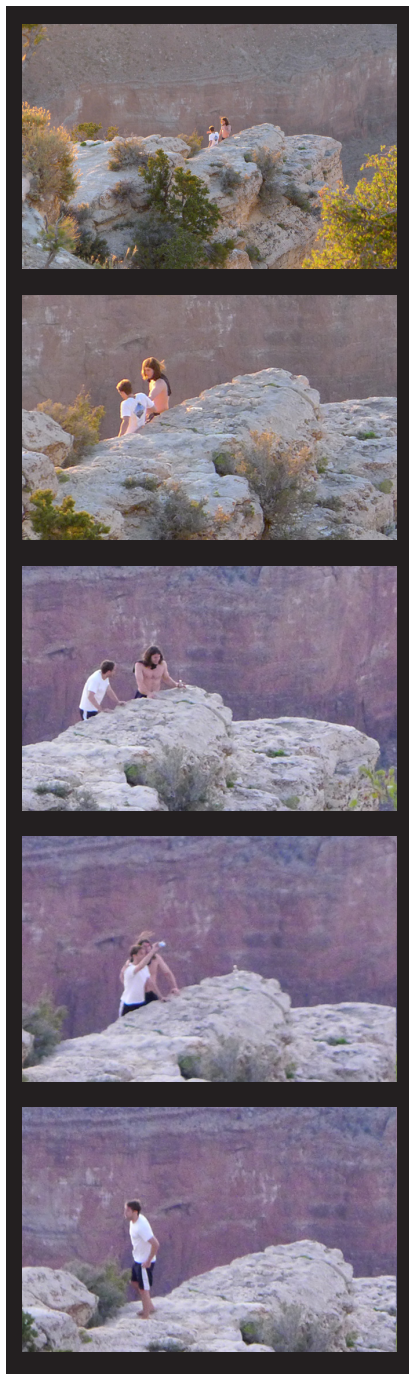
Of course, not all groups are cut from the same cloth. A married couple, a family of four, and a large group of young guys on a road trip create very different intergroup dynamics and present different persuasion challenges.



## MANY VISITORS ARE LAST-MINUTE PLANNERS

While some visitors do research in advance of their trip (and are anecdotally believed to get into less trouble), many visitors arrive at the Canyon with few or no plans for how they will spend their time. Visitors rely on the Park Newspaper, trailhead signage, Rangers and word of mouth to find out more information on hikes (Backlund et al, 2006 & personal observations, Grand Canyon National Park, June 2-8, 2013).





Typical YOLO visitor behavior, witnessed at Yavapi Point.

## HOW DO VISITORS INTERACT WITH THE “RULES”?

One of the assumptions underlying the commonly held “they only have themselves to blame” view is that visitors are acting in an obviously risky manner. Proponents of this view assume that visitors are taking risks they should not, and so injuries or even death are obvious, foreseeable consequences of these actions. But is this really true?

It’s a common belief to assume that what goes around comes around - if something bad happens to someone they probably had a hand in it. But people tend to think this way even if there isn’t any evidence that this is the case. This tendency has been identified as a cognitive bias and termed the *Just World Fallacy* (Lerner, & Miller, 1978).

In order to design for visitors, I needed to understand if visitors were really acting negligently, or whether this was just assumption based on the *Just World Fallacy* and other biases on the part of commentators.

To help understand this I looked at how visitors approach the rules and/or guidelines in place. Are they really non-compliant zealots? Does everyone fit that profile, or is there more going on?

What I found was that, while there are likely a few risk-seekers taking their game to the Canyon, many of the people whose stories make their way into Over the Edge and who needed counseling from PSAR Rangers did not fit this profile. Plenty of people who are putting themselves at risk are not in a classic bravado, risk-seeking mentality.

I broke down visitors into five categories to better understand how they approach safety information, and the “rules” implied thereby.

The conventional wisdom is that a lot of people at risk fall into the category I call *YOLO* — those who know and blatantly blow off the rules and take on risk intentionally. This is named after the popular hashtag of the same name, which stands for You Only Live Once, and can be used by young people to justify extreme or foolish acts.

These *YOLO* individuals, who are mostly males, get a lot of attention with their open disregard for safety. On my first night at the Canyon I witnessed two young men climbing out on a series of precipices, well beyond the safe confines of a busy viewpoint at sunset (see sidebar for photos of the incident). As they climbed and hopped from one precarious perch to another, pushing further out onto a mesa slice jutting out into the Canyon, they openly discussed the danger of their actions with one another (intended as a private conversation but easily overheard at 200 yards away in the open desert). One mentioned to the other the odd feeling of realizing that they were much more likely to die today than on any other day. Given the purpose of my visit, and my familiarity with how these incidents can end, it was quite a way to jump-start the trip. Luckily, after several “selfies” the young men made it back to the Rim safely.

I found, though, that while the *YOLO* visitors create a highly visible presence, they do not necessarily make up the majority of visitors who get into trouble. Even visitors who observers may expect to fall into this category are rarely as oblivious as one might assume. When I asked a Visitor Center Ranger if



# VISITORS AND THE RULES



these types of visitors even ask about their overly ambitious plans, giving the Rangers a chance to persuade them, she said that, "...oh yes, those guys come in all the time, sharing their plans hoping to get validation that they really will be OK" (personal communication, Grand Canyon National Park, June 8, 2013). So even in the case of ambitious go-getters, a seed of doubt is there; the extreme pure *YOLO* seems to be, luckily, a rare bird.

The *Clueless* visitor is much more innocent-seeming than the *YOLO* visitor, but their misjudgments are no less dangerous. While shadowing the PSAR patrols I observed many visitors on the trails who did not know the distance of their planned destination, or who didn't have a planned destination. Some had hardly any trail information at all. When one visitor told the Ranger he planned to turn around at *Cedar Ridge*, the Ranger pointed out that he had already passed it!

This visitor type recalls the key sentiment expressed in *Mountains and Handrails* (Rickard, 2012): if visitors do not even know they are taking on risk, how can they accept responsibility for it? To help *Clueless* visitors, they need to either be given additional information so that they have a clue, or the interventions need to assume very little information responsibility for visitors.



While the tag *Deluded* may seem harsh, it's actually something that human beings often are. People are deceived by their senses, their ego, and a multitude of other forces that keep them from seeing things as they really are. These visitors don't intend to be non-compliant and they do recognize the rules; they just have a false sense of compliance. *Deluded* visitors will tell others that they are doing what they should be doing, while experts will report otherwise.

Given that the Backcountry Day Hikers study (Backlund et al., 2006) found that 94% of visitors felt they were prepared for their hike, while PSAR stats peg unpreparedness levels at around 40% ("PSAR Impact Report," 2013), there seems to be a large portion of visitors who fall into this category. More anecdotally, the PSAR Impact Report (2013) mentions the frequent event of visitors who "know" where they are going, but then give wrong names or say they have enough food, but in fact are vastly under-prepared for their hike (p. 5). Understanding that these visitors don't realize they are doing the wrong thing is critical in designing interventions to change their behavior. Reprimanding visitors who don't think they've done anything wrong seems likely to be ineffective. Instead, these visitors seem to need more information and guidance to get on the right track.

Some visitors understand the rules and recommendations, and yet unlike the *Deluded* they do realize that they are non-compliant. For instance they step behind a sign warning visitors to stay back. However, unlike *YOLO*'s, these visitors don't feel like rule-breakers. Instead, these visitors, which I've labeled *Exceptional*, feel that the rules don't apply to them. They may think that rules are more like optional guidelines that don't apply to them, or that their skills, experience, or just general life know-how means that they don't need to follow the rules. They may also dismiss rules and warnings as mere legal disclaimers that no one really expects visitors to follow. "Those rules are for someone else," is how one PSAR patrol volunteer reported the reaction *Exceptional* visitors give when they are confronted about their non-compliance (personal communication, June 2, 2013).

This instinct, that one's behavior is correct and justified, with only others being the real rule-breakers, is one that almost all people have. It's easy to create a convenient excuse why one needn't be deterred by rules, signs and authority. The reasons that someone feels they are the exception are much more salient and available to them than the reasons they squarely fall under the rules. Like the *Deluded* visitors, these visitors seem unlikely to be affected by calls to authority or more rules.

Unlike the previous visitor types, *Good Faith* visitors follow the rules and know most or all of them. They may be more rule-following by nature or culture and may be more likely to do some advanced research on hiking in the park or to have made a previous visit. *Good Faith* visitors can be bothered by the errant behavior of other visitors, often complaining to Rangers, or even other visitors, about visitors who don't look up to the challenge or step beyond the handrails. These visitors don't require much mediation but could perhaps be utilized to help change the behavior of others.

*Good Faith* visitors seem to be the exception, and may constitute visitors only of a specific personality type who are predisposed to following the rules and doing their research. It may be unrealistic to expect to move visitors who are currently *Deluded*, *Clueless* or *Exceptional* into the model-citizen camp.



## LESSONS LEARNED FROM LOOKING AT VISITORS' INTERACTION WITH THE "RULES"

Creating these categories was a helpful way to explore the dimensions of the visitor audience, but in reality visitors do not necessarily fall into just one category. They may be clueless about the difficulty of their hike, but deluded with regards to their own fitness level.

The biggest discovery I took from this categorization was the realization that the pop-diagnosis on visitors attitudes' was likely off — many people who get into trouble don't fit the young invincible stereotype. It's good news that the *YOLO* crowds make up a highly visible but not necessarily dominant portion of the visitors at risk, though. This means that when trying to change behavior, the Park is not necessarily dealing with a hostile audience that needs to be "won over." Given this, solving blatant non-compliance will not be the main focus of my intervention.

Even the young guys, who may downplay concerns, are rarely completely oblivious. Much more prominent are people lacking information, misinterpreting information, and being let down by their perceptions. Therefore my interventions should try to address these issues.



## SOME VISITORS MAY BE AT GREATER RISK



*Parents visiting with children must be especially careful at the Canyon.*

### CHILDREN, A SPECIAL CHALLENGE

“Kids and young adults seem to run at full function in the heat, sweating appropriately and seemingly going strong, but abruptly, when dehydration kicks in, they crash quickly and often unexpectedly. And die” (Ghiglieri & Myers, 2001, p. 71). A few years ago I witnessed this anomaly first hand on a mountain bike tour where I filled in as a guide for the day. Two boys, age ten and twelve, had been at the front of the riding pack all day, despite an oppressive heat that made the majority of the group head back to camp early. The boys rolled into camp at the end of the ride seemingly unphased by the heat that had wrecked almost everyone else. An hour later, after resting in his tent for a bit, the older boy began vomiting repeatedly. He looked absolutely awful, and was dangerously dehydrated. Luckily, we had access to cooling methods and a vehicle to drive him to the hospital if needed—a safety net kids in the Canyon simply don’t have.

Rangers get extremely worried and tend to be more aggressive in their interventions when it comes to groups with young kids. They feel that both because of their increased vulnerability, and because children have no choice in the matter, their parents should not be permitted to endanger them with their own risky decisions.

### YOUNG MALES (AND OLDER ONES TOO) HAVE MORE PROBLEMS

Males are disproportionately represented in the Grand Canyon fatality totals. Males make up 60% of day hikers (Backlund et al., 2006), yet out of forty-eight environmental deaths since 1975, just five were women (Ghiglieri & Myers, 2001, p. 92-97). Anecdotal evidence from the PSAR team suggests that males are also at higher risk of requiring preventive action or rescue (personal communication, June 3, 2013).

The stereotypical portrait of a Grand Canyon accident victim is the young male, and some of the Canyon’s recent education campaigns have very obviously targeted this demographic (see Chapter Three for details). However, in conversations with current PSAR management, there is less confidence in this approach of focusing almost exclusively on young males. While young males are at elevated risk, one PSAR expert questioned whether people with medical issues who overdo it aren’t equally as problematic. With extremely limited records of victim statistics, a complete picture is not yet known (Anonymous PSAR team member, personal communication, June 3, 2013).

Environmental death statistics reveal that being a male age 40 or older puts a visitor at increased risk of a heat-related cardiac event, but there is also a cluster of deaths in young men 25 and under (Ghiglieri & Myers, 2001, p. 72). This is consistent with NPS-wide SAR statistics, which shows that males 20-29 make up the greatest proportion of SAR recipients (Heggie & Amundson, 2009).

In general, females have been found to assess situations as more risky and therefore take a more conservative approach than males (Bouyer, Bagdasarian, Chaabanne, Mullet, 2001), and having a female in the group seems to reduce risk (“PSAR Impact Report”). PSAR Rangers believe that females



are easier to scare and persuade, and one female Ranger lamented that males can sometimes be less likely to take direction from a female Ranger (Personal communication, June 4, 2013). She told me she combats this by telling these males, “you don’t want to have to have me come rescue you, do you? Because I’m the only one out here today.”

During my field research I witnessed several instances in which females actively pushed for safety choices. In one instance, a 20-something female chastised her partner at the bike rental station when the attendant was explaining the rules, saying, “He’s explaining, and you’re not listening!” I also overheard a couple considering trail options. The male felt that *Indian Garden* was doable for them, while the female, having read the information on the display about the gear required, rebuffed him, saying, “we aren’t equipped — too dangerous.” I also heard a female take charge of a group of several visitors in their late 30s, declaring for the group “OK, let’s head back up.”

With an understanding that females seem to stay safe more often than males, is there some opportunity to leverage this? Can females be empowered or encouraged to help PSAR within or outside of their hiking group? Is there a bright spot to the way females approach their hike differently than males that could be helpful to explore?

## SOLO VISITORS ARE AT INCREASED RISK

Visitors hiking alone make up a small portion of Canyon hikers overall (14% according to Backlund et al., 2006), but they make up a disproportionate percentage of inner canyon fall fatalities.

It is speculated that this occurs because solo hikers lack someone to provide a second opinion and a voice of reason. As one Canyon author proffered, “A solo hiker often has a fool for a companion” (Ghiglieri & Myers, 2001, citing author George Steck, p. 50).

However, this explanation is only conjecture. It is worth considering that some of those who become hurt while alone may not have started their trip solo but instead become separated from their group when a problem arose. The fact that they are alone at the time of a fall may be a sign of trouble rather than a cause of it.

Backlund et al. (2006) found that more advanced, less traveled trails such as the Grandview Trail are popular with solo hikers, suggesting that at least some solo visitors are advanced hikers. While traveling alone in the backcountry always increases a hiker’s risk since they have no one to send for help or render aid in the case of an accident or illness, experienced Canyon hikers may be able to travel reasonably safely despite being alone.

Given the small percentage of visitors that hike solo, and these additional caveats, I chose not to focus special attention on discouraging or informing solo hikers.

## VISITORS TAKING LONGER HIKE BRING ON ADDITIONAL RISK

Shorter day hikes are the most popular options at the Grand Canyon, with roughly half of day hikers turning around at or before the *1.5 Mile Resthouse* on Bright Angel, and nearly 60% turning around at *Cedar Ridge* (1.5 miles down) or earlier (Backlund et al., 2006).



While visitors certainly can get into trouble in the early sections of the trail, PSAR patrols focus primarily on the visitors going beyond these points, as they believe these visitors are at the greatest risk. The dangers of hiking at the Canyon are compounded by the length of a visitor's hike for three reasons: the farther a visitor ventures down into the Canyon, the farther he must come back up to return; the longer the visitor is exposed to the elements, the more wear and tear his body receives; and the more he hikes, the farther he is from rescue personnel.



*Tour bus guests may be a bother, but there is no evidence yet to show they require rescue more frequently than other visitors.*

## COMMERCIAL TOUR PARTICIPANTS ARE NOT A MAJOR CONTRIBUTOR TO INCIDENTS

Large tour groups hitting the trails can be very noticeable to other visitors. While they seem to bystanders like a particularly inexperienced bunch and often draw the ire of other visitors, they do not make up a significant portion of those out on the trail. According to Backcountry Day Hikers study, (Backlund et al., 2006, p. 21) just 6.4% of visitors reporting being part of an organized group.

Since records do not yet exist to identify which rescues are from tour groups, there is no evidence to suggest that tour group members are at greater risk than other visitors. With no increased risk, and a small percentage of visitors overall, I chose not to focus my interventions on tour group members.

## RANGERS WORRY MOST ABOUT SOME VISITOR TYPES

Beyond the basic visitor risk characteristics discussed above, there is a more nuanced profile of problem visitors that PSAR Rangers have tacitly constructed.

When shadowing the PSAR Rangers out on the trails, I saw that some visitors were of special concern to Rangers. Rangers approached interactions with these visitors differently, were relentless in trying to persuade them to change their minds, and were genuinely worried for them if they continued on their hike undeterred.

Combining these observations with the stories of environmental death cases from *Over the Edge* (Ghiglieri & Myers, 2001), I began to outline some problem-visitor types. From this information I developed five problematic visitor profiles. While there is limited hard data to back up the anecdotal evidence that has collected over time to support these profiles, this institutional knowledge is still helpful to help inform my designs.

These are not traditional design personas since they come not from interviews with the visitors themselves, but rather from observations of behavior and suspected motivations. The purpose of developing these profiles was not necessarily to gain empathy with these visitor types, but rather to understand the different segments that exist within the larger visitor pool. This understanding I hoped would then inform how interventions could uniquely affect different visitor types. They were also a way to distill some of the personality-based information discerned from research into a somewhat simplified representation.



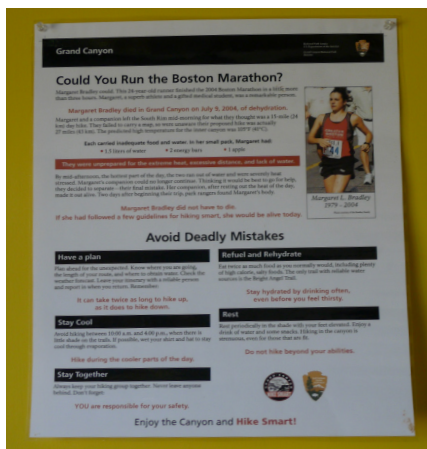
The first group is easily caricatured, and yet, as I witnessed with my own eyes, very much present at the Canyon. *Brocationers* are a group of young (or young at heart) males traveling together. Their visit to the Canyon may be just one stop on an extended road trip, or as a short day or overnight detour from a Las Vegas vacation. *Brocationers* can be especially vulnerable to accidents because risk-taking and adventure are critical parts of their trip, and because they may have recently been drinking or using drugs, making their bodies less tolerant to the punishing Canyon heat. They may be reluctant to heed the advice of Rangers because they are *out-of-society* (see Chapter Four) and because they don't want to be wrong in front of the group. Group dynamics can discourage a concerned member from speaking out due to not wanted to be seen as the wimp or a "party-pooper."

A PSAR Ranger once ran into a visitor about a mile down Bright Angel Trail, who requested directions to the shuttle stop. When the Ranger explained there were no shuttles on the trail, they'd need to go back up to the Rim to catch the shuttle, the visitor was indignant. "But it says right here," the visitor angrily gestured at the Park Newspaper, "Bright. Angel." It took quite a few back and fourths, but the Ranger eventually won out. The trail and shuttle stop are both named "Bright Angel" and the crease of the paper obscured the distinction between the two. This story does a great job of showing the kind of problems the *Clueless* visitor can get into because of their ignorance. They don't just lack information about their hike, they also lack the basic contextual understanding of the environment that would help clue them in in the absence of more concrete guidance. The *Clueless* group overlaps with the type *Clueless* described earlier in this section with regards to how visitor approach rules. Here the *Clueless* group are visitors who just show up at the Canyon and hit the trail, with no idea. They can be non-hiking families, road trippers or international groups, and even active couple or groups.

The case of the Boy Scout group doomed by a recklessly misguided leader (Ghiglieri & Myers, 2001, p. 81-87) presents a classic case of the *Bringing Down the Ship* type. The group leader took the boys on an experts-only, unmaintained trail, in summer. He was the only one who knew the route and relied on a distant memory rather than a map to guide them and instructed the boys to bring a woefully insufficient amount of water, among other negligence.

Unfortunately this was not as unique of an event as one would hope. I witnessed multiple instances while on the trail with the PSAR team of groups led by an aggressive, overconfident leaders who were leading their group astray. Sometimes a Dad with his family, sometimes it was simply a self-appointed leader within a group of friends. In the most damning cases, when members of the group speak up about their concerns, this type of visitor can be undeterred. They may manipulate or bully the group into unsafe choices. These visitors tend to be dismissive if not combative towards the PSAR patrol's attempt to steer them in the right direction. Yet, as one PSAR Ranger remarked, "those types are the worst babies when they end up having to call for help" (Personal communication, June 3, 2013). This tough talk / weak actions pattern also held true in the Boy Scout case, where the group leader and other adults were the first to give up, laying down on the trail while the boys were left to continue on in search of water and help on their own (Ghiglieri & Myers, 2001, p. 81-87).





The story of Margaret Bradley, a fit athlete who was killed by heat the Canyon, is featured on a warning sign at the Backcountry Information Center. More detailed coverage of this messaging campaign is included in Chapter Three.

Someone might think having the latest running or hiking gear will get them a pass from the PSAR Rangers, but they'd be wrong. In fact, the *Fit n' Fancy* type can also trigger a red flag. While this crowd is in better shape than the average visitor, their fitness can make them more likely to disregard the challenges inherent to the Canyon. Used to being the fittest person they know, and with limited experience with failure, this type can fall particularly prey to optimism biases. Many trail runners now hope to make “good time” in the Canyon and often skip breaks and carry extremely few supplies in order to facilitate moving quickly. This worries Rangers, because such runners have no contingency plans. Rangers also worry that while some elite athletes really are up to the task, many other “wannabes” can quickly get into trouble trying to emulate them. Margaret Bradley, a trail runner who died after attempting an extremely arduous run with inadequate supplies and whose story is featured on safety signage at the Canyon, is the poster girl for the *Fit n' Fancy* type.

The *Been There, Done That* crowd has experience, sometimes extensive, in the outdoors, in places like the Alps or big mountains in Asia. They've got the gear, but they may lack desert-specific skills and trail-specific knowledge, and can be over-reliant on gear or GPS. At the Grand Canyon, rescue is much more difficult and conditions more challenging than where these visitors are used to hiking, while information may be less available. The deceptively high altitude of the Canyon, the heat and the down-first hiking patterns are likely all new to them, but they fail to consider these additional challenges.

*Been There, Done That* visitors can be reluctant to talk with Rangers, or listen to them, because they feel like this intervention is intended for less experienced hikers. A *Been There, Done That* can, but will not always, turn into a *Bringing Down the Ship* type in a group situation.



# UNDERSTANDING PSAR

## WHAT IS PREVENTATIVE SEARCH AND RESCUE (PSAR), AND HOW DID IT COME ABOUT?

Search and Rescue (SAR) teams traditionally focus on the technical aspects of locating and extracting people who become lost, injured, or killed in wilderness situations.

To avoid people needing to call on SAR, the Park Service has relied largely on signs and rules to tell visitors how to be safe. Over time, some SAR members became frustrated by how many SAR cases seemed to be caused by human error rather than an unlucky run-in with natural hazards. Realizing that the traditional approach to advocating safety in the park isn't always enough, some park officials have begun to advocate taking a more proactive, preventative approach. They wanted to try to prevent people from getting into trouble in the first place rather than waiting for what seemed like an inevitable accident to occur. After the tragic 1996 season at the Grand Canyon in which several visitors were killed in heat-related incidents, and many more nearly perished (Anonymous PSAR team member, personal communication, June 2, 2013), they formalized their preventative efforts and created the first Preventative Search and Rescue (PSAR) program in the summer of 1997 (Anonymous PSAR team member, personal communication, June 2, 2013).

PSAR is a relatively new concept in outdoor risk management. PSAR focuses primarily on communicating safety information to visitors through advertising and face-to-face interactions. Grand Canyon National Park was the first Park to have a PSAR operation and remains the leader in this space. The team iterates on its efforts from year to year and boasts the only full-time PSAR staff member in the park system (Anonymous PSAR team member, personal communication, June 2, 2013).

## HOW DOES PSAR FIT WITHIN THE LARGER NPS SEARCH AND RESCUE WORLD?

PSAR receives only cursory coverage within the NPS's system-wide Search and Rescue Manual (2011). The brevity in the document's coverage of this topic reveals how new PSAR is to most people in the SAR community and the challenges of tasking this group with a complex communications task.

The manual suggests Parks follow a process of identifying a problem, identifying a solution, implementing the solution, and then reviewing the problem and actions taken. It fails to provide much assistance on how to go about these tasks. It emphasizes the importance of targeting a specific audience and suggests that formal Ranger talk programs can be used to highlight a hazard and its mitigation, or that Rangers can seek out hazardous situations and "use it as a 'teachable moment'" with visitors. Suggestions for written materials and signs are vague and seemingly not research-based, stating: "Only the designer's imagination provides limits. Of course, one needs to keep these materials in good taste."

The manual provides insight into the state (in 2011 at least) of PSAR at the National level and reveals a lack of sophistication in these efforts.



*A PSAR Ranger en route to a patrol station on the South Kaibab Trail.*



## WHO ARE PSAR RANGERS?

The Grand Canyon PSAR team is made up of three to four seasonal Rangers, a rotating cast of volunteers, and one full-time year-round Director. Each Ranger is EMT-trained and most are paramedic-certified and helicopter-cleared as well. Many of the volunteers have medical training, but not all.

Many people are confused by the title of “Ranger.” In the case of PSAR Rangers, that is their official title, but unlike the typical Ranger that may come to mind, they are not necessarily plant experts. Within the Park Service there are two major division of Rangers — Law Enforcement (LE) Rangers, who carry weapons and act as both park wardens and in traditional policing roles as needed, and Interpretive Rangers (Interp), who are the ones who give talks about plants, animals and rock formations.

PSAR Rangers aren’t either of these types of Rangers. They come from a small, separate branch of Medical Rangers. In addition to performing on-trail rescues, PSAR Rangers serve as part of an in-park EMT service, responding to slip-and-falls, heart attacks and all the other medical emergencies that happen on the Rim. This gives them additional medical experience to keep them sharp and helps justify having so many professionals on staff (Anonymous PSAR team member, personal communication, June 2, 2013).

In addition to conducting on-trail patrols (discussed in more length in Chapter Three) and SAR operations, the PSAR team also manages preventative safety messaging campaigns.



*Process: Working through field research notes and reading references to create a profile of how PSAR Rangers think and approach their jobs.*

## PSAR ATTITUDE TOWARD VISITORS

The PSAR team gives off an air of authority reminiscent of law enforcement, both in the way they conduct their team internally and in the way they interact with visitors. They can take a stern, even lecturing tone with visitors when serving on the trail patrols.

Yet, their mission is at its heart very compassionate and understanding of visitors. While PSARers can be frustrated that visitors don’t heed their warnings, they are careful not to embarrass visitors who get into trouble and need help. Even in private conversations I had with PSAR members, no one ever belittled visitors for their ill-advised choices. They feel like some people are impossible to convince, but they still try anyway and rarely write-off visitors or denigrate them (Anonymous PSAR team members, personal communications, June 2-4, 2013). They are more likely to view visitors as misguided and under-informed than as idiots, or simply victims, as-is the more traditional SAR attitude towards those they rescue (Heggie as interviewed in Repanshek, 2009).

The PSAR intercept patrols see their purpose as one of education, not enforcement. Since they cannot force visitors to turn back, they must attempt a variety of tacts to try to convince visitors that it’s in their own best interest to do so (see sidebar). As a visitor approaches, the Rangers make an instant assessment: are they “dialed-in” and prepared for the ambitious adventure they have planned, are they ignorant of the challenge ahead, or are they stubborn, hell-bent on their hike?



It can sometimes feel like a futile effort when so many people, at least on the face of it, disregard their advice. PSAR Members hope, though, that even those who continue on do so with a more cautious outlook and turn around a bit sooner than they would have otherwise. One PSAR Ranger summed it up well. Reflecting on the odd combination of a positive, even idealistic outlook paired with the everyday setback they face as new visitors arrive to make the same old mistakes, he said “You can’t save someone from themselves — but I still try.”

Sometimes the PSAR team’s best efforts are not enough. After having tried first-hand to change the mind of a visitor, it can be devastating for a Ranger when his worst fears about a wayward visitor comes true. The PSAR Impact Report shares one such story, where a Ranger pleaded with a woman to reconsider her plans to take on a hike that was going to endanger herself and her group. The woman refused to listen, and later collapsed and died from heat exhaustion (“PSAR Impact Report”). Despite this woman’s stubbornness and the pain she caused everyone with her own poor choice to continue, the PSAR member who spoke with the victim couldn’t help but feel that she wished she could have done more.

Perhaps the best way to convey the overall attitude of the PSAR team towards visitors is one of a parent of a wayward teen. While they may grow frustrated at times, in the end they still love their child, want what is best for them, and are even willing to give them the benefit of the doubt. Given the exhausting and trying work the PSAR team engages in, I was quite impressed by their ability to keep such a positive and non-judgmental attitude towards visitors.

## PSAR RANGERS ARE SAFETY EXPERTS

The Rangers, and many of the volunteers, are experts, both in the Canyon and its threats, and in hiking in this environment. Everything else that PSAR handles — profiling visitors, psychoanalyzing them, and convincing them to change their plans—is entirely self-taught. The PSAR team Members are not design or communication professionals, and lack expertise in designing targeted communications. Receiving outside help or additional training in these areas may make the team more effective.

## PSAR RANGERS ARE SUBJECT TO EXPERT BLINDSPOTS

Rangers and volunteers come from a variety of backgrounds, but most have worked previously in ski patrol, lifeguarded, or served as civilian EMTs, leaving them socialized into a medical/rescue way of thinking. They possess a wealth of expertise. Not only are they experts on the Canyon and safety, but they also hold an extensive amount of tacit knowledge built over years of savvy outdoor travel. The amount of blood, sweat and tears that the PSAR team has invested in this effort makes them extremely knowledgeable, but it also leads them to have a major expert blind spot.

While Rangers are very sympathetic to the visitors’ plight, their expert blind spots that can make it hard for them to really understand the visitor point of view. They at times fail to understand where the visitor is coming from and may see a visitor making an “obviously” risky choice — like going on a less maintained trail such as Grandview, on their visit — when in fact the visitor has no idea that this is a poor choice at all.



The personality of PSAR members may also set them apart from visitors. As authority figures, the PSAR team is generally a “by the book” group of individuals, so they may not have an easy time relating to visitors with a more liberal relationship with rules and limits. This Good Faith bunch may have a hard time devising strategies to reach *YOLO*, *Deluded* and *Exceptional* visitors (see page 26 for background on these visitor types).

## CONSTRAINTS ON PSAR METHODS

There are three major constraints that affect how the PSAR team approaches their mission.

The first is *money*. The budget for the team, which largely covers Rangers’ salaries, is about \$200,000 (“PSAR Impact Report,” 2013). One PSAR manager I spoke with (Anonymous PSAR team member, personal communication, June 2, 2013) lamented the inability to cover all the trails at all times with a paid PSAR member. While volunteers are major assets, they are not seen as quite as successful in reaching visitors as paid, more thoroughly trained staff members. A team member also spoke of a flipbook of safety information she had designed with the intent to place it near trailheads to serve as a more thorough and engaging intervention. After a lengthy approval process, she got permission to place the artifact, but when she did not receive a grant, the project was shelved due to lack of funds (Anonymous PSAR team member, personal communication, June 2, 2013).

A second constraint is *time*. Since there are only a handful of PSAR Rangers, there just isn’t enough time for them to accomplish everything they would like to do. To better track their efforts, and the results they get, some portion of each PSAR team member’s time is devoted to paperwork and research. While the PSAR team hopes to work with other parks to create a more unified visitor safety front, conduct additional research, and implement new strategies, all of these activities are restricted by the time available with only one full-time year-round staff member dedicated to the PSAR team (Anonymous PSAR team member, personal communication, June 2, 2013).

The last constraint is the *bureaucracy of the NPS* and the red tape and political divisions that come with it. While PSAR would love to create a custom web presence that focuses on visitor safety, the Park’s web site is handled through indirect channels and must meet NPS-wide standards. Similarly, divisions within the park can make even small changes difficult to implement. For instance, one Ranger spoke of an uproar caused by removing some old paper sheets from the trailhead bulletin board in order to make room for a much improved, redesigned poster she had made (Anonymous PSAR team member, personal communication, June 2, 2013).

The PSAR Team feels that safety information should be prioritized over interpretive information. As one Ranger puts it, “what you need to know right now vs. a curiosity that can wait” (Anonymous PSAR team member, personal communication, June 2, 2013). But with a much larger workforce more entrenched in the NPS system, that’s not always how things shake out. Cultural divisions within the park can make change challenging, especially if it is perceived to be at the expense of another division, no matter how slight.



# THE NATIONAL PARK SERVICE CONTEXT

In order to understand the as-is situation and begin to consider how interventions might fit into the larger National Park Service (NPS) ecosystem, I wanted to consider the NPS' perspective. While I did not delve deeply into this topic I did gain a sense of the debate within the NPS community from secondary sources about how much visitor safety problems fall to the NPS to fix and what approaches should be pursued.

## NPS IS A GOVERNMENT BUREAUCRACY CONCERNED ABOUT RISK

The NPS is a large government organization. As a manager of vast swaths of land, some of it quite foreboding, a manager of employees, and host to millions of visitors a year, the NPS has its own set of priorities and approaches to managing risk.

Risk is something actively on the mind of NPS managers, and as a public agency that relies on elected officials for funding, it is acutely aware of the bad press that high-profile rescues and deaths generate, whether or not the NPS could have done anything to prevent them. But as a cash-strapped agency steeped in bureaucratic red tape, it can be hard to innovate or quickly pivot to new approaches (Anonymous PSAR team member, personal communication, June 2, 2013).

## PROTECTING VISITORS FROM THEMSELVES ISN'T THE PARK SERVICES' DUTY

As my risk mitigation exploration showed (see the Casual Sequence Model on page 113), one of the easiest ways to decrease the number of rescues and deaths would be to limit access to them. Despite the calls for increased restrictions that follow each high-profile safety incident, this type of mitigation is rare in the United States.

One famous counter-example is the institution of permits for hiking the cables at the Half Dome in Yosemite National Park. After problems with overcrowding on these metal cables strung up to allow a non-technical ascent of the nearly sheer rock face, a permit lottery was recently put in place. For both safety and environmental reasons, now only permit-holding visitors may use this park feature ("Half Dome Plan").

In general, however, the Park Service does not restrict visitors from engaging in activities to ensure safety (Anonymous PSAR team member, personal communication, June 2, 2013). In fact, GCNP PSAR Rangers tell visitors often that they cannot actually stop them: the Park Service charter actually states that it not interfere with citizens access to the public land it manages except to keep it in its original state. The law states the NPS purpose is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (Dilsaver, 1997).

A fear of a change in this policy—that parks could be closed in order to protect people from themselves—is something that worries outdoor enthusiasts and causes some to feel that reducing rescues and deaths is important to



*Park Headquarters at the South Rim.*



preserving access to the places they love. This leads the NPS itself, as well as fans of the parks, to look to other ways of protecting park visitors.

The NPS also faces a backlash—and even lawsuits—when visitors or their families get hurt in parks. Despite an overall disinterest in becoming a “safe” place for its own sake, the Park Service still must be wary of being held responsibility for visitors’ mistakes.

Yet, the more the NPS warns visitors and creates the appearance that it is “in control”, the more comfortable and less responsible for themselves park visitors may feel. The NPS Comprehensive Study of Visitor Safety found that visitors to more developed, front-country-oriented parks were more likely to place at least partial responsibility for safety in the hands of NPS. Furthermore, as an employer it also must consider the safety of employees. The topic of attribution is further discussed in Chapter Two.

### NPS RISK MANAGEMENT RELIES LARGELY ON VISITOR EDUCATION

Given the constraints not to bar access to increase safety, the main tactics that the Park Service applies is to warn visitors. Using signage, park newsletters, and visitor-facing personnel, the Park Service tries to impress upon visitors that dangers are present: “With the hopes of instilling visitors with more respect- not fear, but respect, for their surroundings, the Park Service has been working to better educate visitors to the danger in the parks they’re entering” (Heggie, quoted in Repanshek, 2009). In addition to getting the word out about dangers, park efforts try to emphasize self-responsibility: “One of the essential roles of our program is to educate the public about the fact that the responsibility for a lot of their safety really lies with them” (Newman quoted in Repanshek, 2009).

### RISK MANAGERS BLAME VISITORS FOR THEIR ERRORS

Rickard (2012) found that park employees were more likely to blame internal factors (the victim) and challenging environmental conditions than visitors were. Visitors, on the other hand, were more likely than staff to point to good old-fashioned bad luck. Interestingly, those staff members not directly involved in visitor safety incidents had above median internal causal attributions, causing Rickard to speculate that these employees, lacking real knowledge, defaulted to a “self-defensive” assumption that the fault does not lie with the park.

### MANAGERS MAY HAVE A DIFFERENT PERSPECTIVE ON RISK THAN VISITORS

For the NPS, risk is something to be considered, analyzed and managed. Scholarly work on the topic of *affect* suggests that this may be very different from how visitors understand risk.

In Risk as Analysis vs. Risk as Feelings (Slovic, 2004) presents the construct of three ways to look at risk: risk as analysis, which “brings logic, reason and scientific deliberation to bear on hazard management,” risk as politics, and risk as feelings, which refers to “our fast, instinctive, and intuitive reactions to dangers” (p. 311). With risk as feelings, we rely on *affect* to determine how we feel about risk. “As used here, “affect” means the specific quantity of “goodness” or “badness” (1) experienced as a feeling state (with or without



consciousness) and (2) demarcating a positive or negative quality of stimulus” (Slovic, 2004, p. 312).

Unlike analysis, which can be slow and cold, “Affective responses occur rapidly and automatically- note how quickly you sense the feelings associated with the stimulus word “treasure” or the word “hate.”” NPS managers, and other experts are likely to examine the dangers of Parks from a risk as analysis viewpoint and even consider the possible political repercussions of the situations. Visitors, on the other hand, are more likely to simply experience risk in a much more abstract and *affect*-driven way.

Espiner’s glacier study (2001) found a similar gap between risk managers and visitors, finding “Managers who work in the glacier environment portray risk in terms of threats to visitor safety, and their own sense of vulnerability to legal liability.”

### PSAR IS STILL AN UPSTART EFFORT WITHIN NPS

In an article interview with researcher and author of a NPS Search and Rescue book, Dr. Travis Heggie, the National Parks Traveler website discussed the NPS approach to reducing SARs (Repanshek, 2009): “Five parks account for 50 percent of the fatalities, or eight parks account for 73 percent of the total costs,” pointed out Dr. Heggie, “and what are we doing about it? Nothing. Nothing. And that’s the thing, The Park Service historically has been a reactive agency rather than a preventative agency.”

Heggie advocates for the cost-saving approach of PSAR, over what he calls the “jarhead” default for search and rescue, where SAR members are “jocks... jumping from SAR to SAR.”



## OTHER ON-SITE PLAYERS

### AT THE CANYON, EVERYONE IS AN INFORMAL RISK COMMUNICATOR

With *In backyards, on front lawns: examining informal risk communication and communicators*, Rickard (2011) examines how risk communications comes into play in casual, everyday risk situations.

By examining the example of pesticide application workers who routinely receive and answer safety questions from homeowners, she looks at how risk communication happens in casual, real-life circumstances. These scenarios are much less cut-and-dry than those examined most frequently in the risk literature — things like nuclear plant safety and major medical decisions.

She posits that while most risk communications literature focuses on formal communications direct from government and institutions, that many people receive risk information through more indirect channels. On a daily basis we take in risk information through intended and unintended communications, and even official risk communications may reach us second (or third) hand via social media or via “informal risk communicators.” Richard defines informal risk communicators (IRC) as people who convey risk information to the public, but not as an official part of their job.

As part of my field research I interviewed many human touchpoints that would qualify as IRCs. The job description for a salesperson at the Grand Canyon Marketplace general store doesn’t include communicating about hazards and mitigation options, yet people ask these employees about hiking options and gear on a daily basis.

I found that while there was no clear “party line” officially disseminated for the PSAR Team or Park Managers on how to dissuade visitors from danger, that everyone I talked to was generally interested and invested in preventing more tragedies at the park.



An aerial photograph of a rugged, forested landscape. A prominent, light-colored rock formation or cliff face is visible on the right side of the image. The surrounding area is covered in dense green vegetation, with several winding, light-colored paths or roads visible through the forest. The overall scene suggests a natural, possibly mountainous, environment.

UNDERSTANDING THE AS-IS

## **CHAPTER TWO**

**WHY DO VISITOR  
SAFETY INCIDENTS  
OCCUR SO  
FREQUENTLY?**



## CHAPTER TWO INTRODUCTION

In order to attempt to reduce the number of visitor incidents, I needed to try to understand why these problems occur. What I found by examining existing literature and speaking to experts is that no one really knows for sure what leads visitors astray.

There are, however, many theories and educated guesses. A lot of the existing exploration of why park incidents occur has to do with exploring fault. Many who deal with the problem up close blame visitors themselves, asking why are the visitors so foolish and wondering if people living in advanced societies are too coddled to even know how to handle risk. Experts from recreational management, on the other hand, question if the parks could be doing more to help visitors be safer and look to understand how visitors and park view responsibility for safety. I begin this chapter with a review of these existing theories.

I was unsatisfied with the lack of evidence supporting many of these existing park-specific explanations, so I also referenced the larger literature, looking to behavioral science to explore additional theories that could be applicable to this problem. I share these findings in the second part of this chapter.

Understanding some of the underlying factors that contribute to visitor safety problems helped me not only to see possible opportunities for intervention but also to understand more about the viewpoints of the people involved.



# EXISTING CONVENTIONAL WISDOM ON WHY VISITORS ERR

## VISITORS ARE INTENTIONALLY RECKLESS

Many members of the public, as well as some experts, assume that people who get hurt did something incredibly stupid to cause it to happen. Whether the facts back it up or not, it's human nature to assume that the victim did something to bring bad consequences on themselves. Victim-blaming is even more so the norm when serious consequences are entailed, a phenomenon called defensive attribution, "...we are more likely to assign blame and to see the event as predictable or controllable as the magnitude of harm increases rather than the product of random chance..." (Rickard et al, 2011).

Although they are not the focus of my project, falls from the Rim are certainly some of the incidents most on people's minds when they think of park accidents. The authors of *Over the Edge* state, "At least 10 [of 50 rim-fall victims] - and possibly as many as 25 or more of them - had deliberately crossed the guard rails or walls to frolic, walk, stand on, or sit on the very edge. In short, before they fell over the edge, 20 to 50 percent of these victims were intentionally reckless."

The authors note that no children have died due to falls. They speculate that this is "due to the reality that children possess a more recently familiarity about the dangers, risks, and consequences of falling in the natural world... or instead, [that] the lack of children falling may be due to many parents exerting a double standard..." (p. 26). They go on to say that children seem to have more "common sense" than their parents (p. 26), implicating adults' recklessness as a base cause of accidents.

Referencing falls, the book reports an NPS spokesperson's reaction to the copious efforts of the park system to prevent these incidents that still manage to come up short "...in general, the falls mostly result from carelessness or ignoring warnings... we issue warnings all the time. We talk about the dangers of getting too close to the rim. Beyond that, I don't know what else it is you can do" (p. 17).

Chief Ranger Ken Miller, discussing this same series of falls in 1993, said "The one common thread from these incidents has been the complete lack of regard for personal safety" (p. 17), and *Over the Edge* echoes this perspective, saying, "Tragedies from failing to heed, through ignorant denial, the Canyon's obvious force of nature come in all nuances."

Interestingly, Bouter et al, as cited by Dolinac (2005) found that the type of traveler who actually does intentionally seek out risk doesn't get hurt as much as most people may think. Those with higher thrill-seeking and sensation-seeking scores were found to not have higher injury rates, likely because they practice the activity frequently, giving them more skills to avoid injury even though they were taking part in higher risk activities.

The biggest question, however, with this theory, is if visitors don't understand they are undertaking risk, is it possible for them to be reckless?



Espiner echoes this concern in NZ glacier park study, finding that many visitors felt very safe and didn't think they were taking on risk. He points out the finding established by prior work that "...in order for risks to be accepted, they first need to be recognized." (2001, p. 239)

### VISITORS ASSUME THE PARK WILL KEEP THEM SAFE

One major theory is that because parks are developed, and there is an air of authority and control, that visitors feel safer than they should and don't feel responsible for their actions.

A news article, referenced in *Over the Edge*, puts it rather bluntly: "Warning signs, guard rails, stern words from Rangers and fear did not register. They were in a park, and that meant the authorities were responsible for their safety, didn't it" (Ghiglieri & Myers, 2001, p. 74).

The authors (Ghiglieri & Myers, 2001) concur, saying, "As sheep...many of us now make the habitual and unquestioned assumption that somebody else is supposed to be watching out for our best interests. We blindly follow the rest of the flock and assume that the shepherd, wherever he is, is keeping his eye peeled for the wolves" (p. 364).

"A lot of tourists approach the Grand Canyon like a ride at Disneyland or some other amusement park, and think it's idiot-proof," notes Tom Jensen, Executive Director of the Grand Canyon Trust. "The Grand Canyon wasn't built by attorneys and engineers" adds another commentor (Ghiglieri & Myers, 2001, p. 17-18).

More than one Grand Canyon official mentioned the "Disneyland" effect to me. It's more than just a casual reference, they explained. Visitors are often stopping at Disneyland, Las Vegas, and the Grand Canyon as part of a road trip, and "the order in which they do it can make quite a difference" (personal communication, June 3, 2013).

I found in my observations that visitors often request advice from Rangers directly, even though their question could be easily answered by the information provided in the outdoor Information Plaza. It seems they would rather leave the judgment call and choice to the Ranger than make their own decision. The outsourcing of this choice could further contribute to visitors feeling a lack of responsibility for their actions.

While *Over the Edge* and others takes the approach that visitors are to blame for feeling coddled by parks and failing to recognize the need to ensure their own safety, the NPS recognizes that they play a role in creating what may be a false sense of safety.

### VISITORS THINK THAT RESCUE IS JUST A PHONE CALL AWAY

Another popularly mentioned trend with limited data behind it is that a growing reliance on cell-phones and GPS has made visitors complacent or provide a false sense of security.

This concern is not exclusive to Grand Canyon but was expressed by interviewees and in *Over the Edge* (Ghiglieri & Myers, 2001) as an additional contributing factor of incidents. It was also speculated to be a problem by



Dr. Sara Newman, head of NPS Risk Management, during a talk (“Opening Address,” 2008).

The authors of *Over the Edge* reference the “of-course-someone-will-rescue-me” mentality that visitors have, suggesting this view is commonly held within the SAR community.

Charles Farabee, an experienced Ranger and author of a book about SAR in the National Parks, was quoted in a news article on the topic, saying that cell phones can help people by allowing them to call for help in a timely manner and to a specific location, but that they also have downsides, “All of this technology is doing a couple of things: Lots of people are leaving their car without anything else in their ‘SAR prevention pack’ AND it is also luring people into ‘pushing the envelope...Many people, laboring under the assumption that they are more invincible and more safeguarded with this cell phone technology, are now going to places and doing peaks and mountain biking and exploring where they would never consider doing this pre-cell phone. I do think there is a greater sense of no personal responsibility” (Repanshek, 2010).

In the same article, NPS Risk Management Director, Dr. Sara Newman, concurs, saying the problem is not technology itself, but a growing over-reliance on it that leaves visitors to bring nothing else besides a phone to help ensure their own safety (Repanshek, 2010).

When directly asked by the Backlund et al. (2006) survey if they agreed with the statement “Park rangers will rescue me if I get into trouble” 13.3% of visitors strongly agreed, and 57% agreed. The study did not attempt to gauge how this affected visitor actions.

While it is certainly not the norm, PSAR Rangers even complained that they actually get “repeat offenders,” visitors who do not curtail their activities even after requiring rescue. A man who had laid ill for several days at Phantom Ranch at the bottom of the Canyon, when asked what was wrong with him, informed the Ranger that it was “the same thing y’all had to fly me out of here for last time” (Anonymous PSAR team member, personal communication, June 2, 2013).

While it seems at least a foolish few are overly reliant on technology and the *availability* of rescue it presents, it’s unclear how large of a trend this actually represents. Certainly, if asked, most visitors underestimate the difficulty, time, and danger of rescuing visitors from the Canyon. While the Park Service is able to use a helicopter, it is not always available, and it is extremely dangerous to operate in the high elevation Canyon environment, especially when temperatures soar. But it’s unclear the extent to which this actually affects visitor choices.

## VISITORS DON’T THINK THE CANYON IS DANGEROUS

The details of some of the incidents seem to imply that many visitors simply don’t realize they are in a hazardous situation, even in the case of the most obvious risk: standing on the edge of the Canyon.

In a popular press write-up referenced in *Over the Edge* about deaths from falling, they mention that with few exceptions, “...the lives were lost by sober,



*The SPOT tracking device, an affordable satellite-signalling device that allows people to send a message for help in an emergency. It has received flack because some experts believe that a emergency beacon for the masses will embolden outdoors visitors and engender an unhealthy sense of safety in dangerous situations.  
Photo source: SPOT LLC*



solid citizens who simply had no sense of the danger of standing on the rim of the mile-deep gorge” (Ghiglieri & Myers, 2001, p. 17).

This explanation seems very fitting, especially when one looks at some of the more remarkable falls at the Canyon. In one incident, a man climbed over the railing at a view point, and was quickly warned by his young son, “Hey, the sign says you’re not supposed to go past the rail.’ [His father] turned to him and allegedly said, “You gotta take some chances in life.’ Then stepping on snow which had nothing underneath it but a few hundred feet of air, Pena vanished from view and plummeted into the frozen abyss.” (Ghiglieri & Myers, 2001, p. 22)

A similar level of disbelief is evoked by an incident when a father pretended to fall over the edge by hopping onto a small ledge behind a Rim wall. Some time passed before it was determined he must have lost his footing and fallen, rather than simply hid or separated from the rest of his group (Ghiglieri & Myers, 2001, p. xii).

This lack of hazard recognition doesn’t seem to be exclusive to the Grand Canyon though. In Rickard et al.’s look at risk attribution in parks (2011), they found that “several of the comments volunteered by respondents invoked ‘risk optimism,’ suggesting that ‘ignorant’ visitors constitute a main safety concern at Mount Rainier National Park.

Espiner found a similar lack of awareness in his glacier study, noting “Visitors also appeared ignorant of many natural hazards...” (2001, p. 245).

At Sequoia National Park, visitor education about river safety was successful in reducing drowning deaths from two per year to zero. Volunteers conducting the outreach reported that visitors were surprised to learn that the river was dangerous, because “it doesn’t look it” (Repanshek, 2009).

The risk of injury from heat exposure is certainly far less of a clear and present risk than of falling over the edge of the Canyon. If visitors don’t grasp the danger of a 1,000 foot fall, is there hope of making the heat risk feel real?

## PEOPLE DON’T KNOW WHAT DANGER IS ANYMORE

Some speculate that the inability to recognize the dangers at the park isn’t due to a failure to assess those specific hazards, but rather a complete lack of understanding of danger itself.

They argue this is due to the ease and safety of modern lives and a disconnection from nature. They say we live in a cushy, highly regulated and litigated world, “in short, we are what would be referred to in biology as a domesticated species” (Ghiglieri & Myers, p. 364).

“Are such seemingly foolish deaths truly due to our having grown up in a culture so paranoidly obsessed with paving the natural world that we can no longer cope with any terrain that has not been laser-leveled?” ask the authors of *Over the Edge* (Ghiglieri & Myers, 2001, p. 17).

In *Death in Yellowstone*, the author put it even more directly: “Nature demands of us that we pay attention. This society has sheltered us from nature...” (Whittlesey, 1995, p. 281).



## EXTREME SPORTS DRIVE VISITORS' VISIONS OF GRANDEUR

Rangers and others involved point the finger at the rise of extreme sports as a possible contributing factor.

Some time ago, skateboarding was seen as an extreme sport. The rise of the X-Games and later the POV camera have increased the popularity of extreme sports exponentially. Athletes continue to push the envelope of what is possible, and recently, even extraordinarily dangerous sports like base jumping are gaining mainstream media coverage.

Even the comparatively mellow sport of hiking has gotten more extreme, with trail running exploding in popularity, while obstacle course races, trail marathons and ultra marathons are becoming commonplace. Not only have pursuits become more extreme, they've also become more competitive. Many people who once enjoyed outdoor sports for their own sake now train more seriously, participate in races, and strive to beat their own "best times."

At the Canyon this trend is reflected in an increase in trail running and the popularity of the Rim-to-Rim hike and other challenging hikes. As more visitors are attempting more arduous, challenging hikes, there is concern amongst Rangers about how to address these new Park uses. How can the Park reach out to these more aggressive park-goers that have little in common with the stereotypical tourist family visitor set?

There is also a concern of the influence that these extreme feats of outdoor adventure, both those inside the park and those seen on TV or YouTube, are having on more casual visitors.

The successes-only coverage extreme adventure often receives in the press could present an overly optimistic picture of the safety of these activities. PSAR Rangers speculate that visitors may then assume that they can easily emulate their favorite extreme athletes and expect similar success (Anonymous PSAR team member, personal communication, June 2, 2013). They're also concerned that because information and stories about extreme hikes are so readily available to everyone online, visitors may feel like being informed about a hike means they are prepared for it. Participating in an online forum isn't sufficient training for a major backcountry adventure, but people can begin to think that by gathering the requisite information, and seeing the example set by others, that they could do it too (Anonymous PSAR team member, personal communication, June 2, 2013).

## THE CANYON TRIPS UP VISITORS

Often left unstated is the role of the environment itself in causing and exacerbating safety problems. People might indeed be foolish, but in a safe environment this won't necessarily result in injuries, illness, and death; the environment is a contributing factor.

Even for experienced hikers, the Canyon presents a nearly unmatched combination of challenges that create both physical and mental hurdles for visitors looking to complete their hike safely.

**Down first:** Since visitors start at the top of the wall of the Canyon and hike into its depths, hikers go down first. They only begin going uphill



*A base jumper in action. Could extreme sports set an extreme precedent for more casual adventurers?*

*Image Source: "04KJER0243" by Xof711 - Own work. Licensed under Creative Commons Attribution-Share Alike 3.0 via Wikimedia Commons - <http://commons.wikimedia.org/wiki/File:04KJER0243.jpg#mediaviewer/File:04KJER0243.jpg>*







## VISITORS UNDERESTIMATE THE CANYON

The PSAR team sums up their belief that nearly all visitors underestimate the challenge that the Canyon presents:

“The most likely reason hikers reported they felt “well prepared” for Canyon hiking is due to a general misconception of the enormity, depth and danger the Grand Canyon presents. We find support for this statement by the fact that we are assisting hundreds of hikers out of the Canyon every year, scores of them requiring a Medivac. There is no other location that we know of in the United States that flies out more hikers than here at Grand Canyon National Park. Even though 76.5% of visitors don’t believe we exaggerate the danger of hiking in the Canyon, we still believe that many of these visitors (up to 39%), underestimate the challenges of Grand Canyon hiking” (“PSAR Impact Report,” p. 30).

*Over the Edge* echoes this sentiment, saying “...two failings that nearly every non-Indian visitor to the Grand Canyon since 1540 has exemplified: an inability to comprehend the scale of the Grand Canyon and a marked - often fatal - tendency to underestimate it” (Ghiglieri & Myers, 2001, p 28).

The fact that visitors underestimate the Canyon may in part be caused by the way this unique environment can throw visitors’ perception off. Explaining a series of falls, *Over the Edge* states “...each victim seemingly became disoriented due to the visual shock of looking down into such an immense hole and in seeing nothing for an instinctive reference point, lost his or her balance” (Ghiglieri & Myers, 2001, p. 24). These victims, however, had also gone over or around guardrails and warning signs to reach their perch, so the Canyon can hardly bear all the blame.

The scale of the Canyon is hard for even Canyon veterans to grasp, and visitors are often duped into thinking a destination they can see must be quick, or even possible, to reach. The fact that the hikes are downhill first, and at altitude further deceives visitors.

## THE SIREN CALL OF THE CANYON DRAWS VISITORS INTO DANGER

Many people who’ve run into trouble summitting mountains will report that they considered turning back but couldn’t help trying to finish what they had started. Like the Grand Canyon’s inner trails, the Half Dome in Yosemite National Park is a frequent site of visitor rescues. Visitors are advised not to take on the final section of the hike in poor weather, yet many visitors continue on anyway. David Buchanan, a regular visitor there, opines, “They call it ‘summit fever... They’ve gone so far, not to make it to the top isn’t an option” (McKinley & Lovett, 2011).

The rare opportunity to be in the park, or to be “most of the way there” already, can compel people to do things they might otherwise realize are unwise. Visitors can also be very driven to try to fit a lot into the day because of limited time at the Canyon or within their vacation time. This may make visitors reluctant to forgo a hike even if the weather, heat or time of day should make them think twice.

The fact that, for many, a trip to the Grand Canyon is a once-in-a-lifetime trip can increase the pressure they put on themselves to seize the day and



*The many switchbacks of the Bright Angel Trail make the downhill journey go by quickly and with little effort.*



make the most of the trip. But there seems to be something even beyond this standard already-committed, loss aversion mentality that encourages people to push themselves at the Canyon.

Both in my conversations with visitors at the Canyon, and in my later evaluative testing, I found that while visitors go into a Canyon visit intending to have a fun experience and see the sites, once there, they seem to be compelled into adventure mode. They suddenly want to take on the hardest hike they (think they) can handle, and triumph.

Offering a free return vacation to the Canyon so that visitors don't try too hard to fit everything in is out of the question, so addressing these factors directly may be impossible. However, simply knowing that they are in play is helpful in understanding the situation and the challenges that interventions face in changing visitor behavior.

## THE PARK ISN'T KEEPING VISITORS SAFE

In the end, some feel it's the park's responsibility to keep visitors safe: if visitors are getting hurt, the park is to blame, at least in part.

Laura Rickard has studied the role of attribution in park safety and how visitors perceive safety and attribution in-depth through both her PhD dissertation, *Mountains and Handrails*, and in an article co-authored with Clifford Sherer and the head of NPS Risk Management, Dr. Sara Newman.

She found that the:

“responsibility to prevent injury begins before the park visit, as visitors are expected to gather information, prepare themselves physically, and gather necessary equipment; as interviewees explained, in this stage, responsibility rests, for the most part, on the shoulders of the visitor. Once beyond the park gates, however, responsibility begins to shift. While visitors remain responsible to maintain situational awareness, as well as to select activities that are within their physical abilities, park managers now take a certain degree of responsibility for visitors, such as to mitigate known risks, and provide park-related information” (Rickard, 2012, p. 331).

In her work Rickard establishes the concept of *preventative attribution*. While standard attribution asks, “whose fault was it this happened,” *preventative attribution* shifts the focus to ask, “whose problem is it to make sure this doesn't happen?”

This allows an interesting third perspective in the matter of fault: perhaps it's the visitors' fault that they get hurt, but it's NPS' problem to stop it from happening. The existence of PSAR, Dr. Newman's office, and the recent creation of a new Safety Leadership Board show that NPS does take some responsibility for visitor safety, even if they wish they could take less and leave more to visitors.



# ADDITIONAL THEORIES ON WHY VISITORS ERR DERIVED FROM SCHOLARLY WORK

## VISITORS ARE SIMPLY OVERCONFIDENT

Seemingly healthy, fit folks can actually put themselves at increased risk, argues *Over the Edge*. Older people, those who are out of shape and have pre-existing medical conditions certainly face increased risk from such a challenging environment, but I noticed that often these people can be a bit more self-aware of their limitations. Young, fit individuals, on the other hand, can fail to even consider the possibility of failure, and their overconfidence can cause their downfall. This overconfidence, however, isn't limited to the young fit crowd; nearly everyone falls pray to the biases that lead down this path.

Many factors and biases can lead visitors to feel overly optimistic, including:

### *The law of small numbers*

The overall chance of being befallen by death or injury at the Canyon is small, making it a low probability event. Unfortunately, people have a hard time making sense of small probabilities (Kahneman, 2011). Some people overestimate the small risk and therefore avoid a largely safe activity because they fear the worst. They feel that even a small chance is more chance than they are comfortable with. One example of this is people who avoid flying even though they acknowledge that it's statistically a safe activity. Other people estimate down the small risk to zero, dismissing the risk entirely. One example of this adjustment is the failure of people to prepare properly for a natural disaster simply because the risk is low.

### Poor experiential feedback

Because there is uncertainty in the equation, people can make poor choices that endanger them or their group, and yet everything still works out OK in the end. This can seem to validate poor choices, meaning there is a lack of proper feedback. Unfortunately, people trust their own experience over rules, advice, and other inputs. If people get a false sense of feedback ("We've made it this far and everything's fine!") they tend to trust it.

### *The impact of affect*

In *Risk as Analysis and Risk as Feelings*, Slovic et al (2004) argue that, "people base their judgments of an activity or a technology not only on what they think about it but also on what they feel about it. If they like an activity, they are moved toward judging the risks as low and the benefits as high; if they dislike it, they tend to judge the opposite—high risk and low benefit..." (p. 5).

It's possible that people have trouble grasping and evaluating risk in the Canyon and therefore utilize *attribute substitution*. People may substitute the question "Is this desirable?" for the real question "is this safe?" or swap out "Do I feel OK now?" instead of trying to figure out the much harder but more important question, "How will I feel later?" in order to make a judgment with the information they actually have on hand.



Visitors lack the knowledge and expertise to make a realistic assessment of risk, making them all the more likely to fall into this trap.

Loewenstein et al., in *Risk As Feelings* (Loewenstein, Weber, Hsee, & Welch, 2001), also argues that people are more optimistic when in a favorable mood. With visitors on vacation in a beautiful place, it's hard to imagine most aren't affected by this bias, feeling even more confident because they are enjoying their visit.

#### *Hot-cold empathy gap*

Visitors are affected even more by *affect* because of another Loewenstein focus, the *hot-cold empathy gap* (2005). Loewenstein has found that people have a very difficult time understanding a state other than the one they're currently in. When in the midst of a depression, people can't image ever feeling better, and may be compelled to take their life. When people with schizophrenia are feeling well after taking medications to control their condition, they can't imagine feeling terrible again, and can discontinue their medication, thinking they'll be fine (Loewenstein, 2005). These are obviously extremely grave consequences of a built-in shortsightedness into our understanding of experiences.

*Hot-cold empathy gap* could be contributing to optimism of visitors by making it hard for them to imagine just how difficult the uphill hike will be, no matter how many warning and declarations of that fact are made. They will also find it hard to imagine themselves in the place of people who could need help when they feel strong and fit. They may have trouble fathoming that they could die in a place that is so beautiful and on a day that's going so well, it is just hard for people to consider states so different and inconsistent with their current one.

#### *A lack of dread*

Even when people do actually attempt to assess risk, they base it much more on *dread* than on objective risk. How much people dread a negative event has been found to be based on how terrible a negative outcome seems, and how much an individual can control it (Slovic, 1987). People also have more dread of things for which negative imagery comes to mind (Slovic et al, 2004), and if it's easier to imagine the bad outcome.

The type of image that comes to mind when someone thinks of a negative event can be affected by *availability*. Since people see frequent media coverage of airplane crashes, very frightening images and thoughts come to mind when they think of them, and unless they're a pilot, they have no control over the plane. Therefore, plane crashes are particularly dreaded events, even if they are much less likely to befall someone than heart disease. The more emotionally laden the images are, the stronger effect they have on people. This is because the images are more likely to be remembered, and because they have a more powerful effect when people think of them (Slovic et al, 2004).

The idea of becoming too hot on a hike does not evoke drastic images the way that a terrorist attack might, and because visitors may not have heard many *affective* stories about deaths and rescue at the Canyon, they likely do not dread having a hiking accident. This lack of dread could contribute to visitors underestimating the risk that Canyon hiking can pose to them.



## VISITORS TAKE A VACATION FROM SAFETY

Away from their normal surroundings and the rules of their normal communities, people who are traveling are more open to new and different experiences than they would be at home, and may feel a lack of norms and social rules while they are temporarily out of society. Anyone who's been thrilled to try an exotic food in a foreign country that they would surely turn their nose up to at home, or been more open to spending the evening on the town with a stranger on vacation has experienced this first hand.

A trip to the Grand Canyon is a break from most people's normal routine. Studies show that this could also mean a break from safety. Espiner's glacier study reviews some of the literature on how the out of society effect could affect park visitors and found that it very well could be factor (2001).

Looking at this topic from another angle, *The Experience Economy's* (Pine & Gilmore, 1999) "Experience Realms Conceptual Map" (see sidebar) breaks down activities into four categories. From the options, it's clear that a hike in a National Park would fall into the active + immersive categories, the intersection of which is labeled as the *Escapist* realm.

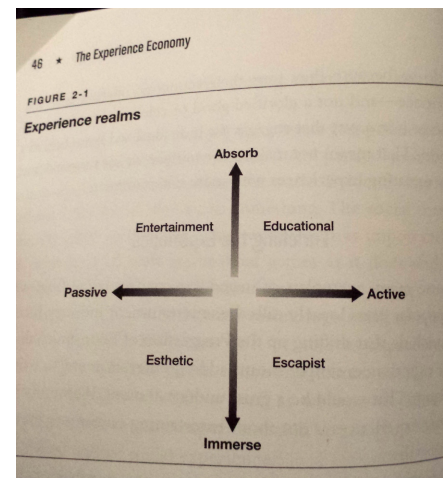
Hiking while on vacation is an inherently challenging time to convince people to do the conservative, safe thing. Pine and Gilmore (1999) go on to say with regards to this Escapist category that "While guests partaking of an educational experience may want to learn, [those taking part] of an escapist experience want to go and do..." This means once in the escapist mindset, people want to be active and are not in a learning place.

## VISITORS TAKE ON MORE AND MORE RISK

Simon Priest's *New Model for Risk Taking* (1993) looks at how a person's risk level is likely to escalate over time. When a person succeeds at a challenging task, he is bolstered and takes on additional risk. When he fails, he often blames external locus of control (outside forces), not himself, and therefore is not deterred. Only when a person is able to recognize they have gotten in over their head, and that their own actions are in part to blame, do they reconsider and counteract the ratcheting effect (Priest, 1993).

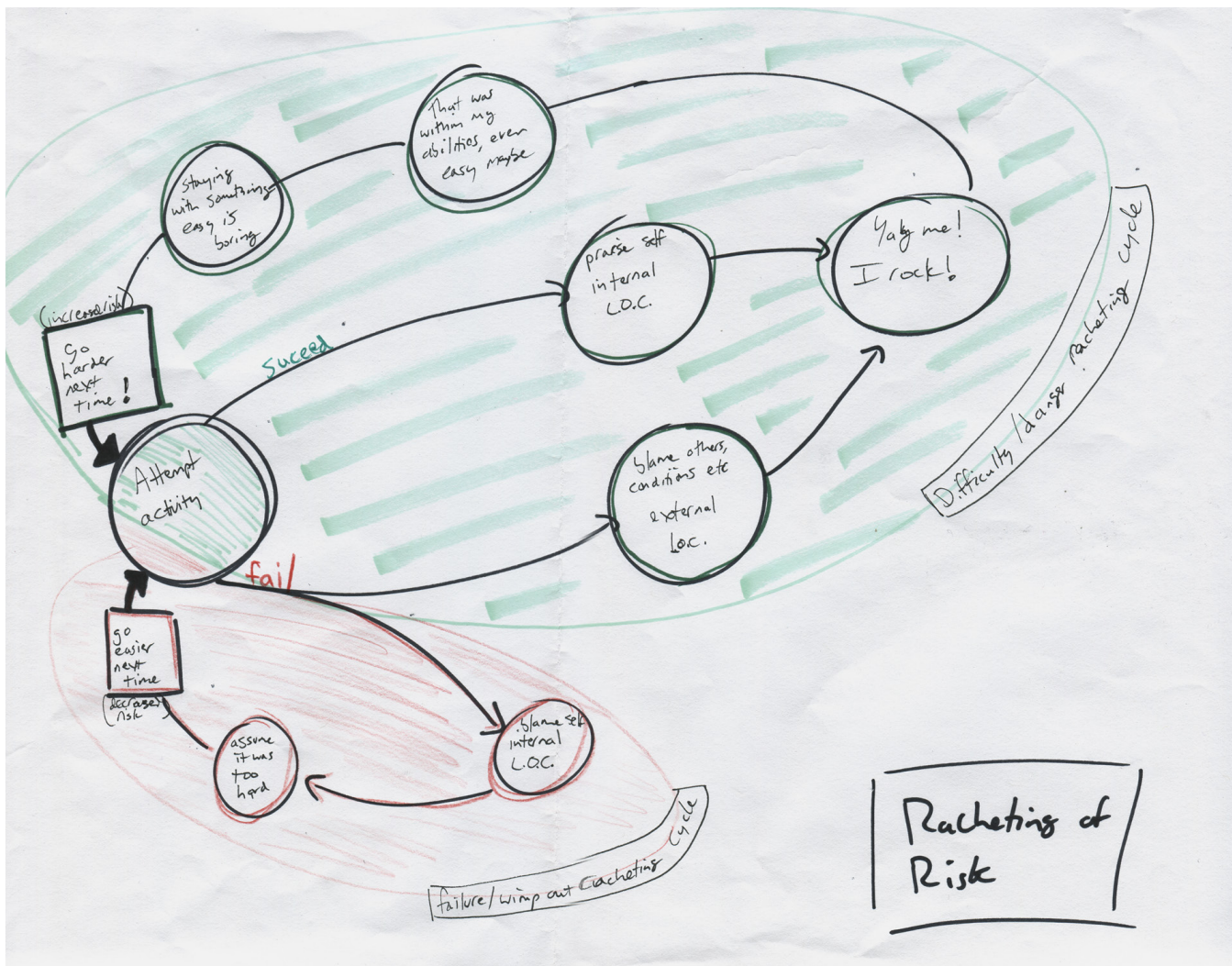
So essentially a person often doesn't really learn their lesson until he fails so spectacularly and in a way that he can only blame himself, that he actually realizes he took on too much. This is very helpful in explaining why people take risks, and why they fail to recognize that they are doing so.

This is a particularly relevant factor in buoying the confidence of aggressive visitors who may have taken dangerous risks in the past and gotten away with it. One example of this is in the boy scout tragedy covered by *Over the Edge*, where one of adult leaders explained nonchalantly that they would run out of water before they reached the river, something he had done before. I also witnessed this in the case of a very stubborn Dad who felt that his boys' previous experience overcoming a dangerous situation on a Boy Scout adventure hike meant they could handle a dangerous hike in the Canyon. The Ranger was very worried about this group, because the man's story, in fact, revealed that they were poor at judging risk and had simply gotten lucky in this past incident to escape unharmed. Instead of learning from this experience, this Dad had taken away the wrong message and ratcheted up his risk.



*The Experience Economy's Experience Realms map implies that hiking at the Park is an "Escapist" experience.*





Process: exploring the risk ratcheting process wherein people take on more and more risk, or less and less risk, as they “learn” from experience.

## VISITORS LACK FAMILIARITY WITH THE ENVIRONMENT AND OUTDOOR SKILLS

A less salacious argument than many, but one that holds standing nonetheless, is that visitors simply aren’t familiar with the environment. This lack of knowledge, understanding, and skills may contribute to behavior that seems ignorant or foolish.

Visitors without hiking experience are likely to underestimate how tiring a short hike can be when it is steep, at elevation, and in the heat. Those with extensive backcountry hiking backgrounds but little exposure to the desert or the peculiarities of the Canyon may overestimate their own personal preparedness and abilities in the unique environment.

Some of the behaviors that strike Rangers as actively foolish, like heading out midday, may not seem hazardous at all to uninitiated visitors.



Speaking of Yosemite deaths, park spokeswoman Kari J. Cobb points to inexperience as a factor, saying in a published report, “We do get a lot of visitors who may not be familiar with nature...But it is nature. And it can be dangerous” (McKinley & Lovett, 2011).

I also found that visitors, and even experts, might overlook the skills that are involved in safe backcountry travel. Hiking, after all, appears as simple as walking. And when everything goes smoothly in easy conditions, it is quite easy. But as with piloting a plane, the real skills come into play when there are challenging conditions, and things don’t go as planned.

This insight arose when I noticed that PSAR Rangers were very worried about some visitors heading too far down into the Canyon, even though they seemed fit and well equipped. I realized, thinking back to the incidents discussed in *Over the Edge* that there was some real evidence to support this concern. These groups weren’t lacking things; they were lacking the knowledge, born of experience, of how to handle an adverse situation. The deeper one goes into the Canyon, the lower the margin for error, and the greater likelihood something will happen that will require the knowledge that inexperienced folks don’t have. And when that happens, not only will they have difficulty troubleshooting, but also the realization that they lack the skills to handle the situation can cause them to panic.

## VISITORS ARE COMPELLED BY SOCIAL PROOF

*Over the Edge* asserts “the single most common misconception that visitors to the Canyon share: “Lots of people hike in Grand Canyon; it can’t be that dangerous” (Ghiglieri & Myers, 2001, p. 67).

Social proof, “the tendency of people to view an activity as more worthwhile if other people are doing it,” (Dirksen, 2011, p. 147), certainly seems to be at play at the Canyon. There is no shortage of crowds, and once one person goes beyond the fence, or is out hiking midday, many others are likely to join them, whether it’s wise to or not.

Espiner (2001) observed the influence of social proof in his site study as well: “Observations of visitors also suggested that the behaviour of other people was an important factor influencing visitor behaviour. When visitors were observed beyond the recommended “safety” zone, this appeared to legitimise the behaviour of ignoring the access restriction.”

## GROUP MEMBERS CAN LEAD VISITORS ASTRAY

Referencing Ewert, 1993 and Schuett 1995, Rickard et al. (2011) mentions that “...research in recreation and leisure studies suggest that one’s traveling companions may be related to, or even influence, recreational activity choices and risk taking”

Of course people influence the choices of those with whom they are traveling. With the vast majority of visitors visiting in groups, the dynamics of the cohort can be a factor in incidents.

Both *Over the Edge* (Ghiglieri & Myers, 2001) and the *PSAR Impact Report* (2013) provide examples where an extremely misguided group leader led others indisputably towards death. The Boy Scout incident discussed earlier



*Once one visitor took a photo on this once ignored rock in the middle of the walkway at Mather Point, everyone wanted one.*



was a clear case where an adult group leader's poor choices condemned the group to tragedy. In a more recent example, discussed in the PSAR report, a woman was warned by the PSAR representative at *Cedar Ridge* that their plan was too ambitious, given the heat and time of day. While other members of her group showed concern, the woman was not persuaded and pushed onward. She made it to within 1/4 mile of Phantom Ranch before collapsing of heat exhaustion and dying (PSAR Impact Report, p. 42). While in this case the group leader herself paid the ultimate price, her efforts put her entire group in grave danger.

Even when a group leader isn't actively compelling the group into a dangerous situation, group dynamics can make a group more or less safe. Group discussions can help deter people from poor choices, but some group members may be reluctant to speak up and look cautious or constrain the group by wanting to take a more conservative approach.

### PARK'S SAFETY EFFORTS MAY GIVE VISITORS A FALSE SENSE OF SAFETY

The fact that parks provide a good amount of safety information, warning, and assistance, may give visitors the perception that the Canyon is a more controlled environment than it really is. This, in-turn, leads to the concerns expressed earlier in this chapter that visitors feel like they're safe because of the park presence.

Some visitors do rely on the safety-related advice they receive from the Park. In Rickard et al.'s study, several visitors appreciated the active role the park took in helping ensure safety, "We relied on feedback from Rangers in choosing our day hikes and in several cases were told of challenges and conditions that were quite helpful and much appreciated (crossings, closures, snow)" (Rickard et al., 2011, p. 539).

I witnessed the same in my time at the Canyon; many visitors sought the advice of Rangers on which hike to take.

In what could be a nod to this more control, more problems effect, the *NPS Comprehensive Safety Report* (Tuler & Golding, 2002) found that less developed parks have a lower rates of incidents. They also found that visitors to those parks had higher rates of assuming they were primarily responsible for ensuring their own safety (Tuler & Golding, 2002). However, since visitors to less developed parks tend to be more advanced users, it is not certain that there is a causal link between these two findings.

### PARKS DON'T "GET" VISITORS

If parks are at least partially responsible for visitor safety, they can be blamed for failing to really understand the visitor audience, and to then tailor their messages appropriately. Espiner, in his study of a New Zealand National Park (2001), notes that, "What initially appears to be a comprehensive risk management strategy for improving the safety of visitors is deficient in the sense that it does not focus on visitor behavior."

Some within the PSAR community are beginning to focus on this concern, but it is not yet resolved. The Grand Canyon PSAR team is beginning to collect more statistics on the visitors they help to help them begin to get a



better understanding of the visitors they should target most with their prevention efforts.

Roger Farmer, the safety lead at Yosemite National Park, notes that they are also making an effort to try to understand visitors better, “That’s what we’re trying to figure out with the social science stuff, is why people take those risks” (Repanshek, 2009).

## THE PARK’S PERSUASION STRATEGY IS LACKLUSTER

When looking to assign blame for safety problems, one can also point a finger at the Parks’ communication strategy. Much of the current information approach focuses on an implied shift of responsibility via a legalistically styled informed consent strategy.

By telling visitors about all the hazards present, and by telling them, “be careful” there is an implied shift of responsibility for managing these threats over to the visitor himself. “Hey, we warned them, if they don’t listen, it’s on them” is the attitude implied by these efforts.

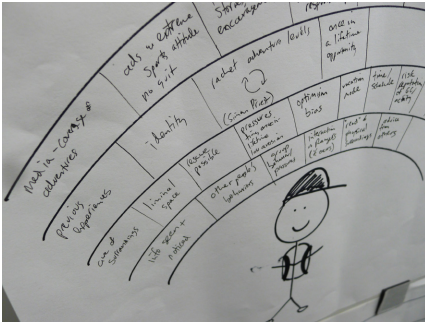
This approach also assumes that visitors simply lack the information to make the correct choice, and once this information is provided, they’ll be good to go. This *information deficit approach* fails to address the myriad of other reasons visitors can err, and can fail to be compelling. While the study touches on communications efforts almost exclusively in the future research section, Rickard’s study (2012) does note that in interviews employees acknowledge the limited effectiveness of an *information deficit approach*, yet they nonetheless rely on it as the linchpin of their risk management efforts. (Rickard, 2012, p. 332). That study also notes that employees articulated a desire to tailor messages to different groups, but actual communications plans are built almost exclusively of blanket messaging and one-way communications. In my research, I even found with new technologies like Twitter, Parks are engaging in a one-way information blast.

More about the Park’s current interventions, and how they may or may not contribute to a safer environment for visitors, is found in the next chapter.



*A warning-focused and unattractive sign doesn't win over visitors.*





Process: Mapping visitor influences

## IN THE END, IS “HUMAN ERROR” TO BLAME?

Visitors make plenty of mistakes in the park environment that greatly contribute to poor outcomes for themselves and others who see the poor example they set. Park authorities are likely correct that “human error” is a factor in nearly all visitor incidents. But what does that human error look like, and what can be done to correct it?

I propose that the fact that visitors make mistakes does not absolve the park from responsibility. People make mistakes. And in this case, many people make the same mistakes, day in and day out, at the Park. And because most people only visit once, there is little opportunity for them to learn from their mistakes. Most repeat visitors to the Park do make better, more informed choices on subsequent visits, but most visitors won’t have a chance for a do-over. And for a few, the learning curve can be so steep that they lose their life because of it.

Regardless of whose fault the problems really are, the Park is in a position to exercise *preventative attribution* and is looking to do so, so I’ll leave the attribution debate largely aside for the rest of the document as I consider how best to move forward.



UNDERSTANDING THE AS-IS

# CHAPTER THREE

## WHAT ARE THE CURRENT VISITOR SAFETY & INFORMATION EFFORTS?





## CHAPTER THREE INTRODUCTION

The previous chapters focused on the incidents, the actors involved, and theories surrounding why visitors get hurt. I hope that from these the reader has started to gain a basic idea of the problem itself and an understanding of the context in which it lies. However, as discussed in the Introduction, the issue of visitors getting hurt in the park is not a new one. The Park has made an active effort to try to decrease visitor injury and deaths. This chapter explores what has already been done to try to decrease visitor safety problems at Grand Canyon National Park.

There is limited documentation of the current efforts, so during my time at the park I inventoried them myself. Through interviews with PSAR Rangers, and observations I culled together a catalog of the current interventions aimed at increasing visitor safety.

In this chapter I've broken the discussion of the current efforts into four categories: Search and Rescue operations, Preventative Search and Rescue manned patrols, informational interventions, and other types of interventions.

I also noticed some Park actions which may affect visitor safety even though they were not intended to do so. I refer to these items as *unintentional interventions*, and include a short section on these items as well.

In addition to documenting what the interventions were, I tried where possible to also understand how visitors were reacting to, and interacting with, these measures. What was capturing visitors' attention? What was being ignored by visitors?

Combining these factual findings with additional insight from scholarly research, I then conducted an informal design audit, analyzing the current strategies and tactics and looking for opportunities to improve the efforts.



# SEARCH AND RESCUE PROVIDES THE LAST LINE OF DEFENSE

When someone is hurt outdoors and requests help, search and rescue (SAR) goes into action. While in many places search and rescue is performed primarily—if not exclusively—by volunteers, in top national parks such as Grand Canyon, search and rescue is a highly professional operation. Grand Canyon conducts hundreds of SAR missions a year (“Grand Canyon National Park Park Profile 2013”), utilizing a team of paramedics and EMTs who are trained both in emergency medicine and in outdoor rescue-specific skills. They coordinate efforts with Rangers stationed inside the Canyon at three Ranger stations.

With a very straightforward trail system, the vast majority of SAR cases at the Grand Canyon fall under the primary mission of rescue, rather than search. Unlike in many alpine parks, at the Grand Canyon visitors who become lost generally do so after falling ill because of exposure. Once someone’s body is beginning to break down because of exposure, their thinking and motor skills can be impaired, causing them to attempt to “short-cut” down a cliff or to stumble and lose their footing (Ghiglieri & Myers, 2001).

The following account of how SAR operations are conducted at the Grand Canyon is based on my conversation with Rangers there (personal communication, June 2, 2013). When a call for help reaches the operations center, a SAR manager determines what resources should be extended to the individual in need. Sometimes information is vague, and rescuers are unsure of a person’s exact location or condition. In other cases the individual himself is calling in from an emergency phone. The most conservative response available is to coach the person through coping techniques so that he can self-rescue without requiring assistance. In many cases, a SAR team member is sent on foot into the Canyon to meet the person and assess what help is needed.

Often the SAR member is able to simply help the hiker rest and rehydrate, and then will walk with him slowly back up and out of the canyon. During the summer they often wait until dark when it is cooler. In more serious conditions, SAR members intervene medically, and if necessary call for helicopter rescue. There are a few specific spaces where helicopters can land in the Canyon. In other cases, a dangerous litter carry maneuver is employed: a SAR member is lowered from the helicopter on a rope, the injured person is placed in a litter attached to the end of the same rope, and then both are flown out of the Canyon, still hanging from underneath the helicopter.

As one can imagine, helicopter rescues are expensive in addition to dangerous, and Rangers want to use this tool as infrequently as possible. To help reduce the severity and frequency of rescues, Grand Canyon utilizes a Preventative Search and Rescue program, discussed at length in the following section.



*Rangers carry a visitor out of the Canyon on the Bright Angel Trail.  
Photo source: NPS*



---

## PSAR PATROL TACTICS

PSAR Patrol members use a variety of tactics to try to change visitors' decision and behavior, including:

- Point out past cases where similar plans or circumstance led to problems
- Say hello to hiker on way down to create familiarity, friendly tone for later
- Attempt to connect with hikers
- Convince hikers their plans are ill-advised (if they are)
- Suggest alternatives to ill-advised plans
- Lure people into alternatives. IE Mention ice cream in front of kids, beer for young guys, suggest "Don't you want to save energy for going to Vegas?" or "Do short hike today, longer better hike tomorrow,"
- Remind them of possible constraints - Do you have a dinner reservation or train to catch?
- Mention the frequent need for rescues
- Provide new information that may help them change decision (without losing face). IE "You can't possibly metabolize enough water to stave off heat stroke at a certain point." or "Rescues take time and planning." or "If you have had a cold or been sick then you are not at your full capacity, regardless of training."
- Show legitimate concern for the wellbeing of visitors
- Tell visitors that "I cannot legally stop you, I'm only looking out for your best interests"
- Provide basic trail information that they may not know (mileage, times, elev change, water avail)
- Ask visitors how long they think the hike will take, or how far they think it is, and then surprise them with actual answer

# PSAR PATROLS PROVIDE VISITOR OUTREACH

During the summer, PSAR Rangers and volunteers patrol the trails, speaking with visitors about their hiking plans.

PSAR patrols are out on the corridor trails everyday, serving as "walking billboards" (Anonymous PSAR Ranger, personal communication, June 4, 2013). This PSARing (pronounced P-saur-ing) is usually a solo activity, due to staffing constraints. However, when a new PSAR volunteer is being trained, they shadow a PSAR team member for at least is two shifts, creating a team of two.

As the PSARer hikes down to their "station" for the day, they greet visitors and try to establish a friendly, yet authority-based, rapport. They position themselves at a point where many people will be, and should be, turning back if taking a day hike. On the days I shadowed team member it was quite warm (although not warm enough to warrant a *Red Flag* warning), so the PSAR Rangers positioned themselves just past the *1.5 Mile Resthouse* on the Bright Angel Trail, and *Cedar Point* on South Kaibab Trail.

Team members generally patrol from 8am-2pm daily on the South Kaibab and Bright Angels Trails. Bright Angel also has a second afternoon shift patrol as well when possible. Lesser-used trails receive occasional PSAR coverage.

Once in position, the PSAR team member intercepts visitors continuing on farther down the trail by asking "Where are you headed today?"

As PSARers engage with each visitor they assess the visitors' plans, and make an instant assessment about their fitness to complete the hike based on their gear, visible fitness level and the information the visitor provides about their hike.

If the PSARer thinks the visitor is overreaching in his plans, she will provide a combination of education ("Do you know how far it is to Skeleton Point?" "You will have shade after 4pm, rest until then"), persuasion ("Look, I'm a Ranger here, and I would not attempt that hike today, it's just going to be miserable"), and alternate options ("What you could do, is you could turn around here, and then get an earlier start tomorrow, and be able to go down to *Cedar Ridge* on the Kaibab - better views there than there are here...") to try to sway the visitor (See sidebar for additional PSAR Tactics).

Even just speaking briefly with each visitor is no small task when one considers that the Bright Angel Trail alone hosts 600 hikers on an average day, and 800 on the busy days (Backlund et al., 2006). All together the main South Rim trails see approximately 80,000 hikers per season. ("PSAR Impact Report," p. 39). While patrollers try their best, if the Ranger is busy speaking with one hiking party, another group may slip past. If a visitor is out on the trail outside of the PSAR patrol hours, they also will miss the patrol.

## KEY CHARACTERISTICS OF THE PSAR PATROL APPROACH

I found the approach that the PSAR takes to visitor safety revolves around three main principles. First, PSAR aims to both convince and educate.



PSARers try to address the short-term need to prevent a visitor from getting hurt, but they also hope to educate them so that they make them better, safer hikers in the future, even if they don't hike again at Grand Canyon. Second, they attempt to reach out to all visitors continuing down the trail. While PSARers gauge visitor readiness and are more persistent with the visitors that worry them most, they try to talk to everyone. Even when trying to reach everyone, the PSARers don't give everyone the same message. The third principle is that a PSARer will attempt to personalize the pitch he makes to a visitor based on his read of the visitor. What alternatives will appeal to the visitor? Is he dead set on this hike and the PSARer should focus on educating him on coping with the heat, or is there a chance he might turn around and efforts should be focused there?

## PSAR PATROL GOALS

PSAR Patrols attempt to change visitors behavior and thinking. They want the visitor to:

### *Change visitor behavior*

Change their planned destination, or timing of the rest of their hike

Take actions, such as drinking more, and take shade breaks to decrease the consequences of overdoing it if they insist on an ambitious plan

Adjust future days' hiking plans based on feedback

### *Change visitor thinking*

Recognize and accept that their plan is unrealistic

Feel more vulnerable

Know how to cope better with the Grand Canyon environment

Understand how their actions could result in undesirable consequences

## PROMISING ELEMENTS OF THE PSAR PATROL INTERVENTION

### *PSAR provides just-in-time information*

PSAR patrols provide just-in-time information and advice to visitors. They are coaching visitors about their hike while they are engaged in it. Rangers are often encouraging visitors to turn around immediately or soon after the discussion. This minimizes the amount that visitors need to forecast into the future or recall in order to put the information into use.

### *Human information sources are highly engaging*

With the intercept approach, most people do engage with the PSARers. Very few people keep going and completely ignore the Ranger speaking to them. Rangers are able to literally interrupt visitors to get their attention in a way that no sign possibly can, and visitors have few other things competing for their attention while they are speaking with Rangers. PSARers make an active effort to establish a connection with visitors, and when this is successful visitors seem to be receptive to the Ranger's message. However, when the visitor and PSARer get off on the wrong foot and fail to connect, visitors seem much less likely to heed the Ranger's advice.





*A PSAR Ranger speaks with visitors about their hiking plans. The Ranger's face blurred to retain anonymity.*

### PSAR intercept sparks discussions

Visitors rarely turn around on the spot after talking with the Ranger. The decision about whether to heed the Ranger's advice or not is often made during conversations among hiking groups after they have continued past the Ranger's position. Rangers know this is the case because sound travels very far in the Canyon. Rangers frequently overhear groups arguing amongst themselves after being warned by them that their plans are too ambitious.

One downside of these group discussions is that Rangers want groups to stay together for increased safety, and arguments about turning around can cause a group to split up and pursue different plans. Overall, however, triggering discussion and allowing dissent within groups to surface seems to be a productive force. My research revealed that groups fair better, and it's speculated that it's because of the effect of "two heads are better than one."

I realized later that part of the reason the Ranger discussion sparks a sudden conversation within groups is that some or all of the information that the Ranger is sharing is new to some group members. They might not have realized how far the hike they were on was, or the group leader might not have even disclosed the planned destination with them. Now that they've been told they are doing something that could be unsafe, some group members may be less comfortable with pushing the line on safety. I wondered how I might spark a similar discussion within groups and correct the information imbalance between group members without a direct confrontation.

### PSAR intercept forces a reality check for visitors

PSARers provide helpful information, and their presence as authority figures might deter some hikers from breaking the rules. After witnessing Rangers' methods first hand, and discussing them with Rangers, we agreed that the most successful service that the intercepts provide is a reality check: "Look, it's still 3 miles to there, it's already 10am, it's going to get really hot in an hour and you just don't have enough time for that hike today."

PSARers are able to size up a visitor and offer a more personalized-feeling appraisal (even if in reality it is fairly generic) to visitors about what they can and can't pull off. The visitor, at that point in their hike, is beginning to have some understanding of the environmental conditions so that comments like "hotter" and "steeper" feel relevant to them.

Visitors are often disappointed by being told that their goal is unattainable and can try to find excuses to dismiss the Rangers' concerns. Still, bringing up these issues and pointing them out to visitors is, at the least, a good first step.

## LIMITATIONS OF THE PSAR PATROL INTERVENTION

### Some visitors miss the Patrol

The PSAR team is fairly adept at getting visitors to engage with them either by physically blocking the path a bit, and by relying on visitors' sense of social obligation to respond to someone speaking to them. However, some visitors do ignore the inquiry and continue down trail. These visitors who refuse to speak to the PSARer, as well as any visitors who hike when a PSARer isn't on trail, will not be affected by this intervention at all.



### Visitors can be confused, intimidated by the Patrol

Visitors are often caught off-guard by the PSARer. Not everyone knows about Park Rangers and what they do, and few visitors know about the PSAR program. Given this missing context, visitors are often caught off-guard and confused by the Ranger standing along the trail asking about their plans. International visitors can be especially confused.

### RESISTANCE TO AUTHORITY MAY MAKE VISITORS LESS COMPLIANT

The fact that the Ranger is an authority figure and is literally standing between a visitor and something he wants to do can make some visitors defensive towards PSAR patrollers. Visitors may be less likely to heed advice from a PSARer that they would have happily taken at the Visitor Center, simply because now they feel like they're being "told what to do." Despite Rangers' efforts to convey a friendly tone, the basics of the situation make it challenging to avoid creating an adversarial relationship right from the start.

Once this dynamic is in place, visitors can be reluctant to "give in" or admit weakness by actually following the Rangers' advice. Hardly any visitors turn around on the spot after speaking with the Ranger. They often continue on a bit further before turning back, seemingly trying to "save face" by not admitting that they are giving in and following the Rangers advice to turn back.

Some may take it further and actually dig their heels in in reaction to the challenge, leading them to become more committed to their overzealous plan to seem tough and prove the Ranger wrong.

While at the Canyon, I ran into one former colleague on a shuttle bus at the Park. He was planning on making the Rim to River and back hike in a day—the very hike that the park is most concerned about discouraging visitors from undertaking. While he is fit and has much more desert hiking experience than most visitors, this was still a challenging and dangerous undertaking, especially because his hiking companion was not as skilled or fit as he. He told me he actually planned on leaving early for the Rim to River hike specifically to avoid the PSAR Rangers. After an aggravating run-in with a PSARer on a warm-up hike, he asked at the Visitor Center what time they start out on the trails so that he could avoid the chastising he knew he would receive when he informed the Ranger about his Rim to River intent. While this was only an isolated incident, the fact that any visitor would go out of their way to avoid the PSAR team is a troubling sign. Especially given the importance of reaching young males, a group of top concern for Park managers, who may be the most likely to be bothered by the assertion of authority by PSARers. How might interventions reach these groups without relying on an air of authority that can be off-putting to some visitors?

### Information can be lost in translation

I noticed a number of instances where Rangers and visitors weren't quite speaking the same language, and neither group really realized that they lacked shared understanding and context. Since Rangers are immersed in the Grand Canyon environment all the time, they may not be aware of some insider perspectives that set them apart from visitors. Some of the instances where visitors and Rangers aren't seeing eye-to-eye include:



### Rangers sometimes misjudge visitors

One downside of relying on a snap-judgment of visitors is that Rangers might guess wrong. While Rangers can win over visitors in a way that signs can't, they can also alienate them in a way that signs can't.

When the visitors feel like the Ranger doesn't "get" them or where they are coming from, they may be unlikely to follow the Ranger's advice. For instance, during one of the patrols I shadowed, a Ranger suggested a group of young men turn back right away and then add on a nice hike on the "all levels" Rim Trail.

She failed to recognize that this group was active military, and they seemed to find the suggestion of such an easy trail downright insulting. Her misjudgement of them caused them to discredit her in turn, and nothing she could say after that could win them back. By not recognizing the group's background and underestimating the group, the Ranger quickly made herself seem like an unreliable source.

With limited time to speak with visitors, it's not surprising that Rangers don't have the opportunity to get to know where each group is coming from, however it's helpful to note that there are pitfalls to having to make such quick assumptions about groups.

### Visitors and Rangers have different ideas of "early"

Rangers and information advise visitors to hit the trails "early" during the hot summer months. I saw that many visitors were surprised when told by the Ranger at 9:00 A.M. or 10:00 A.M. that they were too late to safely execute their hiking plans. For a visitor on vacation, being up and out on the trail at nine o'clock in the morning seems early. However the "early" required for some hikes at the Canyon in summer means being on the trail at 5:00 A.M. or 6:00 A.M.

This difference is compounded by *adjustment* wherein people interpret the advice provided based on their own experiences and biases. Visitors may assume that getting an early hike is advantageous, but that being a bit late is just less good, not downright problematic. While there is some gradient involved, the intent of the departure times that Rangers provide is to help visitors be off the trail before the height of the day's heat. So the difference between starting at the recommended time and starting a few hours later is more of a stark contrast than many visitors expect. The difficulty of a late start is further compounded by the fact that there is little remediation for the midday heat. Once it is the hot part of the day, all that can be done is to suffer through it, or wait and rest for six hours until the temperatures begin cooling back down. Most visitors, however, will continue to exert in the hot sun, slowing down their return which then leaves them exposed to high temps and sun much longer, compounding the problem.

### Visitors' mental model of space is based on information provided, while Rangers' is based on experience

Similar to the confusion caused by "early," I noticed a misunderstanding about the "end of the trail" while shadowing a Ranger on the South Kaibab Trail. Several times visitors reported they were going to the "bottom" or "end," of the trail when asked about their plans. This alarmed the Ranger, who believed the visitors was headed all the way down to the River, only to later learn after further interrogation that the visitor only



*Just after sunrise is a great time to be hiking the Bright Angel Trail in Summer.*



planned to go to *Skeleton Point*. While still a tough hike, going to Skeleton Point it's not nearly as far as going to the River. Skeleton Point is an edge, not really a bottom of anything so at first I shared their confusion - why were they saying they were going to the bottom when they weren't? The following day I realized the source of the issue.

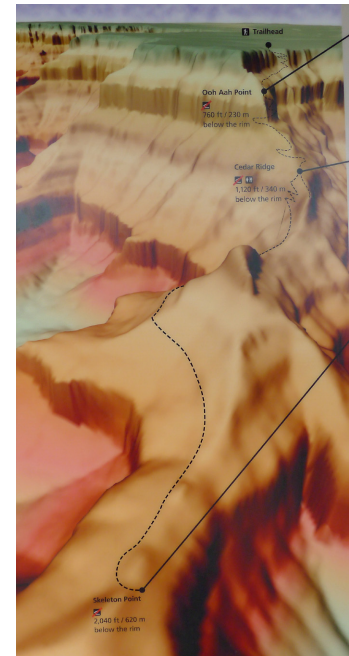
The map in the newspaper, and one at the Visitor Center Information Plaza (see sidebar), shows only day hike destinations, so Skeleton Point is the last point on the map. Because these visitors only have this information, they think of Skeleton Point as the end of the hike. Because Rangers do not consult these resources, they don't realize what the visitor means by "end."

#### Visitors don't distinguish trails based on management levels

Rangers and park managers make a big distinction in their management approach between frontcountry and backcountry trails. They distinguish further between the more maintained Bright Angel and South Kaibab trails and other secondary, unmaintained and less monitored trails. Visitors, on the other hand do not make these distinctions. These differences are not salient, if even known, to visitors. On multiple occasions the Ranger staff expressed shock at the gall of inexperienced visitors to venture onto lesser used trails unprepared, worsening their circumstances considerably by choosing a trail with little Ranger coverage, more challenging footing, and less people and cell coverage if something goes wrong (personal communication, June 2-4, 2013). They seemed completely oblivious to the fact that visitors didn't see the situation the same at all. Visitors often have no idea that there is a difference in safety measures, expectations of preparedness or difficulty between one trail and another.

#### Visitors don't know where they are. Rangers think it's crystal clear.

Similar to the above issue, Rangers think that it is absurd that a visitor could pass *Cedar Ridge* on South Kaibab without realizing they've done so. To the Ranger, this landmark is crystal clear, it's the big opening of the trail, on the ridge, and it's even got a little sign. But of course they also know the location of Cedar Ridge due to their familiarity with the trail. It can be very difficult for a person with a lot of tacit knowledge to realize what it's like for someone who lacks that same understanding and Rangers certainly fall into this trap at times.



*Skeleton Point appears to be the "end" of the trail on this Visitor Center map.*



*Welcome to Cedar Ridge!*



# SAFETY AND HIKE INFORMATION AIMS TO EDUCATE VISITORS

## A VARIETY OF MESSAGES ARE PRESENT

Several different types of messages are currently in use to encourage visitors to be safer hikers. An overview of the main messaging campaigns follows.

### WHAT GOES DOWN

This signage starts with the headline “What goes down, must go back up” or alternatively “Down is Optional, Up is Mandatory” to encourage visitors to think about the return trip. Below the headline it lists a series of cautions and advice on what visitors should do and bring. These signs are placed near trailheads, and trailside, as well as included at information displays through the park.

While it provides important information, the aesthetics of these signs leave much to be desired. The red background is eye-catching, but can make the text hard to read, and the design can come across as hokey. An attempt to speak directly to the “young and invincible” may miss its mark. While targeting a specific audience can be helpful, making clear to that audience that you’re targeting them can make them less likely to fall for what feels like a ploy. The “young and invincible” may dismiss this signage off-hand since it relies on a call to authority that is likely unappealing to this group. The rescue image included could increase *availability* of poor outcomes, but the staged photo may illicit mocking from the intended young male audience, who aren’t likely to imagine themselves in the place of the victim (Weinstein, 1984).



*The signage at a South Kaibab Trail Resthouse (above) and along the Canyon Rim near the Grandview Trail trailhead (left)*





The signage displayed in one of the lodge shops (2nd from bottom) and on a hotel information counter (bottom).

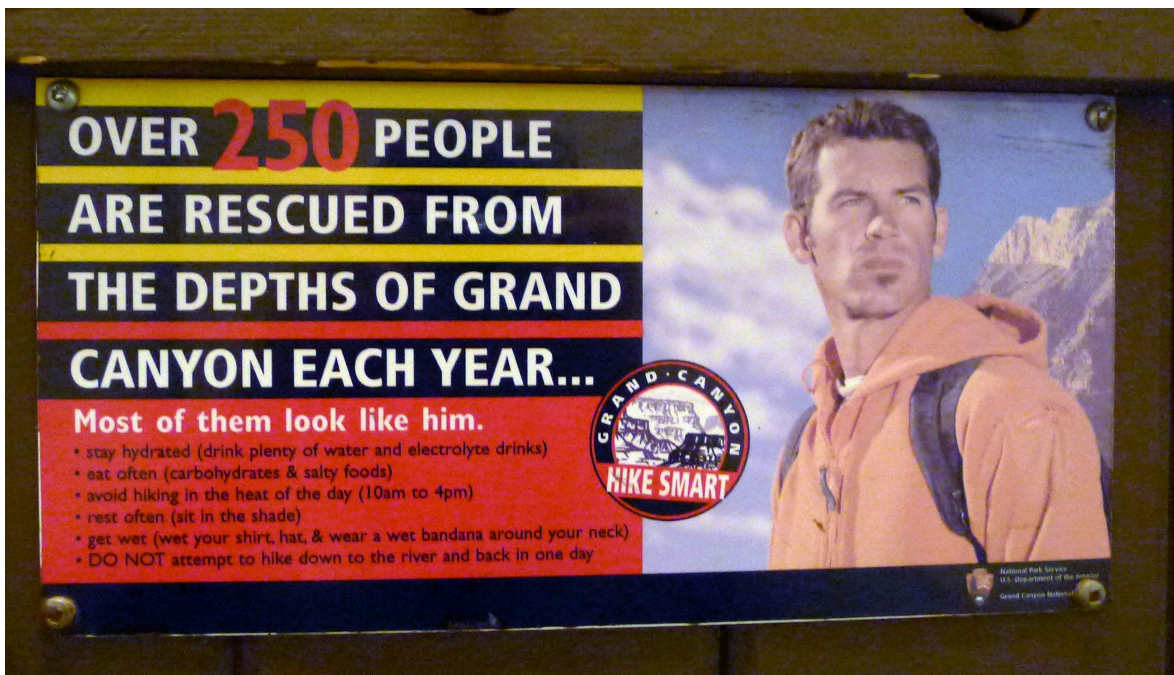


## MOST LOOK LIKE HIM

Created alongside the *What Goes Down* sign series, *Most Look Like Him* is also targeted to young males. The message is very clear: you could get hurt. However, this general sentiment is out of line with young males' perception of the situation. They are likely to assume this sign is "for other people" as Rangers report visitor often say about warning signs. Since many visitors are *Deluded* rather than *YOLO* types (see Chapter Two) this attempt to dissuade young males with the assumption that they are self-aware may be misguided.

While this signage does provide helpful how-to tips for visitors, those not looking much beyond the headline may miss this much smaller information.

### MOST LOOK LIKE HIM SIGNAGE EXAMPLES



The signage as seen on the check-in counter of Bright Angel Lodge.



Most Look Like Him signage even makes an appearance inside one of the Canyon's cafeterias.



## HIKE SMART

Various information online and on-site carries the Hike Smart tag, including bus signage, trail signs and lodging. There are even bags, water bottles, whistles and chapstick emblazoned with the Hike Smart logo! This campaign is certainly ubiquitous and reaches visitors in a number of creative ways.

One downside of the Hike Smart campaign is that it focuses again on a top-down imperative from authorities to visitors. While some information on the website does emphasize that being better prepared will make for a more enjoyable hike, overall the Hike Smart campaign seems to rely on a visitor's interest in compliance to follow the tips.

Also, while "Hike Smart" is memorable, and may provide some awareness to visitors that they should indeed be safe, it fails to provide specific actions visitors should take. The list of tips and cautions listed alongside the logo varies somewhat from artifact to artifact and is much less prominent than the title. This information also may not be concise enough to have visitors commit it to memory given the short interactions they're likely to have with these information touchpoints.

Perhaps if the landmark phrase focused more on actions - "Eat, drink, avoid midday and quit while you're ahead" for instance - it would mean that if visitors took nothing else away but the headline that they would still gained much from seeing this saying repeated over and over again on-site.

---

### HIKE SMART EXAMPLES



*Hike Smart advertising inside a Park shuttle bus.*







*The Margaret Bradley sign's position within the Bright Angel Trailhead display, with white rectangle added to highlight the sign's position.*

## MARGARET BRADLEY

The *Margaret Bradley* piece tells the story about a young women who died at the Grand Canyon after going on a very long trail run with insufficient food and water.

When included within the trailhead signage, the sign catches visitors' attention and is read by visitors. It is interesting to note that it is often the only oversized print piece within the display, and that it has a more professional layout than other notices and includes a large headline. At Bright Angel it is the largest item and in the upper left whereas at the South Kaibab trailhead it is still the largest item, but in lower left position. It received somewhat fewer views at South Kaibab than Bright Angel, but there are far fewer casual trailhead visitors at South Kaibab because of shuttle-only access to that trail..

It's unclear the extent to which the story relies on prominence and hierarchy to get visitor attention, and how much it's simply the piece itself. Either way, the story compels visitors to keep reading and remember it. Most likely the combination of content and display makes it a good example for how to engage visitors.

PSAR Rangers lamented to me that visitors will read, remember and reference the Margaret Bradley story, yet they don't actually adapt their behavior accordingly. They tell the Ranger, "That's so sad" right before they inform her of their overly ambitious plans to hike to *Skeleton Point*, seemingly learning nothing from the story (personal communications, June 2-4, 2013).

The Rangers worry that because Margaret was so obviously woefully under-prepared, and because the hike she was taking on was so far beyond what most visitors will attempt, visitors don't apply the lessons of her death to their own cases (personal communications, June 2-4, 2013).

I would like to offer two caveats to this interpretation. The first is that of course the PSAR Rangers are only noting the cases of visitors who read the sign and are still poorly behaved. There could be many other who are better prepared and take an easier hike because of the signs, which the Ranger would simply not know.

The second caveat is that even if it's not quite enough to change visitors' behavior the *Margaret Bradley* sign is successful in a number of ways. First and foremost, it's read and remembered, making it unique among the information provided. It must be doing something right, even if some adjustments are in order. Also, even if visitors don't immediately apply the lessons to themselves, the mere presence of a story of death increases *availability* of negative outcomes, which should make visitors a bit more cautious. This sad story likely also affects the mood of visitors and causes a moment of sadness, which can lead to increased vulnerability and decreased optimism for visitors, both which should be helpful in encouraging cautious decision making (Loewenstein, 2001, Kahneman, 2011).

The *Margaret Bradley* sign also uses a powerful anecdote to illustrate a larger point, an approach the literature suggests is especially effective. Hendrickx et al. (1989), as cited in Slovic (2004), found that, "...warnings were more effective when rather than being presented in terms of relative frequencies of harm, they were presented in the form of vivid, *affect*-laden scenarios and



anecdotes.” Slovic et al propose that *affect* could play a role in the impact of *availability*, saying “Availability may work not only through ease of recall or imaginability, but because remembered and imagined images come tagged with affect.” (2004, p. 317) In other words, we may be relying less on the memory, and more on the feeling the memory evokes. Kahneman (2011) notes that when dealing with low probability events, they feel more salient with more details, rather than a simple percentage (p. 329) and that people are better at extracting a general principle from a specific example than at thinking a larger principle would apply to them (p. 174).

“If I had the same cooperation [as Margaret Bradley’s family, who actively requested her story be used to help prevent future deaths] from all the victims’ families, I could have a different story at every trailhead,” a PSAR manager told me (June 2, 2013). As depressing as it may be, this could actually be a successful tactic.

THE MAIN MARGARET BRADLEY SIGN

Grand Canyon

National Park Service  
U.S. Department of the Interior  
Grand Canyon National Park  
Arizona

## Could You Run the Boston Marathon?

Margaret Bradley could. This 24-year-old runner finished the 2004 Boston Marathon in a little more than three hours. Margaret, a superb athlete and a gifted medical student, was a remarkable person.

**Margaret Bradley died in Grand Canyon on July 9, 2004, of dehydration.**

Margaret and a companion left the South Rim mid-morning for what they thought was a 15-mile (24 km) day hike. They failed to carry a map, so were unaware their proposed hike was actually 27 miles (43 km). The predicted high temperature for the inner canyon was 105°F (41°C).

**Each carried inadequate food and water. In her small pack, Margaret had:**

- 1.5 liters of water
- 2 energy bars
- 1 apple

**They were unprepared for the extreme heat, excessive distance, and lack of water.**

By mid-afternoon, the hottest part of the day, the two ran out of water and were severely heat stressed. Margaret’s companion could no longer continue. Thinking it would be best to go for help, they decided to separate—their final mistake. Her companion, after resting out the heat of the day, made it out alive. Two days after beginning their trip, park rangers found Margaret’s body.

**Margaret Bradley did not have to die.**

If she had followed a few guidelines for hiking smart, she would be alive today.

Margaret L. Bradley  
1979 – 2004  
Photo courtesy of the Bradley Family

## Avoid Deadly Mistakes

### Have a plan

Plan ahead for the unexpected. Know where you are going, the length of your route, and where to obtain water. Check the weather forecast. Leave your itinerary with a reliable person and report in when you return. Remember:

**It can take twice as long to hike up, as it does to hike down.**

### Refuel and Rehydrate

Eat twice as much food as you normally would, including plenty of high calorie, salty foods. The only trail with reliable water sources is the Bright Angel Trail.

**Stay hydrated by drinking often, even before you feel thirsty.**

### Stay Cool

Avoid hiking between 10:00 a.m. and 4:00 p.m., when there is little shade on the trails. If possible, wet your shirt and hat to stay cool through evaporation.

**Hike during the cooler parts of the day.**

### Rest

Rest periodically in the shade with your feet elevated. Enjoy a drink of water and some snacks. Hiking in the canyon is strenuous, even for those that are fit.

**Do not hike beyond your abilities.**

### Stay Together

Always keep your hiking group together. Never leave anyone behind. Don’t forget:

**YOU are responsible for your safety.**

**Enjoy the Canyon and Hike Smart!**



# HIKE AND SAFETY INFORMATION TOUCHPOINTS ARE PRESENT THROUGHOUT THE PARK

There is a nearly endless supply of sources of hike and safety information in circulation at the Park intending to encourage safer hiking behavior. I made an effort to collect a fairly exhaustive catalog of items available, highlighting those that are key to my project in this section.

Although I reviewed sources such as online forums and reviews, hiking guides, and travel books, due to time constraints, I focused on the main items that visitors interact with on-site at the Canyon. Below I share thoughts on trailhead information, warning signs downtrail, the Visitor Center Information Plaza, and the Park Newspaper.

## WEBSITE & OTHER PRE-VISIT TOUCHPOINTS

Before getting to the park, visitors have a wealth of information available to them to learn more about hiking, safety and the environment at the Canyon. In addition to the official Grand Canyon National Park website, visitors may also peruse other websites such as the independent Grand Canyon hiking site Hit the Trail ([www.hitthetrail.com](http://www.hitthetrail.com)), tourist and trail guide books and maps, message board for travelers, and those for specific interests such as trail running.

While on-site touchpoints were the main focus of my study, I wanted to have some exposure to other sources of information because they could affect how visitors approach on-site interactions and provide inspiration or ideas.

### PROMISING ELEMENTS OF THE WEBSITE

The official Park website provides many pages with hiking and safety information. The summer-specific page ( <http://www.nps.gov/grca/planyourvisit/hike-smart.htm> ) grabs visitors' attention with a red warning headline and provides a lot of helpful hiking tips. The information helps inform visitors by providing information such as high temperatures and descriptions of heat-related illnesses rather than only providing warnings.

### LIMITATIONS OF THE WEBSITE

The site can be a bit overwhelming because so much information is included, and pages have been written and edited at different times. It's inconsistent in content and style across different sections of the website, and it does not correspond precisely with the Park's on-site information. A consistent, simple message about hiking safety can be hard to take away from the site, especially if a visitor only makes a quick visit.

Unfortunately, this is difficult for the PSAR team to remedy. Since the Park's website is part of a NPS-wide system, small changes are difficult to make and large changes are said to be near impossible (Anonymous PSAR team member, personal communication, June 2, 2013). PSAR Managers would very much like to have a fully interactive, state-of-the-art website, but without going outside of NPS organization this is not currently feasible.



## Hiking Tips - Hike Smart

**HIKE SMART** - For a safe and enjoyable hike prepare for your hike before you arrive:

- Review the hiking tips below.
- In summer read the [Summer Hiking page](#) and in winter read the [Winter Hiking page](#).
- Check the [Backcountry Updates and Closures page](#) for current information on trail conditions and situations affecting the backcountry.
- Watch the [Hiking Grand Canyon, Prepare for Backpacking video](#).
- Listen to the [Hike Smart Podcasts](#) (transcripts available).



### Plan Ahead

THE DIFFERENCE BETWEEN A GREAT HIKE OR A TRIP TO THE HOSPITAL IS UP TO YOU!

Your descent marks your entry into a world in which planning and preparation, self-reliance, and good choices are crucial. Don't hike alone. Know what your destination will be and how to get there. Know where water is available. Get the weather forecast. Don't overestimate your capabilities. Hike intelligently. You are responsible for your own safety as well as that of everyone in your party. Stay on the trail and never shortcut switchbacks.

#### Average Temperatures in the Inner Canyon

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High (F)	56	62	71	82	92	101	106	103	97	84	68	57
Low (F)	36	42	48	56	63	72	76	75	69	58	46	37
High (C)	13	17	22	28	33	38	41	38	36	29	20	14
Low (C)	2	6	9	13	17	22	26	24	21	14	8	2

Average temperatures, weather information, and road conditions can be found on the [Weather Conditions page](#).

**WARNING!** Summer thunderstorms bring lightning. Read the [Lightning Danger Site Bulletin](#).

### Be Kind to Yourself

KNOW YOUR ABILITIES; CHOOSE AN APPROPRIATE HIKE.

You will be hiking at high elevation in hot, dry desert conditions with a steep climb out at the end of the day. Everyone who hikes in the canyon for the first time reports that it was more difficult than they expected. Be conservative in planning your hike!

If you have asthma, diabetes, a heart condition, knee or back problems, or any other health or medical issue, limit both your exertion and your exposure to the heat. The altitude, strenuous climbing, dehydration, and intense inner canyon heat will combine to make any medical problem worse. Stay within your training, physical limitations, and abilities.

### Be a Lightweight

THE LESS YOU CARRY, THE MORE ENJOYABLE THE HIKE.

Travel as light as possible. The heaviest items in your pack should be food and water. Use hiking sticks to take stress off your legs. Wear well-fitting and broken-in hiking boots. Bring a small lightweight flashlight and a change of batteries and bulb. Wear sunscreen, sunglasses, and a hat. Bring a map, compass, signal mirror or whistle, first aid kit, and water purification tablets. Keep in mind that all trash (including biodegradable) needs to be carried out of the canyon.

### Avoid Huffing and Puffing

IF YOU CAN TALK WHILE YOU ARE WALKING, YOU ARE WALKING THE PERFECT SPEED.

When you huff and puff your body is not getting enough oxygen. Walking at a pace that allows you to be able to walk and talk means that your legs and your body are getting the oxygen needed to function efficiently.

When your body generates fewer metabolic waste products, you enjoy your hike more and you feel better at the end. At times it may seem like you are walking too slow, but at an aerobic pace (sometimes even baby-sized steps when the trail is steep) your energy reserves will last longer. You will also feel much better that night and the next day.

### Take a Break

TAKE A TEN MINUTE BREAK AT LEAST ONCE EVERY HOUR.

A break of ten minutes helps remove the metabolic waste products that build up in your legs while hiking. Take a break at least every hour. Sit down and prop your legs up. Eat some food, drink some fluids, and take this time to enjoy and appreciate the view. These efficient breaks can recharge your batteries. In the long run, breaks will not slow you down.

### No Food, No Fuel, No Fun

DRINK FREQUENTLY AND EAT OFTEN.

Eat and drink more than you normally do. Eat before, during, and after your hike. Eat before you are hungry. Drink before you are thirsty. No matter what the temperature, you need water and energy to keep going. For every hour hiking in the canyon, you should drink 1/2 to 1 quart (liter) of water or sports drink.

Keeping yourself cool and hiking the canyon takes a large amount of energy (food). Salty snacks and water or sports drinks should be consumed on any hike lasting longer than 30 minutes. Food is your body's primary source of fuel and salts (electrolytes) while hiking in the canyon. You need to eat about twice as much as you normally would to meet your energy and electrolyte needs while hiking in the Grand Canyon.

Your best defense against illness and exhaustion is to eat a healthy breakfast, a full lunch, a snack every time you take a drink, and a rewarding full dinner at the end of the day. This is not a time to diet.

### Watch Your Time

COMING BACK UP IS HARD!

Plan on taking twice as long to hike up as it took to hike down. Allow 1/3 of your time to descend and 2/3 of your time to ascend. As a courtesy, give uphill hikers the right of way. Bring a small, lightweight flashlight in case you end up hiking in the dark.

### Mules and Hikers

MULES HAVE THE RIGHT OF WAY.

Several recent encounters between hikers and mules resulted in injuries to packers and the death of some mules. To ensure safety for yourself, other trail users, and mule riders, when encountering mules on the trails:

- Stop off the trail on the uphill side away from the edge.
- Follow the direction of the wrangler. Remain completely quiet and stand perfectly still.
- Do not return to the trail until the last mule is 50 feet (15 meters) past your position.



#### Hike Smart Podcast 04 (04m:42s) Self-Rescue Tips

In this podcast we're going to discuss some self-rescue tips and common problems encountered by hikers on the trail. One of the great things about Grand Canyon hikers is that

## Day Hiking

Over 250 people are rescued from the canyon each year. The difference between a great adventure in Grand Canyon and a trip to the hospital (or worse) is up to YOU. DO NOT attempt to hike from the rim to the river and back in one day, especially during the months of May to September.

Many options are available for day hikers. Both the South Rim and the North Rim offer rim trail hikes that have spectacular views of the inner canyon, some on paved trails. Or you can choose to day hike into the canyon. Permits are not required for non-commercial day hikes.

If you would like to join a guided hiking and/or camping trip that is educational in nature, consider the [Grand Canyon Field Institute](#).

Day hiking can be a safer and more enjoyable choice than an overnight trip into a difficult area that is beyond the capabilities of any single member of your group.

**WARNING: There are no easy trails into or out of the Grand Canyon!**

Plan on bringing a refillable water container, bottled water in individual disposable containers is not for sale within the park. Water available (year-round) on the South Rim at the Backcountry Information Center in the lobby. Water available (year-round) on the North Rim outside the Backcountry Information Center. Additional water bottle filling stations can be found on the [Go "Green" and Refill Your Water Bottles](#) web page.

**HIKE SMART** - For a safe and enjoyable hike prepare before you arrive:

- Review the [Hiking Tips](#) section.
- In summer read the [Summer Hiking page](#) and in winter read the [Winter Hiking page](#).
- Check the [Backcountry Updates and Closures page](#) for current information on trail conditions and situations affecting the backcountry.



## Backcountry Hiking

First time Grand Canyon hikers tend to react to the experience in one of two ways: either they can't wait to get back, or they swear they'll never do it again.

Going on a hike is a wonderful way to experience some of the canyon's rich natural beauty and immense size.

However, even if you are an avid hiker, hiking the Grand Canyon is very different from most other hiking experiences.

Mental attitude and adequate water and food consumption are absolutely essential to the success of any Grand Canyon hike, particularly in summer. The day hiker and the overnight backpacker must be equally prepared for the lack of water, extreme heat and cold, and isolation characteristic of the Grand Canyon.



Hiking in the Grand Canyon is so demanding that even people in excellent condition often emerge sore and fatigued. Yet small children, senior citizens, and people with physical disabilities have successfully hiked the canyon.

A hike into the Grand Canyon will test your physical and mental endurance. Know and respect your limitations.



**Backcountry Updates and Closures**  
including trail restrictions [Read More »](#)



**Hike Smart**  
tips for a safe hike [Read More »](#)



**Trails & Use Areas**  
trail descriptions [Read More »](#)



**Backcountry Permit**  
how to get a permit [Read More »](#)

SELECT WEBSITE PAGES

Retrieved June 2014, scaled down to fit page





*Bright Angel trailhead display*

## TRAILHEAD SIGNAGE

Near the beginning of each of the trails at Grand Canyon a bulletin board with trail information and park notices is posted. The use of such trailhead signs is standard in many parks, including outside of the US. These signs usually include a map of the trail, distance to various destinations, and often warnings about any particular hazards that hikers should be aware of.

### VISITORS' ENGAGEMENT WITH SIGNS VARIES

While the amount of use the signs receive varies throughout the day, many people do read the trailhead signs. This runs counter to the PSAR Rangers' impression that visitors do not read the signs (personal communications, June 2-4, 2013). Rangers seem to assume that because visitors do not seem to recall or act on the information provided, they didn't read the signs.

I tallied how many visitors read the signage, glanced at it, or continued past it without looking at it at all. I found there were also some visitors who read the sign, but then did not continue on to the trail. These visitors may be planning a future hike, may be dissuaded by the information from taking that hike, or they may just be curious.

During the highest rate of use that I recorded, nearly 50% of visitors going downtrail either read or glanced at the signs. Since some visitors who were recorded as not reading the signs may have in fact read them earlier in the day or one a previous day, the percentage of visitors exposed to the trailhead signage before their hike may even be a bit higher.

Some of the possible reasons visitors may not read the trailhead sign:

- They already have the information from a brochure, the website, or from reading the sign previously
- Other people are reading the sign and there's no room left.
- The information looks unimportant because of its location, angle or lack of upkeep.
- The visitor doesn't intend on going very far down the trail.
- The visitor doesn't realize they need additional information.
- The visitor has no fear of getting lost (the trail are more straightforward than at many parks).

Based both on observing visitors' behavior and speaking with them, visitors are looking at the trailhead signs primarily to find distances and information on hikes. While seeking out this information, however, many visitors' attention is caught by the *Margaret Bradley* sign described earlier. Visitors seem to find it compelling, with most reading the document in its entirety. They often tell others in their party about the sign, and / or read key passages aloud. The strongly worded phrase "Don't go to the river and back" was also often noted and read aloud.

Beyond *Margaret Bradley* and hike information, the rest of the signage seems to receive little attention from visitors.



*Bright Angel secondary trailhead display*



## LIMITATIONS OF TRAILHEAD SIGNAGE

### Presentation of information is confusing and lacks hierarchy

As one PSAR Ranger put it, the bulletin board is a “Patchwork quilt of a barrage of information” (personal communication, June 2, 2013). The series of information sheets that fill the bulletin board lack a coherent style or message. Beyond the bulletin board space, PSAR has added additional signs, which then have yet another style. Political squabbles between departments hamper the ability of PSAR to control signage and prioritize safety and conservation information above interpretative information (Anonymous PSAR team member, personal communication, June 2, 2013).

With this hodgepodge of notices the bulletin board lacks a clear sense of hierarchy. When visitors pass the signs they are often in a hurry to hit the trail. Reading the signs requires them to interrupt what they are doing, and the current sign design doesn't always compel visitor to make the stop.

I found that visitors who do stop are focused on finding hike information within the display. They are looking to confirm basic information about their hike and take note of any special warnings offered. This information is not very easy for visitors to find, and the small size of the type makes it a challenge to read even once the sheet with hiking information is located.

Visitors who do not approach the sign with a specific goal or need in mind often glance for only a few seconds before continuing past. They seem unclear as to the goal of the sign since there are no overall headlines, and they don't seem to find a compelling reason to stop and engage with it.

The series of information sheets that fill the bulletin board lack a coherent style or message. It may be helpful to have a single employee or contractor who manages the visual design of the boards to create a more professional, clear and organized series of messages with a clear hierarchy.

### Outdated information may erode trust

During my visit I noted that some trailheads still had old seasonal notices or outdated weather updates posted. One emergency notice about a water source that was out of order was left up even though the problem had been resolved.

If visitors do not know this information is incorrect they could be led astray and may be angry and distrustful if they later realize this information was wrong. If they do realize right away that the information is wrong, it may call into question the reliability of the rest of the information and discount the general authority of the park management.

A lack of clear responsibility for managing updates seems to contribute to this problem. Designating a specific person to be responsible for sign updates may help. If signs cannot be updated consistently then it would be wise to not include any elements that require frequent updates.

### Signs don't afford group use

Applying the principle of *social proof*, people are more likely to read a sign if they see that others are reading it. I witnessed several incidences of this during my visit - when a visitor was already looking at the sign it felt worthy of others' attention, and when some visitors passed it by, the group behind them was likely to skip it as well. Beyond *social proof*, visitors may simply be more



*Small type is challenging for visitors to read.*





*Visitors attempt to read the signage around another party already using the signs.*

likely to notice a sign's presence if other people are engaging with it, since humans are wired to be more interested in people than in signs. So once the signs draw in one group of visitors more are likely to follow. Unfortunately, the small print and physical layout of the trailhead signs don't afford use by more than one group.

Unlike the Information Plaza display at the Visitor Center, discussed next, the trailhead signs are difficult to interact with and can not be viewed easily by more than two visitors at once.

Often people passing the signs would glance over, but with little information discernible at a glance, they would keep going, especially if there was not room to investigate further. This seems like a lost opportunity to inform visitors who are at least casually interested in engaging with the information.

The Visitor Center signage provides a good model for signs scaled so that a group can look at the information together, and that two or more parties are able to access the information at the same time.



*A visitor reads the Margaret Bradley story on the Bright Angel Trailhead sign.*



## DOWNTAIL SIGNAGE

Once visitors leave the Rim there is limited safety or hike information. There are few signs or other informational displays along the trails because of a desire to conserve the wilderness feel (further discussed on page 84) and because of the challenges of placing and maintaining signs in the backcountry.

Sporadic warning signs are located in particularly problematic spots, and there are also a limited number of more general signs warning visitors not to go too far. Various one-off signs are also placed at rest stops and other destination points. However, more general hiking information is not available. There are rarely mile markers or maps indicating a visitor's current location and the distance to the next stop. PSAR Rangers often provide this information to visitors when they are on the trail. One of the first pieces of information they disperse is how far it is to the visitor's desired destination, as well as alternative turnarounds.

Some visitors carry the Park Newspaper, which contains limited trail information, and some carry the general park handout, which contains no trail information. Whether or not they carry it, though, visitors rarely actually consult these guides. I did not witness any visitors consulting a trail-specific source while on the trails.

*Research note: I personally surveyed the first section 1.5 miles of South Kaibab and Bright Angel, and the first 1/2 mile of Grandview and Hermit's Rest Trails. Other information was derived from internet searches and from conversations with PSAR Rangers.*

## VISITORS ENGAGE WITH SIGNS BY PHOTOGRAPHING AND MOCKING THEM

Visitors passing warning signs often take photos of them and with them. Much of this is done in a mocking manner. As *Over the Edge* (Ghiglieri & Meyers, 2001) notes, there has been at least one case of a visitor dying of dehydration after taking a photo mocking the sign warning visitors about this same condition. While it may be a problem that visitors are not taking the signs seriously, there is an upside to this behavior: the sign succeed in gaining visitors' attention. By stopping and engaging with the signs, visitors spend time looking at them, and they may remember the message, even if they don't take it entirely seriously at the time. Also, while some within a group may make light of a sign, others may take it more seriously and encourage the group to follow the sign's advice later on.

One issue with visitors viewing hazard signs as prime photo opportunities is that the desire for the photo can draw visitors to an unsafe area they might have otherwise ignored. In the case of the yellow fall hazard sign on the Bright Angel, visitors tended to go no farther than behind the sign where they needed to be to take their picture. They seemed to respect the sign somewhat, even as they were mocking it. Perhaps placing the sign well in advance of the hazard would allow visitors to safely take their silly picture. It may seem odd that I would encourage the park to facilitate visitors' mocking of its warning signs, but given that there seems to be a nearly universal urge to engage with the signs in this way, the park should plan accordingly.



A Rim Trail fall warning sign offers warnings in a variety of languages.

## "FAINTING MAN" POSES



Faces have been blurred to maintain anonymity  
Photo source: Google Images.





*It's hard for visitors to miss this signage in an otherwise untouched environment.*

## PROMISING ELEMENTS OF DOWN TRAIL INFORMATION

### Few distractions means signage catches visitors' attention

Visitors have many activities and visuals competing for their attention before they leave on a trip, at hotels, and even at the trailhead. It can be hard for safety and hike information to break through the clutter.

One advantage of trailside signage is that once out on the trail there are few other things competing for visitors' attention. The "Fainting Man" sign, posted right at the bend in an otherwise empty trail, was viewed by almost every visitor I saw pass, and many groups read the headline aloud.

In a barren landscape, passing the sign became an event, something that was a conversation topic for groups. As a result of this placement—and the sign's accidentally humorous style—many visitors discuss the sign and take pictures with it. Visitors are looking to take occasional breaks while hiking anyway, so placing signs in good break spots lowers the inconvenience of stopping.

Thoughtful sign placement may be able to increase how many visitors read the information, and how much time they spend doing so.

## LIMITATIONS OF DOWN TRAIL INFORMATION

### Hazards are not consistently signed (or unsigned)

While one dangerous off-trail ledge on the Bright Angel Trail is marked with a fall warning sign, another similar hazard farther down the trail is unmarked. Too many signs can become a distraction from the natural beauty of the trail, and can dull the impact of the warning, but a lack of consistency on trail marking may lead visitors astray. If some hazardous situations are signed off or blocked, visitors may come to believe that anything without a sign must be OK for visitors.

Where on the trail more general warning signs, such as "Fainting Man," are placed can also feel a bit haphazard. The primary message of this sign is not to go to the River and back in a day. Yet the sign is placed only about a mile down the trail. This means it's viewed by many visitors who haven't in their wildest dreams considered hiking all the way to the River. For those who do have such ambitious plans, it's likely too early on in the hike or them to be open to reconsidering.

Since the eye-catching placement is successful in reaching visitors, this sign spot may be better used to display a message that is more appropriate for the majority of visitors passing it.

### Warnings may send unintended messages

Many visitors read aloud the phrase "Do Not Attempt to Hike to the River and Back in a Day" on the Fainting Man sign, and for the most part this message seems to have gotten through to hikers. Unfortunately, a possible unintended consequence of focusing so much on the "don't go to the River" message may be that other pursuits seem reasonable or acceptable in contrast. "We're not going to the river, only to Skeleton Point" is something Rangers complained of hearing from more than one visitor (personal communication, June 3-4, 2013).



The simplicity of the message seems to have helped its success, but perhaps Rangers should consider drawing the line in the sand a little further up the trail, lest visitors think anything short of the River is an acceptable day hike choice. Without any additional information on what *is* a safe option, visitors could also get the impression that there is something uniquely unsafe about the River as a destination, which is not in fact the case.

#### Visitors expect more amenities, information down trail

Both from conversations with visitors, and from their own actions (witnessed by myself and by PSAR Rangers), it is clear that visitors' expectations about the inner canyon trails are off. Visitors expect things like trash cans, more signs and information, and to be able to ask for help later on (anonymous park visitors, personal communications, June 1-8, 2013).

The presence of bathrooms down trail can leave visitors who aren't familiar with wilderness pit toilets to imagine a full bathroom facility with water. This then can imply a greater level of development, and with it more aggressive management of trails, than actually exists. While trying to maintain a wilderness trail atmosphere with minimal signage is admirable, visitors seem not to anticipate such an information-barren environment.

One way in which this lack of information impacts visitors is that they don't always realize when they've reached their planned destination. While Rangers assume the standard turnaround points are very obvious to visitors, visitors' actions prove otherwise. Visitors also have little information to go on if they either didn't start off with a planned turnaround or want to change plans mid-hike.

The fact that visitors check the trailhead sign to confirm that the destination that they've planned is the right length, and that visitors - even when they have a destination planned - will misstate the name of it when put on the spot by Rangers indicates that visitors don't have their hiking plans well memorized.

*Design for How People Learn* (Dirksen, 2011) discusses the different levels of memory we use and how deep of a memory we need for different situations. Dirksen suggests that a communicator factor this criteria in when designing communications: "Will the learner only need to recognize the information, will they need to recall it outright, or will they need to be able to use it to actually do something?" (p. 103).

The current lack of information down trail assumes that visitors have noted their plan and have it down pat and are even prepared to make adjustments without further guidance. This seems to be a reasonable assumption for advanced hikers on a backcountry route, who likely carry a topographic map as well as outdoors know-how, but it may be too much to ask of novice Grand Canyon visitors.

Many visitors are not prepared to decide on the fly, or even recall their destination without a reminder. This makes sense given that it is less resource intensive for the visitor to simply note the information for recognition. Visitors do not intend to use this information for long, and expect that there will be further opportunities to follow-up, so they seem to bother to record it very precisely, either by writing it down or making an effort to memorize it.



*One ledge that seems to present a tempting photo opportunity to visitors has been marked as unsafe. Yet visitors still proceed out onto the crumbling ledge. Perhaps "overlook" isn't the best description?*



This disparity between visitors' lack of planning and a lack of information on-trail can leave visitors dangerously in the dark. They may have no idea how far their planned hike is, and they may decide at the last minute to continue to the next turnaround, or to a spot they can see further down on the trail, without having any idea what they are getting themselves into.

There seem to be two possible approaches to reconcile visitors' expectations about the trails and the reality of the situation. Either increase information available down trail to better meet visitors' expectations, or do more to warn visitors that they are entering a wilderness area and therefore need to be prepared with information, as well as gear, before heading down trail.

---

### **BUT DON'T PEOPLE HATE MORE SIGNS?**

Many outdoor enthusiasts and park managers are concerned about the effect of too much safety signage on the outdoor experience. Yosemite's safety lead, Roger Farmer cautions about visitor education efforts, "We don't want to inundate them at the entrance stations with all these safety requirements, and we don't want to inundate them with signs along the trail" (quoted in Repanshek, 2009).

A discussion of the concerns that people have about "sanitizing" the parks is included in the book *Death in Yellowstone* (Whittlesey, 1995). The author introduces the idea that wilderness and the front-country are inherently different, saying, "Wilderness is not just another product or commodity to be made safe to prevent product liability litigation. For without those dangers, it would not really be wilderness. Remember, the icy sidewalk in the city that someone slips on is owned by someone else. The bear and the hot springs are owned by you." (Whittlesey, 1995, p. 282)

Whittlesey shares some opinion letters sent in to a newspaper following a high-profile incident at the park to provide a window into how the public views the issue. One letter states: "We feel there are plenty of signs which tell people to stay on the walks... So many times we saw people off the boardwalks or traipsing along paths that state no trail. So people think the signs are there for everyone else but them? We would hate to see fences put up everywhere. it would certainly take away from the beauty of the park. It's a shame so many people who love Yellowstone or the Tetons or other lovely places will have to suffer because of a few who do not obey the signs put there as warnings" (Whittlesey, 1995, p. 282).

While conventional wisdom holds that too many warning signs can be a blight on the park, and an overly signed and restricted park atmosphere is feared, the Comprehensive Safety Report (2002) found high support among visitors for warning signs - over 80% of the visitors surveyed felt parks should keep the "present amount" of warning signs and information about hazards rather than increasing or decreasing. They also found warning signs helpful, with 58% of visitor finding them "very helpful." Directional signage was even more popular, rating a "very helpful" from 68%.

While "danger" signs may not provide a lot of additional information, and can detract from visitors' experience, I believe there may be an important distinction being missed by many between warning or safety signs, and information that leads visitors to make safer choices. I spoke with several visitors who were interested in having—and even expected—additional informational signage down trail. Given that many other wilderness area in the US and abroad have maps, directional signage and distance markers, I believe that the additional of these types of information would be welcomed, and less controversial than more traditional warning signs.

---



## VISITOR CENTER

The newly constructed Visitors Center complex at the Grand Canyon is comprised of a shuttle bus hub, parking lots, a non-profit store, a bike rental shop with small cafe, the main Visitor Center building, and an outdoor patio with informational signage.

Inside the Visitor Center building is a help desk with Interpretative Rangers answering questions, a few interpretive displays, a movie, a separate audio-video display, a few information displays, and an interactive touch-screen informational guide. The information and help desk is staffed by both Rangers (mostly Interpretative Rangers) and volunteers.

Visitors wait in line and speak with the first available representative, with about five representatives staffing the table at once during busy times. There was often a line, sometimes long, to speak with the representatives, which caught some visitors by surprise. Representatives receive questions about hiking, but also about other activities, such as dining and lodging, directions, etc., and provide both standard responses and personal recommendations.



*Photo of Visitor Center directional signage with information plaza notation added.*



Information Plaza Layout

Within the Information Plaza there are six large signage display units, each containing a front, back and sides. Below the content and recorded popularity of each display is noted.

Study method

Views were recorded by the author during two dedicated 45-minute observation sessions, one mid-morning and one mid-afternoon, on a weekday. While not a fully representative sample, the divergence between popular and unpopular signs was consistent across both sessions.



1	2	3	4	5	6
1 1a Tribal History (1%) 1b Green Info (1%) 1c no signage 1d Map of Visitor Center area (2%)	2 2a Hike Smart general information (2%) 2b Weather and Aware (2%) 2c Shuttle info (0%) 2d no signage	3 Map display including services available - both sides (14%)	4 4a South Kaibab Trail (SK) info & warnings (6%) 4b Rim Trail & warnings (23%) 4c Day hike summary (0%)	5 5a Hermit Trail and Grandview shared info & warnings (4%) 5b Bright Angel Trail info & warnings (17%) 5d Hiker levels (5%)	6 6a Visitor Center and Museums Info and info on Hotels (6%) 6b Rangers programs and events (14%) 6d Visitor Center area map (3%)
Paths towards main bathrooms, Mather Point, and Shuttle Buses					
Brown highlighted items received the most views from visitors. (%) Indicates respective popularity of each sign, as measured by the number of views each sign received versus the overall number of sign-views recorded. It is not the percentage of all visitors who read each sign since visitors who read no signs were not tracked.					



## VISITOR CENTER INFORMATION PLAZA SIGNAGE EXAMPLES



*Helpful safety information located at position 2a, that unfortunately receives few views*



*Safety information more directly paired with trail information, as on this South Kaibab sign (location 4a), was more successful in reaching visitors.*

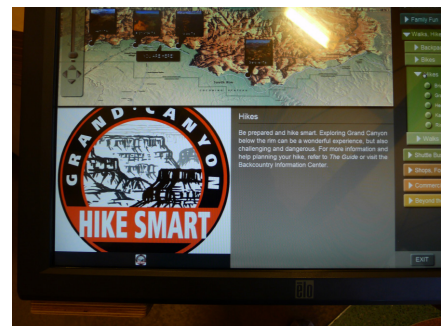




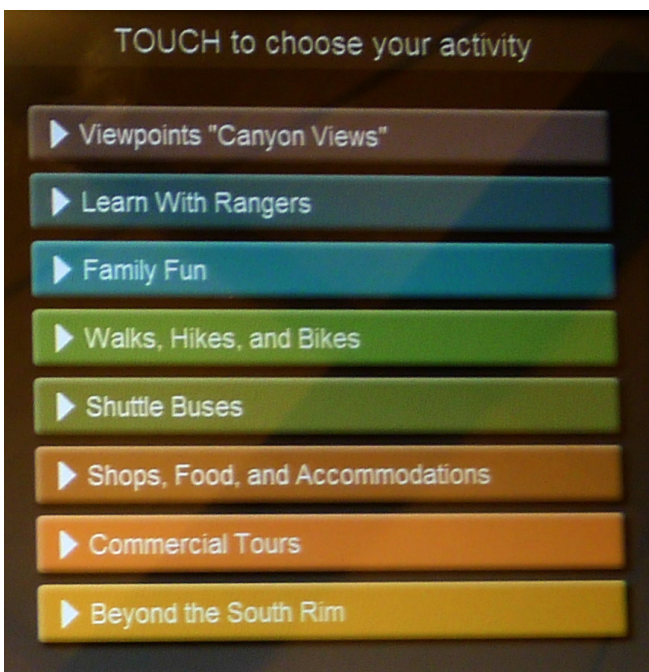
*The kiosk display within the Visitor Center is attractive and inviting, but few guests approached it, possibly due to its location on the far side of the information desk line.*



*After the visitor chooses a trail, the program displays a short paragraph about that trail.*



*A short Hike Smart message is included in the introduction to Hikes section.*



*An introductory screen welcomes visitors to the Grand Canyon.*

*The main menu of the kiosk program. Each option contains general brochure-type information about that activity. While informational, the tool lacks interactive features. It simply provides a way to browse information.*



## VISITOR ENGAGEMENT VARIES BY INFORMATION TYPE AND CHANNEL

At the Visitors Center Information Plaza the most popular displays were the Bright Angel Trail information, the Rim Trail Information, and the Ranger program information. All of these displays are on the busier side of the plaza where signs sit along the route between the Visitor Center building itself and paths leading to the shuttle bus area and Mather Point (see page 86 for location information and a detailed breakdown of views for each sign).

Within the signs the line “Rescue Not Guaranteed” got visitors’ attention and was often repeated aloud. Maps were also popular, and visitors often tried to use them exclusively, only reading blocks of text when couldn’t figure things out from the map. Illustrations included for safety purposes, especially one of a visitor vomiting (see right), were often laughed at and commented on.

While there is an interactive, digital kiosk (see opposite page) available inside the Visitor Center building which aims to help visitors plan their day, it functions simply as a clickable brochure. Hiking descriptions are available via a series of menu choices, but additional context or personalization is not provided through interaction with the program. The kiosks received very little traffic during my observations. Perhaps if there was a sign directing visitors to the kiosk placed at the end of the line to speak to Rangers, or if kiosks were positioned alongside the Rangers (similar to how automated and in-person check-in is often handled at the airport), they may see more use. Ideally they could function similarly to Rangers, providing specific information and personalized hiking tips.

## PROMISING ELEMENTS OF VISITOR CENTER INFORMATION

### Trail-specific signage encourages interactions

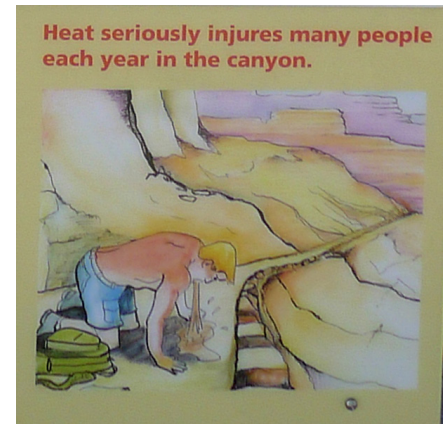
The Information Plaza signage solicits frequent visitor reactions and interaction. The trail-specific signs are particularly popular in drawing interactions. Top interactions with these signs include pointing, tracing a route with a hand, discussing with group members, and bringing a group member’s attention to information. Many visitors also read phrases aloud (especially imperatives such as “Do not go to the river and back in a day” and “Rescue is not guaranteed”), laugh at illustrations, and take photos of the displays, either of information for later reference, or to share wording or images with friends.

### Some hike information is formatted in a user-friendly manner

Visitors find displays showing the length of time required to complete different hike sections very helpful. I noted that visitors were sometimes confused at first about whether this time was for a one-way or roundtrip hike, but generally visitors were able to clarify this upon further inspection.

The portion of the display that shows how much food and water is required for each hike also appears to resonate with visitors. This information was often pointed to and discussed aloud by visitors during my observations. The pictorial approach for showing the supplies needed for each hike seems to be a good one because it facilitates high engagement and light mental lifting for visitors, but for some visitors it may leave a bit too much to interpretation.

While a listing saying how many liters or quarts of water a visitor should bring can be challenging for visitors who lack a point of reference for these measures, providing only a picture of a very generic water bottle may bring



*This illustration placed on the trail information and warning signs grabbed visitors' attention. Even though many laughed, hopefully they still caught the message.*





*An easy to read graphic, but might it be too open to interpretation?*

its own problems. For most casual visitors, the water bottle size that will come to mind based on the image will likely be a disposable bottle, and two water bottles of that size is not nearly enough water for a hike to *Cedar Ridge* in summer, as the sign may seem to suggest. Given that visitors are likely to adjust a bit on the assumption that the sign is overly cautious, they could head down to *Cedar Ridge* thinking a single bottle per person is a reasonable amount, which is a dangerous assumption. In fact at least two liters (67.6 oz) is a good amount for a summer *Cedar Ridge* hike. That much water equates to two Nalgene-type hiking bottles, but if visitors are carrying smaller disposable or reusable everyday bottles, they'll need at least four bottles to have that much water.

Similarly, the use of a sandwich icon to indicate food more generally could leave visitors a bit confused as to which types of foods are best, and why they need to bring food at all, since the reason to bring food is less obvious than the reasons to bring water. Perhaps showing a large pile of snacks alongside an explanation that visitors must eat when drinking water to avoid water poisoning may be more appropriate.

Overall this approach appears to be a good one. By providing information in a visual, easy to digest manner, it captures the attention of visitors. Small modifications to provide a bit more specificity either in the form of a text-based caption, or by making the pictorial depictions a bit more precise could improve the clarity of this signage. When crafting my own interventions I aim to be mindful of balancing the ease of use that simplicity brings, and the clarity that specification offers.



*Groups can use the signage to coordinate, and multiple groups can view the signs at the same time.*

#### Large displays afford multiple users

Unlike the trailhead information display which is too small to be viewed by several people at once, the scale of the displays at the Information Plaza encourage groups to use them together and makes it possible for more than one party to look at the same information at once. At times there were still more visitors interested in the signs than could view at once, but visitors were generally willing to wait briefly to take a turn viewing the display more closely.

#### Visitors value the advice of Visitor Center representatives

During one afternoon of my visit I witnessed many people taking advantage of the information desk to ask which hike the representatives suggest. Rangers and volunteers staffing the center tended to give more specific and nuanced advice than was available through signs or the Park website, and visitors often sought out this in-person advice even after examining the information outside. It appeared that visitors found this information more reliable than that on signs. I also saw visitors using the information desk as a way to settle a disagreement within their group, or to finalize a hike decision that they were a bit unsure about. Visitors seem to be seeking judgment from the representatives as much as information, since they had already gathered much of the critical information through examining the signs before going inside. This suggests that visitors have a lack of confidence in their ability to choose a hike on their own. If true this supports my theory that visitors are more confused and misguided than actively non-compliant. It also suggests visitors may be open to, and even seeking, additional guidance in choosing a hike.



## LIMITATIONS OF VISITOR CENTER INFORMATION

### Organizing hike information by trail confuses visitors

That hike details are organized by trail, but then “hikes” within each trail are listed is a major source of confusion for visitors. The fact that there are long trails, and that a “hike” would consist of an out-and-back that could entail a longer or shorter trip into the Canyon was not clear to visitors. This is a major issue since if visitors do not understand this basic organizing principle they are likely to be disoriented and have difficulty navigating trail information. For instance, a lack of understanding that the Rim Trail is a very long trail of which different sections can be hiked in smaller or larger combinations causes visitor to be very confused about where the “hikes” on this trail start and stop, and where parking and shuttles are available.

### Not all information is seasonally adjusted

While the food and water allocation pictorial display is a hit with visitors, the fact that this information is not season-specific is problematic. While it is noted in some places in the displays that visitors should bring more water in summer, this side note is often missed by visitors, and they may not be clear on what “more” entails. It would be helpful to provide summer-specific information to visitors so they aren’t left to make this adjustment on their own. Another option may be to be specific about the adjustment visitors should make, such as “double these amounts for days over 80 F degrees.”

### Suggested start times are missing from signage

During my time observing the PSAR patrol, I found that one of the first things Rangers do to determine whether visitors can complete their planned hike safely is to check what time a visitor began his hike. Rangers advise visitors to be off the trails from 11 AM– 4 PM. Given this 11 AM deadline to be off the trail, for each destination there is a “leave no later than” time to be able to make it out and back before the midday heat sets in. PSAR Rangers often inform visitors that, for instance, if they want to hike to *Skeleton Point* they should have hit the trail at 5 AM. This information is very helpful for visitors because it gives a specific guidelines and gives them an idea of the extreme measures to which they need to go if they want to complete a challenging hike in the summer. Unfortunately this information is not currently included in the Visitor Center display. While the signage does say to avoid hiking midday, visitors do not generally do the math themselves. It often doesn’t occur to visitors on their own that it is possible to complete a hike while avoiding such a wide swath of times by starting in the early morning or the evening.

### Updatable information is not all up-to-date

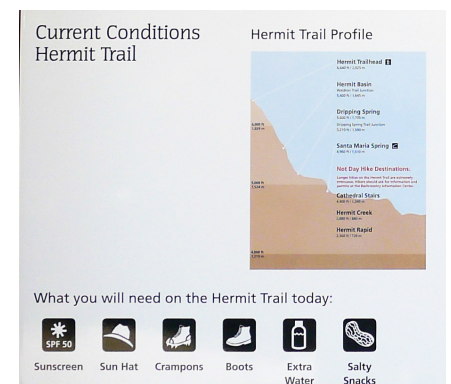
Some signs have dry-erase sections to allow weather or other information to be updated. However, some of this information was out-of-date. As with trail-head signage, these errors can lead to confusion and mistrust. While dynamic information can be of greater interest and help to visitors, these elements should only be included if they can be insured to be updated regularly.

### Segregating safety information may hurt engagement

Within the Information Plaza, the Hike Smart safety information sign receives low traffic. Its placement on the far end of the plaza may be a factor, but it also seems that visitors are not intentionally seeking out safety information. Where safety information is mixed in with trip planning information, as on trail-specific signs, it receives good traffic and people seem interested in it.



Several choices of “hikes” (a trip to a destination point and back) are available on a single trail.



This trail sign was designed to allow an updated gear forecast. Unfortunately, the black and white images that appear to be interchangeable are actually permanent. On some similar signs select items have been underlined with a dry erase marker to indicate that they are actually needed. This sign either was missed, or someone may have erased the marker after it was placed. Either way, when viewed this sign was incorrect and confusing in suggesting crampons were required on the trail in summer.



While better physical placement of the Hike Smart information could increase readership, it may be best to incorporate this guidance into the trip planning information that visitors are actively seeking out in order to increase readership of the safety info. This “vegetables before dessert” setup may be the best way to get people to consider information they might rather ignore, or may not want to be seen looking at due to a stigma around being overly safety minded.



*Visitors ask questions inside the Visitor Center at the information desk.*

**Information desk recommendations can be inconsistent with other messages**  
Advice provided by Visitor Center information desk representatives was not always consistent with that provided by the information displays, PSAR Rangers, or even other information desk representatives.

Sometimes the recommendations of representatives can even undercut the message put forth by PSAR. During my observations, on more than one occasion, a rep. suggested that South Kaibab was the better trail and offered better views than Bright Angel, but was hotter due to lack of shade. While all of this information is accurate, given that visitors were asking about a hike for that afternoon, and that Bright Angel was the safer and better choice for an afternoon hike, why tempt these visitors by sharing an enticing portrait of South Kaibab? It seems that representatives are permitted to share their own personal recommendations, and that different representatives have different levels of comfort with advising visitors to take on a challenging hike. This inconsistency seems problematic, especially if recommendations from these individuals runs counter to what PSAR other sources advise. It may be helpful for PSAR to provide specific guidelines so that information desk representatives are all on the same page.

One-on-one conversations allow representatives to share and emphasize more information about a specific hike, but there are also some drawbacks to conveying information to visitors verbally. It seemed from my observations that during these conversations visitors would focus on the key information they came in looking for: the name of the suggested trail, how long it is, and how to get there, and ignore other details. When the rep. says, “This is the best trail, but only in early morning,” visitors may stop listening after “best trail” and get an incomplete picture. More innocently they may simply not remember important details, like the name of the suggested turnaround point. Some sort of written or reference information might help aid visitors’ understanding and recall.



*A long line to speak with a Ranger may leave some deterred visitors with unanswered questions*

**Long lines can deter use of information desk**

Visitors often must wait in line to speak to an information desk rep. Many visitors are stopping off at the Visitor Center as a detour before getting on with the rest of their day. A delay can discourage them from taking advantage of this information source and they may leave without getting the help they are seeking. If a visitor only has a logistics questions that he can resolve on his own, his safety won’t be affected, but if the line discourages a visitor from clarifying concerns about a hike, it could be a problem.

Providing more coverage for the information desk, or decreasing the confusion that causes visitors to seek in-person help could both help ameliorate this issue. In a broader sense, it’s helpful to consider how easily accessible information is to visitors and how it may be affected by capacity issues.



Many visitors are disinterested in a hike that seems “easy”

I noticed both during my observations near the Rim Trail sign at the Visitor Center, as well as in my evaluative testing later on, that healthy people are turned off on the Rim Trail because it seems like “the trail for strollers and old people” (anonymous evaluative research participant, personal communication, February, 2014)

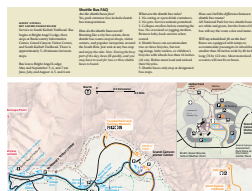
While it is helpful to flag the Rim Trail as an accessible option for those needing it, perhaps within the Rim Trail description sections could be delineated more clearly so that visitors understand that while the Rim Trail does offer easy sections, there are also sections that are enjoyable for people with stronger hiking ability. As it stands now, many fit hikers quickly write-off the Rim Trail even if they’re not looking for a tough hike, simply because of the stigma attached to what seems to be the easy option. This can be problematic because the Rim Trail can be a very good option for mixed ability groups, those with limited time, visitors looking to hike midday, and visitors who simply want a pleasant hike rather than a full-on, sweat-inducing adventure.



## PARK HANDOUTS

The Park Newspaper is handed to each visitor group upon their arrival in the Park. It has been improved on in recent years, and PSAR was able to control safety information in the Summer 2013 version through conferring with the Newspaper's editor. It contains both information about day hikes and an extensive listing of safety information and warnings. Below are thumbnails of the full Newspaper with key hiking sections highlighted below and on the opposite page. A second pamphlet provided to visitors follows the NPS standard for all park brochures and does not contain hiking information.

### THE PARK NEWSPAPER / GUIDE



## Rim Hiking

### Stroll the Rim Trail

The Rim Trail offers a diverse hiking experience along 13 miles (21 km) of the canyon, shown by brown and green dashed lines on the map on pages 4-5. From a short 30-minute sunrise walk to a full afternoon hike, choose your adventure. The Rim Trail is wheelchair accessible from Lookout Studio to South Kaibab Trailhead. Distances are one way.

Difficulty	Start	Finish	Distance	Attraction
<b>Easy, popular</b> Wide, paved trail; accessible by strollers and wheelchairs with assistance	Mather Point	Yavapai Point	0.7 miles (1.1 km)	View the Colorado River and Phantom Ranch
	Yavapai Geology Museum	Verkamp's Visitor Center	1.3 miles (2.1 km)	See and touch canyon rocks along the award-winning Trail of Time
	Verkamp's Visitor Center	Kolb Studio	0.6 miles (1 km)	Explore local history in the village historic district
<b>Easy, Less Traveled</b> Little elevation gain	South Kaibab Trailhead	Mather Point	2.1 miles (3.4 km)	Great views of an inner-canyon trail; paved
	Monument Creek Vista	Hermits Rest	2.8 mile (4.5 km)	Quiet and uncrowded with forest and canyon views; paved
	Hopi Point	Powell Point	0.3 miles (0.5 km)	Expansive east and west views of the canyon; unpaved
<b>Moderate</b> Some elevation gain and/or rough terrain	Mohave Point	Monument Creek	2.0 miles (3.2 km)	Unpaved trail with great views
	Hermits Rest Route Transfer	Trailview Overlook	0.7 miles (1.1 km)	Overlooks Grand Canyon Village and Bright Angel Trail; paved, steep grade

*Rim Hiking excerpt from Page 6 of the Park newspaper (left). Page 7 (opposite page) of the Guide covers hiking below the Rim as well as hiking safety. General safety, including falls, is also covered on page 8 of the Guide (shown only in thumbnail form above).*



## Day Hiking Below the Rim

Day hiking into the canyon affords an unparalleled experience. For an enjoyable hike you must prepare for extreme conditions. Gauge your fitness level, be honest about your health, and don't compare yourself to five or 10 years ago. Know your limits and average walking distance and time. Grand Canyon is an extreme environment! For additional information about day and overnight hiking, visit: [www.nps.gov/grca/playyourvisit/backcountry.htm](http://www.nps.gov/grca/playyourvisit/backcountry.htm).

Trail	Difficulty	Destination	Distance Round-Trip	Elevation Change One Way	Time Round-Trip	Facilities
<b>Bright Angel Trail:</b> Follow the Bright Angel Fault down Garden Creek Canyon on a maintained trail. Plan to park at Grand Canyon Visitor Center and ride the Village Route shuttle bus to the Hermits Rest Route Transfer stop or park at the Backcountry Information Center and walk to the trailhead. Water available at trailhead; water occasionally not available at Indian Garden and resthouses due to pipeline breaks. Always bring a method to treat water.	easy	1st Tunnel	0.4 miles (0.6 km)	60 feet (20 m)	20 minutes	none
	moderate	2nd Tunnel	1.7 miles (2.8 km)	590 feet (180 m)	1–2 hours	none
	moderate	1½-Mile Resthouse	3 miles (4.8 km)	1,120 feet (340 m)	2–4 hours	toilets, water, emergency phone
	difficult	3-Mile Resthouse	6 miles (9.6 km)	2,120 feet (645 m)	4–6 hours	toilets, water, emergency phone
	very difficult	Indian Garden	9 miles (14.4 km)	3,040 feet (925 m)	6–9 hours	water, toilets, ranger station, camping, emergency phone
<b>South Kaibab Trail:</b> Follow an exposed ridge line on a maintained trail for the best views for a relatively short hike. Ride the Kaibab/Rim Route or Hikers' Express shuttle bus to the South Kaibab Trailhead. Water, toilets, and pay phone located at trailhead. For Skeleton Point start before 6 am to avoid hiking in mid-day heat.	moderate	Ooh Aah Point	1.8 miles (2.9 km)	760 feet (230 m)	1–2 hours	none
	difficult	Cedar Ridge	3 miles (4.8 km)	1,120 feet (340 m)	2–4 hours	toilets
	very difficult	Skeleton Point	6 miles (9.6 km)	2,040 feet (620 m)	4–6 hours	none
<b>Hermit Trail and Dripping Spring Trail:</b> Gives intimate views of a long side canyon; rough and unmaintained—for experienced hikers. Begins west of Hermits Rest; water and toilets available at Hermits Rest.	difficult	Hermit Basin	2.8 mi (4.5 km)	1,240 feet (380 m)	2–4 hours	none
	very difficult	Santa Maria Spring	5 miles (8 km)	1,680 feet (510 m)	4–6 hours	treat water
	very difficult	Dripping Spring	7 miles (11.3 km)	1,040 feet (315 m)	5–7 hours	treat water



### Prepare a Day Pack With:

**Water** One quart/liter for every two hours, or drink to thirst. Know your water sources.

**Food** Bring salty snacks and a full meal. Eat often, even if you are not hungry.

**First Aid Kit and Survival Tools** Also include medications, blister care, and duct tape.

**Map** Many trails are well marked, but some are not. Know your route.

**Flashlight or Headlamp** You may end up hiking in the dark unexpectedly; cell phones do not provide adequate light.

**Sun Protection** Sunscreen, hat, sunglasses, and a sun umbrella.

**Communication** Whistle or signal mirror; while cell phones are not reliable, they may be helpful.

**Simple Shelters** Emergency tarp with reflective side.

**Weather-appropriate Clothing and Footwear** Layer for the weather and wear hiking boots with good soles, a hat, and sunglasses.

### Hike Smart

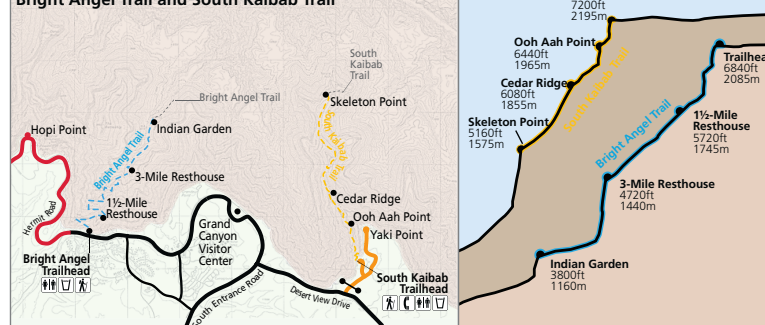
**Plan** Knowledge, being prepared, and a good plan are all keys to success. Grand Canyon is not the place for spontaneity. *Stay together, follow your plan, and know where and how to seek help.*

**Eat and Drink** Snack every time you drink water or energy drinks.

**Rest** Sit down, prop your legs up, and take a 5- to 10-minute break at least once every hour. If you are not feeling well, rest for at least 30 minutes.

Maps do not show all trails; use for trip planning only. Consider purchasing a trail guide at Park Stores before venturing down the trail.

### Bright Angel Trail and South Kaibab Trail



### Health Risks

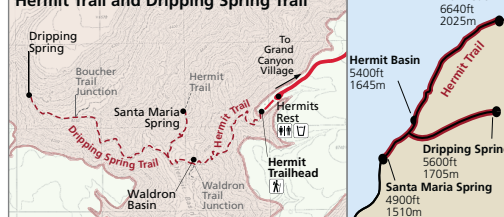
**Common Challenges** Grand Canyon's climate and elevation can intensify all health issues, including minor colds, making hiking more difficult.

**Over Exertion** People often have overly ambitious plans and fail to pace themselves. If you feel unwell, you must rest. Remember it takes twice as long to hike up as it does to hike down.

**Hyponatremia** Results from low sodium in the blood from drinking too much water, not replacing that loss through salty food intake, and losing salt through sweating. Symptoms include nausea, vomiting, altered mental status and frequent urination. Have the patient rest in shade for a long period of time and eat salty foods. If the person's mental alertness decreases seek immediate help.

**Heat Illness** Heat exhaustion can rapidly progress into heat stroke which may result in death. Avoid heat illnesses by taking preventative measures: eat plenty of salty foods, rest often, seek shade, and keep clothing wet. If a person becomes mentally altered, seek immediate help and cool the patient.

### Hermit Trail and Dripping Spring Trail



### Reflection

**Did you Leave a Trace?** Day hikers can literally leave quite a mark in the canyon. Write a postcard to your friends instead of writing on rocks. Take your trash back out with you. Do not feed the wildlife, and guard your food from food-habituated animals.

**Were you Safe?** Did you follow your plans and have enough food and water? Did you have fun?

### Backcountry Camping Permits

You must obtain a permit from the Backcountry Information Center to camp in the backcountry. Open daily 8 am to noon and 1–5 pm. A limited number of last minute walk-up permits available.

### Danger!

**Do Not Day Hike to the Colorado River** Hiking to the river and back in one day is not recommended due to long distances, extreme temperature changes, and a near 5,000-foot (1,500 m) elevation change each way.

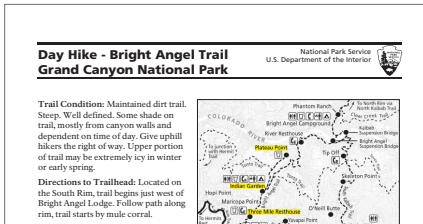
**Do Not Swim in the Colorado River** Diving and swimming in the Colorado River have caused numerous deaths. River currents are fast and the water is a dangerously cold 46°F (8°C).

**Pay Attention to National Weather Service Red Flag Warnings** When hiking trails reach 95°F (35°C), consider shortening your plans. *Hike before 10 am and after 4 pm.*

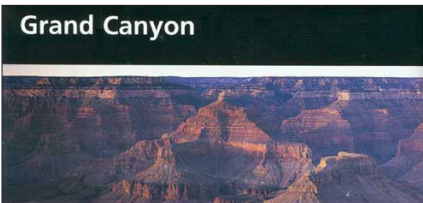


**Need Information? Keep This Newspaper With You**  
Bring this Guide newspaper and your questions to a visitor center. Talk to park rangers, view exhibits, and learn about the park. The visitor centers, except for the Backcountry Information Center, also feature Grand Canyon Association Park Stores and a stamp for your Passport To Your National Parks®.

*The 2014 Summer Guide features a new direct appeal to visitors to keep and use the guide as an information source.*



*This hiking handout is only available online.*



*The official park brochure, which follows a Park systemwide unigrid design, is more map-sized, sturdy and easily to carry than the tabloid newspaper.*

*Image source: NPS (2008 guide cover)*

## LIMITATIONS OF PARK HANDOUTS

Provision of the Park Newspaper is universal, but use is not

Even though each visitor group is provided with a copy of the Newspaper, based on Ranger interviews and anecdotal evidence, it is often not read or even carried by visitors. Rangers and other park personnel expressed frustration to me that visitors often say they didn't know how far the hike they are on was, or have to ask someone about the shuttle schedule even though this information is contained in the paper they have buried somewhere in their bag (personal communications, June 2-4, 2013).

Given that visitors often engage in a hike without having basic information on it, or plan on taking a park shuttle without first referring to the shuttle map, it seems that visitors expect that information, or a person who can help them, will simply be available when needed.

In order to meet this expectation, information should be made available at the times and locations where it becomes important to visitors, rather than in advance. Alternatively, the Park could attempt to warn visitors that information will not be available later, but this requires getting their attention in advance, the very issue trying to be combated.

### A hiking-specific handout is not offered at the Park

One Ranger interviewee mentioned the existence of a hiking-specific handout for families with children, and one handout for other hikers, but these handouts were not available at the park. There is a one-page day hiking information guide available on the park website, but it does not seem to be available to visitors on-site. When I inquired at hotels, the Park campground, and even the Visitors Center about a hiking guide handout, I was either told none was available or referred to the newspaper. Visitors may be more likely to engage with a handout if it is specifically targeted to their interest. Since I found that visitors were specifically seeking information about day hikes, an information piece that clearly contains this information could be popular with visitors.

### The form of handouts may be confusing to Visitors

I often heard Rangers and Visitor Center personnel warning people to carry the Park Newspaper, not the pamphlet. The pamphlet, however, functions and looks like a map or guide, whereas the Newspaper does not seem like it would be a hiking guide. The oversized format of the paper isn't the most convenient to carry and its light newsprint paper wears out quickly. The paper also contains other information that may be extraneous for some visitors, causing it to have a less clear purpose and value to visitors. A hiking-specific guide in a pamphlet or similar format may be more appealing to visitors.



## OTHER ON-SITE INFORMATION SOURCES

While I went into the project expecting that there would be a potential for expanding touchpoints at the park, I was surprised to find that the HikeSmart information was highly dispersed, with messages found in guides in lodge rooms, on bulletin boards at hotels, on the park shuttle bus and even on the “lunch specials” card within the cafeteria.

### POINT-OF-SALE INFORMATION



*Stores at the Canyon contain signage about dehydration, the disposable bottle ban, and the importance of food and electrolytes as hiking fuel alongside products for sale.*

*Disappointingly, Red Bull is displayed for sale alongside water containers in the image at right.*



*A sticker on a salad for sale in the General Market emphasizes that better fuel leads to a better experience. This angle of maximizing a visitor's experience is one that could resonate with young people who may not be worried about safety, but are worried about not getting the most out of their trip.*



*A display in the hotel lobby shows key hiking gear visitors should carry that's available for purchase in the nearby store. The display even includes a small “Hike Smart” flyer.*



## HOTEL LOBBIES

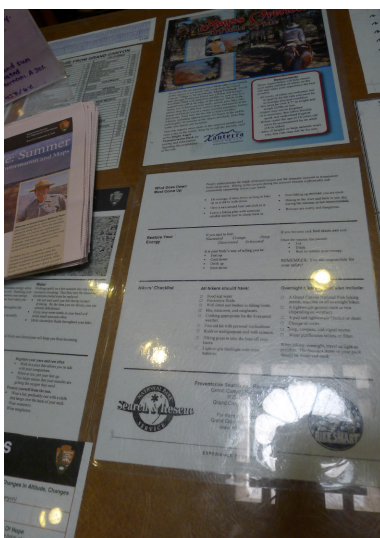
While Canyon hotels have a wealth of hike and safety information posted, much of it is displayed in a jumbled, often hard to read or approach manner. It seems unlikely that visitors are able to gain very much from these displays.

Hotel staff are often asked hiking questions. While all staff members seem to be able to provide basic information, their personal experience level varies. Some hotel staff members had extensive hiking experience and were concerned about making sure visitors receive the Hike Smart message when asked about the issue, while others seemed to be less informed and committed to helping ensure visitor safety. Having a simplified information piece or display for all hotels could cut down on clutter, and providing training for hotel staff could help get everyone on the same page.

---

### HOTEL LOBBY INFORMATION DISPLAY EXAMPLES

*Maswik Lodge  
Transportation Desk*



*Yavapi Lodge Transportation and Bell Desks*





## BACKCOUNTRY INFORMATION CENTER

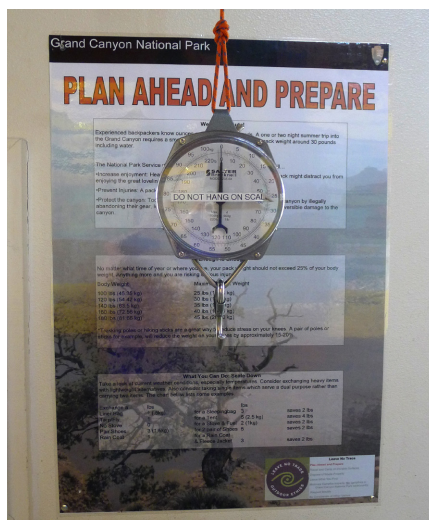
The Backcountry Information Center (BIC) provides an incredible wealth of information that can help hikers plan their Canyon visit. Maps, safety warnings, a list of equipment, and even a scale to weigh packs helps hikers plan appropriately. Unfortunately there is so much information—at least two dozen different signs cover the many walls of the small building with little rhyme or reason to their placement—that it can be overwhelming to visitors.

Also, disappointingly, the Backcountry Information Center is located well off the beaten path, and keeps banks' hours, so most visitors do not view the useful information. Even though it does contain day hiker information, most day hikers do not visit the Center, if they even know it exists. The BIC interacts primarily with overnight hikers since this is where visitors apply for and pickup permits for overnight hikes.

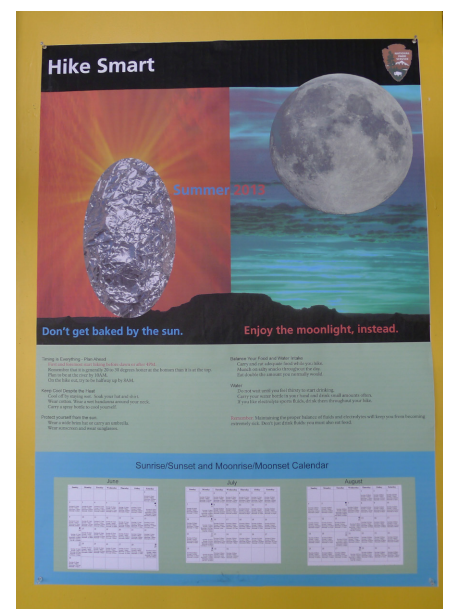


*The entrance to the Backcountry Information Center, which is set back from the main road, about a 10 minute walk from the Rim.*

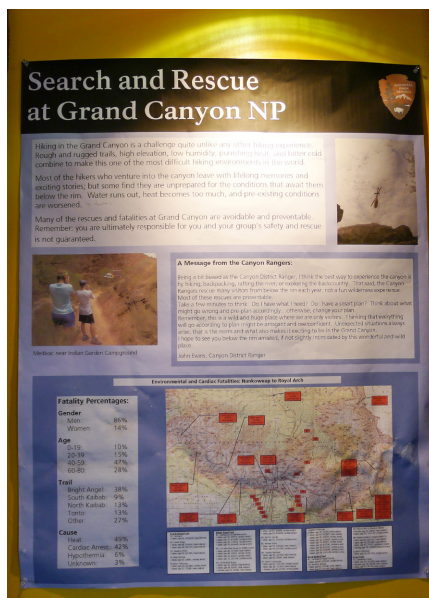
## BACKCOUNTRY INFORMATION CENTER DISPLAY EXAMPLES



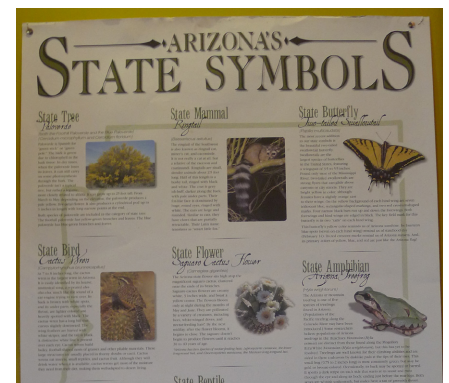
*One of the more intriguing interventions at the BIC was a scale that was provided alongside information about how not to over-pack and end up with an overly heavy backpack. The combination of an intriguing prop, explanatory information, and the means to actually execute on the suggestion being made seemed to be a compelling design.*



*An interesting Hike Smart sign only found at the BIC.*



*A map of SAR incidents helps visitors understand about where risks are higher, and what has led to incidents in the past.*

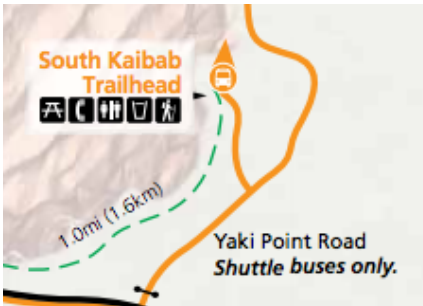


*An example of the information clutter at the BIC. Arizona's State Symbols are not the most pressing information for visitors to have.*



# ADDITIONAL INTENTIONAL INTERVENTIONS

The Park's safety efforts go beyond the items already discussed. Below are a few of the additional avenues the Park uses to try to encourage safer behaviors.



*By not allowing parking at the South Kaibab trailhead, the Park hopes to discourage casual visitors from hiking there unprepared.  
Image source: Screenshot of NPS website*

## RESTRICTING ACCESS TO SOUTH KAIBAB TRAIL

After the tragic 1996 season, one action the park took to try to reduce safety incidents was to limit access to the South Kaibab Trail by eliminating parking at the trailhead. Visitors must take a shuttle to the trailhead, making it less convenient. The change intended to shift hikers from South Kaibab to the less steep, more shaded, and water station-equipped Bright Angel trail. According to the PSAR Impact Report (2013) this change has had a positive impact.

This intervention is a good example of a “nudge” and something that follows BJ Fogg’s Behavioral Model (2013). By making the desired course of action (hiking Bright Angel) easier than the less desired choice (hiking South Kaibab), park managers have encouraged their preferred outcome without taking the option away from visitors entirely. Visitors are still free to hike the South Kaibab Trail, they just have to put in a little more effort to do so.

One downside with this intervention is that the same hassle factor that can keep visitors off of South Kaibab may keep them from changing plans once they reach the trail. If visitors begin to reconsider a planned South Kaibab hike because they start late, or because they don’t have enough gear, they may be less likely to turn around after reaching the trailhead because of the amount of effort already invested to get there via the shuttle. If they realize they should have brought additional water bottles (a fill station is available at the trailhead, but water containers are not) or food for their trek, they will likely be hesitant to turn back to get more supplies given the hassle entailed.

## EDUCATING VISITORS IN ADVANCE THROUGH THE NEWS MEDIA

Fatal incidents often gain news coverage, which presents an opportunity for Park officials to spotlight safety problems. They try to educate the public about danger in the park and what visitors can do to stay safe. Of course Park officials also try to get media coverage outside of these events as well. How likely these messages are to stick, especially if visitors read a news article well in advance of a visit, is up for debate, but a proactive media outreach program certainly is part of the Park’s approach to increasing safety.

## TARGETING VISITORS ENROUTE TO THE PARK WITH TOURIST INFORMATION RADIO

I was surprised when driving into the park that the tourist information radio station included a Hike Smart message. One advantage of this creative approach is that the message is well-timed. Information reaches visitors just as they approach the park, so they may be more likely to pay attention and recall the information. This channel also takes advantage of a captive audience.



## ATTEMPTING A NEW MEDIA APPROACH WITH A PODCAST

A series of PSAR podcasts aim to reach visitors before their visit. As many “we should use new technology” efforts, this approach may be a bit shortsighted.

Given my finding that few visitors actively seek safety information - rather than hike information - packaging this podcast as safety-focused may hurt its appeal. Also podcasts are traditionally something that people are interested in enough to subscribe to in order to hear a whole series of episodes. Any visitor that is that interested in safety is likely a well-informed and well-prepared visitor already.

The information shared on the podcast episodes is interesting, and trying something other than written materials to engage website visitors seems wise. However, the Park might be better off putting this same information into a video format and packaging the video as more of a how-to guide, instead of a safety briefing. Yosemite National Park’s *Hiking Half Dome* video could be a good example. While the video contains many warnings and cautions, it is presented as more of a preview of the hike and a guide on how to prepare. This gives visitors a good reason to watch the video, and makes it interesting and helpful, but visitors still get important safety tips along the way.

## PROVIDING WATER REFILL STATIONS

Adding water stations to Bright Angel Trail where no water sources naturally exist required serious engineering effort, but it certainly makes the trail safer for visitors. With disposable bottles recently banned at the Park, the Park has added water refill stations along the Rim and at trailheads as well. Visitors seem to be taking advantage of these, and their heady presence at the trailhead is a good reminder and impetus for visitors to fill up their bottles.

If the park really wants to encourage visitors to err on the side of carrying more water, they should consider the convenience and cost of containers, as well as the convenience of refilling. Currently there is not an opportunity to buy containers at the filling stations, nor generally are there filling stations at the same places that visitors buy bottles. Including a map and directions to the nearest location to purchase bottles at each refill station, or ideally having them available on the spot (either to borrow or buy) would make it even more convenient for visitors to take enough water with them.

Under the current system, the cost and sizing of water bottles could also have an affect on visitors’ preparedness. Reusable bottles at the park are being sold at retail prices or above, with a small souvenir bottle selling for \$20 (see photo), and larger water bladders for \$30-\$40. Visitors may be conservative in the number of containers they purchase to keep down costs. They may also be reluctant to buy three of something for each member of their group if they feel it’s not a fair price, causing them to buy fewer container than they should.

It would be very interesting to see if visitors would carry more water on the trails if bottles were offered at a discount. An even more direct intervention would be to only sell oversized water containers, large enough that one alone is appropriate per person for the average summer day hike.



*A link to the PSAR podcasts on the Grand Canyon website.*

*Image source: NPS website*



*A water bottle refill station near Verkamp’s Visitor Center (above) and an expensive water bottle for sale at the Park Association Store next to the Visitor Center (below)*







*There's no shortage of Rim-to-Rim souvenirs at the Canyon stores. Even if a visitor hasn't heard of the endurance hike before their visit, he may be intrigued by the triumphant messaging.*

# UNINTENTIONAL INTERVENTIONS

The current interventions at the Grand Canyon entail some explicit, intentional tactics - interventions designed with the intent of making visitors safer. But there are also many unintentional and un-designed interventions in play. Some of these encourage safer behavior but aren't part of any management plan, while others may unintentionally encourage the wrong types of visitor behaviors. Throughout the park environment, messages, the actions of others, and even the built environment have an impact on visitors' behavior. Some specific examples of this are discussed below.

## SOME MESSAGES MAY ACCIDENTALLY GLORIFY EXTREMES

### DEPICTING THE RIM-TO-RIM AS THE ULTIMATE GRAND CANYON EXPERIENCE

With a general trend of more weekend warriors taking on marathons, obstacle races and other extreme adventures, it's not surprising that the Rim-to-Rim hike is also growing in popularity. The allure of the Rim-to-Rim hike seems to encourage many to take on this arduous hike who may have otherwise taken a much shorter hike, or maybe not hiked at all. The mere existence of this hike as an entity may make a long day hike seem less challenging by comparison.

While the official park information doesn't highlight the Rim-to-Rim hike, online message boards and outdoor magazines draw a lot of attention to it. The Park may want to take a more proactive approach in reaching out to these groups to encourage safer behavior within these communities, and to encourage them to self-police where possible. On-site, however, the hike gets an image boost in the form of t-shirts, stickers, and even water bottles being sold in the gift and general stores. These types of items could contribute to an overall image that hardcore activities are intrinsically better than more laid back pursuits, which is not helpful when trying to encourage visitors to be less aggressive in their hike choices.

### EVERYONE IS AN EXTREME ADVENTURER IN THE PARK'S INTRODUCTORY MOVIE

Each National Park has a movie that plays at the Visitor Center and gives an overview of the park. It's always a challenge to cover the geography and geology, human history, and current activities of a park in a single film. I was surprised however, that the Grand Canyon film seemed to go out of its way to portray the Canyon as a place for adventure with fast-cut edits, exciting music, and people being adventurous at every turn.

The film shows visitors sitting on a Canyon safety wall, a Ranger walking off-trail on a tiny ridge, and whitewater rafters blasting through the river. The most egregious example of a "more danger means it's better" attitude was actually displayed found in scenes of park archaeologists and geologists. Even these generally calm fields were turned into high adventure for the film, with these scientists shown walking on towering spires off-trail, traveling on helicopters, and even rappelling and rock climbing.



The film seemed to be trying to sell the Grand Canyon as an adventurous destination. This seems odd since visitors are already at the Canyon and therefore don't really need to be sold on its virtues, and because such a pro-adventure message runs counter to the Hike Smart messaging the park is generally trying to convey.

While it would be hard to prove a link between viewing a cheesy, overly promotional movie and visitors taking on more risks, the movie doesn't do any favors to those trying to encourage more level-headed, risk-adverse thinking at the Park. Instead, it could help contribute to the general notion that more risky activities are intrinsically better than quiet, reflective ones.

## **DOWNTIME SPACES CAN PROVIDE A MUCH NEEDED RESPITE FOR VISITORS**

The Bright Angel trailhead recently underwent a major renovation that included adding a block of restrooms, as well as a small shaded seating area. I found this type of shaded rest area could be having an impact on safety in two different ways.

First, I witnessed that having a shaded, designated hangout space was helpful for some visitors who wanted to hang back while other members of their group hiked down the trail. With a comfortable place to wait, they may have been more likely to sit the hike out than if they would have to simply stand around in the heat. Not only did the shaded area provide a practical benefit, but its very presence suggests that resting is a activity that people are expected to do, making it seem more acceptable and appealing to take a break.

Secondly, the shaded space also provided visitors with a nice space to rest, cool down and rehydrate after completing a hike and returning to the Rim. These visitors may very well have continued on with their day rather than taking a break if this space was not available.

Given the success of this space, the park might want to consider increasing the availability of shaded rest spaces, both at trailheads, and throughout the Park.

A line of people sitting on the ground or crouched up against the wall of the Bright Angel Lodge at midday shows there is an acute need for additional shaded rest spaces in this area. Since rest, especially midday, is highly encouraged by the Park, managers should ensure that the built environment helps facilitate it by increasing the number of areas that afford comfortable break-taking.

## **AN INCONSISTENT SAFETY PRESENCE MAY THROW VISITORS OFF**

As discussed in Chapter Two, the Park's aggressive safety messaging and hand-holding may, in some ways, be hurting safety. As mentioned in the discussion of down trail signage, the fact that some dangerous cliff areas are marked with signs may lead visitors to believe those without signs must be safe enough. Similarly, they may think that since signage warns that going to the River and back in a day is dangerous, that a hike half that length is probably a pretty safe bet. The Park can't be expected to sign every dangerous spot, and



*A rare bit of shade in the Visitor Center area was popular with visitors. Here one man rests while another uses the shade to block the glare on his phone screen.*





To avoid inconsistent messages or creating a sense of control, one State Park in Arkansas has posted these anti-warning, warning signs.

liability concerns may make a sign-free Park impossible, but there should be a standard for which dangers rise to the level of warning, and which do not.

## PUSHING RESPONSIBILITY MAY ACTUALLY MAKE PEOPLE LESS SAFE

Part of what makes humans so difficult to work with is that information, when processed by a biased mind, can have the opposite effect of what is intended. This is the case with one possible unintentional intervention.

Under the current approach, the Park often emphasizes the link between personal action and risk avoidance: to be safe, do these five things! The thinking goes, presumably, people will want to be safe, so they will take those actions. Unfortunately, *Why It Won't Happen to Me: Perceptions of Risk Factors and Susceptibility* (Weinstein, 1984) tells another story.

Neil Weinstein, a leading scholar in the risk perception field, conducted a series of studies to understand why people always seem to think it won't be them. He reinforced an existing notion of an overall optimistic bias about one's own vulnerability, but more specifically, he found the greater the level of control, the more optimistic people were.

So while "considerable evidence does exist showing that perceptions of vulnerabilities predict preventative health behavior..." (Weinstein, 1984) encouraging people to be prepared can make them feel less vulnerable, which in turn can make them prepare less.

When it comes to personal actions, Weinstein puts forth the idea of selective emphasis: people completely discount the things they do that cause them to be at greater risk, and amplify the risk-aversion actions, leading them to conclude they are much better prepared, and much less at risk, than they really are. He offers a simple explanation for this complex self-foil: "Risk decreasing actions might come to mind particularly easily because they are often conducted for the explicit purpose of reducing risk. Risk increasing actions, in contrast, are seldom carried out to intentionally increase risk."

This finding further erodes confidence in the ability of hikers to self-assess their preparedness and adapt their plans based on their risk. This finding seems to imply that parks' emphasis on the power of personal preparedness to avoid accidents could actually lead hikers to feel less vulnerable, not more, which in-turn means they are less likely to take preventive actions.

This finding could help explain the disparity between the park survey of day hikers (I'm prepared!) and PSAR evaluations (no, you're not).

Since Weinstein found that environmental factors evoked very little optimism bias, Park communication may want to emphasize the threat that the environment poses regardless of personal action. Bringing to mind all of the factors that could be helping or hurting a hiker could also help make explicit the complete scorecard of risk-reducing behaviors, *and* risk-increasing behaviors to help a hiker make a more balanced vulnerability assessment.



# CURRENT PARK INTERVENTION STRATEGIES

Based on the current tactics employed by the Park I have tried to tease out the underlying strategies implied by these actions. In reality, the park lacks a clear, consistent strategy in approaching visitor safety, especially at the Park-wide level.

## MAKE PEOPLE BETTER, MORE INFORMED HIKERS.

Much of the current information focuses on preaching proper hiking protocols to visitors and informing them of the myriad hazards present in the park. Park managers see that visitors make mistakes because they don't know what they're doing, and so they try to fill this knowledge gap with information.

The trouble with this approach is that educating visitors and increasing their skill level is not something that can be done quickly and easily; skills must be developed over time (Dirksen, 2011). Add to this challenge that many park visitors are novices who "don't know what they don't know" and may not be interested in learning, and one realizes that trying to educate visitors into better behavior is quite the uphill battle.

## GIVE THEM ALL THE INFORMATION, AND LET THEM SORT IT OUT

This isn't so much a strategy as a lack of one. There are a lot of different safety imperatives, hazard warnings and hike information at Grand Canyon. The variety of hazards at the Canyon makes it difficult to pare down the information, as do divisions of labor within the park and the lack of a clear design voice. Regardless of these obstacles, it's clear that the Park hasn't sat down and prioritized the top three messages they want to get to visitors. Instead they throw it all out there, and leave it up to the visitor to sort it all out. The result? A cacophony of messages, few of which stick with visitors.

It's even harder for visitors to sort through this jungle of information when they aren't that familiar with the context. As risk communications luminary Baruch Fischhoff explains in his 1995 retrospective on the field, the full disclosure approach can fail both because an audience lacks the technical preparations to keep up, and because "all too often communications about risk involve a gush of issues, with little selection."

It's understandable that the Park has avoided trying to make these choices in an official and definitive way. There are certainly trade-offs, political battles and even liability concerns involved in choosing to emphasize some items over others, but the reality is the attempt to share everything has resulted in visitors learning very little. After all, "You can keep handing material to your learners, but you can't make them carry it around" (Dirksen, 2011, p.170).

Speaking about efforts at Rocky Mountain National Park, but in reference to similar issues throughout the NPS, *Mountains & Handrails* (Rickard, 2012) discusses the limitations of the standard approach of providing visitors with information and hoping they take it from there, "...while many employees and volunteers seemed to recognize the limitation of the education approach, such as the difficulty in reaching visitor who are not "motivated" to seek out



information about the park, they nonetheless depend on these methods as a central approach to their risk management efforts” (Rickard, 2012, p. 332).

The resultant swath of information is even more challenging for visitors because it lacks a clear organizing structure, and visitors lack the background to sort it out for themselves. According to Dirksen (2011), in order to commit new information to memory, people look to add it to existing shelves: familiar categories or context into which they can place the new information within their memory. It’s also easier to keep track of new information when it’s already grouped or chunked for a learner. When information comes with its own clear structure, it is as though it comes with built-in shelving (Dirksen, 2011, p. 92).

## FOCUS ON THE PLANNER

*Switch* (Heath & Heath, 2010) presents the concept of the *Planner vs. the Doer* as a way of explaining how people make decisions. *The Planner* is the part of a person that gets excited about running a 5k, registers for the competition and posts to Facebook exclaiming their enthusiasm about the race. *The Doer* is the part of them that hits the snooze button every morning when it comes time to actually get up and go for a training run. *The Planner* is the rational, good intentioned, follow-the-rules part of people, while *The Doer* is the intuitive, emotionally-driven, heat of the moment part.

The Park’s current approach to informing and warning visitors assumes that most people are governed by *The Planner*. *Switch*, and other behavioral psychology works argue otherwise. Unfortunately, reading, and even buying into information in advance doesn’t always mean people do the right thing when the time actually comes to act. A lot changes between people’s intent to be well behaved, and actually doing so. Current interventions attempt to educate visitors so they can make a wise choice, but this may not be enough.



A PSAR team member (face blurred to maintain anonymity) speaks with visitors.

## CHANGE BEHAVIOR ONE VISITOR AT A TIME

Having someone speak to each visitor individually to council them to encourage better choices, either through PSAR patrols or at the Visitor Center, might sound like a crazy idea if it wasn’t what the Park was already doing. Though it’s certainly a resource-intensive way to approach the problem, relying on volunteers to supplement staff helps keep the cost of this one-on-one approach down. So far the PSAR team has been able to make a case for continued funding for their bare-bones operation since it seems to be making a dent in the problem. It is worth exploring if and how a tool could replicate some of the unique value that PSAR brings to the scene.



UNDERSTANDING THE AS-IS:

# CHAPTER 4

## HOW DOES VISITOR BEHAVIOR REALLY AFFECT SAFETY?







*Process: Synthesizing research collected and considered thus far to pull out key insights with which to move forward.*

## CHAPTER FOUR INTRODUCTION

About halfway through my project I had amassed a vast amount of information, and had begun to have a very in-depth understanding of the nuances involved in visitor safety in parks. Before I could transition into the generative stage of my project and put all of this newfound knowledge to use in directing my designs, I needed to boil down this complex web of information and understanding.

At this stage I constructed a number of models, charts and diagrams to help try to synthesize what I had learned. I also asked many questions, this time not of the world or the problem, but of my own data and information. What was most important? Where was there the most room for improvement? What has the best chance of making a real impact, and why?

Changing the nature of extreme sports, for instance, would be too cumbersome of an approach. Instead, I choose to focus on concrete steps the Park could take to change visitor behavior on-site to improve safety outcomes. To help me pinpoint a more a specific focus for my interventions, I stepped back to ask, regardless of why they are doing it, what exactly do we wish to change about visitors' behavior? Getting hurt and requiring rescue is an outcome. What are the actions that visitors take that precipitate that outcome?

In this chapter, I guide the reader through my exploration and synthesis process as I looked to clarify how visitors' actions contribute to problems, and what changes I wanted my interventions to trigger within the visitor-park system in order to attempt to reduce visitor safety incidents.



# EXISTING TOP CONCERNS ABOUT VISITOR BEHAVIOR

Once I stepped back from fault and focused more on visitor behavior specifically, I found the existing information was quite limited. By far the biggest concern expressed in existing sources is simply that too many rescues and deaths are occurring that could have been prevented. The Park Service as a whole, the authors of *Over the Edge* (Ghiglieri & Myers, 2001), and managers on the ground are all displeased with what they consider an excessive amount of poor outcomes at the Canyon. They agree that some risk in nature is unavoidable, however the circumstances surrounding many incidents leave those involved to feel that more can—and should—be done to help visitors avoid putting themselves in a dangerous situation.

More specifically, GCNP PSAR managers have identified heat-related incidents to be a top opportunity for improvement. Overexertion in the heat is extremely likely to contribute to a whole host of medical issues that befall visitors during the summer such as heart attacks and exhaustion, but this link can be hard to prove definitively with limited records. However, even excluding these likely heat-related injuries and instead focusing only on directly heat-caused issues, the PSAR team's analysis of past rescue data found that poor outcomes predictably increase on the hottest days ("PSAR Impact Report," 2013).

Another concern that PSAR is keeping an eye on is an increasing number of visitors engaged in epic hikes, including the Rim-to-Rim hike, and even Rim-to-Rim-to-Rim hikes.

---

## RIM-TO-RIM HIKES

In a Rim-to-Rim hike, visitors begin at one Rim of the canyon (North or South) hike down to the River, across the canyon floor, and up the other side of the canyon to the opposite Rim. In a Rim-to-Rim-to-Rim they go from one Rim to another and then back again (without a night's rest, in the most extreme cases). This activity is most popular in the shoulder seasons of fall and spring, though some do attempt these hikes in summer.

Traditionally, these hikes would be done overnight by backpackers or those staying at the rustic lodging available at Phantom Ranch on the canyon floor. Doing the hike over a few days makes it a difficult test of endurance, but not necessarily a dangerous hike. Recently, however, with the growing popularity of trail running and ultramarathons, visitors have begun doing this hike as a day hike. This means they are doing the entire hike with minimal rest.

In order to be able to move quickly enough to complete the hike with few stops, these visitors take an extremely minimalist approach, carrying as little as a water bottle and light jacket. If they have trained properly and do not become injured, completing the hike in this manner is possible. However, because they have so few supplies, if they slow down or become injured they have no safety net. Rangers are concerned about qualified athletes who still are at risk because of this lack of contingency, but are even more so worried about visitors who are not properly trained for such an adventure but take it on anyway.

The NPS infrastructure was not developed with trail runners in mind, and there is increasing concern about how to accommodate them and encourage their safe and courteous trail use.

One PSAR team member is currently studying trail running use in the park. Until this effort began, no record existed even to establish the amount of trail running use in the park, let alone what sort of rules or modifications may be necessary to address this new, burgeoning activity. Park officials were also considering initiating an RFID tag system for hikers to help them collect better data on trail use to help monitor this, and other, trends (PSAR Impact Report, 42).



# MISCONCEPTIONS ABOUT THE PROBLEM

Based on my research and everything that I had compiled so far, I had a couple of important revelations about misconceptions that then helped propel my process forward:

## 1. IT'S NOT JUST A MATTER OF HAVING THE RIGHT GEAR

Many people assume the key behavior that gets visitors into trouble is not carrying enough supplies, especially on hot days: "If only we could get visitors to take enough water," they lament. Changing this behavior often is the main focus of educational efforts. It seems that this message has gotten through: in the Backlund et al. (2006) study, 96% of corridor hikers carried water (p. 33).

But sometimes it seems water alone is not enough. While I was shadowing a PSAR Ranger on the South Kaibab Trail, a group of shirtless young men approached the Ranger's post. One confidently announced their plan to hike to *Skeleton Point*. It was getting fairly late in the morning and the Ranger was concerned about their plan. When she asked about what supplies they were carrying, one of the young men swung the cheap generic backpack he was carrying and pulled the zipper half open to reveal that it was completely full of disposable water bottles. "We've got plenty of water!" he cheerily declared.

Yet the Ranger still seemed very worried and tried to convince them to change their minds about going so far. Watching this interaction and many others, I came to understand it's not just about supplies; it's about the whole package of what a person brings to a table vs. the challenges they can face on their hike.

The stories from *Over the Edge* (Ghiglieri & Myers, 2001) tell the same tale. Water is critical, but it's not everything.

"There's a very real need to emphasize that the most important piece of gear you take into the backcountry is your brain" (Bane, 2013). This quote comes from a safety expert speaking to avalanche precautions, but it's just as applicable when it comes to visitors at the Grand Canyon.

The reason the Ranger was still concerned about that group of young men was that water was all they had. They likely wouldn't take other precautions like seeking shade and taking breaks when they became hot. They probably didn't have enough food to go along with the large quantities of water they had brought, leaving them susceptible to *hyponutremia* (water poisoning). Someone might turn an ankle or they might fail to recognize the hazard posed by a rockfall or a storm. They might overexert to the point that even ingesting the copious amounts of water they had would be insufficient to cool them. A group member could become separated from the one man with all the supplies. There were still numerous ways these young men's hike could go wrong, even with the water they carried.

The further down into the Canyon a visitor travels, the more likely these events are to occur, and the harder they are to mediate. This group lacked the knowledge, skills and training to handle any adverse events that came up.



That lack of know-how can also lead panic. The difference between a bad day and somebody dying is often whether or not the group panics when things begin to go wrong.

So as this incident illustrates, while supplies are certainly a piece of the puzzle, convincing visitors to bring the right stuff with them isn't a panacea.

## **2. POORLY BEHAVED HUMANS AND A CHALLENGING ENVIRONMENT CONVERGE TO CREATE A DANGEROUS SITUATION**

It's important to recognize the type of danger that is present when looking at backcountry day hiking at the Grand Canyon. While wilderness travel does present hazards—things like rock falls, lightning and tripping and falling can and do happen—we're not talking about an inherently high risk activity like rock climbing or base jumping. In fact it's quite safe to go for a day hike at the Grand Canyon, if one does it right.

I find an analogy to crossing a busy downtown street helpful to illustrate this point. Crossing the street is an activity that carries inherent hazards - cars are very dangerous and a person will be hurt badly if hit, and yet, we've learned to navigate this space safely. Most of us feel pretty comfortable crossing a controlled intersection in the US, so much so that we likely don't even feel much concern doing it.

Now if one thinks of the same scenario with a toddler, it's a whole different story. Having a toddler cross the street without supervision would be very dangerous. He doesn't know the system. He may not remember which light means what, or know that he needs to wait to ensure the cars really stop for the red light before proceeding. He may not be paying careful attention and he may prioritize his urge to get going over the most cautious choice. Most likely he will fail to grasp the gravity of the situation. He doesn't understand what will happen if he chooses wrong and a car does hit him, or causes an accident trying to avoid doing so.

A very similar thing is happening in this park situation. In both cases the danger is not so much the environment on its own, as it is a danger co-produced by the environment and visitors' approach and actions within it. Many visitors are not daredevils dashing across a busy street. They are toddlers, wandering out into an environment they don't understand and underestimate.

Thus, this isn't a risk communication problem so much as it is an optimism bias problem. Visitors don't need to be warned of danger, they need to act in such a way they don't put themselves into dangerous situations.



# WHAT SHOULD VISITORS DO?

In order to help crystallize the idea of what's going wrong, I next asked the question, well, what would successful visitor behavior look like? I wasn't yet considering what my design interventions should look like, but rather what the ultimate outcome of all these safety efforts would be. Once I paused to consider this question, the answer seemed pretty straightforward: **A person visits the Grand Canyon and completes a below-rim day hike without requiring rescue.**

This, however, is just the bare minimum. It would be preferable that: A person visits the Grand Canyon, chooses an appropriate hike for their skill and preparation level, and turns around at an appropriate point for them. Even better: The above, plus upon returning the visitor considers the hike a positive experience. Lastly, perhaps the ideal scenario is all of the above, plus the visitor recognizes the value of skills and their own improved knowledge, and wants to improve those skills and/or build on this experience.

Next I asked, given this is the desired outcome, what might the steps look like leading up to it?

## PROGRESSION OF ACTIONS IN A SAFE HIKE

- Hiker chooses an appropriate trail
- Hiker chooses appropriate turn-around / evaluation points
- Hiker is prepared with food, water and gear
- Hiker has knowledge and skills to self-assess situation and body\*
- Hiker turns around at pre-determined point or turns around before they are a safety risk
- Hiker returns to trailhead without needing rescue
- Hiker has a positive experience and wants to return\*
- Hiker recognizes value of skills, wants to improve / build\*

*\*icing-on-the-cake items*

In addition to having skills and supplies, it's about choosing the right hike:

### A SAFER EXPERIENCE IS MORE LIKELY IF HIKERS:

- Choose the *right* trail
- Choose the *right* turnaround
- Choose the *right* time to hike

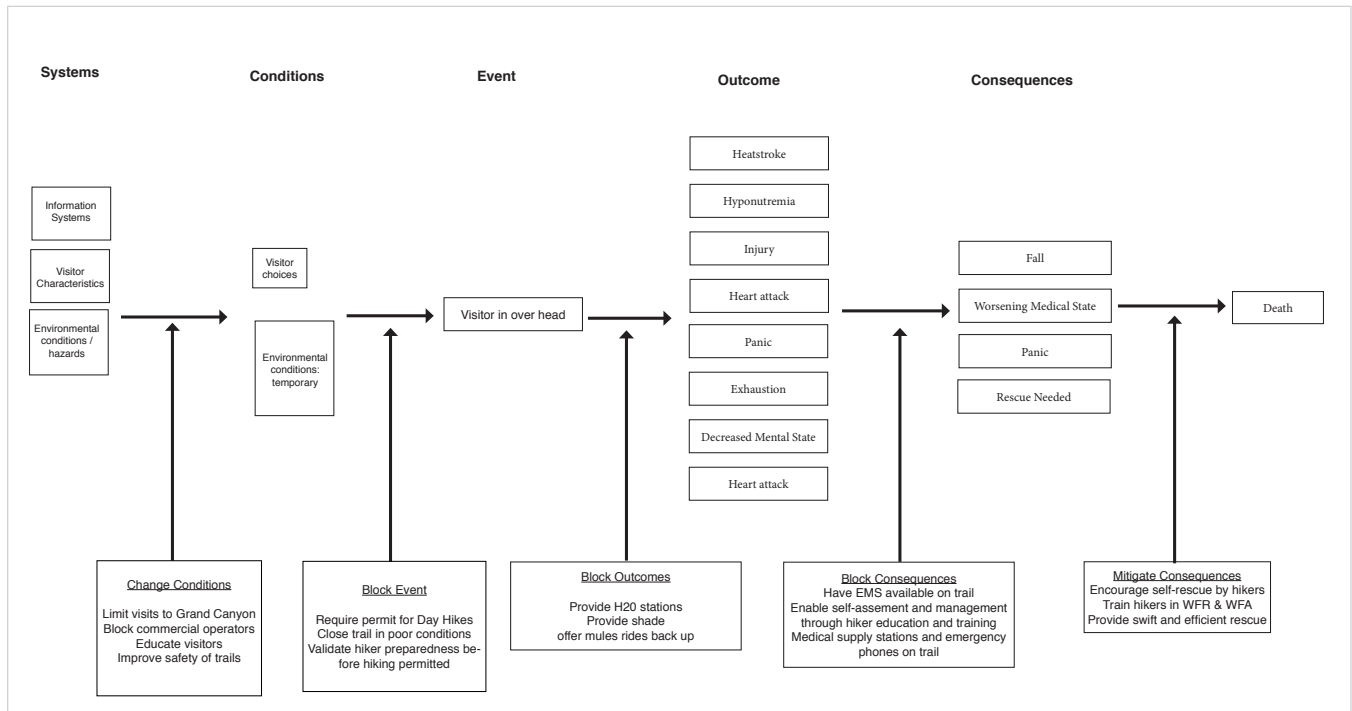
### AND RIGHT IS DEPENDENT UPON:

- Health
- Gear
- Group
- Weather
- Skills
- Experience



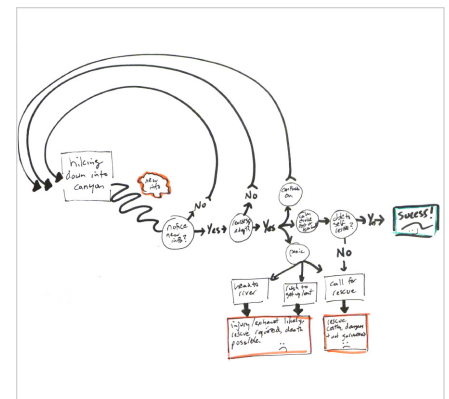
## WHAT IS THE PATH VISITORS SHOULD AVOID?

To help breakdown the process of what—in a more literal sense—leads up to a visitor requiring rescue, I also created a causal sequence model, a tool frequently used in risk management:



This was extremely helpful in codifying what actually happens in the lead up to a visitor requiring rescue or dying. It also helped clarify the options that are theoretically available to correct this problem, including increased EMS availability or closing trails, that were outside of the scope of my project.

I also created a decision tree (see thumbnail at right) that clarified what exactly the “bad” path for a visitor to go down looks like. This helped me realize there may be many “signs” to alert visitors that they may be getting into trouble, but if a visitor either fails to heed these signs, or even fails to notice them at all, they will likely continue on their hike until the problem becomes extremely obvious (and dangerous).



*Process: Developing a decision tree helped me understand the key decision points where things go wrong for visitors.*



# THE KEY MISTAKES VISITOR MAKE

After experimenting with these frameworks and models, I began to synthesize this information to help me clarify what actions and behaviors seem to almost foretell a visitor incident will occur.

I developed a list of undesirable behavior, one or more of which nearly always precedes a visitor getting into trouble.

Poor visitor behaviors:

- Go without water / food / gear
- Go with water but without skills / knowledge
- Go too late in day for hike planned
- Go without a plan
- Go on too hard of a trail
- Plan to go too far
- Go farther than planned

I then looked for patterns within the list to further simplify this list. I found it possible to group them into four overarching types of errors.

*Process: Synthesis of findings to pinpoint the four key mistakes.*





## THE FOUR KEY MISTAKES

Visitors who get into trouble:

### MAKE OVERZEALOUS PLANS

Visitors make plans that are beyond their abilities. They choose the wrong trail or destination, based on their abilities, preparation, the day, time, weather etc. This decision is often made in advance of the hike, perhaps as early as when visitors begin dreaming about their trip and setting goals. They may plan a trip to the Canyon specifically with an overly challenging goal in mind. Other visitors, though, may become excited once on the hike and decide to shoot for a distant destination.

### BRING INSUFFICIENT SUPPLIES

Visitors do not bring enough water, food, or other gear given their plans and abilities. While I found that many speculating on visitor safety issues over-emphasize this factor, it is nonetheless a problem. Having proper supplies gives visitors an important fallback when they become more tired or hot than they expected they would. With proper food, water, and shade supplies the physiological effects caused by their actions can be ameliorated.

### GO TOO FAR

Visitors keep going when they should turn around, based on their abilities, preparation, the day/weather etc. This includes instances where visitors overshoot a planned destination, as well as times when visitors have no planned destination, or one that's too far. This mistake is different from making overzealous plans in that it entails an action, rather than a thought in many cases. Visitors who go too far may not even make a choice at all, they simply continue on down the trail.

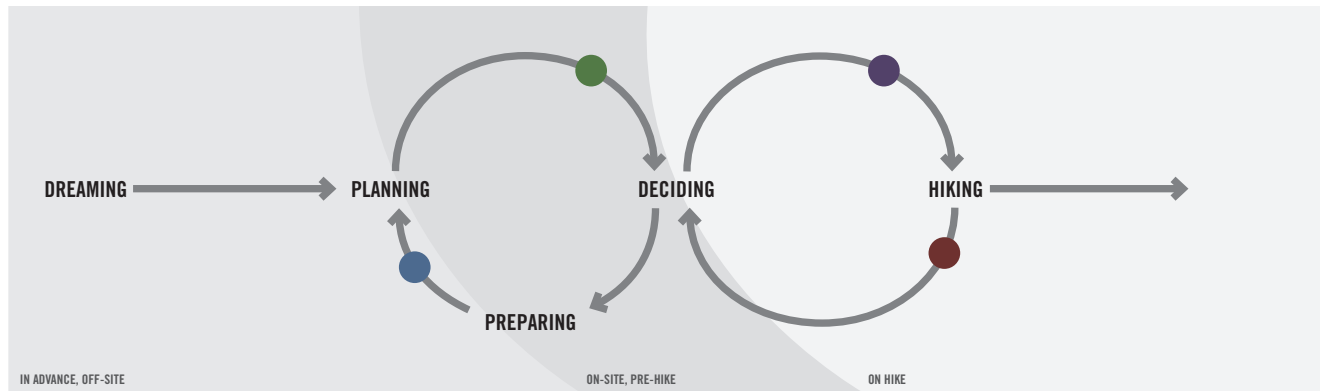
### PANIC

When visitors finally realize they are in over their head and are facing a challenging situation, they panic. This can take a situation from bad to much worse. Examining the environment death cases in *Over the Edge* (Ghiglieri & Myers, 2001) makes clear the degree to which visitors panic when faced with adversity can be the difference between a bad experience, and a life-threatening situation. Since panic is a deeply embedded human instinct, it is extremely difficult to combat.



I placed these actions in the context of the trip to demonstrate where these mistakes generally occur within the hiking process in order to understand which stages of the process an intervention should target:

- 1 MAKE OVERZEALOUS PLANS**  
Visitors choose the wrong trail or destination based on their abilities, supplies, day etc.
- 2 BRING INSUFFICIENT SUPPLIES**  
Visitors do not bring enough water, food, or other gear given their plans or actions.
- 3 GO TOO FAR**  
Visitors do not turn around when they should. Can be due to overriding a plan or lacking one.
- 4 PANIC**  
Visitors panic when they finally are hit with the realization that they are in over their heads.

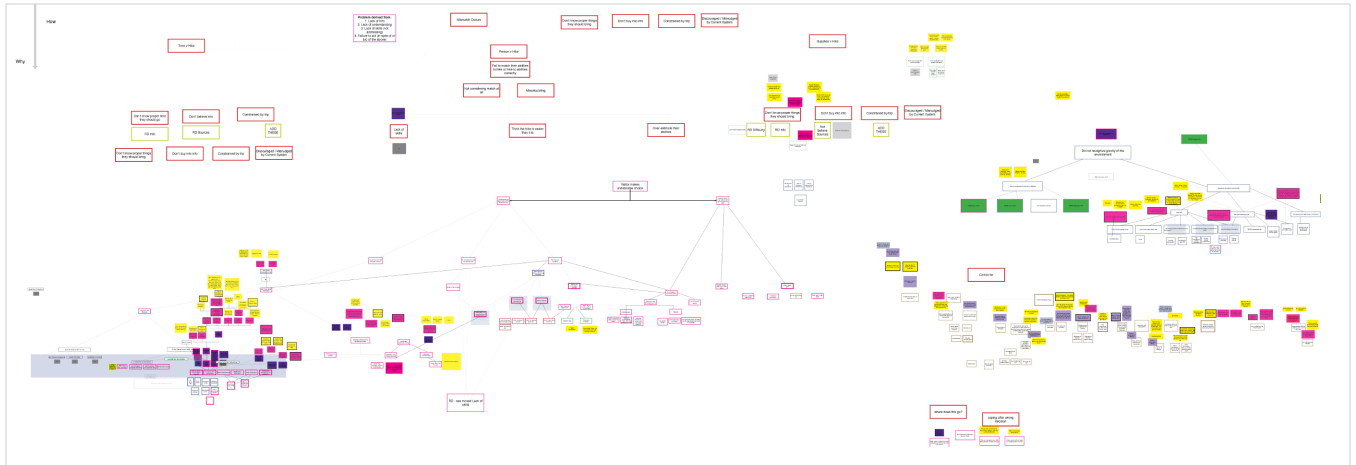


It was clear at this point that my focus needed to be not on risk taking, or on warning visitors per se, but rather on encouraging visitors to make better decisions. Having established these key mistakes, and the points in the process where they are made, I then returned to the my previous question: why are visitors making these mistakes?

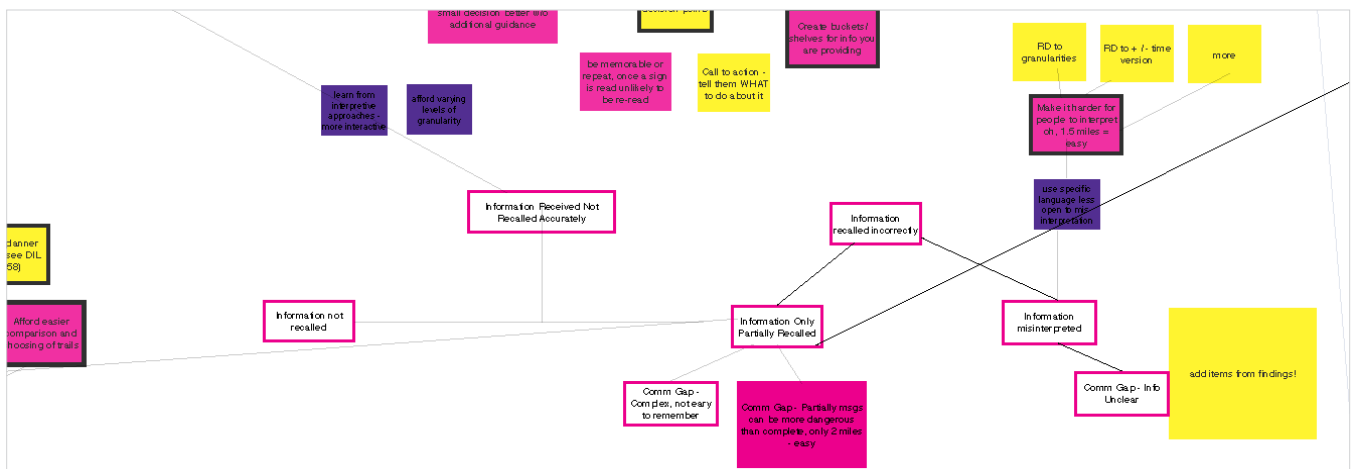
While it is possible to train people not to panic in bad situations, it's extremely challenging to do and certainly beyond the scope of this project. Therefore, I choose to focus on the three other types of mistakes. What leads to visitors making these errors?



I broke down some of the contributing factors for each of three other key mistakes to better understand the origins of these errors:



Process: Considering additional layers of causality. One thing leads to another, as tracked in this massive InDesign file (above). A small zoomed in section of the sheet is shown below.



Some of the possible links from the larger web that I explored included:

### Make overzealous plans

- Overestimate fitness / health level
- Underestimate difficulty of hike
- Are destination / goal focused
- Don't make an assessment of fitness at all

### Go too far

- Don't realize they've overshot their planned designation (if they had one)
- Choose to push beyond planned destination in the heat of the moment
- Has no planned destination, keeps going until tired, doesn't get tired because it's downhill at first

### Bring insufficient supplies

- Don't know what to bring
- Don't plan on going very far, then choose to keep going
- Don't have gear to carry it
- Underestimate what's required
- Inconvenient to purchase



# THE THREE MAIN GAPS THAT CONTRIBUTE TO VISITOR ERROR

After expanding out to consider what could contribute to these errors, I wanted to converge back in to categorize the underlying types of failures that related to these errors. I referred back to the various explanations for visitor behavior explored in Chapter Two, and considered the “gaps” framework explored in *Design for How People Learn* (Dirksen, 2011).

From this synthesis, I found that there are three main types of errors or gaps, on the visitor’s side of things, that contribute to visitors making mistakes:

## VISITORS HAVE LIMITED INFORMATION PRIOR TO, AND DURING, THE HIKE

When choosing a hike, visitors can lack key information about the hike and the difficulty it may present for them. Once engaged in the hike, they may not know how far they’ve gone, or what to do if something goes wrong.

Visitors can miss the information that’s provided by the Park, or skip it because they’re in a hurry. Some visitors read the information, but misinterpret it. Once down the trail, there’s very little information, causing information points to be misaligned with decision points.

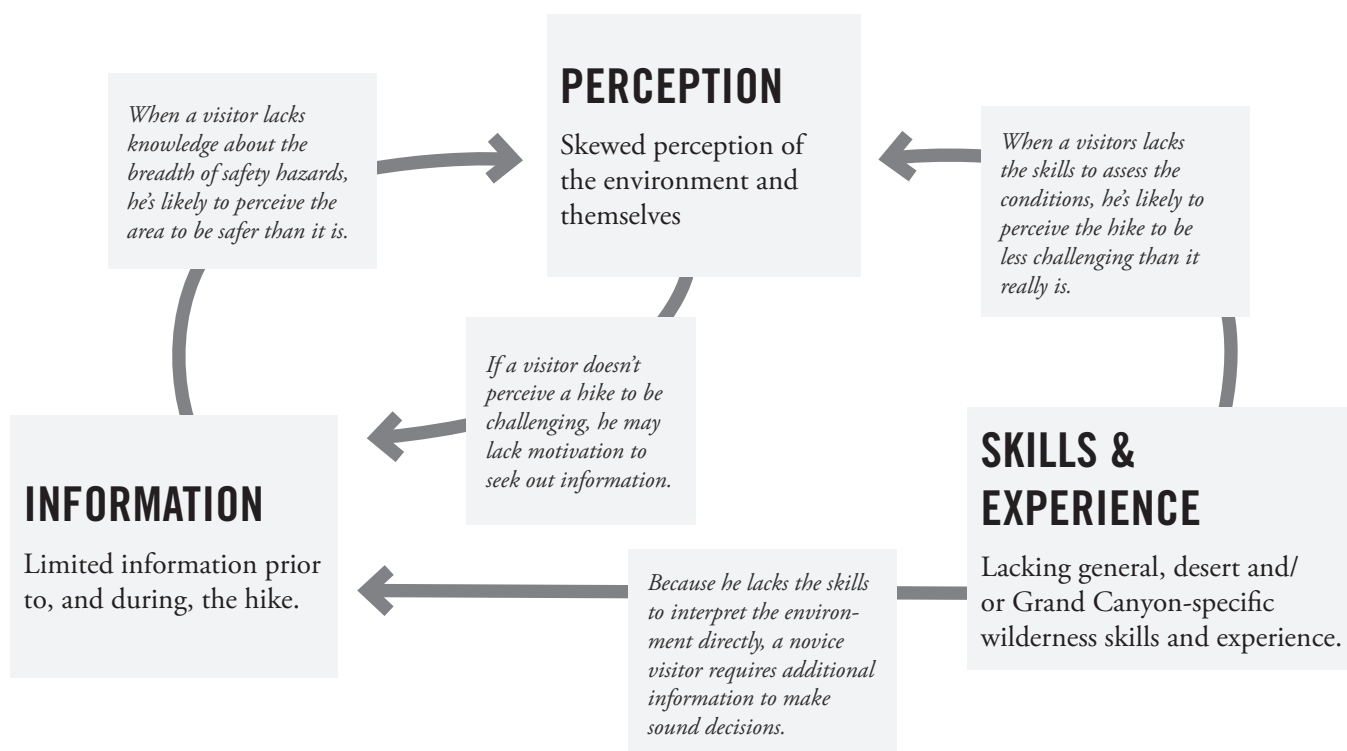
## VISITORS HAVE A SKEWED PERCEPTION OF THE ENVIRONMENT AND THEMSELVES

Visitors can misjudge the scale of the Canyon, the danger that heat presents, and how well they match up to their proposed hike. Making sense is challenging because the Grand Canyon environment is so unique and in such contrast to visitors’ everyday lives. Cognitive biases and “vacation mode” (a type of *liminal space*) exasperate the difficulty. The lack of feedback loops, and of demarcation of wilderness areas, can compound problems further.

## VISITORS POSSESS A LACK OF GENERAL, DESERT AND/OR GRAND CANYON-SPECIFIC WILDERNESS SKILLS AND EXPERIENCE

Visitors can lack vital outdoor skills such as how to monitor physical well-being or how to exercise situational awareness. They may lack the experience to consider desert-specific hazards. Many visitors are first-time Grand Canyon visitors and infrequent hikers. Others have extensive outdoor experience, but in more traditional alpine settings. In the unique Grand Canyon environment, past experiences don’t always translate well.





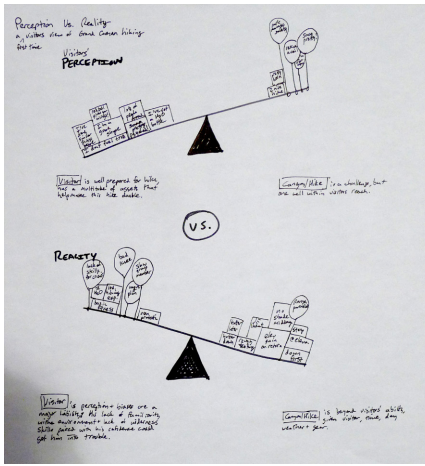
As this diagram shows, it's not so much a question of, "Is this a skills problem, or an information problem?" it's more about how these deficits play off of one another. If someone lacks outdoor skills, they need more information to get by. If they don't perceive it to be a dangerous place, they may disregard information thinking they don't need it.

For instance, because visitors don't know a lot about hiking in a true wilderness environment, they perceive a hike to be easier than it really will be for them, because they have no idea about the skills and knowledge that this type of hiking requires.

When all these factors combine together, it creates a situation where a visitor heads down trail with limited and/or false information about the hike he's planning to undertake and doesn't have a ton of wilderness knowledge and skills to fall back on when he finally comes to the realization that the hike isn't what he had in mind.

Is it any surprise such a visitor may end up in a bad situation?





*Process: Exploring the biased weighing of factors that leads to a mismatch. For a visitor, all of the factors in his favor, the things that make him qualified to take on a hike (shown as blocks on his side) come quickly to mind. Meanwhile, he fails to realize many of the factors that make him less qualified (shown as balloons on his side).*

*He does just as poor of a job sizing up the Canyon as he did of himself. He notes all things that make the hike not so hard, and ignores many issues that should cause him to think twice.*

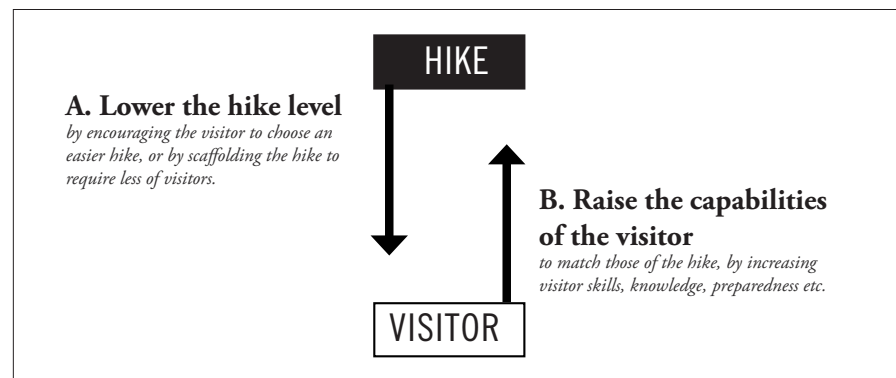
*In the visitor's mind (the top image) the scale balances massively in his favor. In reality, with the factors properly assessed, he is no match for the much heavier Canyon (the lower image).*

# VISITORS AND HIKE ARE MISMATCHED

I mentioned in the opening to the chapter that I had an important realization that it wasn't just about visitors not carrying the right supplies that put them in danger. Yet I also found that one of the main mistakes that visitors make is not having the right supplies for a hike. How do I reconcile these two findings? With the concept of the visitor–hike mismatch.

The PSAR Rangers sum up the core problem in the simple statement, “Visitors underestimate the Canyon, and overestimate their own abilities.” A similar way of looking at risk was explored by Simon Priest in his *New Model for Risk Taking* (1993). As discussed earlier, his model depicts the levels of adventure (and danger) created by a gap between a person's competency and what they are attempting to do. This presents the idea that outdoor activities may not simply have a set amount of danger and risk, rather the combination of the person and the activity determine the risk level. I call this gap between the activity and what a person can handle the visitor–hike mismatch.

Once I utilized this mismatch framework, it became clear that the traditional path of trying to increase the visitor's skills and preparedness was not the only way to close the gap and lower the danger. An intervention could also be used to lower the difficulty of the hike.



In order to make the hike easier, interventions could focus on structural changes that literally make it less challenging, things like adding water stations or paving the trail. However, visitors and park managers chafe at the idea of trying to directly visitor-proof the park.

There is, though, another way to decrease the difficulty of the task that visitors undertake: by changing which task they take on. For instance, instead of making the hike to *Skeleton Point* less difficult for visitors, just get them to turn around at *Cedar Ridge*, which makes for an easier hike. This realization was a major breakthrough in how I was approaching and constructing the problem.

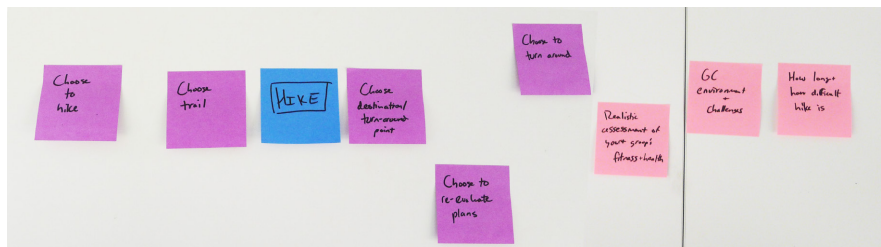
Educating and preparing visitors well enough so that they can take on an overly challenging hike is extremely difficult. When one factors in that many visitors are only visiting once and only for a short time, the obstacles to raising visitors up to the challenge can become nearly insurmountable.

This new approach: “How might we steer the visitor towards a more appropriate hike?” could provide a path with less resistance.

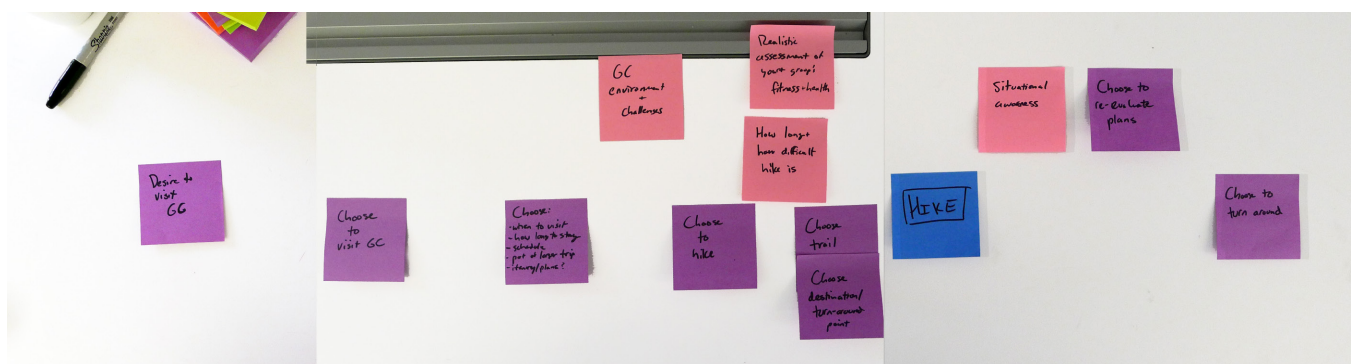


# THE AH-HA MOMENT HAPPENS TOO LATE

Another piece of the mismatch puzzle has to do with timing. This framework explains why visitors' poor choices can result in dire circumstances. If visitors take on a hike that's too challenging for them, but realize five minutes into the hike that this is the case, it wouldn't cause too much of a problem. The group would just turn around and choose a different hike. Unfortunately, too often, that's not what happens at the Canyon. Visitors do eventually realize they are mismatched for their hike, but that realization often comes very late in the process. Visitors often only realize how difficult the hike is, the environmental challenges and their own weaknesses after they hike:



Reports from *Over the Edge* (Ghiglieri & Myers, 2001), online trip reports, interactions with PSAR, and interviews with visitors show that the “aha” moment that people are in over their heads often does not come until after they’ve either begun to feel poorly, or until they turn around and begin to head back uphill. In order to encourage visitors to reconsider their plans, it would be immensely helpful for them to have this realization earlier on, allowing them time to self-correct before they find themselves in a daunting situation. Ideally, the order of things would look something more like this:



## HOW CAN I MOVE THE AH-HA MOMENT FORWARD?

Without critical feedback, visitors seem only to be alerted by exhaustion, sickness, or injury that they're in over their heads. Feedback in real time is critical for any system to work effectively (Norman, 2004, p. 75). While it's a challenge to get visitors to actually “snap out of it” and consider whether their assumptions really make sense, there is a huge potential here to have visitors correct their own actions if a reality check occurs before they find themselves in a bad spot.



# KEY DECISION POINTS

The insight that visitors realize their errors too late caused me to focus on how important a few key visitor decisions points are in impacting visitors' safety.

One of my key research questions early on in my study was about whether visitors were calculating risk incorrectly, or whether they simply weren't making a risk calculation at all. As I began to break down the problem, I realized more and more that risk was the outcome of broader hike choices rather than a decision point of its own. Visitors don't see a choice of which hike to take or what gear to bring as a risk calculation.

Even with this shift, the same question remains: do visitors choose poorly or do they fail to choose at all? Certainly this varies from visitor to visitor, but it seems in many cases that the latter is taking place: visitors are making poor choices by failing to make a choice at all. They continue down the trail without even considering turning around. They choose a trail for the day's hike without considering how the weather forecast should change their plans. In some cases, such as choosing a destination that is beyond their ability, visitors make an active choice, but in many other cases visitors may not even realize there's a choice to be made.

To focus more on visitors' choices, I wanted to match the problematic actions discussed earlier to a list of the corresponding decisions (or non-decisions).

PROBLEMATIC BEHAVIOR	DECISION TYPE	CHOICES	NON-CHOICES
MAKE OVERZEALOUS PLANS	Primarily active	Choosing a trail, turnaround point, or trip plan	Not consulting thorough trail information
BRING INSUFFICIENT SUPPLIES	Can be active or passive	Bringing the wrong supplies Choosing a hike too difficult for supplies carried	Not considering what supplies are needed Not considering which hike is appropriate for supplies carried
GO TOO FAR	Can be active or passive	Choose to continue past a planned turnaround	Continuing on without considering the consequences
PANIC	Passive	n/a	Not being able to override the panic and assess

My interventions, therefore, should focus on provoking and guiding the outcome of these key decisions.



The background image is a landscape photograph. In the foreground, a light-colored dirt path leads from the bottom right towards the center. To the left of the path is a large, craggy rock formation with a warm, golden-brown hue. The middle ground features a series of lower rock ledges and more dense green vegetation. In the background, a steep hillside is covered in thick evergreen trees. The sky is a clear, pale blue. A semi-transparent white rectangular box is overlaid on the left side of the image, containing the text.

# **PART II: ENVISIONING A TO-BE GENERATIVE & USER TESTING PHASE**



## GENERATIVE & USER TESTING PHASE INTRODUCTION

Throughout the project, from the first day I began to think about this problem, ideas came to mind. But of course many of these were unqualified ideas. They might have been based on a misunderstanding of the problem, or they might not meet visitors' needs at all, rendering them unappealing.

As I began to better understand visitors and the park context, and analyzed which current interventions work and which don't, I began to consider how to translate these research findings into design direction.

How should this newfound clarity on the users' perspectives, the use context, and the root of the problem I hoped to address with my design inform my designs? These findings gave me good grounding from which to propose fitting designs, but would they work?

To help increase the odds that my interventions could prove successful in affecting visitor behavior, I reached beyond my own research and called upon existing scholarly work on design for behavior change and decision science to lend additional direction. Combining proven techniques for designing for behavior change with my own situation-specific research findings, I began to draft strategic and tactical guidelines to help direct my designs, as well as to share with others working in this space.

With this set of guidelines and cautions I began to focus on generating well-qualified interventions to propose and test. In the second chapter of this section, I describe the first concept I developed more thoroughly. Developing this concept and testing it with potential users helped me immensely. It allowed me both to get specific feedback on the concept, but also, and perhaps more importantly, it helped me to further refine my understanding of visitors' needs and how they approach decision making.

Finally, in the last chapter, I share some of the final concepts I arrived upon at the end of my study.



# GENERATIVE AND USER TESTING PHASE RESEARCH METHODS

## PRIMARY RESEARCH:

### FIELD RESEARCH

Many of the insights that inform the work in this section were developed through the field research described in Part I. Looking at the current approaches to visitor safety helped me pinpoint bright spots, failures, and opportunities, all of which inform the design criteria outlined in this section.

### EVALUATIVE RESEARCH

I had a draft list of considerations and challenges in mind prior to testing my first concept, but the feedback I received from evaluative research really helped to clarify what would be most desirable for users, as well as most effective. The evaluative process and its findings are covered in Chapter Five.

## SECONDARY RESEARCH: SCHOLARLY SOURCES

To help in structuring the to-be, I returned both to my prior research, as well as to additional scholarly research that focused on guiding people's behavior and decision making.

### RISK AND RISK COMMUNICATIONS

In everyday life, people often use the terms danger and risk interchangeably to mean doing something where someone might get hurt or killed. In the eyes of judgement and decision-making (JDM) experts, they are in fact very different things. Danger or harm is about the consequences, the fact that something bad could happen. Risk, on the other hand, is the odds that such a thing will occur. Decision under risk looks at how people choose when they have a choice with known odds, but with an uncertain outcome, such as flipping a coin.

Much of the guidance on communicating risk focuses on these classic risk scenarios where the odds are known, but which side of the coin one will get is not. Nuclear power is the topic of many articles looking at risk communication because of the controversy surrounding it and the massive amounts of money on the line for proponents of this energy option. Medical choices, a critical and ever-growing issue as the US population ages, is also a popular topic in the literature.

Since these very formal applications are the main applications that the literature focuses on, much of the work assumes that the final risk communication to the public will come in the form of a report. This report is then intended to be handed to an engaged audience that will weigh the costs and benefits of each option, along with a certain probability for each, and then choose wisely.



Many everyday, informal risk communications scenarios don't involve these types of clear risks, or these type of regimented decision-making process. In these informal situations there may not exist a history of prior decision and outcomes, and even if this information has been collected, it simply might not conform to a clear, predictive percentage.

While traditional risk communications studies are not entirely analogous to the much more ambiguous space of visitor safety in parks, they provide a useful starting point to understand the theories that underpin much of the current efforts in park safety. They also helped me to better understand how visitors may be approaching and handling risk in general.

*Risk Perception and Communication Unplugged: Twenty Years of Process* gives a lighthearted summary of the evolution of the risk perception and communication field according to one of the field's preeminent scholars, Baruch Fischhoff.

He summarizes the progress in a short series of seven statements that represent the stages of leading risk communication theories over time, each beginning with the phrase "all we have to do is." It progresses from "get the numbers right" to "tell them the numbers" to "show them that they've accepted similar risks in the past," "show them that it's a good deal for them," "treat them nice," "make them partners." It finally concludes with "All we have to do is all of the above."

Within elaboration of these phases he discusses the difficulties of communicating risk successfully to an audience that will take everything said with a grain of salt, and may find disclosure even more suspicious than silence, something that is certainly a factor in this space.

Authors Eric Johnson and Amos Tversky found in *Affect, Generalization and the Perception of Risk* (1983) that *affect*—essentially mood or emotional state—impacts how likely people believe a perverse event is to occur: "...mood induced by brief reports has a large and pervasive impact on estimates of the frequency of risks and other undesirable events. Furthermore, the effect is independent of the similarity between the story and the risk."

This gives a fascinating option to nudge people to be more concerned about risks by simply depressing their mood. A lost puppy sign at the trailhead could actually cause visitors to be a bit more cautious on the trail. While it would probably be a bad idea to actually depress visitors to increase safety, this scenario also helps highlight the opposite effect that is already in place: a positive mood, created by the beauty of the park, and the vacation mindset, may be contributing to visitors' overly optimistic picture of the risks they face.

*Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk and Rationality* (Slovic, 2004) dives deeper into the influence of *affect* on risk. This article discusses a number of ways in which emotions influence judgement and decision-making, overriding information one may receive from a rational assessment of the situation. This article helps explain why improving decision making in the Grand Canyon scenario is so difficult: "...people base their judgements of an activity or a technology not only on what they think about it but also how they feel about it. If their feelings toward an activity are favorable, they are moved toward judging the risks as low and the benefits as high..."



When visitors are deciding whether to turn back on the trail, they are likely weighing both whether they want to continue and whether it is wise to do so. This study shows that the former assessment weighs heavily on the latter. Given that visitors rarely tire on the way down the trail and are usually very much enjoying the hike prior to turning back, it shows what a high burden it is to convince them to turn around when they are likely to feel that the risk is minimal in continuing on.

The article also explains how viscerally-felt information has a stronger impact both because having an emotion attached to an idea increased its *availability*, and because in decision-making, possibility (being able to imagine it could happen) is more important than probability (what are the dry odds it actually will happen).

## DESIGN FOR BEHAVIOR CHANGE

Given my intent to try to compel visitors to behave better, my secondary research also looked at design for behavior change. I pulled from popular books, as well as more technical judgement and decision making articles, to try to piece together an approach to tackle this problem.

*Design for How People Learn* (Dirksen, 2011) breaks down learning barriers into five major categories: knowledge, skill, motivation, environment, and communication, and then explains how to attack each one of these deterrents. It speaks of the necessity of first understanding your learners and their goals as a prerequisite to other approaches. The impediment that a clash of perspectives between park personnel and visitors causes is something noted both in the comprehensive safety study and in my own observations: if parks want to change visitors behavior, they need to first understand why they act the way that they do.

While intended for a popular audience, *Nudge* compiles key theories in psychology and decision sciences into a straight forward, but science-based, approach to encouraging behavior change. The book uses the construct of *The Planner* (the angelic voice that tells us we are going to eat better) and *The Doer* (the devil who says dive right into that delicious cake), and explains the variety of challenges that *The Doer* faces in faithfully following through on *The Planner's* plans. Since many of these challenging forces can be difficult if not impossible to reverse, *Nudge* focus on changing the things we can control to encourage the choice that the decision architect wants the user to take.

Since I am trying to help hikers make smarter, more informed choices about their hiking routes, and to provoke *The Planner* and its reflective thinking, *Nudge* provides some specific ways to help: utilizing *anchoring*, *defaults*, *availability* and other tools that I am likely to draw upon in my design.

*Thinking Fast and Slow* provides an excellent overview of a huge swath of research around *prospect theory*, and emotional decision making more broadly. Sections about *miswanting*, *insufficient adjustment*, and the value of comparisons are especially relevant to my study.

As with other articles in this section, *Thinking Fast and Slow* helps explain the difficulty of trying to correct optimism bias present in Grand Canyon hikers. It does, however, also provide some ways to attempt to address it, such as the



fact that providing particular examples and encouraging people to generalize from there has been shown to be more effective than providing a generalized fact or statistic, and hoping that the viewer will feel it is personally applicable.

In what is largely a more-accessible version of *Thinking Fast and Slow, Decisive* by Chip and Dan Heath (2013), provides a simplified framework to help people make better decisions. The framework uses the acronym WRAP to describe a process that they argue leads to better decisions: Widen your options, Reality test your assumptions, Attain some distance before decision [being less affected when making decisions] and Prepare to be wrong [re-evaluate and re-consider after a decision is made].

This process tracked quite well with the conclusions I had made based on my own observations and design process of how I could improve the decision-making process at the Canyon. It also confirmed for me the importance of encouraging a wider and more active choice to engage in a particular hike, with particular gear, at a particular time of day. The book's advice to avoid making decisions in the heat-of-the-moment is much tougher in my space, however. This advice really means that what we want visitors to do is call on *System 2* (the computation processing part of your brain) to help with the decision rather than relying on *System 1* (the automatic, emotion-driven part). While hikers can't take a break and decide later about turning around, I can encourage a similar effect by encouraging hikers to make that decision before they begin the hike, or by attempting to use *cognitive strain* or other tactics to wake-up *System 2* when it comes time to decide on the trail.

BJ Fogg argues, in a video explanation of his *behavior model* (2013), that what one is asking a user to do is far more likely to happen if that task is simple. He explains that there is a simple science to determining what is and is not simple: requiring time, money, physical effort, brain cycles, going against the grain (which he labels "social deviance"), or acting outside a normal routine all decrease simplicity.

He argues that each person has a default tolerance for each barrier to simplicity, but that this calculus is not fixed. Instead how much one cares about the amount and type of effort required is influenced by the context at the moment the task is presented. For a busy executive, five minutes is too long to find the information she needs on a website, but a teenager has all day — unless she's sitting in a 11th grade English class and needs to find the answer right now.

"Simplicity is a function of your scarcest resource at that moment," he summarizes, meaning that while generally a student has more time and physical ability than money, in that moment when the test is about to begin, he would be willing to pay for the right answer.

This model could be helpful in framing how to condense and prioritize visitor information, both generically, and with specific context in mind where one resource may be more temporarily scarier than another.

In *Is 28% Good or Bad?* (Fischer, Faberlin & Ubel, 2004) the issue of how people have difficulty evaluating unfamiliar information is studied. The authors look at medical decisions, but the general findings seem applicable to this space as well. They found that when people had multiple characteristics to



compare, they would overlook or underweight those that they had difficulty grasping, and sometimes overweight those that were easy to understand.

“By the same token, personal anecdotes (“my sister had that done”) will influence patient decision making the most when quantitative comparisons of other attributes are difficult to perform. Only when all alternatives are present concurrently will such hard-to-evaluate information be fully integrated into choice process”

This is an extremely valuable insight that will help as I plan better information pieces to help people make informed decisions.

*Additional articles in each topic area helped me better understand what’s going on with the current process, and to consider how the design interventions I propose could be most effective. For a full list of items reviewed, please see the references list on page 187.*



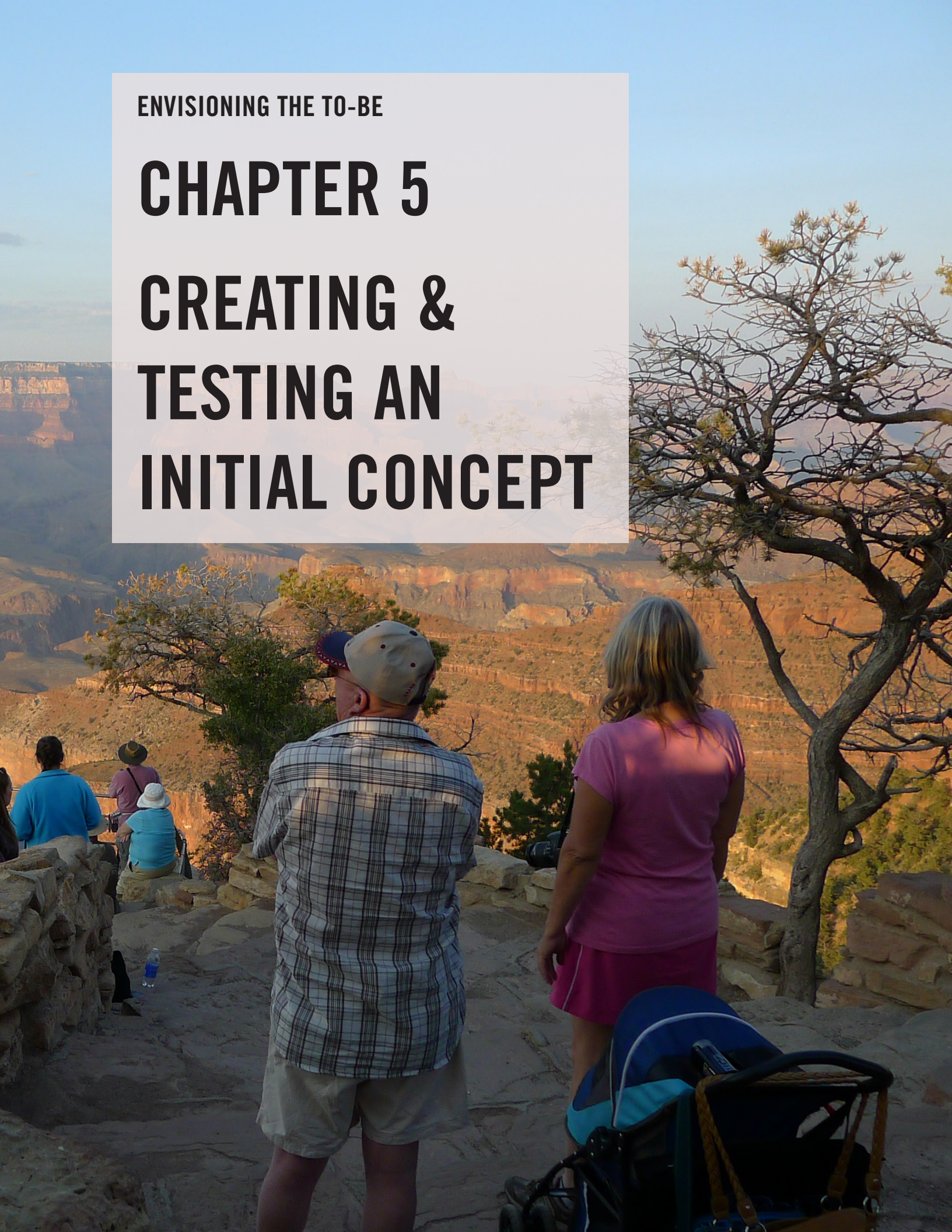




ENVISIONING THE TO-BE

# CHAPTER 5

## CREATING & TESTING AN INITIAL CONCEPT





## CHAPTER FIVE INTRODUCTION

Up until this part of my project I had focused largely on observation, expert opinions, and psychological theory to understand visitors' perspectives. I had spoken with visitors while I was visiting the Canyon, but I didn't have an opportunity to probe more than surface-deep with them directly.

In order to see what would really resonate with visitors, I wanted to get feedback directly from visitors.

I had begun to get more specific about possible interventions. Having used my design criteria to narrow the many ideas I created in the generative stage down to a handful, I next needed to decide which to develop further.

While I felt each of these finalists had the potential to affect visitors, limited time meant I would not have an opportunity to test and finalize each intervention I had envisioned. I considered what my main goals were for concept testing and which concepts I felt would drive the most productive conversation with users.

Some ideas seemed difficult to test through direct user feedback, since they rely upon influencing visitors subconsciously. Others were challenging to test outside the park context, which unfortunately was necessary.

I determined that a tool to help visitors choose the appropriate hike and destination for them was the best intervention to test first. This intervention took a direct approach to guiding visitors towards making better decisions.

By testing this intervention first, I hoped to gain not only feedback on the concept itself, but also to use it as a lens to better understand how visitors were approaching, and making, hike decisions.

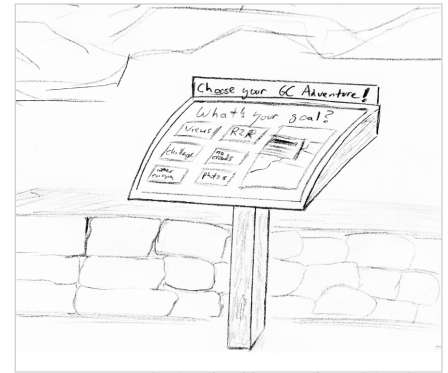


# AN INITIAL CONCEPT: THE INTERACTIVE HIKE ADVISOR

The interactive hike advisor is an on-site digital tool that would help visitors choose a hike. It aims to combat the mismatch between visitor and hike by helping visitors know more about their hike options and help guide them to a better hike choice.

I found that many visitors lack information in advance, but do expect it to be available on site. Not everyone consults the provided information in advance, instead they make a last minute choice to take a hike, or to take a more involved hike than planned. Even if visitors do refer to the information provided, the information currently available doesn't afford easy comparison of trails.

The hike advisor would allow information to be available quickly, where people need it (at the trailhead, visitor center, or lodging) and it would afford a variety of depths of information to be available to meet visitors' differing interests for information.



*Process: An early sketch of how a digital kiosk placed at the trailhead could invite interaction by mimicking existing signage.*

## RESPONDS TO FINDINGS THAT:

- Visitors actively seek hike information
- Visitors prefer interaction with options over flat information
- Visitors have difficulty assessing difficulty of hikes
- Visitors have difficulty assessing which hike is appropriate for them
- Visitors focus on limited hike criteria (distance) and ignore other key criteria (elevation, time of day, etc)

## GOALS OF THE INTERVENTION

The tool intends to encourage an active, informed choice of trail, time, destination and supplies for a visitor's hike. It also helps widen the options that visitors are considering, and draws attention to the factors that visitors may not have considered actively: goals, elevation change, time of day, and visitor traffic levels.

Even after viewing the best information currently provided at the Visitor Center Information Plaza, many visitors are left unsatisfied or confused. Visitors often wait in line to ask Rangers for advice, a sure sign that the information currently available isn't meeting all of the visitors' needs.

Visitors seem to prefer to have more control and interaction with hike information and advice, preferring to speak with a Ranger or fellow visitor rather than looking at purely static information. I also found many visitors are looking at incomplete information (ooh, two miles, that's easy) or failing to consider important criteria (time of departure, whether they are looking for an exhausting workout or a fun family day, etc) when left to decide on a hike on their own.



## BRINGING THE CONCEPT TO LIFE

I developed sketchy wireframes for a hike advisor tool that would help visitors choose a hike. I was interested in seeing if this direction had any potential appeal and understanding more about how users were approaching the decision.

I narrowed down the possible forms and styles to three major directions to test with potential park visitors:

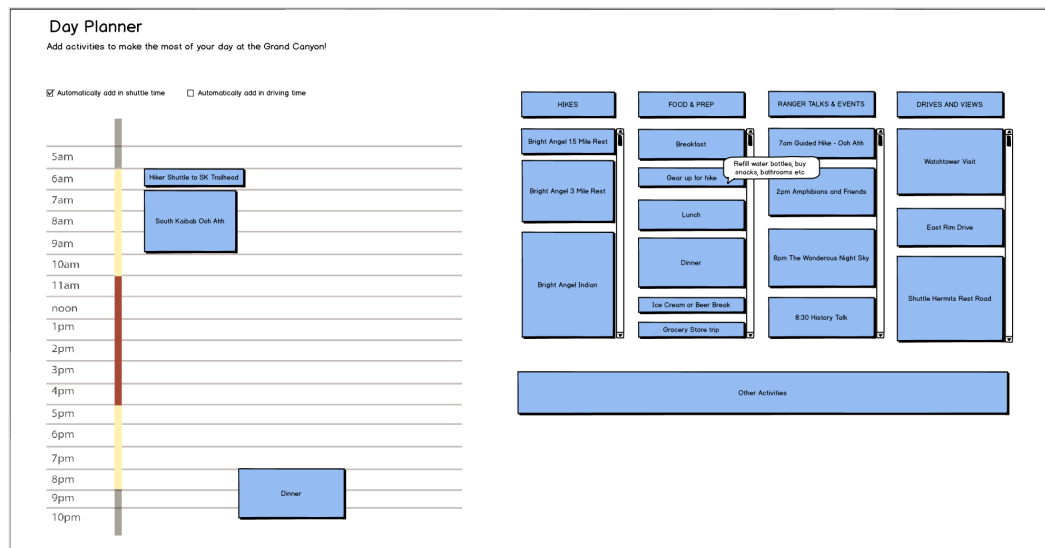
## 1. SURVEY STYLE HIKE RECOMMENDATION ENGINE

A visitor would answer a series of questions to receive a custom hike recommendation.

This tool guides visitors through considering time of day, fitness level, gear, and goals to make a hike choice decision.

I considered how interactions could increase transparency and control for visitors who may not fully trust the tool to simply spit out a choice for them. One such option would be to show several possible options that could be a good fit for the visitor, with the highest recommended one highlighted, rather than simply provide a single expert recommendation.

## 2. CALENDAR-BASED DAY PLANNING TOOL



By showing the length of time a hike will take, a calendar-based version of the tool could help visitors intuitively grasp the gravity of the hike.

As a time-based tool, this version helps visitors prioritize time-of-day as a deciding factor when choosing a hike, and it can provide feedback to visitors about poor timing choices.

This style helps communicate indirectly to visitors that taking a long hike means having limited time to fit in other activities, something that most visitors are wary of. This tool also helps visitors factor in the time needed for meals, purchasing supplies, and shuttle times. These necessities can be added



to the schedule automatically, helping contextualize the hike and nudge visitors not to forget about these key support activities.

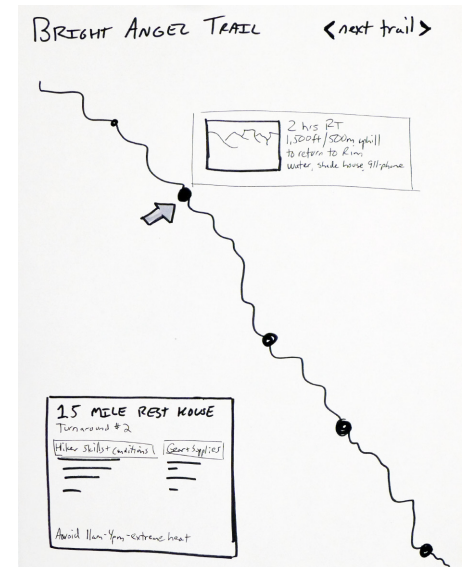
### 3. INTERACTIVE HIKE MAP

The third version of the tool features hike information embedded in a hiking map. It's based on the analog hiking maps that are likely already familiar to visitors.

This friendly format could make visitors more comfortable with it than they may be with something entirely new, while the digital interactive form would make it much easier for visitors to drill down for more information than they can with a standard paper map.

Making it interactive also allows there to be several layers of information about supplies, time-of-day, the difficulty of different sections—much more than can be displayed on a single map.

This style puts the visitor in charge of navigating the information. It also uses visitors' interest in finding basic information about their hike to drive engagement.





# CONCEPT TESTING

## PARTICIPANTS

Concept testing was conducted with younger people who had previous experience visiting at least one US National Park but who had not visited Grand Canyon National Park, or had not visited it in many years. A mix of US citizens and international students participated in the concept testing.

## TESTING ACTIVITIES

### CHOOSE A HIKE USING EXISTING INFORMATION SOURCE

I asked each participant to review the current hike information in the Park Newspaper from Grand Canyon National Park, and to choose a hike given this information. I also asked about their general understanding of the options based on the information provided. Many participants also shared what they were confused by or didn't like about this information style.



*Card sorting helped explore participants' expectations for a hike choosing tool.*

### CARD SORTING - HIKE ADVISOR NAME CHOICES

Prior to showing testers the three wireframes for speed dating, I had them card sort a list of possible titles for the hike advisor tool. By seeing what they understood the different titles to mean, how they grouped them, and which they were most interesting in using, I hoped to gain a better understanding for what level of advice or guidance they were interested in and how they framed the hike decision. This activity provided practical feedback to ensure that the name of my tool would be meaningful and appropriate to visitors. It also helped me grasp the visitors' mental model for making a hike decision.

### SPEED DATING AND FEEDBACK ON EACH CONCEPT

In the last part of each testing session, I presented each of the three concept wireframes to participants. I asked for participants to walk through their understanding of what the tool did and how it worked. I then inquired if they would be inclined to use it, and followed up on the feedback or concerns they provided.

## TOPICS OF INQUIRY

In addition to getting feedback on the concepts and better understanding the visitors' approach to choosing a hike, I was also hoping to explore these topics:

### DO VISITORS TRUST A DIGITAL TOOL?

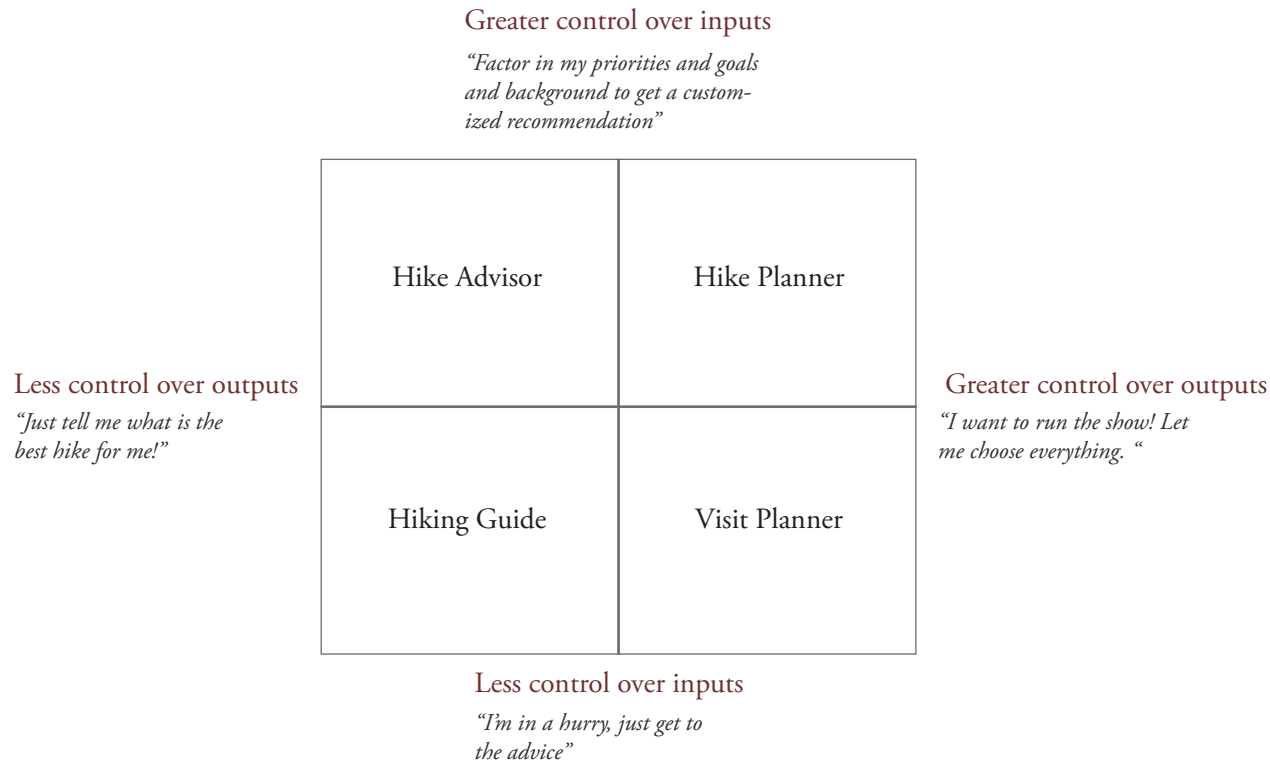
How can I create trust of recommendations and/or subjective information provided by a digital, interactive tool? I found that visitors trust human advice, even from people they don't really know. How can the interactive device replace this? Does it need a human element, or at least a human backup option?



DO VISITORS WANT A GUIDE, AN ADVISOR OR JUST MORE INFORMATION?

On the spectrum of simply providing a variety of information to spitting out a single hike recommendation for each visitor, what level of guidance do visitors need, and what would they want to seek out? Similarly, what level of detail should be provided? More details likely keep visitors more in control, but can lead the process to feel too slow or bulky.

I envisioned the different tool names as falling into the places shown below in the 2 x 2, but I was curious to see if the titles evoked the same understanding from others. I hoped the card sorting, as well as the other activities, would help me learn which segments of these spectrums were desirable to visitors:



WHAT WILL LURE VISITORS IN TO ENGAGE WITH THE DEVICE?

How can I draw visitors in to take advantage of the information provided by the tool? Visitors already often don't use all the information at their disposal. While many visitors are looking for information about hikes, they want to find what they need quickly and continue their trip. Kiosks and choice apps can be long and annoying, and people may have had bad experiences with these tools in the past. How can I draw people in and allow quick interactions, but also cram as much of the desired information as possible into that interaction?



# FINDINGS & INSIGHTS GAINED FROM CONCEPT TESTING

The feedback gained from testing gave me a nuanced understanding of how visitors approach planning their trip and choosing a hike, as well as specific design directions. Detailed feedback gathered on each concept prototype helped to determine usefulness, usability, and desirability of the tools.

## HOW PARTICIPANTS CHOOSE A HIKE



Process: Organizing and synthesizing feedback from concept testing.

### THEY SEE HIKING IS AN ACTIVITY

Visitors want to “seize the day” and make their visit worthwhile. Participants emphasized the importance of what they’re going to see or accomplish on a hike when choosing a hike. “What do I get if I do this one?”

They put hikes together with drives, Ranger talks, and other activity options all in one bucket of things to do at the park. They were not necessarily committed to hiking as an activity first; they were looking for the top activities and attractions to engage in at the Park, be it a hike or other activity. In order to compare a hike to doing something else instead, they wanted to know what special experiences or sights a hike would afford them.

Visitors assumed they were looking to choose a specific hike or route, not a trail. One participant mentioned that on a previous park visit they didn’t follow a specific trail, but rather went to a landmark destination via a series of trails. This reiterated both that visitors are destination-focused, and also that the GCNP approach of categorizing information primarily by trail may not match visitors’ expectations or mental models. The current trail-based organizational structure makes it challenging for visitors to parse the information.

### THEY FOCUS ON LENGTH, HOW “HARD”

When trying to choose a hike from the options presented, key attributes participants wanted to compare included hike length, “how hard the trail” is overall, what they would see, and what facilities would be available.

### THEY CHOOSE BY COMPARISON

In keeping with my expectations, participants did not have a set understanding of what they were looking for in a hike. Rather, each participant approached the choice as a comparative task: looking at the different options first, and then choosing the best fit from within the set.

### THEY FOCUS ON ONE CHOICE AT A TIME

I found that all participants used a *lexicographical* decision process. What this means is that visitors aren’t considering ten different criteria and then choosing the best overall pick, as is done in a Consumer Reports analysis. Instead, they’re simply looking for the most interesting hike to do, and then if that doesn’t settle it, they move to the second criteria: checking to see if it’s beyond their ability.







the ability of the tool to stay up and running in an outdoor environment, and were similarly concerned about the unreliability of phones.

### THEY FIND A HANDHELD ITEM DESIRABLE

While they weren't keen on a digital form, participants liked the idea of having a handheld item as part of the output from the interaction. Either a hike card, a map, or something similar. Participants expressed that having a map provided a sense of security, even if it was rarely referenced.

### THEY WELCOME INFORMATION ABOUT FACILITIES, SHUTTLES

Participants liked having practical information available as well as information about hike difficulty; including these details could help encourage the use of the intervention.

They liked that the interactive map option would show distance between bathroom and water facilities. Knowing the availability of facilities was important to participants (even though these are younger, healthy people), so including this information makes it very valuable to visitors overall, some of whom place an even greater priority on these needs.

Multiple participants also remarked that they liked that the planner tool would automatically add in shuttle time. Given that Visitor Center Information Plaza users also had difficulties with pairing logistical information with hike information, this seems to be a promising opportunity area.



## FEEDBACK ON EXISTING INFORMATION

## EXISTING NEWSPAPER IS CONFUSING & PARTICIPANTS SKIP KEY TEXT

The Park Newspaper hike descriptions contain critical introductory information within a large chunk of text, which participants skipped in lieu of the much more eye-catching chart. However, important context information is missed if the visitor only reads the chart.

## ORGANIZING BY TRAIL LEADS TO CONFUSION

The information left participants confused about the Rim Trail. The Rim Trail is a 16-mile long trail, but nearly all visitors complete only a small section of the trail.

The trail runs along the rim, passing many attractions, shuttle stops and parking areas, so visitors can start and end at a wide variety of places, making the actual shorter hike options along the trail nearly endless. The fact that this is how the trail works was not apparent to participants engaging with the existing information.

The Rim Trail was also not readily comparable to the other hike options since the information on Rim Trail sections was contained in a different chart from all of the other day hike options. Rim Trail section hikes were also given difficulty ratings with respect to other Rim Trail section hikes, rather than in comparison to all other hikes, which misled participants.

The chart with information on Inner Canyon hikes includes a column for facilities and indicates that there are bathrooms on the Bright Angel Trail. No such column was included in the Rim Trail chart, leading participants to believe that the Rim Trail did not have bathrooms available. This led them to believe that Bright Angel was the more facility-laden trail, which they found desirable. In actuality, many sections of the Rim Trail run alongside trailheads and developed areas of the park where restrooms are available.

There seems to be an assumption made by those making the guide that there are “Rim Trail people” and “Inner Canyon people” and visitors would only be looking at one or the other of the two charts provided. While the division between the Rim and Inner Canyon is a sharp one for Park staff, visitors do not seem to be familiar with this distinction at all. This strong differentiation between the Rim Trail and other trails could also contribute to the underuse of the Rim trail by fit visitors who get the impression it’s only for visitors with limited capabilities.

### PARTICIPANTS WANT TO KNOW: OVERALL, HOW DIFFICULT IS THIS TRAIL?

Participants wanted to know overall, how difficult is this trail for each trail listed. With the trail as the main categorizing element, participants expected to get an overall difficulty rating for that trail. The fact that the trail consistency varied only a bit and that the length of the hike was the main determinant of difficulty was confusing to participants and mistrusted. Participants expected that there were easy and hard trails, and wanted that information provided front and center.

[illegible]

## Rim Hiking

### Stroll the Rim Trail

**Stroll the Rim Trail**  
The Rim Trail offers a diverse hiking experience along 13 miles (21 km) of the canyon, shown by brown and green dashed lines on the map on pages 4–5. From a short 30-minute sunrise walk to a full afternoon hike, choose your adventure. The Rim Trail is wheelchair accessible from Lookout Studio to South Kaibab Trailhead. Distances are one way.

[illegible]

*Participants were provided the trail guide information from the 2013 Park Guide / Newspaper. View these items larger on pages 94 & 95.*



## MISCONCEPTIONS SURFACE

I was not intending to use concept testing to see if participants harbored some of the common misconceptions I identified in the rest of my research, but they revealed themselves just the same.

### VISITORS THINK MIDDAY IS WHEN PEOPLE HIKE

Multiple participants were confused as to why the day planner would include early morning and nighttime hours, “you’ll be sleeping at those times so you don’t need it on the calendar,” said one confused tester (February, 2014).

The fact that these could be possible hiking times, or even preferable hiking times, was completely off the radar of participants.

### VISITORS LIKE TO FOLLOW THE LEADER

Multiple participants mentioned the “follow the leader” tendency within groups I had identified. “If someone else wants to do the planning - that’s fine with me!” announced one tester (February, 2014)

One room for potential here may be trying to facilitate decision making that can better involve passive group members. Even though all group members may not have expertise, they likely do have preferences regarding the goal and duration of the hike.

### “INNER CANYON” NOT A MEANINGFUL DISTINCTION FOR VISITORS

Hikes in the Inner Canyon are harder than other hikes because the trails are steep, have tricky footing, and get hotter as one goes down. As mentioned previously, participants had no conception of what the Inner Canyon was or how it was different from the rest of the park. They certainly did not know why any hike in the Inner Canyon would automatically be harder than other hikes, a fact implied but not explained in the Park Newspaper.

### VISITORS ARE CONFUSED ABOUT THE NEED FOR SKILLS

As I suspected, testers were a bit reluctant to allow the tool to factor in their hiking experience level when recommending a hike. They found it odd to be held back by a lack of hiking experience if they were otherwise in good health. This is something I witnessed when shadowing Rangers as well. Visitors do not understand that backcountry hiking can require skills and background that they may lack. Explaining to visitors that their lack of backcountry-specific skills make them less-qualified than they think is a challenge.

### THEY ASSUME WATER IS ENOUGH

When discussing the factors that make the Canyon particularly challenging, many visitors mentioned that they would of course carry plenty of water. As mentioned earlier, the fact that visitors have gotten the message on water is a good thing, but it can also create a troubling impression with visitors that water is the only thing that’s needed to be prepared for a challenging hike.



# MOVING FORWARD WITH FEEDBACK

Testing provided me with a greater understanding of visitors' decision-making processes as well as feedback on the desirability of an information tool to aid them in decision making. Based on what I learned from this testing process, I updated my design guidelines, and continued to refine the other concepts I had under consideration.

Given the overwhelmingly negative response to placing a digital tool at the trailhead, and the consensus amongst testers that the tools as presented were too involved to meet participants' needs, I chose not to develop the Hike Advisor concept any further.

While a version of the tool could have been developed that worked around the objections raised by participants, given the new understanding of visitors' needs such an approach didn't seem prudent. Participants' questioning of the device's necessity helped me to realize that the number of options that are appropriate for any individual visitor is limited to just a handful, so an advanced choosing tool isn't really needed.

Participants expressed a strong interest in being able to compare and choose hikes for themselves. However I still wanted to find a way to help steer that choice and encourage them to consider factors they were currently overlooking. So as I looked to pursue other interventions that could help visitors choose a hike, satisfying those competing needs became my chief hurdle.







ENVISIONING THE TO-BE

# CHAPTER 6

## DESIGN

## CONSIDERATIONS





## CHAPTER SIX INTRODUCTION

“There is no such thing as a “neutral” design.”

*Thinking Fast and Slow* begins with this call to arms (Kahneman, 2011, p. 1), echoing Kinross’ (1989) argument that neutral communications simply aren’t possible. Kahneman adds that “adults can be greatly influenced by small changes in context” (p. 1) and that “A good rule of thumb is to assume that “everything matters” (p. 3). Such is the burden of the designer: consider everything, because each design choice and each detail will impact the user’s experience.

In Chapter Four I set out to try to establish the heart of the problem that results in too many visitors requiring rescue at the Grand Canyon. To synthesize the feedback from concept testing I discussed in Chapter Five and combine it with some of my previous findings from readings and my own field research findings (discussed in-depth in Chapter Three), I created a series of strategies and criteria to help guide my design choices. This chapter will outline this guidance to myself and other “choice architects” in this space.

How can we make interventions that will really work?



# OVERARCHING STRATEGIES

While my research had uncovered myriad ways to attack this problem and plenty of tips and hints for how to go about executing designs, I wanted to first step back and outline my strategies for solving the problem.

I see the final design concepts I propose in the following chapter as tactics—means to an end. In order to evaluate the tactics, it's important to understand and evaluate the strategy they intend to help execute.

At this point in the project I'd reached a major decision point: which ideas and directions would I continue with? Given the feedback I received on my first concept, how should I redirect my efforts? Culling from all of my research—both the research I conducted on parks and the secondary research I relied upon for guidance on designing for behavior change—I narrowed down to focus my intervention around three major strategies that I believed showed great potential to move visitors towards making safer choices. Each of the three takes a different approach to attacking the problem:

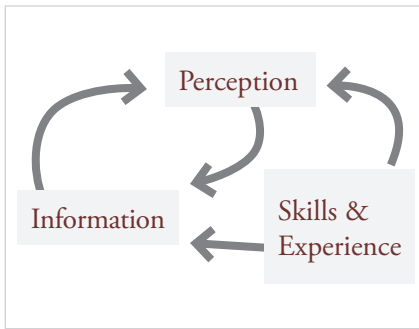
The first strategy, **enable informed choices**, is all about helping visitors make better choices through improved access to information. This strategy assumes that visitors are capable of making better choices for themselves, with some help from timely, accessible information provided by the Park.

The second strategy, **counter optimism bias**, is a bit sneakier. It looks to debias visitors to make the information-based effort more successful, and to make a pass at the perception side of the *information-skills-perception triangle* introduced in Chapter Two.

The third strategy, **boost alternatives**, focuses less on guiding the visitors' decision-making and looks instead at changing the options from which visitors are choosing. By offering appealing options that are safe too, and by changing defaults, visitors may lean towards safer choices with or without improved information and a more realistic outlook on their hike.

An in-depth discussion of each strategy follows.





*The Information - Perception - Skills triangle*

## STRATEGY 1: ENABLE INFORMED CHOICES

As discussed in Chapter Four, many visitors aren't purposely making poor choices. Rather, they lack information and understanding about the difficulty of what they are undertaking. This gap in understanding then leads to a dangerous gap between visitors' capacity and preparations and their hike.

The enabling informed choices strategy aims to correct this by tackling the information side of the information - skills - perception error influences triangle introduced in Chapter Four.

The Park's current interventions, covered in Chapter Three, have failed to fully address visitors' information needs, leaving them under-informed and misinformed.

I wanted to address some of the key issues than I had identified with current interventions when crafting my own:

### VISITORS ARE SEEKING HIKE PLANNING AND CHOOSING INFORMATION, NOT SAFETY INFORMATION

The top thing visitors were looking at on the trailhead signs was the mileage breakdown for the trail. Some seemed to be double-checking against plans, while others were using this information to decide whether to hike, or how far to hike.

### VISITORS HAVE DIFFICULTY COMPARING HIKES TO EACH OTHER AND CHOOSING ONE

Even after looking at information at the Visitor Center Plaza for several minutes, visitors often wait in line to ask a Ranger about which hike they should take. Trailhead information is even less helpful for visitors looking to compare trails or find the best hike for them, and participants in my testing had a hard time with the Park Newspaper as well.

### INFORMATION TOUCHPOINTS OFTEN AREN'T CONVENIENT FOR OR RELEVANT TO VISITORS

Where information is provided and where visitors are making decisions are not the same place. Information is front-loaded, but visitors may miss, disregard, or misremember this information by the time it comes times to make a choice. Little opportunity is provided (absent PSAR Rangers) to receive information down trail. Visitors may not be motivated to engage with information before it seems needed, and even if they do conduct research in advance, they may fail to recall it correctly.

I propose that by providing critical information in a visitor-accessible manner and at the right time and place, visitors will be more likely to make the preferred, safer choice at the key decision points identified in Chapter Four: Choosing a hike, choosing which supplies to bring, and choosing to turnaround.



## HOW MIGHT I ENABLE INFORMED CHOICES?

### AFFORD AND GUIDE COMPARISON

Visitors want to compare options themselves. Information should provide clear options and preferably include feedback on how each choice maps to outcomes. Is one choice more tiring? Will it take much longer?

However, it's important that the design also be mindful of the *paradox of choice*. Visitors want to feel as though they have options but can be easily overwhelmed by too many options. The goal is to provide an experience of informed choice for visitors, while guiding them to choose from amongst a select few choices that are best for them.



Process: Working out the key goals that interventions should work towards.

### CREATE DISTINCT DECISION POINTS

Well-placed information can help create a clear decision point for visitors, helping to avoid the non-decision problems discussed in Chapter Four.

### CO-LOCATE INFORMATION WITH DECISION POINTS

I found visitors have limited information about the hike they are on - its mileage, the name of destinations etc. This may be due in part to expectations set by the front country where information is plentiful and people are readily available to help. Regardless of the cause, visitors are in the habit of not preparing in advance when it comes to information and plans. Having information right where visitors need it, rather than expecting them to carry it with them, literally or figuratively, should help inform and steer visitor decisions.

### MIMIC VISITORS' DECISION APPROACH

I found in my testing that visitors use a *lexicographical* decision strategy. Rather than evaluating everything and choosing the best option, visitors are looking for the landmark activity or hike that gives them the best experience, and then (possibly) checking to see if that is beyond their ability. They are not running a multi-attribute test to choose a “best fit” trail.

The intervention I propose should take this into account. It should walk and direct visitors to a hike choice in a similar fashion to the way they do it on their own.

This will make the tool more useful than one that attempts to convert them to a more complex decision making process, like my first Hike Advisor concept, discussed in Chapter Five, would have required.



## STRATEGY 2: COUNTER OPTIMISM BIAS

People are pretty poor at judging the difficulty and unpleasantness of a task they've yet to undertake (Loewenstein, 2005). As discussed in Chapter Two, the lack of familiarity with unique challenges of the Grand Canyon environment, a vacation mindset, counterproductive experiential feedback, and even being in a good mood make visitors even more likely to overestimate what's appropriate for them.

I found this optimism to be a key reason why visitors bite off much more than they can chew and realize it way too late. The misplaced confidence of visitors can be countered by applying proven judgement and decision making strategies for *debiasing*. These are ways to reverse the judgement errors people make and create a reality check to snap them out of the *System 1* autopilot that may be leading them astray.

As long as visitors are overconfident, they are likely to remain deluded, dismissing warnings as intended for other people and making overzealous plans. I propose that by helping visitors be a little less optimistic, they can more accurately assess themselves and their hike, leading to smarter choices that decrease the visitor-hike mismatch. Countering optimism bias should also encourage them to realize more quickly when they are outmatched.

### HOW MIGHT I COUNTER OPTIMISM BIAS?

#### REDIRECT VISITORS' ATTENTION TO OVERLOOKED INFORMATION

Factors such as elevation change and time of day are important factors in how challenging a hike is for visitors, but these factors aren't currently on most visitors' radar. I want to encourage visitors to consider these elements when deciding on a hike, and preferably to help them understand these factors on a visceral level. A few strategies for accomplishing this that I can utilize include:

#### USE CONTRAST TO DRAW ATTENTION

One way to help guide visitors is using contrast to draw attention to the element one wants the audience to focus on. When making a comparative construct, I must keep in mind that people will focus on the section or criteria with the greatest contrast. So in order to encourage visitors to factor in elevation change more in their hike choice, I should emphasize the contrast in elevation gain from one hike to another in my design.

#### INCREASE AVAILABILITY OF OVERLOOKED CRITERIA

*Confirmation bias* is a bias wherein people have a tendency to look for and notice information that supports their claims and ignore things that run counter. This tendency helps visitors remain optimistic even when they should begin to doubt themselves and their plan. For instance, when considering if they can take on a challenging hike, visitors will think of all the things that make them fit (how frequently they go to the gym and that they're young), but they will fail to make the same mental list of things that make them less fit (a bad knee, being hung over that day or recovering from a recent illness).



By increasing *availability* of the overlooked criteria, I can bring these factors to the forefront of visitors' minds. Increasing the frequency with which these items are mentioned and moving up their place in the hierarchy should make them more *available* to visitors. Using imagery and making the concepts more *affect*-laden can also make them more memorable, which should also help with *availability*.

## MAKE OVERLOOKED CRITERIA EASY TO GRASP

If visitors don't understand an element or criteria, like elevation gain or time of day, they'll simply disregard it in their decision making. In order to have this critical information reach visitors it must be presented in a way they understand and can engage with. One way around this is to translate elevation information that may confuse into something easier for visitors to grasp, such as using time and the phrase "uphill hiking" as a substitute for the more technical elevation statistic. Another option is to help visitors understand better what elevation gain is, and feels like, so that they then feel comfortable factoring it into their calculations.

## INCREASE AVAILABILITY OF POOR OUTCOMES AND BASE RATES

These strategies look at using counter information more generally. *Base rates* are the more generalized rate at which things statistically occur. Talking about base rates attempts to tap into people's rational *System 2*, reminding them that over time ice-cold statistics run the show. For instance, when someone has a really good feeling about an upcoming lottery drawing, it can be helpful to remind them that even if they have better than average odds of winning, the odds of winning overall are only 1 in 1,000,000. Visitors may think that they are above average and pretty fit, but by reminding them that fit in this case includes people who run 100-mile races, it can help create a *base rate* from which they can more accurately compare themselves.

By increasing *availability* of poor outcomes, one can help people understand that bad things can and do happen, and they shouldn't simply dismiss the possibility off-hand. People are more concerned about a bad outcome if it comes to mind more easily. It will come to mind more easily if they hear about it more often, if they can picture the bad outcome easily, and if that picture carries a negative emotional weight (Kahneman, 2011). So by giving visitors an idea of what visitor safety incidents look like, and putting this information in front of them more frequently, it should reduce optimism bias a bit.

## CREATE FEEDBACK LOOPS

As discussed in Chapter Four, there is little feedback currently incorporated in to the visitor information system, especially on trail. Visitors have no reason to doubt themselves until it's too late because they receive so little feedback. As discussed in Chapter Two, visitors may use *attribute substitution*, considering "Am I still having fun?" to judge "Have I gone too far?"

To help encourage visitors to make a more accurate assessment of which hike they should choose, how they are doing, and whether they should keep going, visitors need feedback.



## HIGHLIGHT OPTIONS AND DECISION OPPORTUNITIES

As discussed in the section on enabling informed choices, visitors often fail to recognize that there are options available and decisions to be made; they often simply drift along with what seems to be the default. They are unlikely to question their preferences if they don't even realize there are other options, and they're unlikely to consider that they might be wrong if they don't realize they're making a choice at all. By showing visitors that there are options and that they are making choices, this may make them more accountable and thoughtful about their actions. Mapping decisions to outcomes should help even more, helping visitors make the connection between their current actions and future consequences.

## USE INFORMATION TO EMPOWER LESS OPTIMISTIC GROUP MEMBERS

When information is presented to all group members (for instance, by Rangers at the information center, or when a PSAR Rangers intercepts a group) it sparks a group discussion about choices. This gives reluctant group members a chance to speak up sooner and counter a group member who may be overconfident. Inter-group discussion (especially female to male) seems to be key to questioning overconfidence, but if group members don't realize what they are doing, they can't speak up. Research found group members are often in the dark about plans, or are provided misleading information by a group leader about the difficulty of their hike. By leveling the information playing field and provoking discussion within groups, I could help empower these cautious group members to influence their groups' decisions.



## STRATEGY 3: BOOST ALTERNATIVES

I found visitors often do not have a strong idea of which activities they want to engage in in advance. Instead, they look to find out what is “the” thing to do at the Park. Redirecting these defaults away from dangerous hikes could yield major safety gains. PSAR Rangers often succeed in swaying visitors by providing them with appealing alternatives to continuing on a long hike, and I think this same approach can help in other ways as well.

For instance, the Park warns visitors to avoid heading into the Canyon midday, yet many visitors come for a short visit, and want to maximize their time at the Canyon. Warning alone may not be enough to dissuade them from hiking midday; it is critical that the Park provide appealing alternatives.

Visitors avoid the “easy” trails, and likewise would be likely to avoid anything that seems short of the ideal Canyon experience. To succeed, alternatives much be as attractive, if not more, than other options, and ideally some “alternatives” can become the new defaults.

I propose that by boosting alternatives, the Park can make visitors think twice about their default plans, and ideally even shift the defaults. Proposing and supporting alternatives could nudge visitors to stay off the trail midday, take shorter, less challenging hikes, and consider non-hiking activities when appropriate.

### HOW MIGHT I BOOST ALTERNATIVES?

#### PROVIDE VISITORS WITH MORE MEDIUM OPTIONS

“Easy” trails carry a stigma with many visitors. Visitors want to maximize their experience, and don’t want to sell themselves short or have regrets about their visit. However, many of the hardest and longest options are simply too difficult for many visitors. By giving visitors additional, appealing in-between options, visitors may choose more appropriate hikes.

#### ALLOW VISITORS TO GET A SENSE OF ACCOMPLISHMENT WITHOUT ENDANGERING THEMSELVES

I found many visitors don’t intend to take a tough hike, but are tempted by a desire to have a big accomplishment and gain “bragging rights.” Offering and branding additional hikes and activities as landmark options could offer visitors a sense of accomplishment without requiring them to take on a dangerous challenge.

#### MAKE SAFE ACTIVITIES BE AND/OR SEEM MORE COMPELLING

As discussed in the unintended interventions section of Chapter Three, it’s important for the Park to avoid promoting adventure and danger at the expense of safe exploration and enjoyment of the park. Naming and describing hikes such that shorter destinations seem more appealing, carefully choosing destination photos for hike turnarounds so that the unsafe hike doesn’t appear much more appealing than the safer options, and encouraging information desk staff and other on-site personnel to recommend safe hikes can all contribute to making these hikes more attractive to visitors.



*The recent addition of a paved bike trail and on-site bike rentals could help improve visitor safety. Biking provides an appealing, active option for visitors that requires less preparation and risk than an inner canyon hike.*



## EMPHASIZE EXPERIENCE OVER CHECKLIST ACCOMPLISHMENTS

People head to the Canyon looking to have a good time and enjoy the views. Yet, as discussed in Chapter Two, something about the Canyon drives them to change their objective, causing them to focus on pushing themselves and doing the toughest hike they can.

Perhaps if interventions can remind them that they came to the Park to have fun, or refocus visitors on experience rather than accomplishment, they will make more reasonable choices.



# TACTICAL DESIGN CRITERIA

While the strategies discussed previously provide direction for my designs, these more specific design criteria give suggestions for how to succeed in reaching visitors with my designs.

## TO REACH VISITORS, INTERVENTIONS SHOULD:

### BE PLACED ON-SITE AT THE PARK

Many visitors do little to no research in advance of their visit, expecting that guidance will be provided and that it will be easy to “play it by ear” at the park, so I choose to focus on interventions that are intended to be placed on-site.

### BE ACCESSIBLE AND USABLE BY A HIGH VOLUME OF VISITORS

The park and trails see a high volume of visitors. For instance on a busy Saturday in the Summer the Bright Angel Trail can host over 800 day hikers (Backlund et al., 2006). So the design should be highly scalable or able to be accessed by many people at once. The interventions must withstand heavy use and accommodate multiple and diverse users.

### BE HARD TO AVOID

I found that visitors won't make an effort to seek out safety information and are only interested in expending minimal time and effort to find hike information. I also found some visitors within a group are out of the loop, lacking even basic information about the hike they are undertaking. To have the intervention reach visitors, it must be placed in such a way that it's hard to miss. Avoiding spaces where there is much competition for visitors' attention and time may also help.

### BE READABLE AND PROFESSIONAL

It goes without saying that items should be legible and appear professional, and yet not all current interventions meet this standard. In order for visitors to use information it has to be easy to use and read, even in the challenging Canyon environment with many visitors, limited space and bright sunshine.

## TO WORK WITHIN THE PARK SYSTEM, INTERVENTIONS SHOULD:

### WORK WITH THE PARK'S LAISSEZ FAIRE POLICY

Park Service policy prohibits interfering with visitors' right to use the trails, even if visitors may be putting themselves in danger. Interventions must work with visitors, rather than simply stopping their behavior through additional prohibitions or restrictions.

### BE ECONOMICAL

While I didn't want to confine myself to only considering solutions that would fit in the current Park budget, since that would be extremely restrictive,



*A rush of visitors near the Bright Angel trailhead on a nice summer day.*



I did prioritize low-cost concepts and avoided proposing any outlandish demonstration pieces or interventions that would be completely infeasible in the budget-conscious public park system. By proposing low-cost solutions I increase the changes of the interventions being put into use, and make it easier to scale the idea to reach many visitors, as well as possibly be adopted in other parks.



*Even though it's encased in glass and located on the Rim, this sign still became weathered and worn quickly.*

## STAND UP TO ENVIRONMENTAL CHALLENGES

Outdoor interventions must be designed with the challenges presented by a harsh outdoor environment in mind. Artifacts should be hardy, and require minimal maintenance.

## PROVIDE HELPFUL GUIDANCE WITHOUT REQUIRING A PERSON

I found that visitors trust people and advice they give, but naturally distrust signage and official communications. PSAR Rangers provide valuable information not highlighted elsewhere, and force a reality check for visitors. However, relying on people to guide visitors is an expensive strategy, and one that simply doesn't work in larger, more spread-out parks. How can I translate some of the best qualities of the PSAR service into low-cost pieces that could easily be replicated at other parks?

## TO APPEAL TO VISITORS, INTERVENTIONS SHOULD:

### PROVIDE THE INFORMATION VISITORS SEEK

Visitors are busy and want to focus on enjoying their visit. They are willing to expend some energy (but not a lot) to get information they already think they need. Visitors see value in information they think they need. They're interested in what the highlights of each hike are, overall difficulty of trail, availability of facilities, and transit directions. They are not seeking out, and may not see the value in, other information such as temperature, steepness, elevation difference, safety warnings, etc. To get this information for visitors, it may need to be paired with information they're already seeking to encourage visitors to engage with it in the first place.

### AFFORD AT-A-GLANCE USE

Visitors are in a hurry to hit the trail. They don't want to spend more time than they have to on making their choice and getting moving. The fact that visitors read the *Margaret Bradley* story and speak with the PSAR patrollers means visitors are willing to engage a bit longer with something once it has their attention, but the initial opportunity to draw a visitor in to engage with an intervention is brief.

### AFFORD INTERACTION WITHOUT RELYING ON DIGITAL

People are more likely to engage with and learn from pieces than afford interaction. I found that maps, large scale items, and humorous items currently draw interaction from visitors. My testing revealed that visitors were very disinterested in a high-technology solution on-site, so I need to find ways to get visitors interacting with items without relying on a digital tool.



## BE GROUP-FRIENDLY

Most people visit the Canyon in groups. Interventions should take advantage of this dynamic, or at the very least physically afford group use.

## TO ENLIGHTEN RATHER THAN CONFUSE, INTERVENTIONS SHOULD:

### USE HIERARCHY TO MAKE CLEAR WHAT'S MOST IMPORTANT

As the inventory of interventions in Chapter Three reflects, there are a lot of different pieces of information to communicate to park visitors and it can quickly become overwhelming to visitors. To make it easier for visitors to actually note and remember the most critical points, the Park must first decide which points are the most important. They should not expect the visitor to do this sifting which is hard even for Park experts to do. The Park can help visitors by drawing attention to a few key items, and then emphasizing those consistently throughout multiple artifacts.

### MINIMIZE WORDS WHERE POSSIBLE, WHILE MAINTAINING CLARITY

In my testing, participants gravitated towards quick-to-digest tables and graphics and skipped over written descriptions that were being used for conveying key information. Visitors also missed critical information by skipping subtitles at the Visitors' Center Information Plaza. It's important to ensure that items that will catch visitors' attention most are the items that are most important for them to take away.

### PROVIDE VARIED LEVELS OF INFORMATION

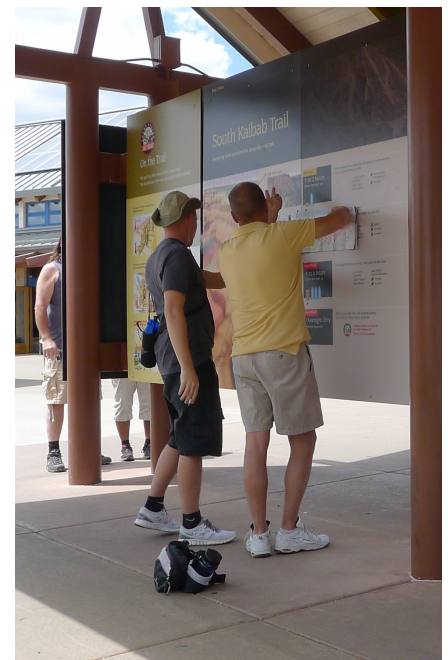
Visitors want to be able to grasp the point of an artifact quickly, but they may also need more in-depth information to fully understand what's being conveyed. Also, given the variety of park visitors, some may need more background than others. For instance, experts might just need to be reminded to bring water, but for those visitors new to hiking, they might not understand why this is important, and further explanation could help sway them. Providing several layers of information and multiple "reads" can help the piece to reach a varied audience without becoming overwhelmingly dense.

### BE CONSISTENT ACROSS CHANNELS, TOUCHPOINTS

While some variety in style can help engagement, the overarching message and approach of the Park should be consistent whether it's on a sign, a bulletin board, or the website. As one General Store employee I spoke with (June 7, 2013) remarked, "What they need is just a basic 'this is what you need to have', and put it everywhere....Eventually you pick it up out of curiosity - alright, I've seen this everywhere, what's the deal?"

### AID DECISION-MAKING OR PROVIDE HOW-TO KNOWLEDGE

When the Park provides visitors with a wealth of information, it's not always clear what visitors are expected to do with it. Current information may focus too much on generic messages of caution and preparedness at the expense of specific guidance to help guide the visitors to the desired action. Memorable



*A visitor attempts to match the Park Guide to the Visitor Center signage.*



imperatives like “Be prepared,” “Hike Smart” and “What goes down must come up” create awareness, but they do not lay out the specific steps that visitors need to take to be safe.

Information must not only be used as a means of disclaimer or to generically educate visitors, it should also hold a purpose either in helping visitors make better choices or giving them specific, how-to information.

## ASSUME NO PRIOR KNOWLEDGE

I found that many visitors do little to no research in advance of their visit. Many also often have limited hiking and backcountry background. So I should not assume much background knowledge on the part of visitors. To accommodate this, I want to avoid assuming that my visitors already know about common backcountry hazards, or are comfortable with tasks like reading a topographic map.

## USE EVERYDAY LANGUAGE AND MAKE MEASUREMENTS MEANINGFUL

“Is 1200 feet alot?” “How many meters is that anyway?”

When people have information they can’t readily categorize and place in terms of other things they already know and understand, they have difficulty grasping it, and especially remembering and applying it to other things (Dirksen, 2011). Elevation, distance, and even steepness and heat are characteristics that visitors without extensive hiking experience do not really know how to process. Furthermore, as *Is 28% Good or Bad?* (Zikmund-Fisher, Fagerlin and Ubel, 2004) discusses if people can’t understand or contextualize the measurement, they will disregard that factor when making a decision. This seems to be exactly what is happening when a visitor assumes a three mile hike can’t be that big of a deal. Because they don’t know how hard 2,000 ft of elevation gain may be, they simply ignore this characteristic and judge the difficulty of the hike without it.

Technical measurements should be paired with, or replaced by, everyday language that is easier for visitors to understand and translate into expectations. The phrase “a very steep, two-hour uphill hike” may provoke emotion and help visitors appreciate the effort required to complete the hike better than simply listing the hike as a “2 miles, 1500 foot elevation change roundtrip.”

## MEET VISITORS WHERE THEY ARE

Changing visitors’ mental model is extremely hard, especially given the short timeline of a visit and the myriad influences discussed in Chapter Two. While attempting to change visitors’ perceptions and assumptions is still a worthwhile cause, efforts shouldn’t be limited to this challenging course of action. Interventions can be crafted that still work even if the visitor doesn’t change their basic approach to their trip or understanding of the Canyon.

## USE SPECIFICS TO ILLUSTRATE A LARGER POINT

My secondary research (Kahneman, 2011, p. 174) revealed that people are not good at taking general rules (Visitors often get into trouble at the

Trail Log	
Distance from Hermits Rest to:	
Dripping Springs:	3 miles (4.8km)
Hermit Creek Camp:	7.8 miles (12.6 km)
Colorado River at Hermit Rapid:	8.9 miles (14.3 km)
Elevation	
Hermits Rest:	6,640 feet (2,024 meters)
Hermit Creek Camp:	3,040 feet (927 meters)
Hermit Rapid:	2,400 feet (732 meters)

*It's hard for visitors to translate these technical measurements on the Hermit's Rest Trailhead signage into experiential expectations.*



Canyon) and applying them to themselves (“Oh, I should bring extra water so I don’t have a problem”). Instead people are more likely to take a specific example that’s provided, like the *Margaret Bradley* sign (“this lady died because she was unprepared”), and extrapolate the general rule from the instance (“people can get hurt here”) and then from that apply it to themselves (“I don’t want to end up like that lady, I guess I should bring some more water”). Interventions, therefore, should focus on providing anecdotes and particulars rather than using statistics or generalizations that visitors will more easily dismiss.

## MAKE IT EASIER TO DO THE RIGHT THING

BJ Fogg’s Behavioral Model (2013) explains that when one wants to change behavior they must make the desired path as simple as possible for visitors to follow. In *Switch: Making the Change when Change is Hard* (Heath & Heath, 2010), the authors use the phrase “script the critical moves” to describe a similar concept. To help nudge visitors in the right direction, interventions can help make clear what that preferred path is, and encourage visitors to take it.

I mentioned in Chapter Three that requiring a shuttle to reach the South Kaibab trailhead deters casual hikers from using the trail - it makes it easier for visitors to go with the safer Bright Angel Trail instead.

The South Kaibab hiker shuttle is another example of this principle already in use at the Grand Canyon. To encourage hikers to get an early start there is a 6:00 AM Hiker’s Shuttle that heads directly to the South Kaibab trailhead from the South Rim hotels. This makes clear to visitors that 6:00 AM is a good and popular time to start down the trail, and it makes it more convenient to take the shuttle early since later on the shuttle doesn’t run direct.

To be more effective, interventions should help show visitors the way to the desired choice, and make it easier for them to take the action.

## UTILIZE THE POWER OF AFFECT

By provoking feelings, interventions more compelling and memorable and have a greater change of affecting visitors decisions (Kahneman, 2011). Interventions should be designed with the feelings it will evoke and create with visitors in mind.







ENVISIONING THE TO-BE

# CHAPTER 7

## FINAL CONCEPTS

Welcome to

### 1.5 Mile Resthouse

From here, you can choose to:

Return to the Rim

or

Continue on to  
3 Mile Resthouse\*

1.5-2 hours  
of uphill hiking

4.5-6 hours  
down and then back  
up to Rim

Either way, don't forget to drink, have a snack,  
take a shade break, fill your water bottles,  
and soak yourself with water before departing.

\*Next major stop. The trail is  
"out and back" so you can  
turn around anytime.



**RESCUE IS NOT GUARANTEED**

Cell phone coverage is weak in this area; emergency phones at each resthouse can be used to request help.





## CHAPTER SEVEN INTRODUCTION

After much research, synthesis and ideation, it was finally time to propose a set of intervention concepts. Having begun with such a wide swath of topics, I never intended to be able, in less than a year, to arrive at a single, thoroughly iterated and tested solution. Instead, I intended to use the design research process, and the making process, to help interrogate the problem, and to arrive at some ways to approach mitigating it that can be further developed and tested in the future.

In this chapter I share some potential concepts and artifacts that help bring to life the strategies and design considerations discussed in the previous chapter. Keep in mind, these interventions require additional user-testing to validate the approach and would benefit from refined aesthetics before being put into use in parks.



# VISITOR-CENTERED INFORMATION

Given the variety of problems with the current information artifacts at the Canyon, fixing just one item isn't going to solve the Park's problems. Instead I propose a modified approach to communicating with visitors that places a greater emphasis on visitors' needs and mental models and less on traditional warnings and disclaimers.

My critique of current information artifacts revealed missing information, confusing information, and a gap between where information is provided and when visitors make key decisions.

I also found that right now hiking options at the Canyon are organized primarily by whether they take place in the Inner Canyon or not, an organizational NPS distinction that is meaningless to visitors. Left to their own devices, visitors judge difficulty of trails largely on mileage, neglecting key factors that make a Canyon hike more difficult than they're expecting, such as steepness of the trail, difficulty of footing, and most importantly elevation change and time of day. So for instance, a two-mile hike sounds easy enough, if someone doesn't factor in that it's 90 degrees outside and the hike has 2000 feet of elevation gain.

To combat these issues, I propose a series of information artifacts that will better inform visitors and guide them towards safer choices:

**On-trail Informational Signage** creates a designated decision point, precipitating group discussion. By framing the choice unambiguously as one of turn back now or continue on with a longer return hike, it challenges the tendency of visitors to mindlessly continue down the trail and encourages reluctant group members to speak up.

Designating **Hike Levels** makes it easier for visitors to gauge the overall difficulty of hike sections, and pairing this system with the **Level Finder** helps visitors choose the appropriate hike.

An **Elevation-Based Trail Map** is designed to highlight elevation and effort and combat optimism bias by encouraging visitors to think about the way back uphill right from the start. The **Trail Guide** pairs the elevation guide with important safety and hazard information to empower visitors and remind them that things can and do go wrong.

An **Overview Map**, styled similar to a ski resort trail map, highlights varying Hike Levels and allows visitors to visually compare trail length and steepness. A hawk's eye view makes elevation change much more apparent and provides a sense of scale to help visitors begin to grasp the immensity of the canyon.



---

## STRATEGIC CRITERIA ADDRESSED

---

*Afford and guide comparison*  
*Create distinct decision points*  
*Co-locate information with decision points*  
*Mimic visitors' decision approach*  
*Redirect visitors' attention to overlooked information*  
*Use contrast to draw attention*  
*Increase availability of overlooked criteria*  
*Make overlooked criteria easy to grasp*  
*Create feedback loops*  
*Highlight options and decision opportunities*  
*Use information to empower less optimistic group members*  
*Make safe activities be and/or seem more compelling*

---

## TACTICAL DESIGN CRITERIA ADDRESSED

---

*Be placed on-site at the Park*  
*Be accessible and usable by a high volume of visitors*  
*Be hard to avoid*  
*Stand up to environmental challenges*  
*Provide helpful guidance without requiring a person*  
*Provide the information visitors seek*  
*Afford at-a-glance use*  
*Afford interaction without relying on digital*  
*Be group-friendly*  
*Use hierarchy to make clear what's most important*  
*Provide varied levels of information*  
*Aid decision-making*  
*Meet visitors where they are*  
*Make it easier to do the right thing*  
*Utilize the power of affect*

---

## ON-TRAIL INFORMATIONAL SIGNAGE

---

**ADDRESSES VISITOR ERROR:** Going Too Far

**PRIMARY GOAL:** Enable informed choices

**SECONDARY GOAL:** Counter optimism bias

---

On-trail informational signage intends to prompt decision making and then provide salient information to compel better decisions. I found that visitors often don't know when they've reached the turnaround points, and that many tend to not even think about turning around until it's too late. They listen to their experiential feedback ("I don't feel tired") and their perceptions ("I don't think we've gone that far") in the absence of objective feedback.

This on-trail signage system intends to create focal points to spur decisions, placing information right at the point where visitors are making a critical decision (or non-decision) to turn around. It shifts the conversation, encouraging visitors to shift attention away from whether they are enjoying the hike currently to specifically determining if they want to go farther, given the time and supplies required to continue farther before heading back.

By framing the choice unambiguously as one of turn back now or continue on with a longer return hike, it challenges the tendency of visitors to mindlessly continue down the trail. The signs offer turning around now as the default choice and utilize contrast to emphasize how much longer continuing on is than turning back, nudging visitors without strong preferences to turn back.

The signage also intends to increase feedback. Visitors who know how far they've gone each time they reach a destination point can begin to calibrate what they're feeling and thinking with what they've actually done. The signs provide objective but *affect*-laden information regarding how long the return hike will take, whereas currently visitors rely solely on their own memory or perception.

To help level the information playing field within groups, these signs would be placed right on the trail where they would be unavoidable, allowing everyone in the entire group to see. Placing this information where there currently is none and using the signage to indicate a decision point hopes to give reluctant group members an impetus, as well as the knowledge about hike difficulty, to speak up.

By framing the options as turning back or continuing on to the next point, the signage makes the decision required of visitors clear and crisp. The creation of clear hike endpoint options also indicates to visitors that there are multiple opportunities to turn around and that going all the way down to the River is by no means required nor even the default destination of the hike.



*An illustration depicting the sign placed on the trail. Placing the signs in prominent spots is extremely helpful in ensuring they reach all visitors.*



Welcome to

# 1.5 Mile Resthouse

From here, you can choose to:

Return to the Rim

**1.5-2 hours**  
of uphill hiking


or


Continue on to  
3 Mile Resthouse\*

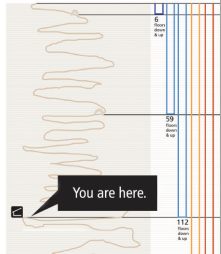
**4.5-6 hours**  
down and then back  
up to Rim

Either way, don't forget to drink, have a snack,  
take a shade break, fill your water bottles,  
and soak yourself with water before departing.

\*Next major stop. The trail is  
"out and back" so you can  
turn around anytime.

 **RESCUE IS NOT GUARANTEED**  
Cell phone coverage is weak in this area; emergency phones at each resthouse can be used to request help.

 **BRIGHT ANGEL**  
TRAIL GUIDE



**You are here.**

**Need a map?**



---

## STRATEGIC CRITERIA ADDRESSED

---

*Afford and guide comparison*  
*Mimic visitors' decision approach*  
*Redirect visitors' attention to overlooked information*  
*Use contrast to draw attention*  
*Increase availability of overlooked criteria*  
*Make overlooked criteria easy to grasp*  
*Create feedback loops*  
*Use information to empower less optimistic group members*  
*Make safe activities be and/or seem more compelling*

---

## TACTICAL DESIGN CRITERIA ADDRESSED

---

*Be placed on-site at the Park*  
*Be accessible and usable by a high volume of visitors*  
*Work with the Park's laissez faire policy*  
*Be economical*  
*Provide helpful guidance without requiring a person*  
*Provide the information visitors seek*  
*Afford at-a-glance use*  
*Afford interaction without relying on digital*  
*Be group-friendly*  
*Minimize words where possible, while maintaining clarity*  
*Aid decision-making*  
*Assume no prior knowledge*  
*Meet visitors where they are*  
*Utilize the power of affect*

---

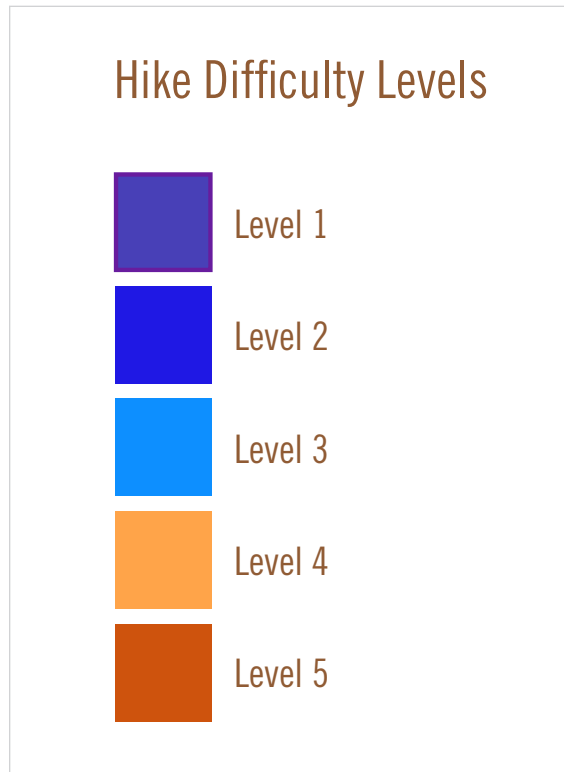
## HIKE DIFFICULTY LEVELS

---

**ADDRESSES VISITOR ERROR:** Making overzealous plans  
**PRIMARY GOAL:** Enable informed choices  
**SECONDARY GOAL:** Counter optimism bias

---

The hike level system would classify each hike at the Canyon with a rating of one through five. Creating a system of hike levels makes it easier to gain at-a-glance understanding of how hard trails are and makes it easy to compare hikes. By assigning each hike a level, it's easy for visitors to compare hikes to each other and to choose one that matches their ability and preparation levels.



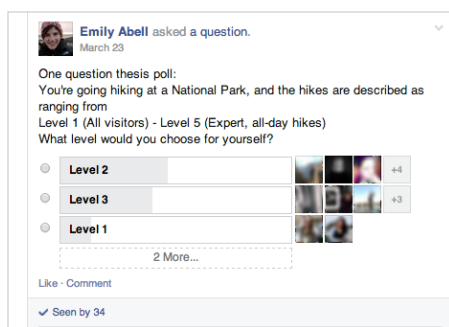
In my concept testing, I found participants wanted a quick, easy way to compare and choose hikes and they wanted to know how difficult, overall, a trail was. Participants assumed that difficulty would be based mostly on the trail itself, rather than on which destination they chose on the trail. This is often the case in an alpine environment, where the steepness, difficulty of footing, or difficulty of wayfinding contribute to the difficulty rating of a trail. While these factors do contribute to difficulty at the Canyon, the biggest determinant for how “hard” a trail is there is how far into the Canyon it takes a visitor. In order to be able to differentiate that different sections of the same trail have different difficulty levels, and to help visitor visualize that these longer hikes were rated as more difficult, I developed the hike levels concept.

As discussed earlier, because visitors are not familiar with how difficulty and exertion is affected by things like distance, steepness, heat, and elevation gain, they lack the internal mental structure (*shelves* in the parlance of *Design for*



*How People Learn*) to understand and recall information provided to them about these factors. A much simplified hike level system is easier to grasp and comes within its own structured information system. A simple one through five number system that's also color-coded is accessible to most visitors and doesn't require prior hiking knowledge or English-language background. If a Ranger or bus driver tells the group to stick with purple or blue hikes, that's easy to remember and then act upon.

Even though it seems like an objective system, hike levels can also nudge visitors towards more appropriate hike choices. I knew from concept testing that most people wanted to avoid the "easy" hikes, but they also realized that the absolute hardest hikes would be beyond their ability. The hike level system uses this information, along with the principle of *anchoring*, to direct and default visitors to taking a hike that's a Level 3. The system then is based on this assumption, making the Level 3 hikes those that are a good choice for most fit, but less-experienced, visitors.



As a quick test of this theory, I ran an informal poll on Facebook:

*"You're going hiking at a National Park, and the hikes are described as ranging from Level 1 (All visitors) - Level 5 (Expert, all-day hikes)*

*What level would you choose for yourself?"*

I was actually surprised that some active friends actually rated themselves a Level 2, but most of those who exercise regularly chose Level 3 as expected.

The proposed color scheme also reinforces the *anchoring* effect by jumping to warm colors, evocative of danger, for Hike Levels 4 and 5 after starting off with more relaxing cool colors. The scheme also shows that there is a large shift in moving up from Level 3 to 4, and from Level 4 to 5 with the major color differentiations at these jumps.



Level 3 vs. Level 4



Level 4 vs. Level 5

The hike level system is a single concept that would then would be deployed on a variety of artifacts, such as the overall difficulty map, trail maps, a trail guide and a level chooser tool.



---

## STRATEGIC CRITERIA ADDRESSED

---

*Afford and guide comparison*  
*Create distinct decision points*  
*Co-locate information with decision points*  
*Mimic visitors' decision approach*  
*Redirect visitors' attention to overlooked information*  
*Use contrast to draw attention*  
*Increase availability of overlooked criteria*  
*Make overlooked criteria easy to grasp*  
*Increase availability of poor outcomes and base rates*  
*Highlight options and decision opportunities*  
*Use information to empower less optimistic group members*

---

## TACTICAL DESIGN CRITERIA ADDRESSED

---

*Be placed on-site at the Park*  
*Be accessible and usable by a high volume of visitors*  
*Be readable and professional*  
*Work with the Park's laissez faire policy*  
*Be economical*  
*Provide helpful guidance without requiring a person*  
*Provide the information visitors seek*  
*Use hierarchy to make clear what's most important*  
*Provide varied levels of information*  
*Aid decision-making or provide how-to knowledge*  
*Assume no prior knowledge*  
*Meet visitors where they are*  
*Make it easier to do the right thing*  
*Utilize the power of affect*

---

## TRAIL GUIDE

---

**ADDRESSES VISITOR ERROR:** Making overzealous plans

**PRIMARY GOAL:** Counter optimism bias

**SECONDARY GOAL:** Enable informed choices, Boost alternatives

---



*The front of the Trail Guide displays one section of the Elevation-based map.*

*Shown in folded position, as it would be displayed and carried by visitors.*

I found visitors were uninformed both about the hikes they were attempting and about the Canyon and hiking more generally. It seemed visitors had limited interest in taking the time to learn about the hike they were undertaking, and expected the information they needed to be available later on when they needed it.

The Trail Guide is a direct response to these needs and the feedback I received during concept testing. It provides a vehicle for the Elevation-based Map (see page 172) and also provides a wealth of additional information to guide visitors on their hike.

I found visitors were very interested in directions to the trail and basic hike descriptions, so I included this information to encourage visitors to take interest in the guide. I also included information that is currently overlooked by visitors but which is important for them to know about to hike safely. Hazard warnings are given in a simplified manner that explains not just what the hazard is, but what visitors should do to about it. Medical hazard information is conveyed in a similar how-to manner. While these explanations help educate visitors about what to do should one of these adverse situations arise, this information also serves a sneaky purpose. By putting this information front and (literally) center, it increases the *availability* of adverse events to visitors, encouraging them to feel a bit more vulnerable and hopefully make safer choices as a result.



## BRIGHT ANGEL

TRAIL GUIDE

### How do we get there?

The bright angel trailhead is located along the Rim, just east of the Bright Angel Lodge. It's a walking distance from the main Rim area, as well as Maswik Lodge and the Backcountry Information Center.

**Take the Hassle-Free Shuttle Bus**  
After parking at the Visitors Center, take the blue line to the Hermit's Rest Transfer stop. Walk up the ramp behind the shuttle stop to reach the Rim area. The trailhead will be straight ahead on the left.

**Nearby Parking is Limited**  
and traffic can be busy in the Village area. However if you want to park nearby, a handful of spots are located along the road and next to the trailhead. A much larger amount of parking is available at the Backcountry Info Center, a 10 minute walk from the trailhead.

**Trailhead Facilities**  
Restrooms and a water bottle refill station are both located in the trailhead area. If you don't already have reusable water bottles, purchase them nearby at the gift shop at the Bright Angel Lodge and then fill up at the trailhead.

### What should we bring?

**WATER BOTTLES\***  
Bring at least one large bottle or backpack reservoir, or 3 small bottles PER PERSON.  
Water can be refilled at water fountains on the trail (On BRIGHT ANGEL only) but you must bring your own bottle. Refill at every water station.

**SUN PROTECTION**  
Protect yourself by covering exposed skin with SPF clothing or sunscreen, and using a hat and sunglasses to shield yourself. Umbrellas can help, and so can bananas.

**LOOSE-FITTING COTTON CLOTHES**  
Unlike in colder climates, cotton is a good choice. Here it's ability to hold onto moisture can help keep you cool. Soak your clothing at every station.

**OUTDOOR SHOES\***  
The trail is steel with loose dirt and rock. Flipflops, dress shoes etc can make your hike dangerous and just plain unpleasant.

**BACKPACK**  
If you don't have a backpack, you're probably not carrying enough food and water. It's best for everyone to carry their own in case you become separated.

### What trouble might we run into?

Nature doesn't discriminate - the Canyon doesn't care if you're young or old, on your first hike or your 50th. Be prepared and alert when anytime you're in the backcountry.

**Everyday Hazards**

**Extreme heat + little to no shade**  
Avoid hiking midday and take an easier hike than you normally would. Managing the intense sun is a workout for your body even when you're standing still. Take shade and water breaks, and don't forget salty snacks too!

**Steep trails with unsure footing**  
Try going uphill before deciding how far down you'll go - you have no idea how hard coming back up is until you try! Be careful with your footing, and think twice about hiking Bright Angel if you have poor balance, bad knees, or just don't feel comfortable on a rocky, dirty path.

**Cell service is limited & rescue is not guaranteed**  
We do our best to help when people get hurt or sick, but rescue in the backcountry is a slow and challenging process. Stay on top of your body's needs, and don't be afraid to take a break or turn back early. It's much more embarrassing to be rescued!

**Unpredictable Hazards**

**Storms & Lightning**  
Summer thunderstorms are common. Avoid the Rim and metal railings during a storm.

**Rockfall**  
Loose rocks and boulders are everywhere. Stay on-trail. You endanger yourself and others taking shortcuts.

**Flash flooding**  
Flash floods can occur without it raining locally. If you see waterfalls or mudslides forming, retreat to higher ground if possible and stay away from any moving water.

**Snakes**  
The Canyon is home to snakes and other animals. Leave them alone and they'll probably leave you alone.

### What should we do if someone...

Most visitors to the Canyon have an enjoyable visit. But some people do get hurt or sick, especially those who overdo it.

	<b>Feels sick</b>	Take a break, in shade if possible. Have some water and snacks. Dunk water on the head if you can spare it or are near a Resthouse. It is not unusual to feel a bit sick, or just plain worn out after exercising in the hot sun. There is no need to panic, simply rest and refuel, and then slowly head back. Make sure your group stays together - if one person isn't feeling well, you all stop.
	<b>Feels exhausted</b>	
	<b>Throws up</b>	<b>If the person is awake and alert:</b> follow the instructions above - rest in shade, cool and refuel. <b>If person passes out:</b> turn them on their side so they don't choke. Send someone to call for help from an emergency phone.
	<b>Hurts an ankle, knee, or other</b>	If they can move themselves, try to start moving back uphill slowly and carefully. Provide a shoulder or trekking poles to help. If they cannot move on their own, or have a broken bone, call for help.
	<b>Falls</b>	If someone falls more than 10 feet (3 meters) or lands on their head, call for help. Do not try to reach the person if they're in an unsafe position. Otherwise assess condition and turn back if needed.

**Call 911 or find the nearest emergency phone if a person has:**

- Passed out or not responding
- Complaining of head injury
- Confused or nonsensical
- Fell more than 10 feet
- Vomits more than once
- Fallen off trail (do not attempt to rescue on your own if unsafe)
- ... or if you feel someone is in grave danger

### When can we hike?

**EARLY MORNING 4am-9am**  
TOP PICK - The most popular time for hiking in the summer. If you want to take on a challenging hike you should plan on heading out by 6am at the latest. Leaving at 6:30am means you can go 1.5 hours downhill into the Canyon before you need to turn back.

**LATE MORNING 9am-11am**  
9am probably doesn't sound like "late morning" to you, but for hiking in summer at the Canyon it is! Starting this late means you only have time for a short hike, you want to be back out of the canyon by 11am.

**MIDDAY 11am-4pm**  
DO NOT HIKE IN THE CANYON MIDDAY. The sun is at its hottest and there is no shade. Stick to short hikes on the Rim or around the village, or use this time to do indoor or shady activities such as viewing the Visitor Center movie, visiting an interpretive exhibit, or taking a drive.

**LATE AFTERNOON 4pm-7pm**  
While the sun is still up, shade can start to be found on the Bright Angel trail. Starting now will mean you'll get some relief on the way back up as the shade moves in. Be sure to bring a headlamp or flashlight in case you take longer than expected and you don't want to have to rush uphill.

**SUNSET 7pm-9pm**  
Viewing sunset from out on the trail is a great way to beat the Rim crowds and hike in cooler temperatures. Just be sure to bring some warmer clothing and a headlamp or flashlight. Once the sun dips below the Canyon walls it becomes very dark quite quickly.



---

## STRATEGIC CRITERIA ADDRESSED

---

*Afford and guide comparison*

*Co-locate information with decision points*

*Redirect visitors' attention to overlooked information*

*Use contrast to draw attention*

*Increase availability of overlooked criteria*

*Make overlooked criteria easy to grasp*

*Create feedback loops*

*Highlight options and decision opportunities*

---

## TACTICAL DESIGN CRITERIA ADDRESSED

---

*Be placed on-site at the Park*

*Be accessible and usable by a high volume of visitors*

*Be economical*

*Provide helpful guidance without requiring a person*

*Afford interaction without relying on digital*

*Minimize words where possible, while maintaining clarity*

*Provide varied levels of information*

*Be consistent across channels, touchpoints*

*Aid decision-making*

*Assume no prior knowledge*

*Meet visitors where they are*

*Utilize the power of affect*

---

## LEVEL FINDER

---

**ADDRESSES VISITOR ERROR:** Making overzealous plans

**PRIMARY GOAL:** Enable informed choices

**SECONDARY GOAL:** Counter optimism bias

---

The hike level system helps visitors choose a hike, but how do visitors know which level is appropriate for them? The Level Finder helps visitors and visitor groups choose which level hikes are a good choice for them.

I found in both my on-site and evaluative research that visitors aren't sure how to choose an appropriate hike for themselves. They want to find the best hike they can handle but do not have a set idea of what "challenging" means for them in terms of distance, elevation and trail grade.

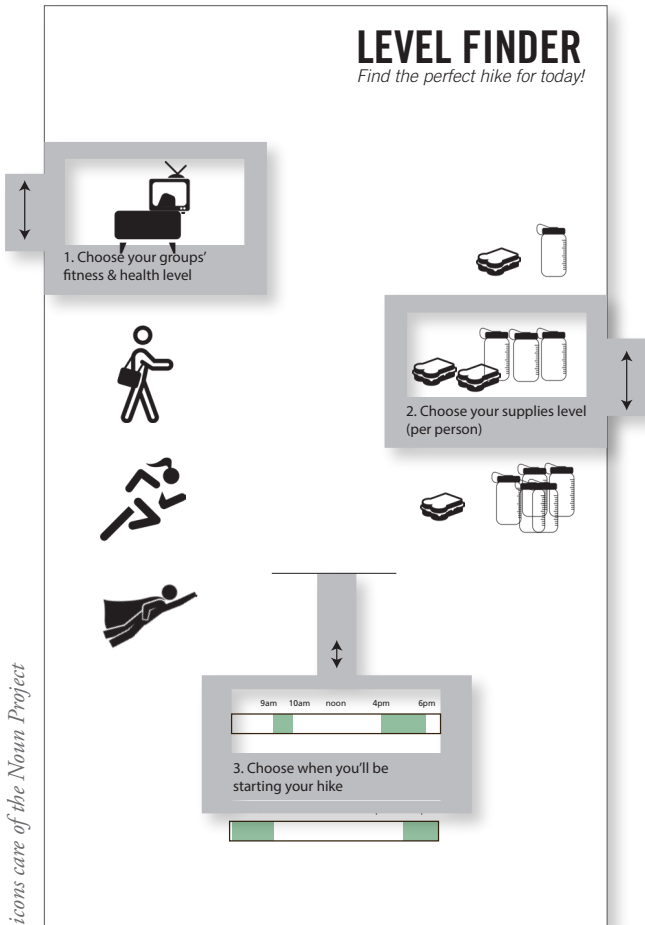
The level-finder tool helps visitors choose which hike level is best for them on that day. Concept testing participants didn't want an involved digital tool to help them choose a hike, so instead I created this simple analog tool.

By going analog the design avoids the high cost and limited placement options of a digital tool.

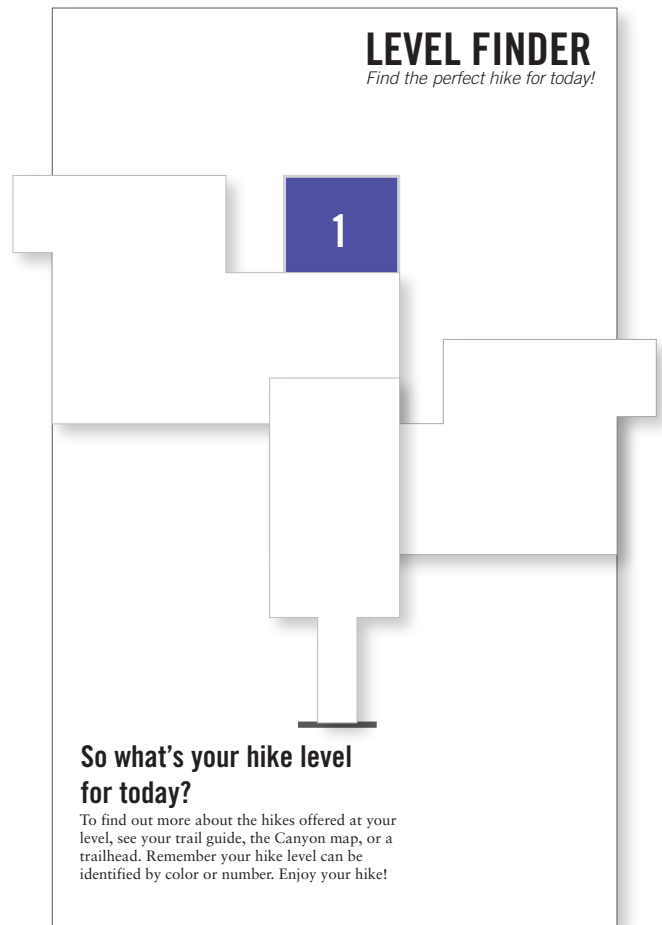
Even if a visitor doesn't complete the interaction with the tool, or if he chooses to override the tool's suggested level and go on a harder hike anyway, having used the tool can still result in the visitor taking a safer hike. Simply by exposing the visitor to the choice criteria listed along the sides the tool, the tool helps increase *availability* of these overlooked factors. Even if the visitor doesn't interact with the tool very much, just glancing at the tool brings time-of-day, fitness level, and gear to the forefront as decision factors that the visitor should be using to choose a hike.

A paper version can satisfy the basic requirement for the tool while allowing it to be given away with the park entrance handouts, with the hiking guide, or alongside informational displays. However, the basic principle of the level finder could easily be translated into other forms. Options include a website feature which would allow for more detailed customization, signage that contains similar information but less interactivity, or an on-site digital kiosk.





Front of device



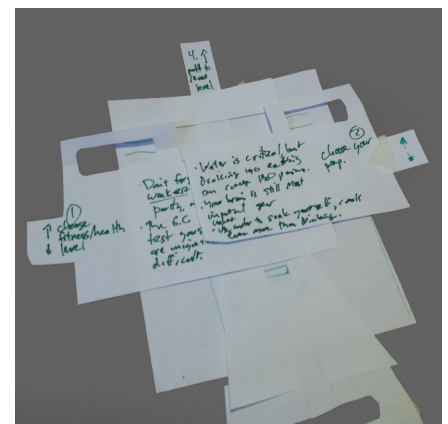
Back of device

### Level finder operation

A visitor uses the tabs along the sides and bottom of the device to move the view window until it highlights the option they wish to choose for their fitness level, supplies and hike start time. Flipping over the device reveals the hike level or levels that are appropriate for him.

### Prototype style

Using playful imagery is one option for making the level finder more appealing to visitors.



Process: A paper prototype version created to workout the paper folding and movements required to have the device work mechanically..



---

## STRATEGIC CRITERIA ADDRESSED

---

*Afford and guide comparison*

*Redirect visitors' attention to overlooked information*

*Use contrast to draw attention*

*Increase availability of overlooked criteria*

*Make overlooked criteria easy to grasp*

*Create feedback loops*

*Highlight options and decision opportunities*

*Use information to empower less optimistic group members*

---

## TACTICAL DESIGN CRITERIA ADDRESSED

---

*Be placed on-site at the Park*

*Be readable and professional*

*Work with the Park's laissez faire policy*

*Be economical*

*Afford at-a-glance use*

*Afford interaction without relying on digital*

*Minimize words where possible, while maintaining clarity*

*Be consistent across channels, touchpoints*

*Aid decision-making or provide how-to knowledge*

*Utilize the power of affect*

---

## ELEVATION-BASED TRAIL MAP

---

**ADDRESSES VISITOR ERROR:** Going too far, Making overzealous plans

**PRIMARY GOAL:** Counter optimism bias

**SECONDARY GOAL:** Enable informed choices

---

Visitors' inability to grasp the challenge that elevation change presents was a problem that came up again and again in my research. Boiling down this unfamiliar elevation information into more simplified hike levels is one way to deal with this difficulty. The elevation-based map tackles the same problem from a different angle.

For visitors who want to take a more hands-on appraisal of trail difficulty, this map presents visitors with all the key stats on the trail and turnaround options so they can decide themselves. However, by creating an innovative format which uses elevation as the organizing element, this map presents the key trail information with a twist.

The design is intended to increase the salience of elevation change and help visitors have a visceral reaction to the massive amount of uphill and downhill hiking involved in venturing into the Canyon. To help visitors translate elevation gain into something relatable, the number of flights of stairs to reach the Rim from each destination is listed, and lines marking flights of stairs draw further attention to the scale. The design also intends to help visitors recognize how much more challenging hiking to one destination is than another. Currently visitors often think, "maybe we'll just go to the next point," thinking it's just a small addition to their hike already in progress, when in fact this next point doubles the length of their hike.

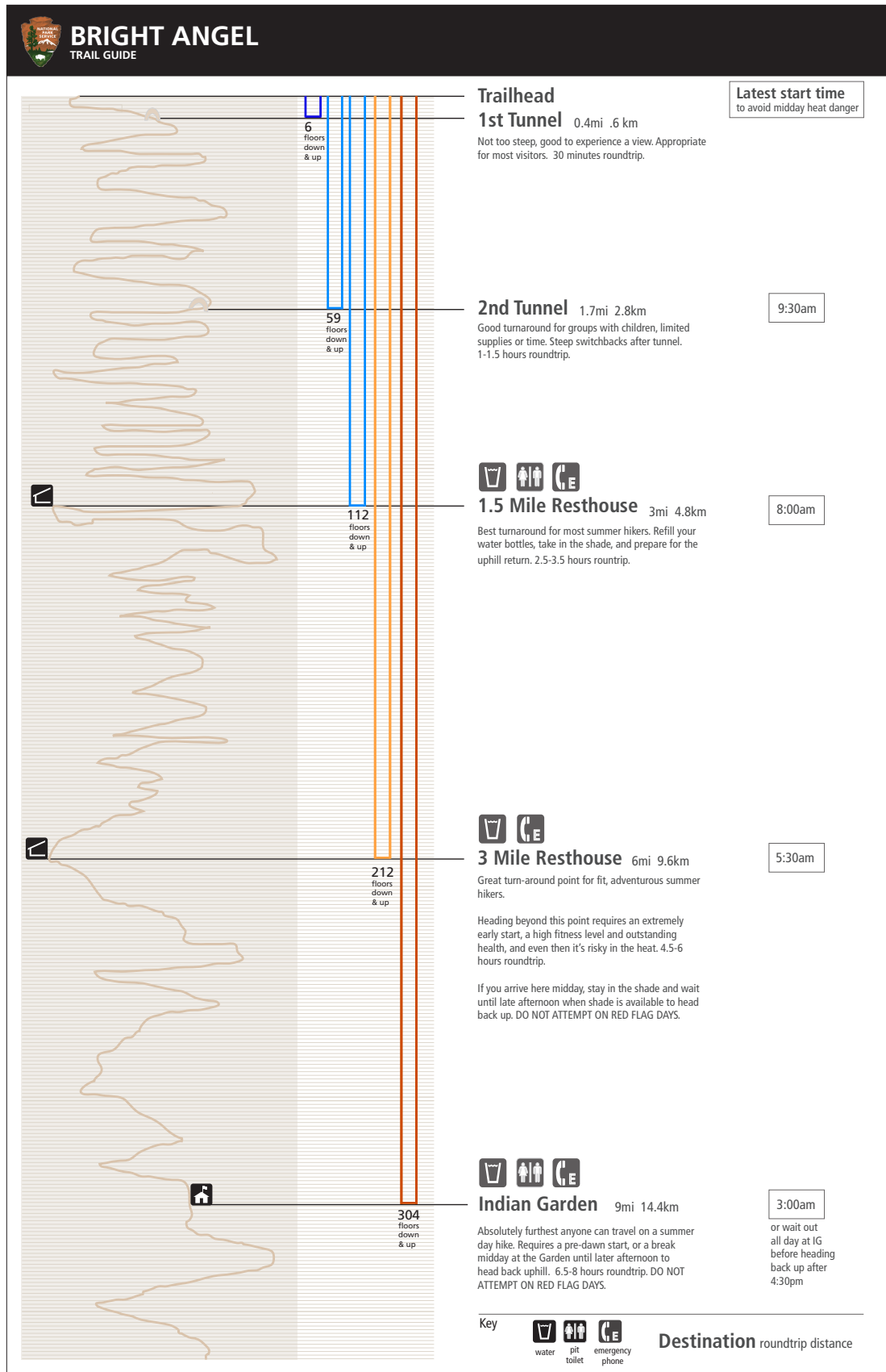
In order to accentuate the role of elevation change even more, the map is designed to be very long and narrow, so much so that the visitor must unfold the map to see it's entire length.

This map also includes recommended latest start times for each trail destination. As noted previously, Rangers often provide visitors with this information and it's well-received. However start times are only available through speaking with Rangers: they are not listed on any of the hiking or safety information artifacts.

To appeal to visitors, the map also includes facility and landmark information, things that I found in my testing were important to visitors.

The map is intended to be a low-cost item so that it could be widely available at the Park and provided for free or with an optional donation. I prototyped the map using a single, double-sided tabloid sheet folded vertically down the center and then in thirds horizontally for a pocket sized foldout. This helps elongate the map section as well as making the guide much more portable than the Park Newspaper currently provided.







---

## STRATEGIC CRITERIA ADDRESSED

---

*Afford and guide comparison*

*Redirect visitors' attention to overlooked information*

*Use contrast to draw attention*

*Increase availability of overlooked criteria*

*Make overlooked criteria easy to grasp*

*Emphasize experience over checklist accomplishments*

---

## TACTICAL DESIGN CRITERIA ADDRESSED

---

*Be accessible and usable by a high volume of visitors*

*Be readable and professional*

*Work with the Park's laissez faire policy*

*Be economical*

*Stand up to environmental challenges*

*Provide helpful guidance without requiring a person*

*Afford at-a-glance use*

*Afford interaction without relying on digital*

*Be group-friendly*

*Minimize words where possible, while maintaining clarity*

*Provide varied levels of information*

*Aid decision-making*

*Assume no prior knowledge*

*Meet visitors where they are*

*Utilize the power of affect*

---

## HIKING OVERVIEW MAP

---

**ADDRESSES VISITOR ERROR:** Making overzealous plans

**PRIMARY GOAL:** Counter optimism bias

**SECONDARY GOAL:** Enable informed choices, Boost alternatives

---

I found visitors had a hard time grasping the importance of elevation gain and that they were confused by the fact that individual trails could contain a number of out-and-back hike options. This map allows visitors to explore these issues intuitively.

Using a birds eye view, the hike overview map allows visitors to get a good feel for what elevation gain really means. They can quickly size-up and compare trails to each other just using natural visual cues. The map also shows the hike difficulty level of each trail section, making clear that the difficulty is largely determined by how deep into the Canyon they venture.

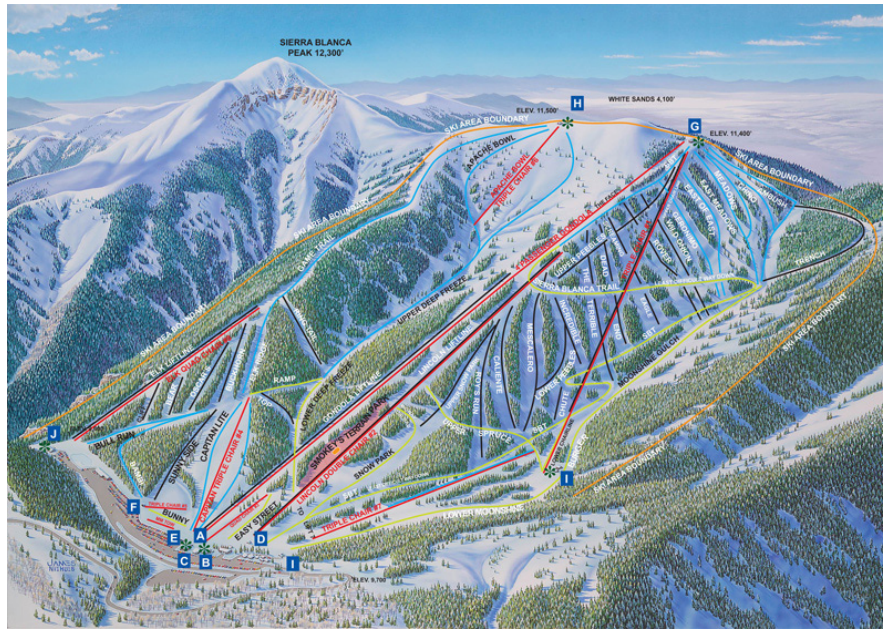
The angle of the map also helps make the steepness (and at times drudgery) of the trails more apparent and helps visitors realize that they don't necessarily get to see or do more by going further down into the Canyon.

The tool intends to help change visitors' perceptions, yet in a way that doesn't cause a confrontation because it doesn't compete directly with visitors' existing beliefs or views. Instead, it simply provides them with new, engaging information that will help shape their understanding of the Canyon.

Like the elevation-based trail map, this map makes elevation gain, rather than distance, the key organizing metric. It is visually apparent how much farther down one trail section goes than another, whereas the distance of hikes is harder to ascertain. This directs visitors to consider elevation gain as a primary deciding factor in choosing a hike, rather than focusing on mileage.

During my field research I found that the existing maps provided were popular and invited interaction. The visual appeal of these type of maps should make it even more compelling. While the map is based on a the conventions of a ski-map, I hope that the intuitive visual style makes it highly accessible even to visitors who aren't familiar with ski maps.



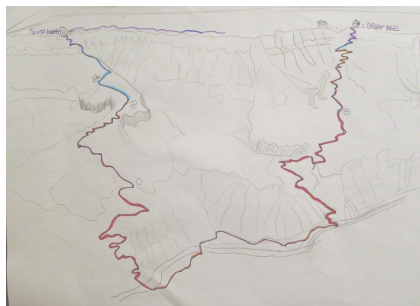


*A typical ski slope trail map. These maps are usually hand-painted landscape illustrations onto which the trail information is added. Image source: Google Images.*



*A view similar to my proposed perspective for the overview map: looking down on the trail from above with the South Rim at the top of the frame.*

*Image source: Google Earth*



*A hand-sketch depicting what a ski-style map for the Canyon might look like.*



*The sketched map placed on top of the satellite image creates a rudimentary illustration.*



# EXPERIENTIAL PROMPTS

I found that visitors massively underestimate the Canyon and the difficulty of hiking there. I also found that most visitors are in a great mood and are failing to consider what could be challenging about a hike or the fact that something bad could happen to them if they overstep safety boundaries.

To challenge visitors' perceptions in a fun and interactive way, I propose two experiential prompts. These are intended to be a little more creative and less practical than some of the other solutions offered, however by exploring these "blue sky" concepts, I hope to further interrogate the nature of visitors' perceptions and their approach to hiking at the Canyon.

The *#Fail Photo Op* redirects the existing visitor behavior of mocking safety signage to a more productive *debiasing* end, increasing *availability* of rescue outcomes and prompting visitors to figuratively and literally put themselves in the place of someone needing rescue because of their own "stupidity."

The *Uphill Challenge* uses a hike simulation device as a fun, interactive way to close the *hot-cold empathy* and perception gaps by letting visitors experience the challenges of uphill hiking at the Grand Canyon before they actually head out to hike.

These solutions aim to pack an emotional punch and encourage visitors to pre-experience the Canyon to help combat optimism bias and other false assumptions visitors may have about the Canyon and their hike.



# HIKING FAIL PHOTO OP

**ADDRESSES VISITOR ERROR:** Making overzealous plans, Going too far, Bringing insufficient supplies

**PRIMARY GOAL:** Counter optimism bias

The Hiking Fail Photo Op takes a creative approach to reaching visitors. Visitors have a habit of mocking safety signage in a playful way. This intervention takes advantage of that inclination as well as visitors' interest in taking photos and sharing them on social media.

Built with the express intent to be posed with, the Hiking Fail Photo Op encourages visitors to kiddingly play the role of a hiker in need of rescue. While visitors would step into the exhibit intending to make light of the situation, the exhibit hopes to have a serious affect on visitors, even if only at a subconscious level. By literally putting themselves in the place of someone needing help, this intervention should make the experience of needing rescue feel more real and believable to visitors. This, in turn, should increase visitors' perceived likelihood of this outcome. Providing a picture of what a rescue situation looks like should also increase availability by making it easier for visitors to imagine a negative outcome.

The rough prototype below uses a hand-painted, cartoon style. This aesthetic is based on photo cutouts featured at many tourist attractions in the United States. This style intends to make the exhibit more approachable and enticing for visitors. The unrealistic and somewhat upbeat imagery, however, may decrease the impact of the *availability effect* since it means visitors aren't conjuring up a realistic image of a rescue situation, and because the image itself is not viscerally negative or dreadful. A more realistic looking and negative emotional image may be more effective in stirring visitors, but visitors would probably be less likely to interact in a playful way with an overtly negative or serious image.

While depressing stories or photos of visitors who were hurt would have an effect on visitors, they would also be a perhaps overly aggressive tactic that would hurt visitors' experience in the park. This intervention attempts to find a compromise between the strongest possible imagery and something less upsetting to visitors, inviting interaction rather than consternation or avoidance.



Mockup of the Hiking Fail Photo op utilizing stock imagery (cartoon figures and rocks).

## STRATEGIC CRITERIA ADDRESSED

*Redirect visitors' attention to overlooked information*

*Increase availability of poor outcomes and base rates*

*Emphasize experience over checklist accomplishments*

## TACTICAL DESIGN CRITERIA ADDRESSED

*Be placed on-site at the Park*

*Be accessible and usable by a high volume of visitors*

*Be hard to avoid*

*Work with the Park's laissez faire policy*

*Be economical*

*Stand up to environmental challenges*

*Afford at-a-glance use*

*Afford interaction without relying on digital*

*Be group-friendly*

*Minimize words where possible, while maintaining clarity*

*Assume no prior knowledge*

*Meet visitors where they are*

*Use specifics to illustrate a larger point*

*Utilize the power of affect*



---

## STRATEGIC CRITERIA ADDRESSED

---

*Mimic visitors' decision approach*

*Redirect visitors' attention to overlooked information*

*Increase availability of overlooked criteria*

*Make overlooked criteria easy to grasp*

*Create feedback loops*

---

## TACTICAL DESIGN CRITERIA MET

---

*Be hard to avoid*

*Be readable and professional*

*Afford interaction without relying on digital*

*Be group-friendly*

*Minimize words where possible, while maintaining clarity*

*Assume no prior knowledge*

*Meet visitors where they are*

*Use specifics to illustrate a larger point*

*Utilize the power of affect*

---



*Process: an early model of the concept crafted with simple wood blocks and paper. Working in low-fidelity with simple materials helped me quickly work out ideas*

---

## UPHILL CHALLENGE

---

**ADDRESSES VISITOR ERROR:** Making overzealous plans, Going too far

**PRIMARY GOAL:** Counter optimism bias

---

I found it was extremely difficult for visitors to imagine how challenging the uphill climb at the Canyon will be ahead of time. The literature offered few good suggestions of how to help people anticipate; it's just very hard for human beings to imagine and assess an experience correctly before they've actually had it. I determined that the only way for visitors to understand the experience and believe just how hard the hiking is, was for them to actually experience it.

One way to go about doing this would be to modify the trail so that there is an uphill section early on in the hike that gives visitors an idea of what to expect on the return trip. Unfortunately the Grand Canyon trails are extremely constrained in their construction and are also historic gems that cannot be altered. I also considered using activities or signage to "trick" visitors into turning around and briefly hiking back uphill to allow them to sample the uphill portion of their hike before they decide to turn around for good. I think if I could succeed in turning visitors around this could be a successful tactic, but motivating visitors to do so would be a major challenge.

I determined that the best approach would be a manufactured simulation of the uphill hike that could be available for visitors to try at the Visitor Center, IMAX, area hotels, or even the Las Vegas or Phoenix airports where many visitors begin a trip to the Canyon.

This device draws visitors in with a fun, competitive premise that encourages them to pre-experience the challenge of the uphill hike. Prospective visitors would use a stair master or similar exercise equipment that has been calibrated to match the intensity of a Canyon hike. As a visitor uses the device, it would update their location on a map of a trail within the Canyon, showing their progress from a chosen starting point. Seeing how little progress a person makes after a few minutes should help the participant and spectators get the message that longer Canyon hikes are both tiring and time consuming. Given that the heat is a key factor in the difficulty of Canyon hikes, the addition of a heating element would be very helpful in both giving visitors a more complete picture of the challenge and in reminding visitors that they will feel the heat on the uphill hike.

The public nature of the display and branding it as a "challenge" would hopefully draw fit, overconfident young people to give the device a try. Even if these visitors don't admit to others that the "hike" was challenging, the understanding they gain from experiencing the hike's difficulty will hopefully still affect their plans. Beyond fit visitors looking to prove their abilities, the Challenge may also attract many more visitors who are simply curious.

By increasing the number of visitors who are aware of the difficulty of hiking uphill at the Canyon, the Challenge tool could even have a ripple effect on the conventional wisdom about hiking at the Canyon, helping visitors to realize that an inner canyon hike is no small undertaking.





*A mockup of the Uphill Challenge in use.  
Image source: Man on stepper and flooring from  
Google Images.*

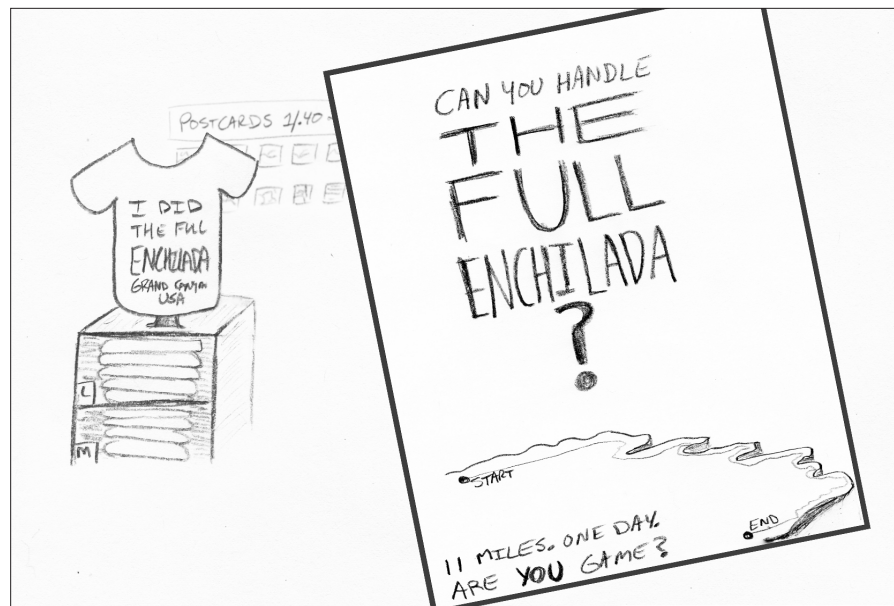


# OTHER SOLUTIONS

## REBRANDING TRAILS

Rebranding Trails makes safer trail options more appealing to visitors, and draws attention away from less safe options. By rewording trail descriptions and choosing images associated with hikes and destinations carefully, the Park can help steer visitors towards better summer day hike choices.

One example of this is rebranding the full length of the Rim Trail as a destination hike. The Rim Trail is 16 miles long, giving it great potential as a landmark hike for visitors, but current trail descriptions and branding make the Rim Trail unattractive to fit visitors. By creating a fun name - The Full Enchilada - and a brand, this hike can entice visitors away from long inner canyon treks that are much more dangerous.



*Process: Sketches of Full Enchilada marketing material prototypes reminiscent of those available for the Rim-to-Rim hike.*

## ON TRAIL DEBIASING SIGNAGE

On-trail Debiasing Signage relies on proven *debiasing* techniques to encourage visitors to be more realistic and informed when deciding to continue a hike. Rather than focusing on issuing a warning which visitors will assume is “not for them,” this signage draws attention to overlooked considerations and emphasizes base rates. These elements intend to help visitors make a critical reality-check.



Continuing beyond this point on a day hike is inappropriate for **99%** of visitors.



 **RESCUE IS NOT GUARANTEED**  
Cell phone coverage is extremely weak in this area. In an emergency, send someone to Indian Garden or Bright Angel Campground Ranger stations to request help, or use the emergency phone located at each resthouse.

*Visitors may think signs aren't for them, or that they are in above-average shape. Reminding them of the base rate - in this case that going beyond a point is only for the top 1% of visitors - it may help give visitors (or their hiking companions) a reality check that makes them realize the rules do apply to them.*

# Are you sure?

**Is everyone else in your group as fit and healthy as you?**

Stay together, and remember kids are poor at regulating their temperature, but will not realize their body is sick until they are in really bad shape.

Children have died of heatstroke because adults failed to yield to their bodies' needs.

**Do you have enough water and food?**

Keeping your body cool is critical, but drinking a lot of water without eating salty snacks can cause water poisoning, which can be deadly. Whenever you take a break have salty snacks along with water.

Have enough water not only to drink, but to use to soak yourself- water on your skin will cool your body even quicker than drinking.

**How will you feel heading back uphill?**

Heading down is easy, going back up is tough.

Do not wait until you feel tired to turn back, you will not tire until you begin your ascent, and at that point there is no way out but up.

It gets hotter as the day progresses and there is NO shade beyond this point.

 **RESCUE IS NOT GUARANTEED**  
Cell phone coverage is extremely weak in this area. In an emergency, send someone to Indian Garden or Bright Angel Campground Ranger stations to request help, or use the emergency phone located at each resthouse.

*Asking questions can prompt visitors to think of counterfactual information - the evidence that doesn't support their desire to keep going. By framing it as a prompt rather than a direct order, this approach may be less offputting to visitors than a more direct "you shouldn't do this" tone.*



# FOUR WAYS TO INTERVENE

## PROVOKE

Snapping visitors out of their misconceptions and assumptions is difficult. However, even attempting a wake-up call has the effect of increasing availability of negative outcomes, so even if visitors don't consciously reconsider their views, they still reap a optimism-lowering benefit from these intervention elements.

## PROMPT ASSESSMENT

These interventions use dissonance and comparison to encourage visitors to make a more active assessment of themselves and their surroundings.

## PROMPT A DECISION

I found that visitors often didn't even recognize there was a decision to be made at all, yet this non-decision could lead to dangerous outcomes. To combat this, these elements make clear to visitors that they have an active decision to make amongst options.

## NUDGE THE DECISION

Hopefully visitors will make better choices once they are more aware of the challenges of the Canyon, and the important decisions to be made. However, this indirect approach may not be enough. To help sway visitors towards safer choices, many interventions also include nudges designed to prod visitors towards the safer option.



The previously discussed interventions intend to affect visitor behavior in a variety of different ways. Below, examples of interventions are shown for each of the four categories of intervention methods.



*Hiking Fail Photo Op*



*Debiasing Signage*



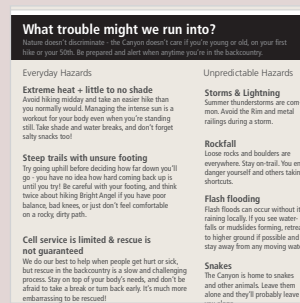
*Self rescue guide in Trail Guide*



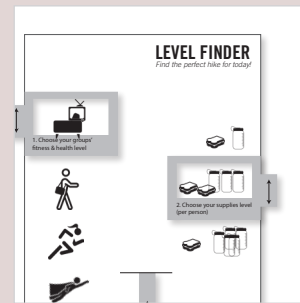
*Uphill Challenge*



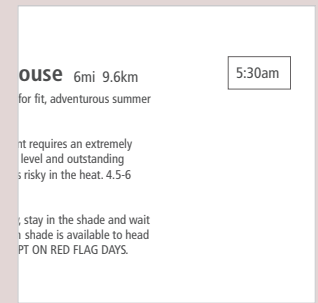
*Emphasizing elevation on the overview & trail maps*



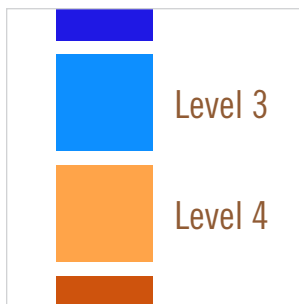
*Hazard information in Trail Guide*



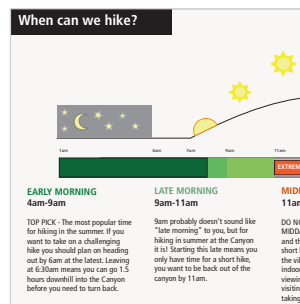
*Hike levels and level finder*



*Linking desired destination with its safe start time*



*Choose a hike level and hike*



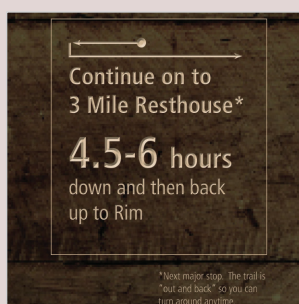
*Choose when to hike*



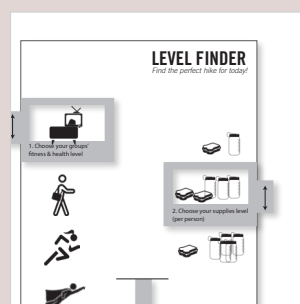
*Choose what gear to bring*



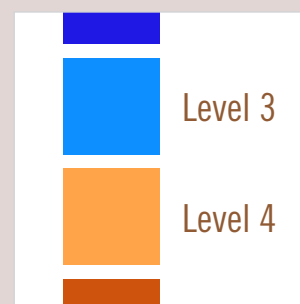
*Choose a turnaround*



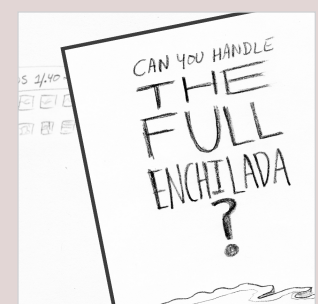
*Framing of turnaround choice*



*Level finder options and outcomes*



*Levels color scheme*



*Hike descriptions & marketing*



# EPILOGUE

## FURTHER RESEARCH OPPORTUNITIES

I believe these proposals have a great deal of potential, but the only way to know for sure how effective these solutions are is with further user testing. Since each of these solutions also plays on the context in which they would be used, and on visitors' psychology, by far the best way to test these items would be by deploying prototypes in the intended context. Noting if visitors exposed to the solution make fewer behavioral errors is the best way to see if these solutions meet their aim, but of course gaining feedback from visitors and Rangers would also be helpful in informing future iterations.



# NOTES

## PHOTO CREDITS

All photos displayed in this document are property of and copyright Emily Abell, except where otherwise noted in the captions. Permission to photograph in public spaces was granted by Grand Canyon National Park, and was included in the IRB-approved project proposal.

## IRB APPROVAL & PARTICIPANT ANONYMITY

Carnegie Mellon University Institutional Review Board (IRB) granted *Exempt* status to the project with a number of conditions, including that no research participants be identified. Due to this provision, the names of the individuals interviewed, and photos of identifiable people have been excluded from this report.







# REFERENCES

- America's National Park System: The Critical Documents - Edited by Larry M. Dilsaver. (n.d.). Retrieved May 7, 2014, from [http://cr.nps.gov/history/online\\_books/anps/anps\\_1i.htm](http://cr.nps.gov/history/online_books/anps/anps_1i.htm)
- Anderson, S. P. (2011). *Seductive interaction design: creating playful, fun, and effective user experiences*. Berkeley, CA: New Riders.
- Arkes, Christensen, Lai, and Blumer. (1987). Two methods of reducing overconfidence. *Organizational Behavior and Human Decision Processes*, 39, 133-144.
- Backlund E., Stewart W., Schwartz Z. & McDonald, C. (2006). Backcountry Day Hikers at Grand Canyon National Park. *Park Planning and Policy Lab at University of Illinois Urbana-Champaign*
- Ballantyne, C. (2007, June 21). Strange but True: Drinking Too Much Water Can Kill. *Scientific American* Global RSS. Retrieved April 26, 2014, from <http://www.scientificamerican.com/article.cfm?id=strange-but-true-drinking-too-much-water-can-kill>
- Bane, C. (2013, April 26). Colorado's Loveland Pass Avalanche: Lessons Learned. *Outside Online*. Retrieved February 10, 2014, from <http://www.outsideonline.com/outdoor-adventure/snow-sports/Loveland-Pass-Avalanche-The-Worst-Accident-That-Shook-the-Ski-Industry.html?page=5>
- Beard, C. (2012, October 23). Saving lives all in a day's work at Grand Canyon National Park. *Grand Canyon News*. Retrieved April 5, 2013, from <http://grandcanyonnews.com/main.asp?SectionID=1&SubsectionID=1&ArticleID=10136>
- Beck, U. (1992). *Risk society towards a new modernity*. London: Sage Publications.
- Bouyer, M., Bagdassarian, S., Chaabanne, S., & Mullet, E. (2001). Personality Correlates of Risk Perception. *Risk Analysis*, 21(3), 457-466.
- Brotman, B. (2011, July 25). How do you explain park deaths? You can't. *Chicago Tribune*. Retrieved April 12, 2013, from [http://articles.chicagotribune.com/2011-07-25/features/ct-talk-brotman-yosemite-0725-20110725\\_1\\_park-deaths-grand-canyon-poor-judgment](http://articles.chicagotribune.com/2011-07-25/features/ct-talk-brotman-yosemite-0725-20110725_1_park-deaths-grand-canyon-poor-judgment)
- Critical Questions for NPS Social Science. (n.d.). *NPS: Explore Nature Social Science Home*. Retrieved May 12, 2013, from <http://www.nature.nps.gov/socialscience/>
- Dickson, T. J., Chapman, J., & Hurrell, M. (2000). Risk in outdoor activities: the perception, the appeal, the reality. *Australian Journal of Outdoor Education*, 4(2), 10.



- Dirksen, J. (2012). *Design for how people learn*. Berkeley, CA: New Riders.
- Dolnicar, S. (2005). Understanding barriers to leisure travel: Tourist fears as a marketing basis. *Journal of Vacation Marketing*, 11(3), 197-208.
- Du, N., Budescu, D. V., Shelley, M. K., & Omer, T. C. (2011). The appeal of vague financial forecasts. *Organizational Behavior and Human Decision Processes*, 115(1), 143.
- Duarte, N. (2010). *Resonate: present visual stories that transform audiences*. Hoboken, N.J.: Wiley.
- Espiner, S. (2001). The phenomenon of risk and its management in natural resource recreation and tourism settings: A case study of Fox and Franz Josef Glaciers, Westland National Park, New Zealand (Doctoral dissertation, Lincoln University).
- Farabee, C. R. (1998). *Death, daring, and disaster: search and rescue in the National Parks*. Boulder, Colo.: Roberts Rinehart.
- Fischhoff, B. (1975). Hindsight  $\neq$  Foresight: The effect of outcome knowledge on judgment under uncertainty. *Journal of Experimental Psychology: Human, Perception, and Performance*, 1, 288-299.
- Fischhoff, B. (1995). Risk Perception And Communication Unplugged: Twenty Years Of Process1. *Risk Analysis*, 15(2), 137-145.
- Fischhoff (2011). Communicating about the risks of terrorism (or anything else). *American Psychologist*, 66, 520-531.
- Fogg, B. (n.d.). BJ Fogg's Behavior Model. *BJ Fogg's Behavioral Model*. Retrieved March 10, 2014, from <http://www.behaviormodel.org/ability.html>
- Ghiglieri, M. P., & Myers, T. M. (2001). *Over the edge: death in Grand Canyon : gripping accounts of all known fatal mishaps in the most famous of the world's seven natural wonders*. Flagstaff, AZ: Puma Press.
- Gigerenzer & Gaissmaier (2011). Heuristic Decision Making. *Annual Review of Psychology*, 62, 451 – 482.
- Grand Canyon National Park (U.S. National Park Service). (2014, August 1). *National Park Service*. Retrieved April 15, 2013, from <http://www.nps.gov/grca>
- Grand Canyon National Park Park Profile 2013(n.d.). *Grand Canyon National Park*. Retrieved May 8, 2014, from <http://www.nps.gov/grca/parkmgmt/upload/2013-park-profile.pdf>
- Half Dome Plan. (2012). *National Park Service*. Retrieved May 7, 2014, from <http://www.nps.gov/yose/parkmgmt/hdp.htm>
- Hamonko, M. (2011). Preventative Search and Rescue: A Pilot Study and Brief Review of the Literature. *Wilderness Medicine.org*. Retrieved April 18, 2013, from <http://www.wildernessmed.org/preventativesearchandrescueapilotstudyandbriefreviewoftheliterature.html>



- Heath, C., & Heath, D. (2010). *Switch: how to change things when change is hard*. New York: Broadway Books.
- Heggie, T. W. (2008). Search and Rescue in Alaska's National Parks. *Travel Medicine and Infectious Disease*, 6(6), 355-361.
- Heggie, T. W., & Heggie, T. M. (2009). Search and Rescue Trends Associated With Recreational Travel in US National Parks. *Journal of Travel Medicine*, 16(1), 23-27.
- Heggie, T. W., & Amundson, M. E. (2009). Dead Men Walking: Search and Rescue in US National Parks. *Wilderness & environmental medicine*, 20(3), 244-249.
- Hike Smart Tips & Podcasts. (n.d.). *National Park Service*. Retrieved October 15, 2013, from [http://www.nps.gov/grca/photosmultimedia/hike\\_smart-00.htm](http://www.nps.gov/grca/photosmultimedia/hike_smart-00.htm)
- Hiking Half Dome [Video]. (n.d.). *National Park Service*. Retrieved June 12, 2014, from <http://www.nps.gov/media/video/view.htm?id=F9FC4FCC-C962-4209-5796BAB6765182FA>
- Johnson, E. J., & Tversky, A. (1983). Affect, generalization, and the perception of risk.. *Journal of Personality and Social Psychology*, 45(1), 20-31.
- Kahneman & Tversky (1979). Prospect Theory: An analysis of decision under risk. *Econometrica*, 47, 263-292.
- Kahneman, Knetsch, & Thaler (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives*, 5, 193-206.
- Kahneman, D. (2011). *Thinking Fast and Slow*. New York, NY: Penguin LTD.
- Kinross, R. (1985). The Rhetoric of Neutrality. *Design Issues*, 2(2), 18.
- Lackey, B. K. (2002). Empirical and theoretical analysis of communication focused on human-black bear conflicts in Yosemite National Park (Doctoral dissertation, University of Idaho).
- Lerner, M. J., & Miller, D. T. (1978). Just world research and the attribution process: Looking back and ahead. *Psychological bulletin*, 85(5), 1030.
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings.. *Psychological Bulletin*, 127(2), 267-286.
- Loewenstein, G. (2005). Hot-Cold Empathy Gaps And Medical Decision Making.. *Health Psychology*, 24(4,Suppl), S49-S56.
- Malcolm, C. (2013). PSAR Impact Report (Draft). Grand Canyon, AZ.
- Mather, K. (2011, July 20). Yosemite waterfall deaths: 3 hikers swept over falls, presumed dead. *Los Angeles Times*. Retrieved April 2, 2013, from <http://latimesblogs.latimes.com/lanow/2011/07/three-hikers-dead-at-yosemites-vernal-falls.html?lanow>
- Mather, K. (2011, July 20). Chain-reaction rescue killed three at Yosemite. LA Now. Retrieved April 7, 2013, from <http://latimesblogs.latimes.com/lanow/2011/07/chain-reaction-rescue-killed-three-at-yosemite.html?lanow>



- McKinley, J., & Lovett, I. (2011, September 5). At Yosemite, 18 Reminders of Dangers of the Outdoors. *The New York Times*. Retrieved April 2, 2013, from [http://www.nytimes.com/2011/09/06/us/06yosemite.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2011/09/06/us/06yosemite.html?pagewanted=all&_r=0)
- National Park Service (2011). Search and Rescue Reference Manual. Retrieved from <http://www.nps.gov/policy/DOrders/RM-59.pdf>.
- National Association For Search And Rescue. (n.d.). National Association For Search And Rescue. Retrieved June 15, 2013, from <http://www.nasar.org/>
- Newman, S. (Director) (2008, August 1). Opening Address. *Wilderness Risk Management Conference*. Lecture conducted from NOLS, Jackson, WY. Retrieved from [http://www.nols.edu/nolspro/pdf/opening\\_speech\\_sara\\_newman.pdf](http://www.nols.edu/nolspro/pdf/opening_speech_sara_newman.pdf)
- Newman, S. (2009). An Introduction to Visitor to Visitor Injury Prevention Strategies [Course Participant Guide for NPS Training event]. Retrieved from [http://www.nps.gov/training/tel/Guides/Intro\\_Visitor\\_Injury\\_pg\\_05202009.pdf](http://www.nps.gov/training/tel/Guides/Intro_Visitor_Injury_pg_05202009.pdf)
- News Release: Three Visitors Swept Over Vernal Fall in Yosemite National Park. (2011, July 20). *Yosemite National Park*. Retrieved April 8, 2013, from <http://www.nps.gov/yose/parknews/vfallsar11b.htm>
- Norman, D. A. (1992). Design principles for cognitive artifacts. *Research in Engineering Design*, 4(1), 43-50.
- Norman, D. A. (1993). *Things that make us smart: defending human attributes in the age of the machine*. Reading, Mass.: Addison-Wesley Pub. Co..
- Norman, D. A. (2004). *Emotional design: why we love (or hate) everyday things*. New York: Basic Books.
- Pine, B. J., & Gilmore, J. H. (2011). *The experience economy*. Harvard Business Press.
- Polaine, A., Lovlie, L., & Reason, B. (2013). *Service Design: From Insight to Inspiration*. Brooklyn, NY: Rosenfeld Media, LLC.
- Porter, B. E., Bliss, J. P., & Sleet, D. A. (2010). Human Factors in Injury Control. *American Journal of Lifestyle Medicine*, 4(1), 90-97.
- Practical Solutions for Challenging Issues. (n.d.). *Wilderness Risk Management Conference*. Retrieved May 8, 2013, from <http://www.nols.edu/wrmc/>
- Preventative Search and Rescue (PSAR). (n.d.). Mountain Rescue Blog. Retrieved April 18, 2013, from <http://mountainrescueblog.wordpress.com/personal-responsibility-in-the-mountains/>
- Priest, S. (1993). A New Model for Risk Taking. *Journal of Experiential Education*, 16(1), 50-53.
- Repanshek, K. (2009, April 26). Staying Safe and How Not to Become A SAR Statistic in the National Park System. *National Parks Traveler*. Retrieved September 15, 2013, from <http://www.nationalparkstraveler.com/2009/04/staying-safe-and-how-not-become-sar-statistic-national-park-system>



- Repanshek, K. (2010, August 26). You Can't Always, or Fairly, Blame Technology For Visitor Woes in National Parks National Parks Traveler. Retrieved January 10, 2013, from <http://www.nationalparkstraveler.com/2010/08/you-cant-always-or-fairly-blame-technology-visitor-woes-national-parks6467>
- Rickard, Laura (2011). In backyards, on front lawns: examining informal risk communication and communicators. *Public Understanding of Science*, 20(5), 642-657.
- Rickard, L., McComas, K., & Newman, S. (2011). Visitor Proficiency Profiling and Risk Communication at a National Park. *Environmental Communication: A Journal of Nature and Culture*, 5(1), 62-82.
- Rickard, L. N., Scherer, C. W., & Newman, S. B. (2011). Exploring Attribution Of Responsibility For Visitor Safety In A US National Park. *Health, Risk & Society*, 13(6), 527-545.
- Rickard, L. (2012). Mountains And Handrails: Linking Theories Of Attribution, Risk Perception, And Communication To Investigate Risk Management In Three US National Park (Doctoral dissertation, Cornell University).
- Search and Rescue: Lessons from the Field. (n.d.). *Yosemite National Park*. Retrieved May 10, 2013, from <http://www.nps.gov/yose/blogs/psarblog.htm>
- Shanteau, J. (1992). How much information does an expert use? Is it relevant?. *Acta Psychologica*, 81(1), 75-86.
- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk As Analysis And Risk As Feelings: Some Thoughts About Affect, Reason, Risk, And Rationality. *Risk Analysis*, 24(2), 311-322.
- Slovic, P. (1987). Perception of risk. *Science*, 236(4799), 280-285.
- Smith-Jackson, T. L., & Hall, T. E. (2002). Information Order and Sign Design: A Schema-Based Approach. *Environment and Behavior*, 34(4), 479-492.
- Stewart et al. (2006). Decision by Sampling. *Cognitive Psychology*, 53, 1-26.
- Stickdorn, M., & Schneider, J. (2011). *This is service design thinking: basics, tools, cases*. Hoboken, N.J.: Wiley.
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: improving decisions about health, wealth, and happiness*. New Haven, Conn.: Yale University Press.
- Tuler, S., & Golding, D. (2002). A comprehensive study of visitor safety in the National Park System: Final report. *George Perkins Marsh Institute, Clark University*.
- Tversky, A., & Kahneman, D. (1974). Judgment Under Uncertainty: Heuristics And Biases. *Science*, 185(4157), 1124-1131.



- Updike, L. (n.d.). Grand Canyon Hiking 101: Who are the Grand Canyon PSAR Rangers?. Examiner.com. Retrieved April 11, 2013, from <http://www.examiner.com/article/grand-canyon-hiking-101-who-are-the-grand-canyon-psar-rangers>
- Weinstein, N. D. (1984). Why It Won't Happen To Me: Perceptions Of Risk Factors And Susceptibility. *Health Psychology*, 3(5), 431-457.
- Whittlesey, L. H. (1995). *Death in Yellowstone: accidents and foolhardiness in the first national park*. Boulder, Colo.: Roberts Rinehart Publishers.
- Yaniv, I., & Foster, D. P. (1995). Graininess of judgment under uncertainty: An accuracy-informativeness trade-off. *Journal of Experimental Psychology: General*, 124(4), 424-432.
- You Can't Always, or Fairly, Blame Technology For Visitor Woes in National Parks. (n.d.). Commentary, *News and Life in America's National Parks*. Retrieved June 8, 2014, from <http://www.nationalparkstraveler.com/2010/08/you-cant-always-or-fairly-blame-technology-visitor-woes-national-parks6467>
- Zikmund-Fisher, B. J., Fagerlin, A., & Ubel, P. A. (2004). Is 28% Good or Bad? Evaluability and Preference Reversals in Health Care Decisions. *Medical Decision Making*, 24(2), 142-148.







