INTERAGENCY
VISITOR USE MANAGEMENT
COUNCIL

Visitor Capacity Guidebook

Managing the Amounts and Types of Visitor Use to Achieve Desired Conditions

Edition One | February 2019

This page intentionally left blank.

Acknowledgments

Primary contributors to the development of this guidebook include members of the Interagency Visitor Use Management Council and technical advisors listed alphabetically: Keith Brown (Bureau of Land Management), Kerri Cahill (National Park Service), Mary Ellen Emerick (U.S. Forest Service), Rachel Franchina (U.S. Forest Service), Aleksandra Pitt (National Park Service), Jennifer Reed (U.S. Fish and Wildlife Service), and Rose Verbos (National Park Service). We wish to extend our thanks to those who contributed to the publication of this guidebook, including the graphic designers, editors, and reviewers.

The Interagency Visitor Use Management Council consists of the following agencies:

DEPARTMENT	AGENCY
Department of Agriculture	U.S. Forest Service
Department of Commerce	National Oceanic and Atmospheric Administration
Department of Defense	U.S. Army Corps of Engineers
Department of the Interior	Bureau of Land Management
Department of the Interior	National Park Service
Department of the Interior	U.S. Fish and Wildlife Service

Suggested Citation:

IVUMC (Interagency Visitor Use Management Council). 2019. Visitor Capacity Guidebook: Managing the Amounts and Types of Visitor Use to Achieve Desired Conditions. Lakewood, CO. https://visitorusemanagement.nps.gov/VUM/Framework.

Contents

FIGURES

TABLES

This page intentionally left blank.

Abstract

Visitor use management is essential for maximizing benefits for visitors while achieving and maintaining desired resource conditions and visitor experiences on federally managed lands and waters. Visitor capacity, a component of visitor use management, is defined as the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established. This visitor capacity guidebook, in combination with the "Visitor Use Management Framework," provides managers with processes to collaboratively develop long-term strategies to manage the amounts and types of visitor use to protect resources, improve access, connect visitors to key experiences, and achieve desired conditions. The purpose of this guidebook is to provide cohesive guidance on identifying visitor capacity and implementing related management strategies and actions on federally managed lands and waters. Similar to the framework, the sliding scale of analysis is discussed throughout this guidebook to ensure the investment of time, money, and other resources for a project is commensurate with the complexity of the project and the consequences of the decision. Overall, this guidebook is meant to expand on the framework, guiding a professional and consistent approach to identifying and implementing visitor capacity.

This page intentionally left blank.

1

Chapter 1: Introduction

This page intentionally left blank.

Chapter 1: Introduction

Kayakers enjoy Spark Lake, Deschutes National Forest.

Connecting people with nature and history builds healthier minds and bodies, enhances bonds between family and friends, contributes to the quality of life and resiliency of local communities, and inspires and rejuvenates our spirits (e.g., Cordell et al. 1999; Daniel 2010; Driver 1976). Additionally, experiencing federally managed lands and waters helps visitors develop an understanding and sense of belonging to a real place and, thus, to act as citizen stewards of our collective natural and cultural heritage (e.g., Larson et al. 2011; Marchand 2014; Vagias and Powell 2010).

Every year, people seek out federally managed lands and waters to pursue a growing variety of visitor experiences. As public interest in and use of these lands and waters changes, this nationwide trend requires that all of us—visitors, managers, and citizens—adopt more effective ways to manage visitor use to ensure that these special places, and the benefits they generate, persist for current and future generations. Effective visitor use management helps meet this changing demand and helps federal agencies protect resources and improve visitor experiences. Visitor use management simultaneously supports appropriate public access to these valued places while ensuring the long-term viability of the resources and social and managerial conditions that make desired visitor experiences possible.

Proactive visitor use management and addressing visitor capacity are more important now than ever before as patterns in outdoor recreation and visitor use are continually changing. The visiting public is becoming more diversified with new interests and needs, oftentimes leading to new and emerging visitor experiences. Different facilities and services are needed to support changes in visitor demographics and spatial and temporal distribution, increasing visitation from travel and tourism providers with an emphasis on international visitors, and visitation by larger intergenerational family units. These changes often result in the need to consider social and environmental justice factors, such as race, class, gender, and age, to accommodate shifting visitor expectations (Rose 2010; Rose and Paisley 2012). Increasing reliance on technology, coupled with metropolitan populations close to federally managed lands and waters, is also requiring a higher demand for information and quality services.

In addition to changing patterns of use, a significant increase in visitation in many areas is another reason for proactive visitor use management and addressing visitor capacity. Increasing visitation is driven by numerous factors, including national and state marketing campaigns, rising international travel and tourism, low travel cost, social media influences, changing weather patterns, and new and emerging forms of recreation.

Protecting resources while managing for visitor benefits is inherently complex. Visitor use management includes applying a flexible set of tools and strategies. Managers must analyze not only the number of visitors but where, when, and why they go; what they do; and the impacts they leave behind. The sustainability of infrastructure, level of facility development, and site hardening, such as roads, trails, and recreation sites, are also highly influential factors in identifying the amounts and types of visitor use that can be accommodated.

The Interagency Visitor Use Management Council (the council) "Visitor Use Management Framework" (the framework) provides cohesive guidance on analyzing and managing visitor use on federally managed lands and waters (https://visitorusemanagement.nps.gov/VUM/Framework) (see figures 1 and 2).

The framework is intended to provide a legally defensible, transparent decisionmaking process that meets law and policy requirements, ensures agency accountability, and provides sound rationale upon which to base management decisions and actions, including visitor capacity. Overall, the framework is meant to be adaptable to different agency policies and regulations and yet allow for a professional, comprehensive, and consistent approach to visitor use management on federally managed lands and waters.

This "Visitor Capacity Guidebook" (this guidebook) is intended to expand on guidance from the council's framework and to provide specific direction for identifying and implementing visitor capacity. Managers of federal lands and waters must identify and implement visitor capacity management strategies and actions when legally required and/or when managing the amounts and types of visitor use directly relates to achieving and maintaining desired conditions. The icon below and to the left indicates a reference to specific elements and steps in the framework and is used throughout the guidebook to direct readers.

Visitor capacity is a component of visitor use management and is the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established.

Desired conditions are defined as statements of aspiration that describe resource conditions, visitor experiences and opportunities, and facilities and services that an agency strives to achieve and maintain in a particular area. Desired conditions describe what conditions, outcomes, and opportunities are to be achieved and maintained in the future, not necessarily what exists today. Descriptions of desired conditions paint a picture of what the particular area will look like, feel like, sound like, and function like in the future. Additional guidance on desired conditions is forthcoming.

A significant amount of theoretical and empirical research has focused on visitor capacity, also known as carrying capacity, user capacity, and recreational capacity. For examples of research, see "Managing Outdoor Recreation: Case Studies in the National Parks" (Manning et al. 2017) and "Capacity Reconsidered: Finding Consensus and Clarifying Differences" (Whittaker et al. 2011). "Putting Visitor Capacity in Perspective: A Response to the Capacity Work Group" also provides perspective on recent collective work of federal agencies toward effective visitor use management and planning (Graefe et al. 2011). This guidebook is not intended to be a comprehensive representation of the literature on this topic. This guidebook is aimed at providing cohesive guidance for managers to identify and implement visitor capacity on federally managed lands and waters.

While this guidebook focuses on providing managers of federal lands and waters with the tools necessary to identify visitor capacity and implement related management strategies and actions, the process and outcomes have potential application to nonfederal agencies, such as municipal land and water managers, metropolitan planning organizations, and others tasked with evaluating visitor uses of public resources to achieve desired conditions.

Figure 1. Overview of the Visitor Use Management Framework.

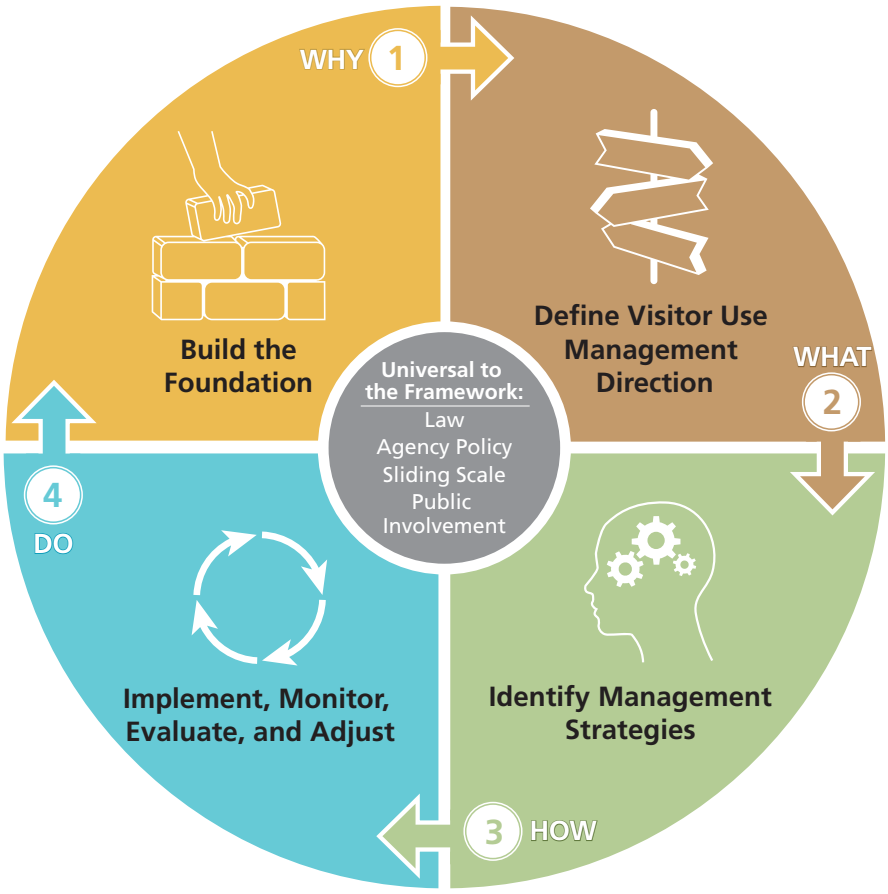
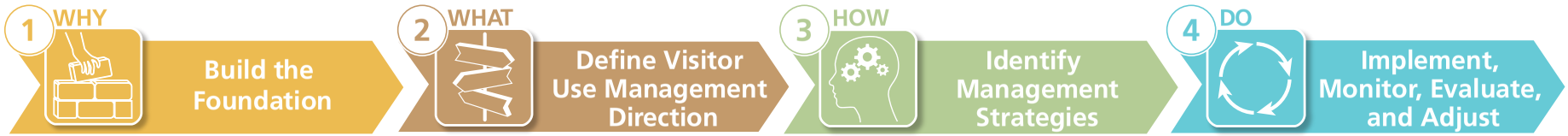


Figure 2. Elements and steps of the Visitor Use Management Framework.



Steps:

1. Clarify project purpose and need.
2. Review the area's purpose and applicable legislation, agency policies, and other management direction.
3. Assess and summarize existing information and current conditions.
4. Develop a project action plan.

Outcome: Understand why the project is needed, and develop the project approach.

Steps:

5. Define desired conditions for the project area.
6. Define appropriate visitor activities, facilities, and services.
7. Select indicators and establish thresholds.

Outcome: Describe the conditions to be achieved or maintained and how conditions will be tracked over time.

Steps:

8. Compare and document the differences between existing and desired conditions, and, for visitor use-related impacts, clarify the specific links to visitor use characteristics.
9. Identify visitor use management strategies and actions to achieve desired conditions.
10. Where necessary, identify visitor capacities and additional strategies to manage use levels within capacities.
11. Develop a monitoring strategy.

Outcome: Identify strategies to manage visitor use to achieve or maintain desired conditions.

Steps:

12. Implement management actions.
13. Conduct and document ongoing monitoring, and evaluate the effectiveness of management actions in achieving desired conditions.
14. Adjust management actions if needed to achieve desired conditions, and document rationale.

Outcome: Implement management strategies and actions, and adjust based on monitoring and evaluation.

This guidebook answers the following questions:

- When and where is it necessary to identify visitor capacity?
- What is visitor capacity?
- How does a project team identify visitor capacity?
- How does a project team implement visitor capacity?

To answer these questions, this guidebook offers guidelines and implementation considerations, as well as examples that demonstrate the application of visitor capacity in visitor use management projects. It is important for managers of federal lands and waters to acknowledge the dynamic nature of visitor use, the level of resiliency of natural resources, sensitivity of cultural resources, and that conditions change and visitor expectations evolve. While the identification of visitor capacity is unique to each project area, the following basic guidelines (see figure 3) should always be applied:

1. **Determine the analysis area(s).** (e.g., Is it necessary to identify visitor capacity for an entire river corridor—a large area that contains multiple access points and multiple different activities—or a specific feature or destination point?). In certain circumstances, there may be a need to develop an overall visitor capacity that is some combination of the individual analysis areas.

2. **Review existing direction and knowledge.** Review desired conditions and indicators and thresholds, and pay particular attention to conditions and values that must be protected and are most related to use levels. Also, review management strategies and actions from the framework. Are there lessons learned from comparable areas where desired conditions, indicators, thresholds, and management strategies are similar?

3. **Identify the limiting attribute(s).** Identify the attribute(s) that most constrains the analysis area's ability to accommodate visitor use. The limiting or constraining attribute(s) may vary across the analysis area.

4. **Identify capacity.** Use monitoring data, research, lessons learned from comparable areas, and professional judgment to identify a capacity based on desired conditions and the limiting attribute.

Figure 3. Visitor capacity guidelines integrated within the framework.

SLIDING SCALE

Throughout this guidebook, the sliding scale of analysis is emphasized to ensure the investment of time, money, and other resources for identifying visitor capacity is commensurate with the complexity of the project and the consequences of the decision. Numerous factors influence where a visitor capacity issue lands on the sliding scale. The sliding scale focuses on four criteria, including the level of uncertainty about the issue, level of risk of impacts to resources and visitor experiences, degree of stakeholder involvement, and level of controversy/ potential for litigation (figure 4). It is important to acknowledge that the process for identifying visitor capacity does not vary with project complexity; rather, the investment of time and resources varies. The amount of investment is dependent on where the project is on the sliding scale. The same fundamental process to identify visitor capacity is used regardless of the placement on the sliding scale.

The framework's decision support tool can help determine placement on the sliding scale (tables 1 and 2). The decision support tool uses a simple high, moderate, or low rating system that, when used in conjunction with the broad criteria previously presented, can help inform the level of analysis needed for a project and visitor capacity decisions (figure 4). If the overall responses to the questions are "high," then the level of analysis is likely high. If the overall responses are "low," then the level of analysis is likely low. However, if some of the responses are high, some are low, and some are moderate, the level of analysis is likely somewhere in the middle. When only one criteria is rated as high, carefully decide the overall level of analysis. For example, a high risk of controversy may mean that the level of analysis is also high or that the level of analysis is moderate and accompanied by a robust public involvement process. Document the rationale for any determination, regardless of the level of analysis.

Figure 4. Representation of the four criteria involved in the sliding scale of analysis.

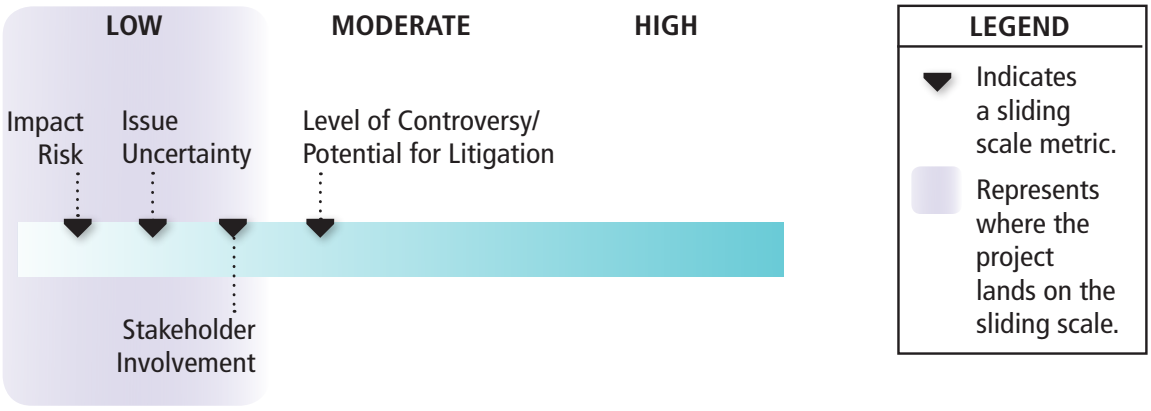


Figure 4 displays a hypothetical example of the sliding scale. In this example, the project team identifies the impact risk, issue uncertainty, and stakeholder involvement associated with the proposed project to be low; and the level of controversy is low to moderate. This example suggests that the project is generally low in complexity and does not require substantial investment of resources for the identification of visitor capacity. However, the project team should communicate with involved stakeholders as the project progresses.

The rating questions provided in the decision support tool (table 1) are undoubtedly incomplete; the decisionmaker must consider other factors and variables in cases in which regulatory standards must be met. While the decision support tool can help determine where a project falls on the sliding scale, the project team ultimately decides the necessary level of analysis. See table 1, 2 and the council's website for a blank decision support tool: https://visitorusemanagement.nps.gov/VUM/Resources.

Table 1. Sliding Scale of Analysis Decision Support Tool.

Project Name:

Decision Support Tool	RATING QUESTIONS	RATIONALE	HIGH MODERATE LOW
1	What is the likelihood that the situation involves sensitive, rare, or irreplaceable **natural** resources?		
2	What is the likelihood that the situation involves sensitive, rare, or irreplaceable **cultural** resources?		
3	What is the likelihood of imminent and significant changes to the natural or cultural resources?		
4	What is the likelihood of imminent and significant changes to **visitor experience?**		
5	How will the issue affect other aspects of land management in the area or surrounding areas?		
6	What is the geographic extent of the issue's impacts? Scales of impacts include: national, regional, state, local/county, and site or project.		
7	What is the relative interest of stakeholders affected by the action? Stakeholders may include: local communities, general public, special interest groups, recreational visitors, commercial users, traditional-subsistence users, tribes, and others.		
8	Is the impact temporary (low) or long lasting (high)?		

Table 2. Rating system to help determine the location on the sliding scale of analysis.

CRITERIA - Use the ratings assigned to questions 1-8 to evaluate the following 4 sliding scale criteria. Combine those criteria into a single qualitative rating (high, moderate, or low) of the project's appropriate location on the sliding scale.

	CRITERIA	RATIONALE	HIGH MODERATE LOW
A	**Issue Uncertainty**		
B	**Impact Risk**		
C	**Stakeholder Involvement**		
D	**Level of Controversy**		
	Location on the Sliding Scale		

Use of the sliding scale is paramount to identifying and implementing visitor capacity and is emphasized throughout this guidebook. For relatively simple projects at the low end of the sliding scale, identifying visitor capacity may be based on available information and include:

- A short description of the analysis area.
- A brief overview of existing direction and knowledge.
- A summary description of the limiting attribute.
- Identification of associated management strategies and actions.

Management strategies are general approaches of addressing visitor use management issues, while actions are specific ways of implementing management strategies.

At the high end of the scale, similar types of information are needed but with more indepth analysis and robust documentation. There may also be a need for input from a variety of technical experts, investment for new data collection, and a formalized decision process consistent with the agency's planning and compliance guidance.

GUIDEBOOK OVERVIEW

Chapter 1 provides an introduction and rationale for this guidebook. The legal requirements and necessity of identifying visitor capacity and management strategies and actions to implement visitor capacity are discussed in chapter 2. Chapter 3 outlines the concept of visitor capacity. In addition to the guidelines for identifying visitor capacity (chapter 4) and implementing strategies and actions for managing visitor capacity (chapter 5), the process of distributing visitor capacity (allocation) is addressed as an important consideration throughout this guidebook. Finally, this guidebook concludes with chapter 6, four theoretical case studies to further demonstrate the visitor capacity guidelines in action. The case studies represent a range of examples for identifying and imlpementing visitor capacity.

Call-out boxes throughout this guidebook provide considerations and key questions for project teams. The considerations presented are not an exhaustive list and may not apply in all project areas. Rather, they are meant to promote critical thinking.

STEP 10

Given the importance of identifying and implementing visitor capacity, the council modeled this guidebook of best practices after the guidelines for visitor capacity within the framework. This guidebook establishes a consistent approach to identifying and implementing visitor capacity to meet agency goals and applicable legal requirements.

In addition to this guidebook, three contributed papers on the relationship between the amounts and types of visitor use and environmental, social, and wildlife impacts are available on the council's website (https://visitorusemanagement.nps.gov/VUM/Framework). These papers were prepared by experts in the field, David Cole (Aldo Leopold Wilderness Research Institute), Stewart Allen (Bureau of Land Management), and Jeff Marion (U.S. Geological Survey), and serve as an important resource for project teams considering best available knowledge to inform identification of visitor capacity.

This page intentionally left blank.

2

Chapter 2: When and Where to Identify Visitor Capacity

This page intentionally left blank.

Chapter 2: When and Where to Identify Visitor Capacity

A person photographs Yellowstone's Lower Falls from an off-road wheelchair at Artist Point.

The primary goals of visitor use management are to maintain opportunities for high-quality visitor experiences and protect resources. An important component is to consider when and where identifying and implementing visitor capacity is most appropriate and how to address legal requirements of the agencies. The council's "Visitor Capacity on Federally Managed Lands and Waters: A Position Paper to Guide Policy" states, "Federal managers need to address visitor capacity in many situations when required by law or when visitor use levels threaten the desired conditions of an area" (https://visitorusemanagement.nps.gov/VUM/WhatGuidesIt).

Further, the Wild and Scenic Rivers Act (1968), National Trails System Act (1968), and National Parks and Recreation Act (1978) direct agencies that manage federal lands and waters to address visitor capacity (also known as carrying capacity, user capacity, and recreational capacity). Relatedly, the Wilderness Act (1964) authorizes commercial use in wilderness only to the extent necessary to achieve the recreational and other purposes of wilderness.

For information on addressing user capacity for wild and scenic rivers, see the Interagency Wild and Scenic Rivers Coordinating Council's technical paper titled "Steps to Address User Capacities for Wild and Scenic Rivers" (https://www.rivers.gov/documents/user-capacities.pdf). For information on extent necessary determinations in wilderness, see relevant guidance from the individual agencies that manage wilderness.

STEP 10

The council's recommendations on visitor capacity are designed to provide managers with flexibility to identify visitor capacities based on site-specific conditions. Visitor capacity includes consideration of two primary characteristics of visitor use—the amounts and types—which includes also understanding the timing and distribution of visitor activities and behaviors as they relate to desired conditions. The council's recommendations from step 10 of the framework state, "Where necessary, identify visitor capacities and additional strategies to manage use levels within capacities."

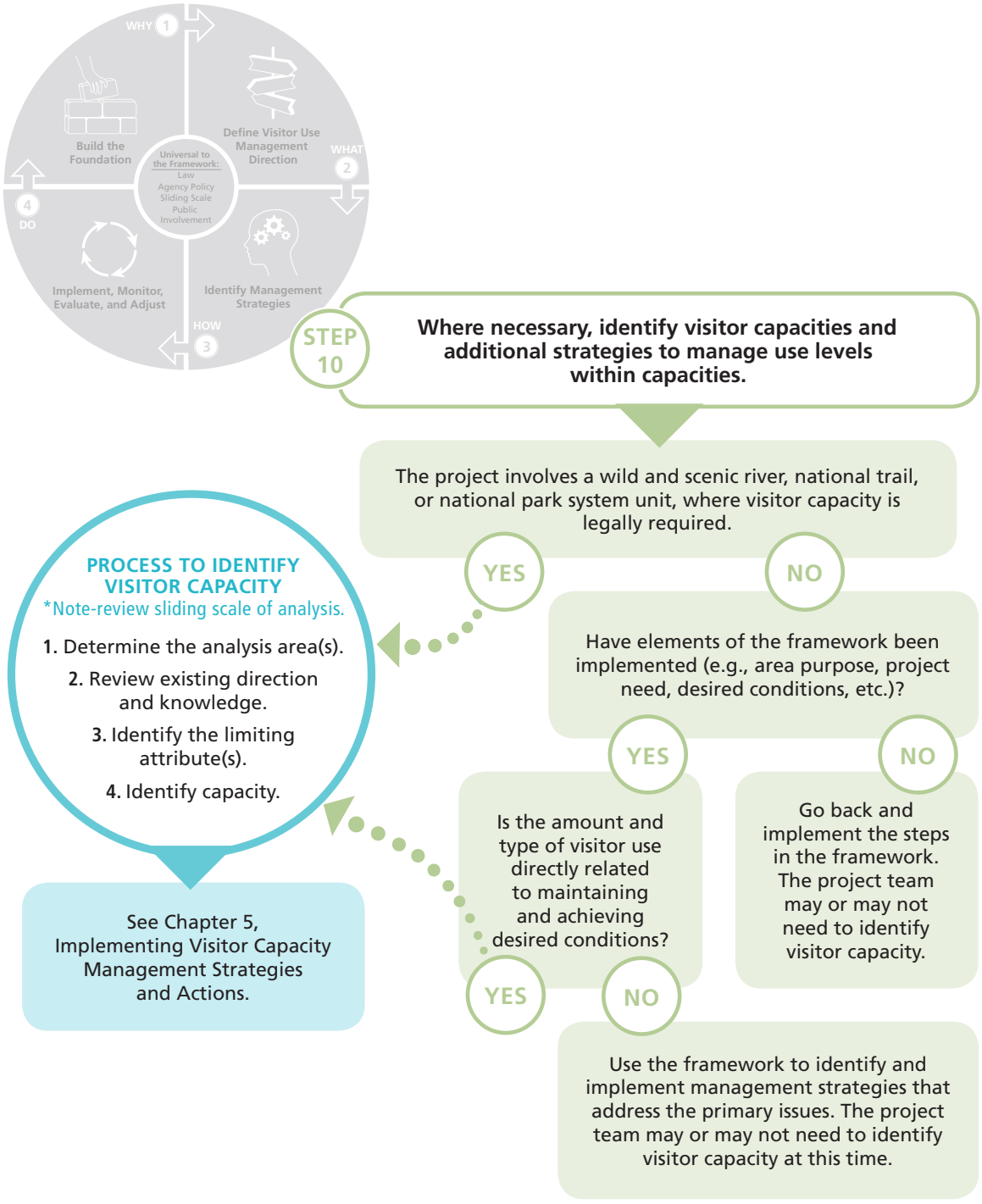
The major tenets of the council's recommendations are as follows:

- Managers should identify and implement a visitor capacity when the amounts and types of visitor use directly relate to achieving and maintaining desired conditions.
- Managers must identify and implement a visitor capacity when legally required.
- Decisions on visitor capacity should be based on the desired conditions of a specific area and should be directed by pertinent laws and agency policies.

Visitor use levels vary widely across the diverse portfolio of lands and waters managed by federal agencies. In some places, current visitor use levels and/or types of use are threatening desired conditions. In other areas, current use levels and/or types of use are far from threatening desired conditions and may never pose a threat.

The visitor capacity decision tree can assist managers in navigating visitor capacity decisions and identifying where visitor capacity can or must be determined (figure 5).

Figure 5. Visitor capacity decision tree, which helps determine where to identify and implement visitor capacity.



It is important to identify a visitor capacity when the amounts and types of visitor use directly relate to achieving and maintaining desired conditions and/or when it is legally required. For instance, a desired condition in a high-demand backcountry area may be to protect solitude. However, with increasing use levels, visitors may experience a loss of opportunities for solitude. Identifying a visitor capacity and associated management strategies may help ensure opportunities for solitude are preserved. In this instance, visitor capacity is an important tool for achieving and maintaining the desired condition.

3

Chapter 3: What is Visitor Capacity?

This page intentionally left blank.

Chapter 3: What is Visitor Capacity?

This chapter focuses on what visitor capacity is, as well as, what it is not. There are two parts to visitor capacity: the identification of visitor capacity and the identification of strategies and actions to manage within visitor capacity. This chapter and chapter 4 address the first part of visitor capacity. Chapter 5 addresses the second part of visitor capacity, ensuring the amounts and types of visitor use are managed within the identified visitor capacity.

Visitor capacity is….

- A management tool and, in some cases, a legal requirement.
- A number.
- Based on desired conditions.
- A necessary precursor to making allocation decisions.
- Based on a variety of inputs.

Visitor capacity is not…

- An isolated decision.
- Equivalent to visitor use management.

VISITOR CAPACITY IS A MANAGEMENT TOOL AND, IN SOME CASES, A LEGAL REQUIREMENT

Visitor capacity is a tool that can aid managers in achieving and maintaining desired conditions and, in some cases, is a legal requirement. It is important to identify a visitor capacity when the amounts and types of visitor use directly relate to achieving and maintaining desired conditions or when identifying a visitor capacity is legally required. Desired conditions provide the foundation for long-term direction about resource conditions and visitor experiences. The visitor capacity process helps ensure the desired conditions are achieved and maintained in an area.

STEP 10

Visitor capacity includes consideration of the amounts and types of visitor use, including the timing and distribution of visitor activities and behaviors as they relate to desired conditions. By the time a project team gets to step 10 of the framework, it should be clear whether managing the amounts and types of visitor use is directly tied to achieving and maintaining desired conditions and/or is necessary to meet legal requirements. If not, visitor use management strategies, other than visitor capacity, may be more appropriate to implement, including those strategies that influence visitor behaviors and expectations.

VISITOR CAPACITY IS A NUMBER

Two recreation groups share the trail. Photo Credit: Jeff Marion.

Visitor capacity is the maximum amounts and types of visitor use that can be accommodated in an area while achieving and maintaining desired conditions; visitor capacity reflects who and what are being managed. Some examples of visitor capacity metrics include the number of people, number of people by activity (e.g., climbers, boaters, hikers), number of groups of people, number of stock, number of heartbeats (e.g., combined human and horse), number of boats, number of vehicles, and number of commercial and competitive permits.

It is also important to consider if the visitor capacity should vary over time or space. For example, it might be more useful to identify the number of people per hour versus the number of people per day if there are high-use times that have a more significant impact on desired conditions. To identify the most appropriate visitor capacity metric, assess all the aspects of the amounts and types of visitor use that affect desired conditions. For example, in the early 1970s, many river-based visitor capacities focused on encounter rates with boats from other parties. However, as visitors increasingly switched from rafting to kayaking, the number of boats per party and the number of encounters with boats from other parties increased sharply. This change in use type resulted in exceeding the encounter rate and thus the visitor capacity without an increase in visitation. In this case, both the overall number of people and the number of boats per group were important.

Visitors await the eruption of Old Faithful, Yellowstone National Park.

VISITOR CAPACITY IS BASED ON DESIRED CONDITIONS

Visitor capacity is not identified in a vacuum or an inherent property of a place (Wagar 1964). It is identified only after decisions are made about management objectives, desired conditions, and other management actions for an area (McCool et al. 2007; Shelby and Heberlein 1984; Wagar 1964). For this reason, identifying and implementing visitor capacity is an iterative process. For example, desired conditions for an area may describe a quiet setting where the sights and sounds of nature will predominate. Desired conditions for another area may describe a social experience where the sights and sounds of other visitors will predominate. The visitor capacities and management actions identified for these areas would likely be different even if the resources within them are similar due to desired conditions that were established for those areas.

VISITOR CAPACITY IS A NECESSARY PRECURSOR TO MAKING ALLOCATION DECISIONS

Allocation is the process of distributing visitor capacity among a variety of uses or opportunities to achieve or maintain desired conditions. Once visitor capacity is identified for an area, managers may need to determine appropriate allocations among a variety of uses or opportunities. Information about the categories of use to be allocated should be considered as the visitor capacity is being identified.

There is no single formula for allocating visitor capacity. Rather, allocations should be based on local conditions, agency guidance, desired conditions, and professional judgment. Allocation decisions are best supported by understanding the desires and use patterns of stakeholders and collecting monitoring data needed to determine how and to what extent different categories of uses can occur while achieving and maintaining desired conditions. This includes considering how certain types of uses best achieve desired conditions. For example, commercial services may help facilitate visitor access for visitors who may not have the skills and abilities to otherwise access an area. Also, certain types of uses may cause particular types of social or resource impacts, which may influence allocation decisions.

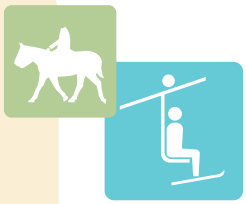
VISITOR CAPACITY IS BASED ON A VARIETY OF INPUTS

The best available science should be applied when identifying visitor capacity. This may include research applicable to or conducted specifically for the analysis area, depending on where the project falls on the sliding scale. In addition to the best available science, visitor capacity decisions are based on other factors, including professional judgment and staff experience and expertise. Monitoring data and lessons learned from comparable areas, in which desired conditions, indicators, thresholds, and management strategies are similar, can also inform visitor capacity. Additionally, public input informs visitor capacity decisions.

VISITOR CAPACITY IS NOT AN ISOLATED DECISION

Identifying and implementing visitor capacity occurs within the larger visitor use management framework. It is important for project teams to work through the framework elements and steps. Visitor capacity should not be identified until the elements and steps of the framework have been implemented, including identification and evaluation of factors affecting desired conditions, such as fluctuations in amounts and types of visitor use. Visitor capacity decisions made in isolation of the elements and steps of the framework have the potential to over- or under identify the visitor capacity or could result in management strategies that are incompatible with the area's desired conditions. Although the process of identifying visitor capacity is presented within the framework as linear, the guidelines are highly iterative and are intended to be applied in a flexible manner using the sliding scale decision support tool. Additionally, visitor capacities may need adjustment over time if desired conditions change. These adjustments may be needed due to factors such as changes in visitor behaviors, use patterns, resource conditions, or knowledge of potential management strategies or actions. Chapter 5 of this guidebook discusses considerations for adjusting visitor capacity over time.

Identify visitor capacity after making decisions about desired conditions, developing management goals and objectives, considering the sliding scale of analysis, and identifying other management strategies and actions for the area.



VISITOR CAPACITY IS NOT EQUIVALENT TO VISITOR USE MANAGEMENT

The term visitor capacity is a component of visitor use management and, therefore, should not be used interchangeably with the term "visitor use management." Identifying visitor capacity is just one of many visitor use management strategies available to achieve and maintain desired conditions. Visitor capacity decisions are, therefore, part of a holistic approach to visitor use management and can be made only after desired conditions, and appropriate indicators and thresholds, are established.

4

Chapter 4: How to Identify Visitor Capacity

This page intentionally left blank.

Chapter 4: How to Identify Visitor Capacity

Visitors ascend Angels Landing, Zion National Park.

As an outcome and subcomponent of visitor use management, the identification of visitor capacity is unique to each project area, and there are four guidelines directing the process. This chapter provides an indepth explanation of each guideline and the sliding scale of analysis considerations. A summit scenario is also presented throughout the chapter to demonstrate the process for using the visitor capacity guidelines and application to a specific area. In addition to this chapter, four case studies in chapter 6 demonstrate how to identify visitor capacity in a range of settings. Project teams should also revisit the decision support tool to determine the appropriate level of analysis and placement on the sliding scale.

For example, identifying visitor capacity for a low-use remote river might be on the low end of the sliding scale because the river is challenging to get to and desired conditions are currently being maintained. Visitor capacity identification should, therefore, warrant a lower investment of agency resources. In contrast, identifying visitor capacity for a high-use river might be on the high end of the sliding scale because of greater potential for impacts on natural resources and reduced opportunities for contemplative experiences. In addition, because management actions most likely would affect many stakeholder groups, a higher level of agency resources could be required to identify visitor capacity.

A flyfisherman enjoys solitude.

Throughout the process, the project team should document visitor capacity decisions. This includes application of each guideline in the process, the rationale for the identification of visitor capacity including the level of agency resources used for the analysis, and an explanation of how appropriate levels of resources were determined. The visitor capacity analysis tool (appendix, table A1) can be used to facilitate discussions about the visitor capacity process and to build documentation of the rationale for the identification of visitor capacity. Also, include whether the visitor capacity warrants assembling a project team for identification. Decisions made during the visitor capacity process can affect previous and future decisions.

In other words, the guidelines are intended to build on each other, and it is important to revisit decisions made throughout the process.

The four guidelines to determine visitor capacity include (figure 6):

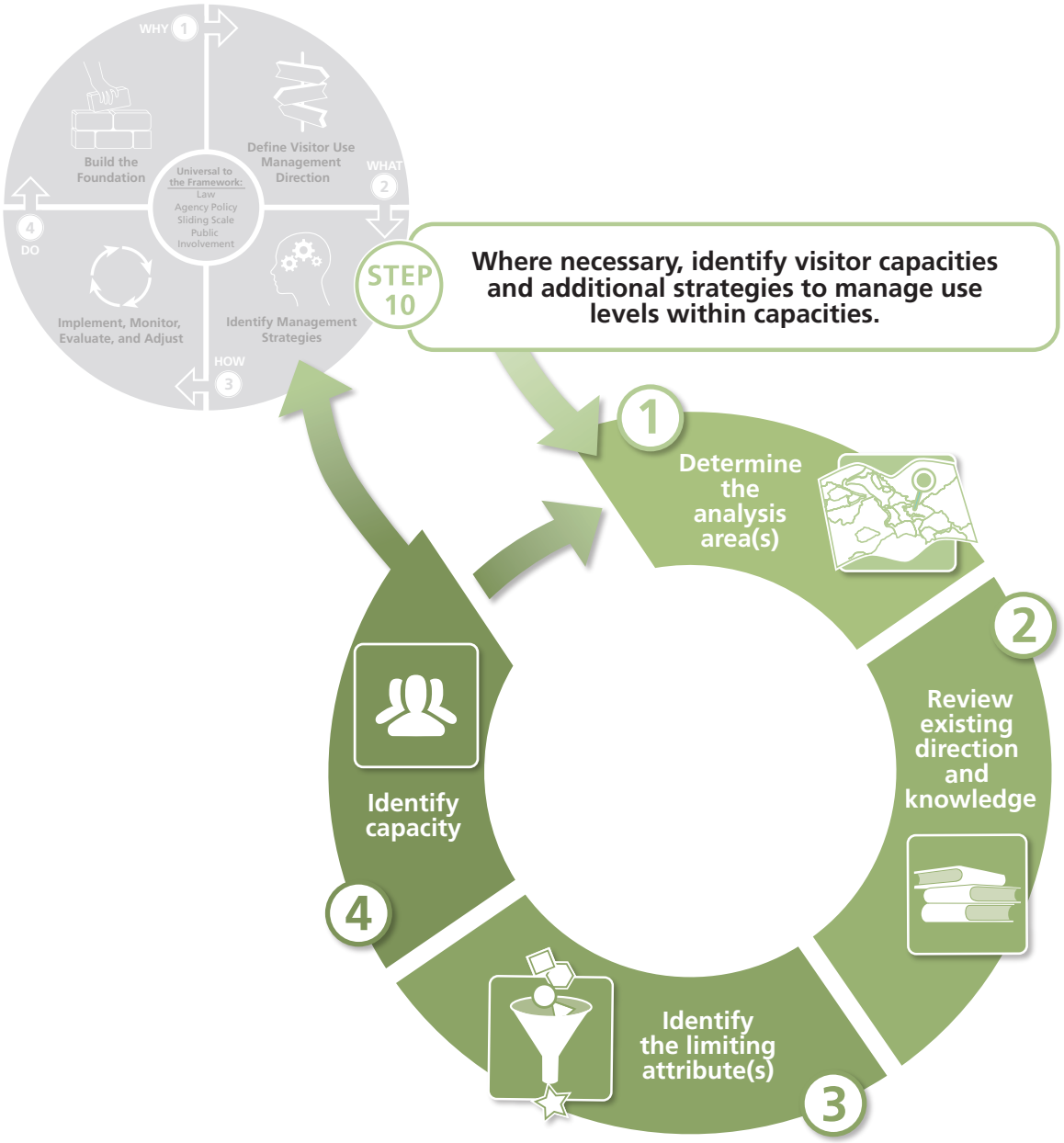
1. Determine the analysis area(s).

2. Review existing direction and knowledge.

3. Identify the limiting attribute(s).

4. Identify capacity.

Figure 6. Visitor capacity guidelines integrated within the framework.



GUIDELINE 1: DETERMINE THE ANALYSIS AREA

This guideline has a far-reaching effect on identifying visitor capacity because it involves identifying (1) where geographically the visitor capacity will be implemented, (2) displacement or other unintended effects of managing visitor use levels, and (3) the effect of managing allocation(s) of visitor use within the analysis area(s). To determine the appropriate analysis area(s), the project team must understand the relationship between existing and potential visitor use patterns and desired conditions. Managers should also revisit the sliding scale of analysis to determine the appropriate level of analysis.

Consider where (geographically) the visitor capacity will be implemented. It is important to consider the scope of factors affecting desired conditions when determining the boundary or spatial extent of the analysis area. An analysis area can include an entire administrative unit or river; a subunit such as a watershed, corridor, high-use area, or river or trail segment; or multiple subunits with a common set of desired conditions, which may have the same or different visitor capacities. When determining the analysis area(s) for multiple subunits, managers should consider the relationships between existing and potential visitor use patterns, as well as the desired conditions and, relatedly, the Recreation Opportunity Spectrum (Clark and Stankey 1979). To determine the analysis area(s), consider both geography and implementation of visitor capacity (i.e., how the amounts and types of visitor use will be managed and how management strategies for implementing visitor capacity will be supported, consistent with desired conditions).

For example, it might be appropriate to select an entire trail as the analysis area, with multiple access points and multiple types of recreational activities where visitor opportunities and desired conditions are uniform, access is naturally limited by geography, and/or use patterns are stable with no foreseeable threats to desired conditions. Alternatively, it might be appropriate to select individual trail segments or groups of trail segments as the analysis area, where trail access, foreseeable visitor use levels, key features and destinations, and desired conditions vary by trail segment or zone.

Consider displacement and other factors within the analysis area. Displacement could be an unintended effect of management strategies or actions to address visitor capacity (Hall and Cole 2007; Manning 2007). Visitor displacement can occur in many forms, including spatial and temporal shifts in visitation. These shifts can have both positive and negative effects on the visitor experience. Spatial displacement is commonly used to describe visitor selection of less crowded areas when a previously selected area is perceived as too crowded. Temporal displacement typically occurs when visitors elect to visit at less crowded times.

For instance, increased interest in an area might cause visitors to seek a less crowded experience, and to achieve that goal, they might travel to their next choice

for the same activity. Visitors can also choose other activities or select to use a commercial service provider. However, some visitors may be attracted to areas that others perceive as "crowded" experiences. These visitors might feel safer in crowds or enjoy the social aspects of being around a higher number of people.

Displacement can also occur if visitor use is highly constrained or limited in one area and subsequently shifts to another area. In addition, displacement can or may have already occurred because of management inaction. Identification of displacement due to management action or inaction might lead to a redefinition of the analysis area(s) if visitors relocate to other nearby areas. This should also be considered, though the solution may be more difficult.

Visitors can relocate to other areas within the analysis area and adjacent or nearby federal, state, and county lands that are managed differently. Other nearby agency managers can therefore become significant stakeholders in a visitor capacity process.

In the summit scenario that follows, it is possible that identifying and implementing a visitor capacity for the trail summit could reduce visitation to the immediate area and unintentionally displace visitors to another nearby popular destination, potentially resulting in unintended impacts in that location. Therefore, in some situations, it might be important for the analysis area to include several adjacent areas so they can be collectively managed to meet desired conditions. Further, the analysis area might need to include an overall visitor capacity in which visitor use levels will be managed for a larger area (e.g., a reservation system for an entire unit, shuttle-only access to a corridor).

Consider the effect of allocation(s) of visitor capacity on the analysis area. Similar to determining the analysis area for visitor capacity, consider how allocation(s) will be managed. For example, allocation of visitor capacity might apply only to a smaller geographic area.

GUIDELINE 1: DETERMINE THE ANALYSIS AREA(S)

SUMMIT SCENARIO

A backpacker takes in the breathtaking view of mountain vistas.

Consider a popular trail that leads to an iconic summit with beautiful scenic vistas. The trail is part of a larger trail system, with multiple entrance and exit points. Desired conditions are being achieved along most of the trail but not at the summit, where desired conditions are threatened. A visitor capacity and strategies to manage the visitor capacity are needed to achieve desired conditions at the summit.

Some management strategies have been explored and piloted with some success. The surface of the trail has been hardened through previous management actions to better support visitation and to focus visitor use onto the trail. This has helped reduce widening of the trail to some extent. Vegetation trampling is also a concern at the summit in times of high visitation. Further, visitors are reporting high levels of crowding at the summit.

The amounts and types of visitor use on trails leading to the summit are closely related to resource conditions at the summit. Therefore, at this time, the analysis area does not need to include the entire trail but, rather, should focus on the trail segment closest to the summit and the summit itself.

It may be appropriate to revisit the scope of the analysis area during the visitor capacity process. Consider the following questions:

- In which area(s), geographically, will visitor capacity be implemented, and why?
- What notable developments in planning direction and information have occurred since determining the analysis area? Do any new developments influence the visitor capacity analysis area?
- Do new management tools that can achieve and maintain desired conditions influence the original analysis area?
- Has the limiting attribute(s) (see visitor capacity guideline 3) become more clearly defined and, therefore, may it affect the scope of the analysis area?

GUIDELINE 2: REVIEW EXISTING DIRECTION AND KNOWLEDGE

This guideline of the visitor capacity process involves a review of existing direction and knowledge, including (1) applicable law and policy, (2) prior applicable planning and guidance, (3) existing conditions in the analysis area, (4) existing indicators, triggers, thresholds, and objectives, (5) applicable existing management strategies and actions, and (6) use patterns for commercial and other allocation categories. Project teams should pay particular attention to conditions and values that are most related to visitor use levels. In addition, project teams should consult the sliding scale of analysis to ensure the amount of time, money, and other resources associated with review of applicable existing direction and knowledge are commensurate with the complexity of the visitor capacity analysis area and consequences of the decision.

Review applicable law and policy.

Review applicable law and policy to ensure that any legal requirements for identifying visitor capacity are met. See chapter 2 of this guidebook and the council position paper on visitor capacity identified in chapter 2 for more information on legal requirements. Review the area's applicable legislation and purpose, secretarial orders, agency policies and directives, and other management direction. Additionally, chapter 4 of the framework summarizes applicable law and policy by agency.

Review prior applicable planning and guidance.

Prior planning and guidance provide focus to the project team on the desired condition(s) they are trying to achieve and maintain for the analysis area. If available, review zoning descriptions for the analysis area to better understand how desired conditions may vary from area to area. If desired conditions for the analysis area have been previously developed, it is essential to review them. Desired conditions are intended to be future oriented and aspirational. However, during review of prior planning and guidance, it may be determined that the desired conditions are outdated, do not reflect the best available information, or do not clearly articulate management direction. Often, the project team will need to further refine the desired conditions to ensure they are specifically tailored to the analysis area. Existing plans may not have fully addressed legal requirements, or there may be new legal requirements that were not addressed in previous plans. Under these circumstances, prior plans would need to be updated. Carefully examine prior planning and guidance to determine whether they remain valid.

Visitors board buses, Denali National Park and Preserve.

Review existing conditions in the analysis area.

In addition to reviewing past planning and guidance for the analysis area(s), the project team should review the existing conditions in the analysis area to inform the visitor capacity process. Identify and fully describe changes in the setting since previous planning efforts and guidance were completed. Also, identify and fully describe any issues and/or trends in conditions that are emerging and would influence visitor use management and visitor capacity identification. This information can be obtained from visitor surveys, field observations, monitoring data, relevant research, and formal and informal conversations with visitors and other stakeholders. It is important to determine whether and what type of additional information is needed to sufficiently describe current and future natural and cultural resource conditions and visitor use characteristics and experiences for the analysis area.

Review information on the current amounts and types of visitor use, including their spatial and temporal distribution (e.g., times of day, days of the week, weeks of the month, months of the year). Most commonly, visitation varies between weekends and weekdays, as well as seasonally or by months of the year. For instance, the visitor capacity for winter months may be lower than summer months to provide diverse visitor opportunities and better match use levels with resource and facility constraints.

A dogsledder rides across a snowy landscape.

If possible, consider trends in visitor use that are foreseeable. Visitor use and, therefore, visitor capacity may vary in response to unique events. For example, management of increased visitation due to an uncontrolled natural event (e.g., solar eclipse) or a regular seasonal event (e.g., hunting season, caribou migration) may be enhanced by identifying a visitor capacity specific to that anticipated event. The project team should also consider visitor responses to weather events (e.g., visitor behavior during heavy rainstorms) and projected conditions related to climate. Understanding visitor responses may not have immediate consequences for visitor capacity, but awareness of these projections can yield more informed decisions.

Also, remember that visitor capacity can be identified only in the context of all the other management strategies and actions that have been or will be taken in the area. This includes management strategies or actions occurring outside the analysis area that could affect visitation within the analysis area (such as closure and/or permitting of adjacent areas). Because these other actions influence the relationship between amounts and types of use and resource and social conditions, they will affect the identification of visitor capacity. Be sure to consider and document other management actions within and outside the agency's control or jurisdiction that can influence visitor capacity.

Crowding is subjective, whereas density is measurable. This guidebook uses crowding to describe subjective perceptions and density to refer to the measurable and objective aspects of the amounts and types of visitor use. It is ideal to collect both density and crowding data to understand visitors' perceptions of crowding relative to density. One way this can be achieved is to compare observed visitor densities to visitors' perceptions of crowding. Perceptions of crowding can be difficult to interpret without accurate density data.

When available, it is important to review relevant literature and consider social science research to understand visitor motivations, perceptions, and preferences for participation in recreation activities within the analysis area. The results of research can help inform: (1) assessment of temporal and spatial distribution of visitor use based on observed visitor densities and/or visitor perceptions of crowding at key destinations (Cahill et al. 2018); (2) whether a visitor capacity is needed to modify visitor use patterns; and (3) when and where visitor capacity should be implemented. The supplemental papers provide additional information on the relationship between visitor use and impacts.

Similar to reviewing the characteristics of visitor use, it is also important to review resource conditions in the analysis area. For example, resources might be more or less resilient to visitor use depending on the ecological environment. Document resource conditions that are directly impacted by visitor use. Interdisciplinary project specialists and resource managers can contribute to this identification and documentation.

Review the desired conditions as they relate to current commercial services and other categories of allocation. Identify the differences between existing and desired conditions that are connected to commercial use. Consider also if commercial service providers are helping achieve or maintain desired conditions. If desired conditions are not being met, determine if it is due to commercial or individual noncommercial use.

Visitors admire a rare, clear view of Denali.

STEP 7

Review existing indicators, triggers, thresholds, and objectives.

Review the indicators, triggers, thresholds, and objectives associated with the amounts and types of visitor use that were documented during the discussion of desired conditions for the analysis area.

Indicators are specific resource or experiential attributes that can be measured to track changes in desired conditions so that progress toward achieving and maintaining desired conditions can be assessed. Thresholds are minimally acceptable conditions associated with each indicator. Typically, selecting indicators and establishing thresholds occur after desired conditions and management objectives for the analysis area are determined and before the visitor capacity process begins.

An example of an indicator is the number of informal (visitor-created) trails per mile of designated trail. An associated threshold could be: There is no more than one informal trail leaving the designated trail per mile.

Review established triggers for any of the indicators associated with the amounts and types of visitor use in the analysis area. A trigger is a condition of concern for an indicator that is enough to prompt a management response to ensure that desired conditions continue to be maintained before the threshold is crossed. A sensitive resource that requires close scrutiny may have multiple triggers to ensure management responses are taken to avoid crossing the associated threshold. An objective, although not used as frequently, is a specific result that an agency aims to achieve within a specified timeframe, often associated with an indicator. Objectives reflect conditions that are affected directly by agency action.

Assess whether the indicators, triggers, thresholds, and objectives associated with the amounts and types of visitor use for the analysis area are sufficient to achieve and maintain desired conditions, and allow managers and the project team to identify the extent to which existing conditions vary from desired conditions. In this guidebook, indicators, triggers, thresholds, and objectives are discussed in relation to the role of identifying visitor capacity.

The "Monitoring Guidebook: Evaluating effectiveness of visitor use management" serves as a companion to the framework and this guidebook and provides direction for selecting indicators, establishing thresholds, and developing a monitoring strategy. See the council's website for more information (https://visitorusemanagement.nps.gov/VUM/Framework).

Review indicators and thresholds related to commercial use and other categories of visitor capacity allocation. Would increasing/decreasing the commercial services or other categories of allocation change conditions related to indicators? If so, describe where, when, and what amounts and types of commercial services or other categories of allocation are affecting desired conditions.

Review applicable existing management strategies and actions.

STEP 9

Review applicable existing visitor use management strategies and actions to achieve and maintain desired conditions. Describe the range of management actions that have been or will be implemented. In the absence of a legal requirement to identify a visitor capacity, in which case identifying a visitor capacity is nondiscretionary, one or more of the management actions should direct the need to identify and implement a visitor capacity to achieve or maintain desired conditions.

The management strategies and actions will likely inform visitor capacity (i.e., increase, decrease, or maintain the amounts and types of visitor use). For example, an area might be able to accommodate increased use while maintaining desired conditions if the specific management action includes hardening a recreation site. It is also important to consider financial feasibility of management actions before considering their effect on visitor capacity. The project team should evaluate when the action(s) may be implemented given financial considerations and how the visitor capacity may be affected as the action(s) is phased over time. Therefore, it is important for project teams to review management strategies and actions and understand their relationship to changes in visitor use levels.

Analyze use patterns for commercial and other allocation categories, if relevant.

Backcountry visitors approach a small plane awaiting them.

Commercial services and other allocation categories may be an integral part of existing visitor use and may need to be analyzed as part of identifying visitor capacity to help inform subsequent allocation decisions. Review existing commercial uses and other categories of allocation, and consider whether their visitor use patterns differ from use patterns of individual noncommercial visitors. Also, consider demand from international visitors and the need for commercial services. Consider variations in demand for commercial services based on proximity to a community, the type of terrain, or access limitations. For example, commercial service providers may be able to provide the only access to some areas with challenging terrain because they have specialized equipment (e.g., float plane, helicopter, drift boat, raft). Group sizes, timing, motivations, and preferences vary among commercial services and other categories of allocation. The amounts and types of visitor use in these cases should be identified based on agency guidance and best practices.

In some cases, management direction for commercial services exists in the applicable management plan, policy guidance specific to commercial services, or other allocation categories. Ensure the management plan is applicable and has adhered to relevant legal requirements. In such cases, the plan may provide guidance on the amounts and types of uses that are appropriate for an area. If commercial services are allocated, consider the percentage of current visitor use that is allocated to commercial services, and identify the factors that may influence the current ratio of commercial use. For example, operational capacity, or the sustainable management of programs and staff, can affect the number of permits issued. Also, there may have been a lack of demand for the services in the past, but demand could be increasing. Are all the authorized days or trips being used by existing commercial service providers consistently each year? The answer may influence the amount of commercial services that should be allocated in the future.

SUMMIT SCENARIO

GUIDELINE 2: REVIEW EXISTING DIRECTION AND KNOWLEDGE

A backpacker takes in the breathtaking view of mountain vistas.

Desired conditions are detailed in the comprehensive trail management plan, which states, "Visitors will have the opportunity to view scenic vistas without affecting the naturalness of the trail and summit area." A visitor capacity has not been identified in prior planning and guidance. Previously, the trail leading to the summit was zoned as "natural," defined as on or near four-wheel drive roads, but at least ½ mile from all improved roads; and authorized for nonmotorized use.

Desired conditions are being achieved along most of the trail but not at the summit where resource and social conditions are threatened. Impacts on desired conditions occur as visitation continues to increase and it becomes more difficult to preserve the naturalness of the trail segments leading to the summit. Vegetation surrounding the summit has been trampled during periods of high visitation. In addition, visitors are reporting high levels of crowding. Visitation is primarily comprised of day hikers, during fall and spring.

LOCATION: Trail leading to the summit

Indicator 1: Number of visitor encounters with other groups per day.

Threshold 1: Individual groups encounter no more than 4 other groups along the trail during 80 percent of the high-use season.

LOCATION: Summit

Indicator 2: Amount of increase in trampled vegetation.

Threshold 2: There is no more than a 2 ft increase in trampled vegetation from baseline values that were identified as acceptable.

After reviewing current visitor use information, including commercial services and other categories of allocation, note major concerns relating specifically to the amounts and types of visitor use.

Remember, visitor capacity is defined as the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established.

Evaluate events or activities that are not related to visitor use that could affect the visitor capacity of the analysis area. For example, soil erosion in an analysis area caused by a large forest fire could affect the amount of visitor use that can be accommodated, given the increased sensitivity of resources. Note any changes in desired conditions for the analysis area that are directly or indirectly caused by amounts and types of visitor use. Compare and document differences between existing and desired conditions. It is helpful to draft and review a table of issues, impacts, desired experiences (e.g., solitude, social setting, self-reliance), and opportunities related to the amounts and types of visitor use in the analysis area. Information about the differences between existing and desired conditions and about how these differences relate to amounts and types of visitor use can inform the visitor capacity process and can help develop a rationale for the visitor capacity decision.

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

Can you spot the chipmunk?

This guideline involves identifying the attribute(s) that most constrains the analysis area's ability to accommodate visitor use. The limiting or constraining attribute(s) may vary across the analysis area. The project team should consider all potential attributes that would constrain the analysis area's ability to accommodate visitor use. The limiting attribute could range from specific (e.g., encounter rates every ¼ mile of trail) to more general (e.g., sense of crowding as perceived by visitors) depending on the complexity of the project as determined by the sliding scale. However, a more specific limiting attribute is likely to be more meaningful in guiding the project team's analysis.

For example, a limiting attribute could be a historic building's structural integrity or historic characteristics that are highly vulnerable to too many people passing through the building. Other limiting attributes might include declining resource conditions from visitor use, such as trampled vegetation, compromised wildlife habitat, erosion, or damage to highly sensitive or irreplaceable resources. The project team should also consider limiting attributes related to tribal concerns, such as sacred or archaeological sites. Encounters with other groups, visitor congestion, and visitor crowding may also be considered limiting attributes. Visitor safety should also be considered as a potential limiting attribute. For example, if an analysis area experiences more than 30 safety incidents during the hottest months on one of the trails, managers might consider the use of search and rescue or emergency response data to monitor visitor safety as a limiting attribute. A natural soundscape is another example in which the limiting attribute could be related to visitors' opportunities to experience an environment where natural sounds predominate. Existing visitor services (e.g., shuttle bus) and facility infrastructure (e.g., parking spaces) may be considered limiting attributes if expanding infrastructure is not possible due to impacts on important resources. It is crucial to take time to consider the dynamic nature of visitor patterns, activities, and experiences to ensure resources in the analysis area are protected in the future when identifying the limiting attribute(s).

The limiting attribute(s) may vary by analysis area, based on specific resources and desired conditions of the area. Review any relevant literature on the relationship between visitor use and impacts (see supplemental papers on relationship between visitor use and impact on council's website) and any relevant research for the analysis area that could inform identification of the limiting attribute(s).

LIMITING ATTRIBUTE

Consider a reservoir that has the desired condition to ensure balance and compatibility of private and public uses along the lake's shoreline. Managers brainstorm a list of potential limiting attributes for identifying visitor capacity for a multi- and high-use lake area with 96 miles of shoreline. These may include the size of the reservoir, opportunities to expand boat ramps, visitor safety, shoreline visitor experiences, on-water visitor experiences, or the financial feasibility to build new boat ramps. During the review of existing conditions, managers discuss the financial implications of building new infrastructure. As a result of that discussion, building new boat ramps is deemed too costly, therefore it was removed as a potential management option. As the discussion continues, managers determine that visitor safety when launching boats and on-water visitor experiences are the most constraining attributes for the amounts and types of visitor use on the reservoir. Therefore, achieving and maintaining the desired condition to balance private and public uses would be most constrained by visitor safety and on-water visitor experiences.

EXAMPLE

It is important for the project team to select indicators related to the limiting attribute(s) to ensure desired conditions are achieved or maintained. Assuming the analysis area has multiple indicators and thresholds, it is likely only one or two are related to the most limiting attribute. For instance, if visitor congestion along trails (i.e., visitor experience) is the most limiting attribute, then the project team might select an encounter rate indicator or another similar indicator to monitor congestion.

If the project team is considering allocation of visitor use, it may be appropriate to identify limiting attributes specific to the types of uses that will be allocated. For example, it may be important to consider allocations for recurring group events that use shuttle buses to drop off participants causing surges in visitation to the analysis area. The limiting attribute might be the ecological conditions at the trailhead. This attribute could be monitored through a trail width indicator. If trail width widens and vegetation is trampled, the visitor experience may diminish.

Consider desired visitor experiences such as opportunities to have contemplative or solemn, peaceful, and reverent experiences at a battlefield or memorial. In these situations, the desired conditions could suggest a lower visitor capacity given the limiting attribute. Desired conditions can also account for situations in which higher capacity events could be acceptable from time to time. For example, the same desired condition for the battlefield may also include an exception that states higher levels of use would be acceptable for special events, such as when the area hosts a candlelight ceremony on the anniversary of the battle.

Categories of allocation may also have different limiting attributes, depending on season, type of visitor use, and number of participants. For example, allocation for a one-time competitive event might be an allocation limited in space and time. For instance, the visitor capacity for a special event using an amphitheater may be constrained by the space for visitors to observe the concert or noise regulations imposed by nearby communities.

What attribute(s) most constrains the analysis area's ability to accommodate visitor use? How does the attribute(s) constrain visitor use?

SUMMIT SCENARIO

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

A backpacker takes in the breathtaking view of mountain vistas.

The amount of encounters between visitors and impacts on vegetation are both identified as limiting attributes in the summit scenario analysis area, including the trail segment closest to the summit and the summit itself. The desired condition related to the social environment is monitored through the encounter rate indicator. The encounter rate indicator reflects conditions along the trail leading to the summit. As use on the trail increases, so does crowding on the summit. Therefore, the degree of crowding at the summit directly relates to the visitor capacity for the analysis areas.

The trampled vegetation indicator reflects impacts on the fragile ecosystem at the summit that supports unique wildlife and contributes to the naturalness of the analysis area. As use increases, so does the likelihood that visitors will leave the trail to seek unobstructed views, causing damage to the natural resources in the analysis area. The vegetation at the summit is sensitive to trampling and would be difficult to restore to natural conditions.

The two limiting attributes, encounters between visitors and impacts on vegetation, constrain the analysis area's ability to accommodate visitor use along the trail and at the summit, and therefore both inform the visitor capacity. Monitoring of encounter rates and vegetation has revealed that thresholds have been or are close to being exceeded. In combination, these two limiting attributes suggest that current use levels need to be decreased to achieve and maintain desired conditions.

GUIDELINE 4: IDENTIFY CAPACITY

This guideline involves identifying visitor capacity, including providing a rationale for the visitor capacity, and determining allocations of visitor use. Regardless of where the analysis area is on the sliding scale of analysis, use the three previous guidelines to identify the visitor capacity and to develop and document the rationale for the visitor capacity. This should include applying any relevant and available monitoring data, visitor use patterns, research, lessons learned from comparable management areas, and professional judgments that informed the visitor capacity process (see supplemental papers on council's website for additional references). Following and recording information from the guidelines in the visitor capacity process can serve as documentation of the rationale and add credibility to the professional judgment applied to the visitor capacity decision.

Visitors and dogs enjoying a waterfall view.

To identify a visitor capacity, managers have to identify the maximum levels of visitor use that will maintain and achieve desired conditions. The visitor capacity is based on the conditions of the analysis area and likely will vary by location. If visitor capacity will be implemented unit-wide and at specific sites, consider identifying an overall visitor capacity. Think beyond the sum of all identified site-specific capacities, and consider if there is a need to assign higher importance to certain variables at various locations. For instance, consider the average amount of time visitors spend at key destinations, connections that facilitate access between sites, and visitors arriving from adjacent lands. These are just some of the factors that could affect visitor use patterns, visitor capacity implementation, and the need for an overall capacity.

Based on the assessment of desired conditions and existing conditions in relation to indicators, triggers, and thresholds associated with the amounts and types of visitor use, should visitor use levels be increased, decreased, or maintained in the analysis area?

Visitor capacity might increase, decrease, or maintain current amounts and types of visitor use. Some important considerations for identifying visitor capacity include:

- If visitor capacity increases or decreases, associated management strategies and actions should identify where and how visitor use levels will increase or decrease. Revisit the existing conditions, and determine the level of increase or decrease.

- If visitor capacity remains the same, existing conditions and use levels should be managed to achieve or maintain desired conditions, and management strategies and actions should be monitored to minimize resource and experience impacts while maintaining visitor use levels. Revisit existing conditions, and verify desired conditions are being achieved.
- For each visitor capacity, identify management strategies and actions that support the decision.

After initially identifying a visitor capacity, again review the scope of the analysis area, applicable existing direction and knowledge, desired conditions, indicators, triggers, thresholds, objectives, and management strategies and actions to assess whether there is a need to further refine the visitor capacity. Also, consider the degree of stakeholder involvement and/or interest and how to incorporate this to the extent practicable. Only after this, consider the targeted amounts and types of use.

SUMMIT SCENARIO

GUIDELINE 4: IDENTIFY CAPACITY

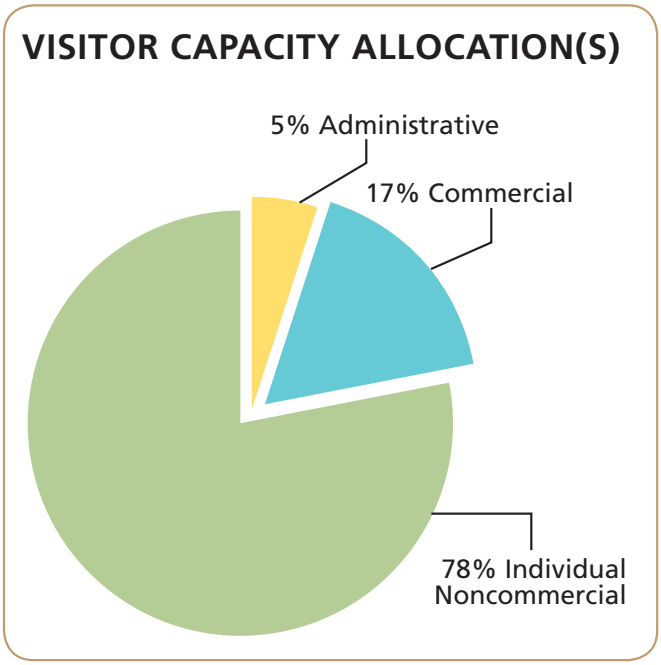
A backpacker takes in the breathtaking view of mountain vistas.

The project team used guidelines 1 through 3 to identify a visitor capacity below the current level of visitor use along the trail to ensure that each group encounters no more than 4 other groups along the trail during 80 percent of the high-use season. The project team also identified a visitor capacity below the current level of visitor use at the summit to reduce crowding and protect sensitive vegetation. The summit viewing area will be able to accommodate 12 visitors at one time, thus reducing the likelihood visitors will trample vegetation when they seek unobstructed views.

Determine allocations of visitor use as subsets of visitor capacity, if necessary.

After identifying visitor capacity, allocation is the process of distributing visitor capacity among a variety of uses or opportunities to achieve or maintain desired conditions. Allocation is not always necessary and should be leveraged when relevant and useful to the site. Allocation is typically expressed as a ratio or percentage delineating proportions of visitor use, such as 78 percent individual noncommercial, 17 percent commercial, 0 percent group events, and 5 percent administrative (figure 7). Regardless of the ratio or percentage, allocation considers all the different types of visitor use in an analysis area and the appropriate proportion of that use.

Figure 7. Example of visitor capacity allocations.



Allocation is the process of distributing visitor capacity among a variety of uses or opportunities to achieve or maintain desired conditions. When considering categories of visitor capacity allocation, follow applicable agency policy and guidance.

There is no one way to allocate visitor capacity; categories of visitor capacity allocation are likely to range. General types of allocation categories (defined in paragraphs that follow) include, but are not limited to:

- Administrative
- Commercial
- Group events
- Individual noncommercial

Other examples of allocation categories may be directed by visitor activities, modes of travel, and kinds of services, such as commercial road tours, noncommercial road tours, concessions, outfitters, tour operators, guided groups, commercial special events, noncommercial special events, special park uses, cooperating association events, filming crews, private groups, casual users, independent users, and noncommercially supported visitors. These categories of allocation could have overlap (based on management of the analysis area) and are not intended to be mutually exclusive but, rather, provide examples of potential uses and opportunities to distribute visitor capacity. For example, while commercial use is noted as one type of allocation category, institutional use and competitive use also may or may not be commercial.

The decision to determine allocations of visitor use should be based on desired conditions and how managers will implement visitor capacity. Ensure the investment of time, money, and other resources for allocating visitor capacity are commensurate with the complexity of the project and the consequences of the decision through the use of the sliding scale of analysis. When determining allocations as subsets of visitor capacity, managers should ask questions based on desired conditions and the mechanisms by which implementation of visitor capacity will be managed. Depending on the selected allocation, managers should include considerations, such as how allocation may help achieve or maintain desired conditions, the level of potential displacement for certain user groups, impacts on resources from particular groups or types of visitor uses, and potential socioeconomic impacts on user groups. Project teams should also consider social and environmental justice factors, such as race, class, gender, and age, that are relevant to allocating visitor capacity and that influence visitor experiences.

Administrative allocation.

Administrative allocation is a category of visitor capacity allocation often reserved for distributing user capacities on designated wild and scenic river corridors. Other examples of administrative allocation include research trips, monitoring, and facilities/trails maintenance. Managers of other protected areas, such as wilderness, marine, and public access natural areas, may allocate visitor capacity for administrative use, thus influencing the available visitor capacity for other types of uses. This type of allocation provides opportunities for managers to meet the administrative needs of managing an area while achieving or maintaining desired conditions for visitors. Consider administrative allocation of visitor capacity when administrative use could displace visitor use or otherwise affect the visitor experience. For example, consider administrative allocation if frequent river floating groups or monitoring expeditions occupy limited camping space or affect solitude for other boaters.

ADMINISTRATIVE ALLOCATION

The visitor capacity for the Volcano Wilderness analysis area is 36 trips with no more than 14 consecutive overnight stays. The limiting attribute of the Volcano Wilderness is the sensitive resources surrounding many of the campsites and their ability to recover from physical use. Administrative personnel take horseback trips once a month in the spring, summer, and fall (six trips total) into Volcano Wilderness, using the same trails and campsites as the public. These trips are necessary to conduct maintenance and monitoring and are included in the visitor capacity given the sensitivity of resources surrounding the campsites. The desired condition of opportunities for solitude, in addition to the limited availability of campsites appropriate for this group size, including livestock, provide the need for an administrative allocation. Therefore, the visitor capacity includes an allocation for administrative use. Six trips out of the total 36 are allocated to administrative use. The remaining 30 trips are available for individual noncommercial use.

EXAMPLE

Commercial allocation.

This type of allocation involves commercial services, such as lodging, food and beverage, retail, marinas, outfitting and guiding, road-based tours, and other visitor experiences and opportunities, in which transfers of money, goods, and/or services occur. A commercial allocation can be expressed in many ways, such as by client days, trips, season, year, or other temporal or spatial measures (depending on agency permitting procedures).

In areas often needing commercial allocation, access may be limited by a number of variables, such as terrain, extreme weather hazards, or dangerous wildlife. A commercial allocation may also be needed when the activity or setting requires a specific skill. For example, a national forest in Alaska may allocate a majority of visitor capacity in key areas to commercial groups based on the area's logistical challenges or terrain. In such areas, access may be nearly impossible without a boat or plane and may require a considerable amount of skill and knowledge. In contrast, other areas may have a high level of road density, signs, services, available maps, and other information that allow for easy and safe access by visitors and minimize need for commercial services. In those areas, it may be appropriate to allocate a small amount or no amount of visitor capacity to commercial services. Commercial or noncommercial road-based tours may best be considered in commercial allocation, but the allocation may also be identified as external to other commercial services depending on the desired conditions of the analysis area.

The sliding scale of analysis can help managers determine the need for and scope of a potential commercial service assessment. The commercial allocation worksheet (appendix, table A2) provides one way to examine factors that could inform allocation of visitor capacity to commercial services. Allocation of visitor capacity to commercial services should be based on professional judgment and the best available information, consistent with applicable agency policy and guidance, and should have a documented rationale.

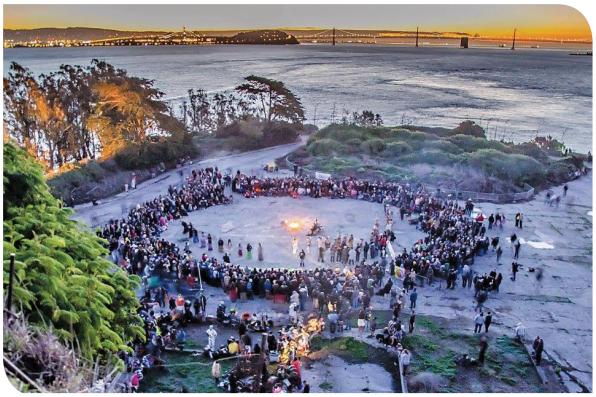
EXAMPLE

COMMERCIAL ALLOCATION

The parking lot at the trailhead of a popular horseback riding trail has 20 spaces to support large horse trailers. Parking is full on some holiday weekends, and desired conditions are being achieved most of the time. All visitor parking is restricted to designated areas only. The agency has determined that identifying a visitor capacity for the area is important to maintain desired conditions. The commercial services needs assessment for the analysis area identified a moderate need for commercially supported day-use horseback riding due to difficulty of access to the area by horseback for tourists. The visitor capacity has been identified as 80 people at one time, based on the average group size per vehicle (20 parking spaces x 4 people per vehicle = 80 people). The project team has allocated up to 20 percent of the visitor capacity to commercial services. Further, only 5 percent of the commercial services allocation is designated for holiday weekend use, with the remaining 15 percent of use designated for nonholiday weekends and less busy weekdays. This management strategy ensures parking remains available for individual noncommercial horseback riders.

Group events allocation.

This type of allocation involves recreation events requiring a participation fee and noncommercial group events, including one-time or recurring events, such as triathlons, group hikes, and group bicycle rides. Some agencies require permits for gatherings that include more than a specified number of people or whenever desired conditions are threatened. While the increased visitation is temporary, the larger number of participants and the activities involved can affect desired conditions. Again, using this type of allocation should be based on how the area will be managed and what is required to achieve or maintain desired conditions.



Special group event near San Fransisco Bay.

Prior to authorizing a group event, project teams would have identified and balanced the impacts this event would have on biophysical resources, facilities, and social experience with the benefits to participants, including meeting public and agency need. This would also include an analysis of how the event would affect visitor capacity. An area's visitor capacity can vary spatially and temporally (e.g., there may be more flexibility on weekdays or in shoulder seasons to allow for these types of events). In other situations, an existing visitor capacity may recognize that higher visitor use is present on weekends and holidays, and the event may be able to occur within those parameters.

Project teams should consider current and typical visitor use patterns in the analysis area and the impact of group events on key destinations. Visitor use conflicts could arise if group events interfere with visitation in high-use areas. Consider whether it would be appropriate to temporarily close an analysis area with group events based on the impacts of group events on other types of visitor use. Also, managers could provide increased levels of pre-trip planning information for the day of the event to minimize impact on other visitors. Allocation of visitor capacity to group events should be based on professional judgement and the best available information, should be consistent with applicable agency policy and guidance, and should have a documented rationale.

EXAMPLE

GROUP EVENTS ALLOCATION

An ultramarathon has been proposed for 20 miles of a popular trail. This event will involve up to 100 participants for no more than 4 hours on this trail segment before the course continues onto other trail segments off federal lands. The visitor capacity for the 20 miles of trail is informed by typical hiking speed, day and overnight use patterns, and party size. The visitor capacity for this trail segment is 200 people at one time, mostly consisting of multiday backpackers. However, the speed of the participants in this event will far exceed typical visitor use patterns. It is expected that the runners will traverse the 20 miles in 4 hours versus the 8 to 16 hours typical of other users. Based on the ratio of the number of participants (100) to the total visitor capacity (200), the allocation for the group event is set at 50 percent of the overall visitor capacity for a 4-hour period to balance the demand between the group event and other visitor use.

Individual noncommercial allocation.

This type of allocation involves noncommercial visitor use. Individual noncommercial use is included in the overall visitor capacity. If project teams allocate portions of visitor capacity to administrative use, commercial services, or group events, the remainder should be allocated to individual noncommercial use.

EXAMPLE

INDIVIDUAL NONCOMMERCIAL ALLOCATION

A rocky intertidal area, popular for its tide pools, has a visitor capacity of 300 people at one time, with 80 percent of the visitor capacity allocated to individual noncommercial visitor use. An additional 15 percent of the visitor capacity is allocated to commercial services, more specifically guided school groups that use the location as a learning area for young school-age children. Desired conditions for the tide pools have prioritized the guided school groups over individual noncommercial use when the guided school groups are visiting the area. The remaining 5 percent is allocated for one-time group events, such as weddings. Given the overall visitor capacity of 300 people at one time, during one-time group events, managers may have to close the area temporarily to other types of uses so as not to exceed the area's visitor capacity.

Documenting the visitor capacity and any allocation of visitor capacity.

It is important to document the visitor capacity process, including the rationale for the visitor capacity and any allocation of visitor capacity. A well-articulated rationale is helpful when communicating with other agency staff, partners, line officers, and the general public. The rationale should contain a narrative that expresses the logical and reasonable means to support successful development of an implementable and defensible visitor capacity. Further, it is important to include a well-articulated rationale for allocation of visitor capacity among categories of use that describes the potential for offering experiences to nontraditional visitors, the level of challenge and risk, demand, and benefit to local economies, among others.

Because identifying visitor capacity and allocation of visitor capacity are agency decisions, they can be challenged in court. Federal courts generally defer to agency decisions when the administrative record for the decision demonstrates that the agency considered the relevant factors and articulated a rational connection between the factors found and the choices made (see *American Whitewater* v. *Tidwell*, 959 F. Supp, 2d 839 (D.S.C. 2013), *aff'd*, 770 F.3d 1108; *Ohio Valley Environmental Coalition* v. *Aracoma Coal Company*, 556 F.3d 177, 192 (4th Cir. 2009); *Marsh* v. *Oregon Natural Resources Council*, 490 U.S. 360, 376-77 (1989)). Thus, the rationale for identifying visitor capacity and allocation of visitor capacity should be well reasoned and supported by evidence.

5

Chapter 5: Implementing Visitor Capacity Management Strategies and Actions

This page intentionally left blank.

Chapter 5: Implementing Visitor Capacity Management Strategies and Actions

There are two parts to visitor capacity: the identification of visitor capacity (see chapter 4) and the identification of additional management strategies and actions to implement the identified capacity. Management strategies are general approaches for addressing visitor use management issues, while actions are specific ways of implementing management strategies. One example of the eight basic management strategies is modifying the timing of use to achieve desired conditions (Cole et al. 1987). For more information on management strategies and actions, see element 3 of the framework or other literature, such as "Managing Outdoor Recreation: Case Studies in the National Parks" (Manning et al. 2017).

Eight Basic Management Strategies

- Modify type of use.
- Modify visitor behavior.
- Modify visitor attitudes and expectations.
- Modify the timing of use.
- Modify the location of use.
- Increase the ability of sites to handle use.
- Modify the spatial distribution of use.
- Reduce use or increase the supply.

(Cole et al. 1987)

Visitor capturing photo of wildlife (mountain goat).

Once a visitor capacity has been identified, next identify the specific management strategies and actions that will be most effective in implementing the visitor capacity. There are a variety of conceptual frameworks that highlight appropriate management strategies. The framework focuses on three general categories of management actions, including (1) site management/engineering, (2) information and education, and (3) regulation/enforcement. These are sometimes referred to as the three "E's"—engineering, education, and enforcement. These kinds of actions can help managers increase supply, reduce impact of use, increase durability of the resource and/or experience, or limit use (Manning et al. 2017).

Management strategies and actions to implement visitor capacity exist along a continuum. From influencing to regulating visitor behavior, subtle to obvious, and direct to indirect, the management strategies and actions should achieve or maintain desired conditions within the identified visitor capacity. Management strategies might target the visitor decision processes that influence behavior and induce visitors to behave a certain way through communication and education strategies (Anderson et al. 1998). Alternatively, management strategies might directly affect visitor access more greatly influencing freedom of choice (Manning et al. 2017).

Fencing off a cliff dwelling.

Managers and project teams should identify a range of strategies that occur along a continuum, beginning with less direct strategies and actions, such as informational and educational campaigns to influence visitor behavior. For example, a management action might involve encouraging visitors via the administrative unit's website to select less popular areas or times to avoid crowding (Anderson et al. 1998). Alternatively, an action might involve providing real-time, online information about parking availability and wait times to influence visitor use patterns; based on this information, visitors may delay their arrival or select a new location. If messaging is a key management strategy for implementing visitor capacity, consider the intended audience, as different audiences are attracted to different activities (e.g., hunters, birdwatchers), and consider different messaging or delivery mechanisms.

Progressing along the continuum of management strategies and actions can redistribute amounts and types of visitor use and may be more effective to maintain visitor use levels within an identified visitor capacity. For example, a management strategy could include modifying an area to accommodate an appropriate amount of visitor use such as area or facility closures to protect sensitive resources. This type of modification could redistribute visitor use to alternative areas. The closed area would have a visitor capacity of zero (Anderson et al. 1998). A management strategy could also include directly managing physical access to an area, such as by requiring a timed entry reservation for access. Other types of managed access systems are outlined as follows (Anderson et al. 1998):

- **Reservation system:** A reservation system requires visitors to plan ahead to obtain a permit for access and manages the amount of visitor use in an area and distributes use to follow acceptable use patterns (spatial and/or temporal).
- **First-come, first-served (queuing) system:** A queuing system requires visitors to obtain a permit on a first-come, first-served basis and can manage the amount of visitor use by redistributing that use to follow acceptable use patterns. This approach works well with areas that have an uncomplicated application process and/or mainly local users.

- **Lottery system:** Everyone has an equal chance of participation with a lottery system because selection is random. This system is generally used in areas with extremely high demand and requires adequate enforcement resources on the ground. As with reservations, this system requires visitors to plan ahead to obtain one of a limited number of permits and could be connected to reservations, queuing, eligibility requirements, or fees.
- **Merit/eligibility system:** Eligibility requirements encourage self-selection in regard to willingness to meet selection criteria. If the requirements are limited or costly, this allocation method and management strategy could be less equitable than reservations, queuing, or lotteries. Eligibility requirements can include specific skills, knowledge, or previous experience relevant to the area or the activity.
- **Charge fee:** Managers can require visitors to pay a flat or differential fee to gain access to a specific park, forest, or other public land area or a smaller area inside the boundaries of a larger unit.

When selecting the most appropriate management strategies and actions to implement visitor capacity, it is important to consider the manner and degree to which they impact visitor experience. Federal agencies often try to minimize impact to visitors using less obtrusive measures first while still achieving and maintaining desired conditions. For example, it may be more effective to manage visitor use by employing a permit system than by limiting the size of a parking lot, particularly if there is limited ability to restrict parking along the road that accesses the lot. However, if limiting the size of the parking lot and preventing roadside parking would be effective, it might be the preferred management action because it would maintain a higher level of visitor freedom and require less active management than a permit system. In another example, concentrating camping on durable sites might be subtly accomplished by creating desirable, visually obvious, and easy to access campsites. Alternatively, it might be achieved by regulating camping to designated sites. Generally, a mix of indirect and direct actions and subtle and conspicuous actions are needed to ensure desired conditions are achieved or maintained. No single formula exists for deciding which management strategies and actions are best to implement visitor capacity. The identification of management strategies and actions should be based on professional judgment and the best available information and requires both objective and subjective decisions.

Combinations of management strategies and actions may be needed to ensure desired conditions are achieved or maintained. Considerations for effectively implementing management strategies and actions include (1) assessment of their effectiveness in achieving and maintaining desired conditions; (2) assessment of potential unintended consequences, such as displacement and inequity among user groups; and (3) the availability of resources required to administer the management strategies and actions (e.g., staff to implement a permit system).

Historically, federally managed lands and waters have been places where people with specialized equipment, knowledge about the areas, and opportunity predominate (Rose 2010; Rose and Paisley 2012). As the visiting public becomes more diversified, federal land managers strive to provide high-quality visitor experiences considering social and environmental justice factors, such as race, class, gender, and age. These factors are especially relevant to identifying management strategies and actions to implement visitor capacity that may impact the visiting public in a variety of ways.

SUMMIT SCENARIO

IMPLEMENT VISITOR CAPACITY

A backpacker takes in the breathtaking view of mountain vistas.

The project team identified a range of management strategies to implement the visitor capacity of 12 people along the trail (no more than 4 other groups encountered along the trail during 80 percent of the high-use season with a maximum group size of 3 people) and at the summit (no more than 12 visitors at one time at the summit). Ultimately, the project team decided to require summit reservations through an online system with a cost per person. Visitors deposit reservation tickets into an unmanned ticket collection station where the trail to the summit departs from the trail system. A comprehensive monitoring strategy provides staff a framework to ensure desired conditions are achieved. Staff monitor the number of tickets collected and compare this with encounter rate data to ensure visitor capacity is not being exceeded. Monitoring the encounter rate indicator provides important information to ensure the reservation system supports the visitor capacity of 12 people on the summit at one time and ensures desired conditions are achieved. Monitoring the trampled vegetation indicator ensures natural resources are protected and visitors are not trampling the vegetation surrounding the summit. In summary, identifying and implementing visitor capacity and associated monitoring ensures the desired conditions for the area are achieved.

IMPLEMENTING ALLOCATIONS OF VISITOR CAPACITY

In situations in which visitor capacity has been allocated for an area, managers need to identify management strategies and actions for implementing the allocation categories of visitor capacity. The following are examples of possible management strategies for implementing allocations (Anderson et al. 1998).

- **Physical separation:** A trail could be allocated for only equestrians or for only nonmotorized uses. For river systems, certain types of uses could be allocated per segment.
- **Spatial or temporal zoning:** An area could be devoted to skiing part of the week and snowmobiling the rest of the week. One-way trails could be designed to allocate use. River launches could be allocated by different days or times. If spatial or temporal zoning is used, ensure information about it is well known and widely disseminated to users from surrounding regions.
- **Historic use:** Visitor capacity could be allocated based on percentages of categories of uses that have historically occurred in an area.
- **Limited entry:** Where use levels are reaching or exceeding thresholds, managers may wish to allocate only a certain number of groups or people per day or limit overnight use. This strategy could coincide with designating campsites or limiting destination selection. For example, if research has shown that, of all users, 30 percent go to destination X and 70 percent go to destination Y, and the visitor use does not reach or exceed thresholds, it may not be necessary to designate campsites or limit destination selection for destinations X and Y.

In addition to the foregoing management strategies, the following are various strategies for allocating visitor capacity under commercial permits:

- **Gradual percentages:** A certain percentage of a commercial services allocation is distributed, with the remainder distributed later or reserved for walk-in requests. This approach requires considerable staffing to implement and manage.
- **Even split:** Use is allocated evenly among different types of commercial service providers.
- **Uneven split:** Use is allocated unevenly among different types of commercial service providers (e.g., based on the patterns of use associated with activities, their effects on achieving and maintaining desired conditions, or existing use patterns).

Small plane taking off over a river.

MONITOR AND EVALUATE

STEP 11

Step 11 of the framework involves developing a monitoring strategy. Monitoring is an integral part of the framework, as it provides key feedback about conditions to managers that is central to visitor capacity decisions. The term monitoring refers to the process of routinely and systematically gathering information or making observations to assess the status of resource conditions and visitor experiences. Visitor use monitoring data typically include indicators, triggers, thresholds, and objectives such as use levels and patterns, sociodemographic characteristics, preferences and expectations, use impacts, and other evaluative measures. It could also include monitoring actual visitation to determine if management strategies and actions are effective in managing to visitor capacity.

Monitoring is critical to determine whether management strategies and actions are achieving and maintaining desired conditions and implementing visitor capacity effectively. Monitoring indicators and thresholds that are sensitive to change can suggest to managers when desired conditions are not being achieved or maintained and when those changes are directly related to visitor capacity (maximum amounts and types of visitor use). In addition, monitoring and evaluating management actions, including implementation of visitor capacity, can indicate when new management strategies and actions are needed to achieve and maintain desired conditions.

ADJUST, IF NEEDED

The framework stresses the importance of using adaptive management methods. Managers and project teams should build adaptive management into their overall visitor use management strategy. Periodically evaluating management direction, including specific methods for implementing visitor capacity, will enhance the likelihood of maintaining or achieving desired conditions. Assessing the outcome of management actions is necessary to ensure management actions are having their intended effects.

STEP 14

Before adjusting management actions or visitor capacity, identify the probable cause of the issue. Then consider whether adjusting the management actions or visitor capacity would help achieve desired conditions, and document the identification and its rationale. Adjust management actions and visitor capacity when there is evidence that thresholds are being approached or when conditions are trending away from desired conditions. Visitor capacity may need adjustment over time based on increased knowledge of relationships between visitor use and impacts or changes to desired conditions. Project teams should acknowledge the adaptive nature of addressing visitor capacity and should describe the process used to adjust visitor capacity.

Plans should describe:

1. The criteria and rationale for identifying visitor capacity.
2. The relationships among the level of visitor use, management actions, and the desired conditions (and assumptions about factors that influence those relationships, including other possible management actions).
3. The types of new information that would trigger reevaluation and adjustment of visitor capacity.
4. The procedures for public notification of and participation in visitor capacity decisions.

Review the agency's guidance on NEPA (National Environmental Policy Act) compliance to determine if an adjustment to visitor capacity would require additional environmental analysis.

This page intentionally left blank.

6

Chapter 6: Visitor Capacity Case Studies

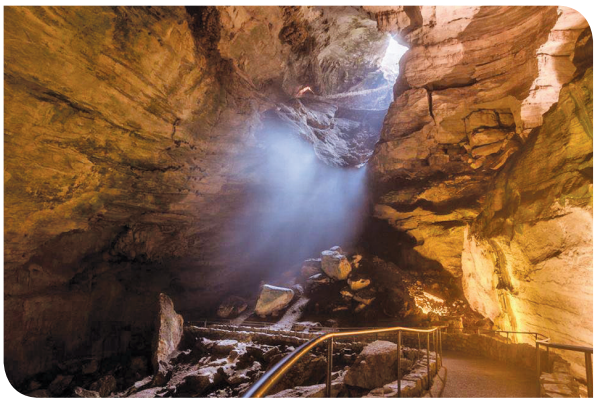
This page intentionally left blank.

Chapter 6: Visitor Capacity Case Studies

This chapter presents four theoretical case studies of the identification of visitor capacity and management strategies and actions to implement visitor capacity. The case studies provide examples from a range of settings, and each study demonstrates the guidelines while highlighting nuances of each setting. The purpose of the case studies is to highlight the visitor capacity process and variances across settings.

CASE STUDY 1: VISITOR CAPACITY FOR SENSITIVE CAVE RESOURCES

Introduction.



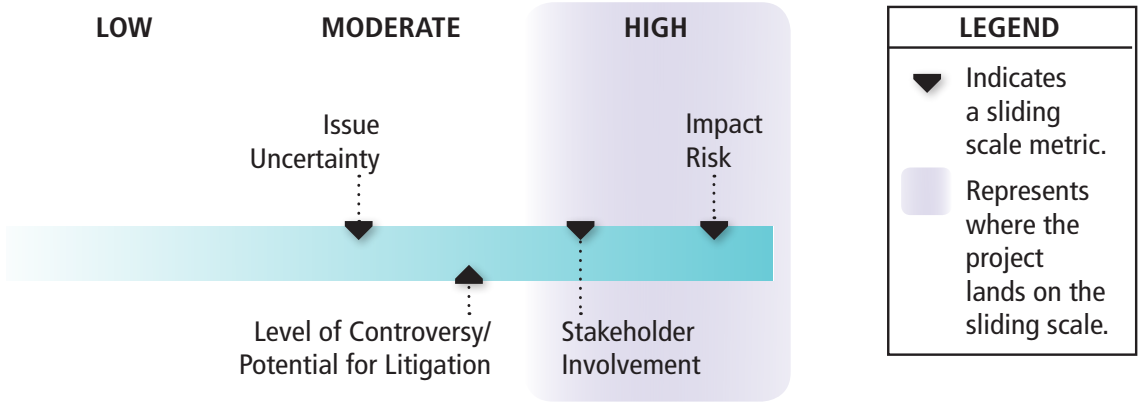
Pathway through a karst landscape.

Hatu Cave is home to a world-class karst landscape (a landscape formed by the dissolution of soluble rocks, including limestone and dolomite) and is at the core of scientific explorations and discovery. The cave contains fragile and perishable materials within a distinctive cultural and natural landscape and provides opportunities for visitors to connect with unique natural treasures. The cultural landscape of Hatu Cave has been shaped by human use beginning with American Indian explorers who ventured inside more than 5,000 years ago. The cave also supports more than 1,000 plant species and is home to more than 50 nationally and state-listed threatened and endangered species. The cave is recognized as having one of the most diverse karst biota in the world, including more than 30 species that spend their entire life in the cave and more than 90 others that can readily be found in the cave.

Today, the Hatu Cave system comprises approximately 30,000 acres in four counties and has two entrances, a primary developed entrance and a secondary natural entrance. Hatu Cave is within a 1-hour drive for more than a million residents of a rapidly growing urban metropolitan area. Visitors are drawn to the cave to participate in and connect with the unique environment. Visitors explore the complex cave system through ranger-led tours, surface walks, and guided and unguided rappelling trips. Other visitor uses occur within the larger protected area and include camping, hiking, biking, boating, and canoeing.

Of the 30,000 acres of this complex cave system, 250 miles have been surveyed to date with six caves located as a result. Hatu Cave's cavernous limestone, or "karst," features are the primary attraction for most visitors. In karst terrain, everything that happens on the surface affects the caves below—surface and subsurface are intricately bound together, and water is the connecting thread throughout the park. Within the subterranean spaces, the interplay of water and mineral has produced remarkable formations in stone, some of them breathtaking in their beauty and fragility.

Figure 8. Case Study 1: Representation of the four criteria involved in the sliding scale of analysis.



Using the decision support tool, managers determined that the level of visitor use analysis needed is on the high end of the sliding scale. Although issues are well known and documented, there is a moderate level of controversy associated with any action or change that would restrict or confine visitors in this area. There will be a low level of impact to adjacent lands if visitor capacity is not addressed. There is a high level of threat to perishable and fragile natural and cultural resources associated with visitor capacity, including visitor-caused degradation of resources (e.g., damaging cave floors and walls, disrupting ambient sound levels) and a high level of encounters. If visitor capacity is not addressed, there will continue to be impacts to the perishable and fragile natural and cultural resources, unless visitor use patterns change substantially on their own, which is highly unlikely to occur. Stakeholder input continues to be supportive. While litigation is unlikely, setting a visitor capacity for the cave system may engender a moderate level of controversy. Taken as a whole situation, the visitor capacity decision is likely to be high on the sliding scale of analysis.

GUIDELINE 1: DETERMINE THE ANALYSIS AREA(S)

The analysis area includes two access points and six individual caves within the Hatu Cave system. Despite variance in visitor use levels and patterns at the two entrance points, the desired conditions of the cave are consistent throughout the six individual cave units. Management strategies and actions will vary by access location to meet desired conditions for the entire cave system.

While Hatu Cave is part of a larger protected area offering opportunities for camping, hiking, biking, boating, and canoeing, the visitor capacity process will focus on the cave system itself because it is managed as a separate visitor experience from other opportunities in the larger protected area. Identifying the visitor capacity for Hatu Cave is legally required based on its National Park Service designation and level of protection.

Displacement. Visitor displacement from the cave system to the larger protected area is a potential concern. However, displacement to another cave system is highly unlikely, as there are no similar caves within several hours drive. Despite the concern for intrasite displacement, it is important to identify an overall visitor capacity for Hatu Cave exclusive of the larger protected area. The rationale is the need to achieve and maintain desired conditions inside the cave system.

Visitor capacity is legally required, and the amounts and types of visitor use are directly related to achieving and maintaining desired conditions. The most meaningful analysis area is the entire cave system. The visitor capacity decision is likely to be high on the sliding scale of analysis.

GUIDELINE 2: REVIEW EXISTING DIRECTION AND KNOWLEDGE

Review prior applicable planning and guidance.

Hatu Cave has a white-nose syndrome response plan (2011), water resources management plan (2006), and cave management plan (1987). Previous planning did not identify desired conditions or visitor capacity. The following goal and desired conditions for Hatu Cave are based on the fundamental resources and values identified by cave managers.

Goal: Hatu Cave provides for visitor use in a way that contributes to the cave soundscape experience, preservation of cave resources, and challenging recreation opportunities.

Desired conditions:

- Visitors of varying abilities have a diverse range of opportunities and settings to experience, learn about, and have a direct connection with the cave, including challenging recreation. The cave soundscape experience is managed as a vital component of a healthy, intact, biological community.
- Visitor use does not disrupt the ambient sound levels.
- Visitor use occurs as a way to protect and enhance the natural function, diversity, complexity, and resiliency of the cave system and does not degrade cave resources.
- Visitors have opportunities to understand, enjoy, and appreciate natural resources and ecological processes occurring within the cave system.

Review existing conditions in the analysis area.

Visitor experience: Visitors reach the limestone caves by hiking 1 mile up a paved trail with a nearly 1,000-foot elevation gain. While ascending the mountain, visitors pass many geologic layers, getting an introduction to area geology and witnessing more than 200 million years of geologic time. The steep grade of the trail provides a challenge to all visitors regardless of physical fitness level. Rockfall from the steep canyon walls is a safety concern, with particularly hazardous trail sections marked with a painted stripe, which advises visitors to not stop along the trail. The winding, scenic route offers outstanding panoramic views of the nearby urban metropolitan area. Some visitors hike the trail and do not necessarily visit the caves, while others use the trail as a means to gain access to the caves.

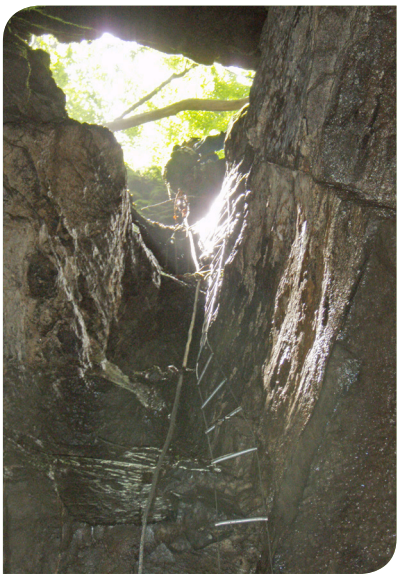
Visitors to Hatu Cave get a high-quality, immersive experience through an intimate cave tour or through a challenging recreational experience. Cave infrastructure, including lighting and a safe trail, contributes to an accessible and enjoyable cave experience. A wide variety of summer interpretive programs is available throughout the cave, including cave tours, deck and grotto talks, and youth programs. Evening programs are currently scheduled on peak summer weekends, but attendance is generally low.

The staff's first priority is safety, and very few safety incidents occur each year. Staff take numerous precautions to address employee and visitor safety around the visitor center and river area, along the trail, and in the caves.

Generally, the canyon has limited artificial light at night, allowing good opportunities to experience natural darkness. The night sky, however, is negatively impacted by ambient light and air pollution from adjacent urban development.

The cave was closed to visitor use for more than 2 years to prevent the spread of white-nose syndrome in bats. Since reopening, the overall condition of the visitor experience has declined due to crowding that has resulted from an increase in cave use by visitors at both entrances. Guided tours, which are accessed from the primary developed entrance, are most popular on summer weekends, while much less visitor use occurs during weekdays. During high-use times, guided tours include more than 40 visitors at a time. On tours with more than 20 people, visitors report rushed

experiences, the inability to learn about and experience the uniqueness of the cave environment, and inappropriate behaviors from others on the tour. Additionally, some visitors are not able to participate in the guided tours, given limited time at the site, and, consequently, are unable to experience the cave system. All guided tours follow the same route in the cave.



Cavers descend through natural entrance using rope ladder.

The secondary natural entrance is receiving increased use as rappelling and caving grow in popularity. Visitors looking for challenging recreation opportunities often wait 1-2 hours to access the cave system through the natural entrance. Ecological and biological impacts occur outside the secondary natural entrance as groups trample vegetation and cause other resource damage. After inside the cave system, groups encounter one another frequently at pinch points, where damage to the cave system is concentrated. Managers are working to update monitoring protocols to track daily visitation and average length of stay for those who enter from the secondary natural entrance.

Primary developed entrance visitors and secondary natural entrance visitors do not interact. Due to the technical expertise and equipment necessary to navigate the cave system through the secondary natural entrance and the inaccessibility of several caves from the primary developed entrance, guided tour groups do not go beyond the first three major caves within the six-cave system. Visitor surveys have not been conducted; however, based on field observations and monitoring data, impacts to the internal cave system are increasing and quality of the visitor experience is declining. The following cave condition assessment provides additional information about the natural conditions and visitor use characteristics in the analysis area. This assessment is repeated each year in April before peak season begins.

CAVE CONDITION ASSESSMENT

Cave floor: The cave floor is in poor condition in areas where the entire floor has been developed or altered for the tour trail, such as in Center Cave where the entire floor is developed and filled with rubble. The floor is in good condition in other areas, such as the natural floor of Alberto Cave, Back Chamber, and most off-trail areas.

Cave walls: The cave walls are in poor condition in areas with narrow passageways, such as the connections to Center Cave and Alberto Cave where visitors and visitor groups experience tight squeezes as they encounter one another. Rubble has accumulated alongside these narrow passageways. The cave walls are in good condition in other areas, including Back Chamber and most off-trail areas.

Entrances: The primary developed entrance and Alberto Cave entrance are in fair condition due to development for visitor use. The secondary natural entrance to Middle Cave, a ¼ mile from the cave trail and accessible to experienced recreationists only, is in good condition. The natural entrance requires a 200-foot rappel to reach the cave floor. Until this planning effort, there has been very little emphasis on management of the secondary natural entrance.

Cave visitors learn about the fragile ecosystem.

Infrastructure: Overall, the infrastructure is in fair condition. The new tunnel doors and the concrete trail are in good condition. Corrosion is evident on some components of the Middle Cave Lake bridge, and regular inspections by a qualified engineer are required to accurately determine its condition, life expectancy, and maintenance requirements. The lighting system is deteriorating and requires continuous maintenance. The existing transformers are larger than needed for the newly installed light-emitting diode (LED) lights; some wires are not in conduit or buried; and visible abandoned infrastructure remains in the caves, all of which detract from visitor experiences.

Overall, there are negative effects that are preventing achievement of desired conditions for Hatu Cave. Visitor use is degrading cave resources and disrupting ambient sound levels. The visitor experience is becoming more limited, as access to the secondary natural entrance decreases during high-use times and guided tours through the primary developed entrance become filled.

Review indicators, triggers, and thresholds.

The cave management team identified the following indicators, triggers, and thresholds to protect cave resources, decrease impacts to ambient sound levels, and maintain high-quality visitor experiences. These measures will help ensure management strategies and actions achieve and maintain desired conditions.

Given the fragile and perishable nature of the cave resources, the project team identified two triggers to prompt management actions associated with indicator 3, which are increases in dBA over natural ambient sound levels in representative high- and low-use areas. Where dB is the relative intensity of sounds in air and dBA is a mathematical adjustment to dB to align with the sensitivity of human hearing. This indicator provides a way for managers to achieve desired conditions related to protecting both the cave soundscape experience and ambient sound levels. An increase of 1 dBA above natural ambient sound levels will prompt management action. The project team will collect baseline data (i.e., natural ambient sound levels) during plan implementation. Potential management actions will focus on indirect actions, such as providing visitor information, and direct actions, such as designating more quiet zones and days or increasing ranger presence. Additionally, a thorough

monitoring of cave resources is a priority for the next high-use visitor season. Further management actions are associated with an observed increase of 2 dB above natural ambient sound levels. These actions might include changing regulations of organized groups (e.g., group size limits), reducing use levels, and/or decreasing the number of permits assigned.

Indicator 1: Number of visitor encounters within the cave system through the secondary natural entrance.

> **Threshold 1:** Individual groups encounter no more than two other groups per day.

Indicator 2: Documented annual cave condition assessment changes from visitor-caused actions and disturbances. This assessment includes a rating of "good, fair, poor, or destroyed."

> **Threshold 2:** Change in the overall site condition to a lesser condition as a direct result of visitor use (e.g., good to fair, fair to poor).

Indicator 3: Increase in decibels (dBA) over natural ambient sound levels in a representative high-use area (Center Cave) and a representative low-use area (Middle Cave).

> **Threshold 3:** Anthropogenic noise will not increase above natural ambient sound levels by more than 3 dBA in Center Cave and Middle Cave for 90 percent of daytime hours from 6 a.m. to 6 p.m.
>
> > **Trigger 3a:** Anthropogenic noise will not increase above natural ambient sound levels by more than 1 dB in Center Cave and Middle Cave for 90 percent of daytime hours from 6 a.m. to 6 p.m.
> >
> > **Trigger 3b:** Anthropogenic noise will not increase above natural ambient sound levels by more than 2 dB in Center Cave and Middle Cave for 90 percent of daytime hours from 6 a.m. to 6 p.m.

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

The highly sensitive cave environment is considered a nonrenewable resource. Damage is irreparable, and cave environments have low resiliency, often taking years and sometimes decades to restore and repair. High visitation levels at both entrances are also impacting visitor experiences and constraining the analysis area's ability to accommodate visitor use. However, visitor experience is of lower significance than damage to the highly sensitive cave environment. The project team and managers therefore identified the highly sensitive cave environment as the limiting attribute. The threshold for this limiting attribute (the threshold that would result in the lowest allowable visitor capacity) is threshold 2: Change in the overall site condition to a lesser condition as a direct result of visitor use (e.g., good to fair, fair to poor).

GUIDELINE 4: IDENTIFY CAPACITY

Primary developed entrance capacity. The primary entrance will be managed to include group size limits on guided tours and a reservation system during peak times, with a percentage allocated for a first-come, first-served system. Given the limiting attribute, the highly sensitive cave environment, the project team decided it is better to have smaller group sizes and more frequent trips into the cave, rather than larger groups that have the potential to intentionally or unintentionally cause negative impacts to cave resources. Guided tours, collectively, will take a maximum of 80 people into the cave each day during the off-peak season (October through April). Each guided tour will include no more than 20 people and will run every other hour from 9 a.m. to 5 p.m. (9 a.m., 11 a.m., 1 p.m., and 3 p.m.). For peak season, guided tour frequency will increase and group size will decrease. Each day during peak season (May through September), guided tours will take a maximum of 90 people into the cave. Guided tours will include no more than 10 people and will run every hour from 9 a.m. to 5 p.m. The reservation system will have 8 available slots to reserve, with 2 slots on each tour available on a first-come, first-served basis.

Secondary natural entrance capacity. The natural entrance will be managed by a permit system with group size limits, and visitors will be required to show proof of caving certification from a reputable organization and Leave No Trace training. Given the limiting attribute, the highly sensitive cave environment, the project team decided it is better to have smaller group sizes to decrease the potential for intentional or unintentional negative impacts to cave resources. The permit system will limit groups to between 3 and 10 people, with 3 permits available from 9 a.m. to 1 p.m. and an additional 3 permits available from 1 to 5 p.m. A maximum of 60 people each day will enter the cave system through the natural entrance. Given the level of technical expertise required to enter the natural entrance, no guided tours will originate from this area.

Overall visitor capacity. The project team identified a visitor capacity for Hatu Cave of 150 people per day. The overall visitor capacity is the sum of the visitor capacities for the primary developed and secondary natural entrances. The project team identified reservation and permit systems as a management action for implementing the visitor capacity at each entrance.

IMPLEMENT VISITOR CAPACITY

The project team identified several management strategies and actions to implement visitor capacity and manage within the identified capacity. Management actions related to the primary developed entrance include group size limits on guided tours and a reservation system during peak times, with a percentage allocated for a first-come, first-served system. Management actions related to the secondary natural entrance include a permit system with group size limits. In addition, visitors will be required to show proof of caving certification from a reputable organization and Leave No Trace training. Implementation of visitor capacity will allow the project team to set appropriate group sizes and daily use levels to achieve and maintain desired conditions inside the cave system.

MONITORING AND NEXT STEPS

The visitor capacity for Hatu Cave is intended to achieve and maintain desired conditions and visitor experiences. This involves protecting the world-class karst landscape and providing visitors a diverse range of opportunities to experience the cave, including challenging recreation, with ambient sound levels. The overall visitor capacity of 150 people per day throughout the cave system requires implementation and monitoring that will be conducted as part of the management plan for Hatu Cave. Implementation of the visitor capacity will include collecting baseline conditions and data of the cave floor, cave walls, entrance area footprints, infrastructure, and natural ambient sound levels. Monitoring will include assessments of the baseline conditions and data. Additionally, cave managers intend to conduct a visitor use survey to understand visitor perceptions of their cave experiences.

CASE STUDY 2: VISITOR CAPACITY FOR MULTIPLE ACTIVITIES IN A WILD AND SCENIC RIVER CORRIDOR WITHIN A WILDERNESS

Campers relaxing after a long day on the river.

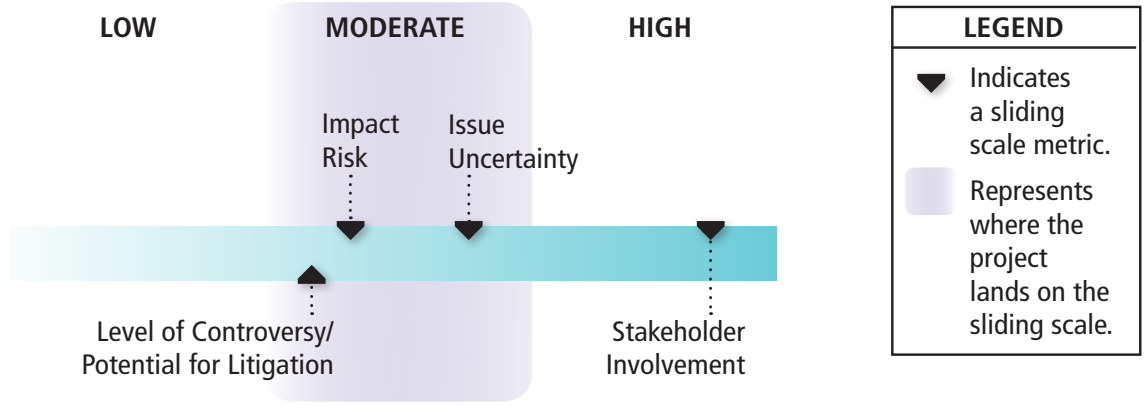
Introduction.

This case study explores the identification of user capacity at the Tundra National Wildlife Refuge. The refuge contains both a wilderness and a wild and scenic river with a wild classification. Identifying a "user capacity" is required by the Wild and Scenic Rivers Act, and for this reason, this case study refers to "user capacity" in place of the term "visitor capacity." River managers are further clarifying outstandingly remarkable values (ORVs) for the Tundra River through a comprehensive river management plan (CRMP) process. The CRMP process will follow the "Visitor Use Management Framework" and recommended steps from the Interagency Wild and Scenic Rivers Coordinating Council to identify user capacity for a designated wild and scenic river. An ORV is a specific river value that is generally identified in the enabling legislation or in a CRMP and may include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. An ORV must be a river-related value that is rare, unique, or exemplary at a regional or national scale.

The Tundra National Wildlife Refuge receives most of its visitation between June and August. Visitor opportunities at the refuge include hunting, fishing, backpacking, and basecamping, which all primarily require the river for access. These visitor opportunities are highly valued for the sense of solitude and immersive experience they provide.

Due to gradual increases in visitation and slow recovery of vegetation, the pristine and fragile setting is experiencing biophysical impacts. Biophysical is defined as the physical and biological environment, not including geologic resources. Since the refuge's establishment and the river's wild and scenic designation shortly after the Wild and Scenic Rivers Act of 1968 was enacted, the public has voiced concerns about the declining visitor experience, including seasonal conflicts between hunting and nonhunting float trips along the river corridor. Additionally, the public has expressed interest in preserving the unique wilderness opportunities available in the refuge (e.g., diverse and immersive experiences while engaged in multinight float hunts; expedition-style treks across pristine landscapes).

Figure 9. Case Study 2: Representation of the four criteria involved in the sliding scale of analysis.



The project team considered the questions in the decision support tool to determine the appropriate level of analysis for identifying user capacity. Wild and scenic rivers offer some of the rarest types of opportunities for recreationists in the United States. A user capacity is legally required, and there is high stakeholder interest in favor of management decisions that protect solitude and immersive experiences. However, the process of identifying user capacity can be conducted by a small, interdisciplinary group of specialists with a modest but targeted scoping effort to address resource impacts caused by visitor use. Based on this reasoning, the project team decided the project falls on the moderate area of the sliding scale of analysis.

GUIDELINE 1: DETERMINE THE ANALYSIS AREA

Managers initially intended to view the entire unit holistically, with a general need for "preservation of wilderness characteristics." As a result of this initial effort, a group size limit of 6 persons and a maximum trip length of 10 days were established for all activities. However, after further review, the project team determined the analysis area should be the river corridor as defined in the enabling legislation for the river. The river contains clear visitor use patterns and impacts, such as seasonal conflicts between hunting and nonhunting groups along the river corridor. Additionally, the river has increasingly diverse visitor uses, such as packrafting. As this river is a designated wild and scenic river, there is a need to identify user capacities for the river corridor (¼ mile from each bank) to ensure the protection and enhancement of identified ORVs. This 50-mile river has one segment that is classified as "wild."

The analysis area is the wild and scenic river corridor (1/4 mile from each bank). User capacity is legally required, and the amounts and types of visitor use are directly related to achieving and maintaining desired conditions of the river values. The visitor capacity decision is likely to be moderate on the sliding scale of analysis.

GUIDELINE 2: REVIEW EXISTING DIRECTION AND KNOWLEDGE

Review prior applicable planning and guidance.

A review of applicable existing direction and information started with reviews of the Wilderness Act and the Wild and Scenic Rivers Act, including the legal requirements to address user capacity on designated river corridors. These legal requirements are expanded upon in the 1982 Final Revised Guidelines for Eligibility, Classification, and Management of River Areas. Additionally, law specific to the National Wildlife Refuge System (16 U.S.C. 668dd-668ee) prioritizes wildlife-dependent recreational activities, including hunting and fishing, over nonwildlife-dependent recreation, such as whitewater kayaking.

The initial eligibility study for this river documents that the wild river segment has three ORVs, including recreational, scenic, and biological. While the refuge does have a comprehensive conservation plan (CCP), this plan does not meet the legal requirements of a CRMP or define a user capacity.

The highest priority desired condition in the wild segment of the river is to preserve unique opportunities for solitude. Solitude is a primary wilderness characteristic and the most endangered opportunity on the river. Lack of solitude is also a prominent threat to pristine conditions, potentially degrading visitor experiences and biophysical conditions.

Review existing conditions in the analysis area as well as indicators, triggers, and thresholds.

The project team summarized information about visitor use characteristics, including the amounts, types, timing, and distribution of visitor use. Four types of visitor use occur throughout the river corridor: (1) river-dependent hunting and wildlife viewing floats; (2) hunting (on foot); (3) semi-river-dependent backpacking and packrafting; and (4) basecamping. For the analysis area, it is important to understand the difference between access/egress areas. River access/egress areas are defined as areas receiving concentrated basecamper use that also include both plane landing areas and raft put-in and take-out areas to access lands and waters. Basecampers are a distinct user group with a unique set of impacts due to extended duration at one site relatively near to an access/egress point.

The project team determined that identifying a user capacity would enhance visitor experience. The wild river segment also involves sensitive, rare, or irreplaceable natural resources and uniquely pristine biophysical conditions. The wild river segment's experiential and biophysical resources are unique in the region, and agency personnel are closely following the project. While stakeholder interest is high, the stakeholders who visit are considered a very small segment of the public. The legal requirement for user capacity is clear, and most stakeholders are in favor of protecting the wild river segment. Taken as a whole, there is no direction or knowledge that elevates the level of analysis beyond the moderate level determined earlier in the process.

Next, the project team focused on reviewing the indicators, and thresholds, which were developed during preparation of the CRMP. The indicators and thresholds were identified from the river's ORVs and apply to the entire length of the river. Indicators and thresholds were identified based on visitor survey data and professional judgment to ensure appropriate monitoring protocols could be established to achieve and maintain desired conditions. The project team examined the relationship between visitor use and impacts for each indicator and threshold to identify at what point and under what conditions thresholds might be reached and at what point resource conditions and visitor experiences would be at risk of unacceptable impacts from additional visitor use. A summary of each type of visitor activity follows, including associated data and desired conditions, indicators, and thresholds.

River-dependent hunting and wildlife viewing floats. These visitors depend on and concentrate along the river corridor. They are able to readily disperse, and they seek rare solitude opportunities, such as float-hunting while witnessing a caribou migration. Existing conditions include a per-trip average of viewing just over two other groups (consisting of one float-hunting group along the river corridor, one basecamping group at a stationary point along the river corridor, and one backpacking or packrafting group). Refuge visitation data show that roughly 175 visitors travel the river corridor each year. Visitor satisfaction survey results indicate that river floaters with a focus on wildlife viewing show less concern for solitude opportunities than float-hunting groups and packrafters. A packrafter is a backpacker who also carries an inflatable boat (packraft) to navigate bodies of water. Biological studies conclude that impacts on wildlife from human-wildlife encounters along the river corridor are insignificant. This finding is linked to the timing of human-wildlife encounters, which occur during the post-calving migration of caribou.

Indicator 1: Encounter rates at river access or egress areas.

> **Threshold 1:** Individual groups encounter no more than one other party at one time at river access or egress areas. Individual groups encounter no more than two other parties by sight or sound at river access or egress areas over a 5-day period.

Indicator 2: Percentage of time within sight or sound of another party on the river (primary indicator). Note: Since rafters can disperse more readily than other user groups within the river corridor, managers can institute a dispersal requirement for rafters.

> **Threshold 2:** Individual groups encounter other groups no more than 5 percent of their entire trip (based on the 10-day maximum trip length).

Hunting (on foot). This type of visitor use refers to foot-based hunting that does not entirely depend on the river corridor and involves more dispersed recreation. Through surveys and focus groups, the project team identified solitude as a key attribute for this category. Hunting within sight or sound of other hunters is a major concern for this type of visitor use. There is a low concern for solitude while staging at an access point prior to a hunt. The 10-day maximum trip length applies to nonboating hunting, river-dependent hunting, and wildlife viewing floats. Past visitation data show that a minimum of 40 and a maximum of 60 hunters have used each of the refuge drainages each season for the past 5 years. While hunting in proximity to other types of visitor use could pose issues for soundscapes in theory, there is not a documented history of this as a pervasive issue.

Indicator 1: Encounter rates between hunting groups.

Threshold 1: Individual groups encounter no more than four other parties by sight or sound from the access areas per trip (within first 2 and last 2 days of trip).

Threshold 2: Individual groups encounter no other parties during the primary hunt phase of their trip (middle 3 days of trip).

Semi-river-dependent backpacking and packrafting. This type of visitor use involves occasional reliance on the river corridor and maximum capability for dispersal, to obtain the highest degree of solitude. Semi-river-dependent backpacking and packrafting are a low threat to the solitude experiences of other types of visitor uses due to their smaller average group size and dispersed camping patterns in the Tundra National Wildlife Refuge. The desired condition is for semi-river-dependent backpacking and packrafting groups to experience no more than minimal impacts on their solitude. These visitor uses have no known conflicts, and their estimated levels are nowhere near a threat to thresholds for solitude. Past visitation data show that about 50 backpacking parties of no more than 6 individuals per party visit the refuge each year. An undetermined number of those parties are packrafting—using small, inflatable boats to cross secondary tributaries.

Indicator 1: Number of groups encountered.

Threshold 1: Individual groups encounter no more than four other parties within sight or sound of the access areas per trip (within first 2 and last 2 days of trip).

Indicator 2: Percentage of time within sight or sound of other groups at access areas.

Threshold 2: Individual groups encounter no other parties by sight or sound during the primary phase of their trip (middle 3 days of trip).

Basecamping. Basecamping occurs for extended periods at stationary locations near access/egress areas, as well as along the river corridor, but usually out of sight from the river. The visitor use patterns of this activity cause a greater concentration of biophysical impacts than other types of activities. Basecamping groups are encouraged to establish camps as far from access/egress areas as possible to disperse impacts, but many basecamps are established within 1 mile of access/egress areas. Basecampers are required to establish basecamps beyond sight of access/egress areas. This requirement maximizes opportunities for solitude by limiting interactions with other groups while dispersing biophysical impacts from access/egress areas. Significant impacts on vegetation are attributed to basecampers who establish basecamps on tundra within the vicinity of access/egress areas.

Restroom located on a boardwalk.

Indicator 1: Number of basecamps along the river corridor at one time.

Threshold 1: No more than one basecamp within sight of any segment of the river corridor at any one time.

Indicator 2: Number of basecamps within the vicinity of access/egress areas or within sight of access/egress areas.

Threshold 2: No basecamps within 1 mile of access/egress areas or within sight of access/egress areas, whichever distance is greater.

Administrative use. Air travel is frequently used in this area for both administrative and visitor use. Visitors use air travel to access the area. The agency uses aircraft for a variety of management activities (e.g., aerial counts of sheep or caribou). At some point, the number of flights over the river corridor could impact a visitor's sense of solitude (related to both wilderness character and the recreational ORV).

Indicator 1: Number of administrative flights over the river corridor per day.

Threshold 1: No more than two administrative flights per day over the river corridor.

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

The project team identified temporal congestion at the access and egress areas of the river as the most limiting attribute. The limiting attribute is based on the desired condition of preserving unique opportunities for solitude (related to recreation ORV and wilderness character), which is the desired condition most sensitive to visitor use levels in the river corridor. Solitude is a primary wilderness characteristic and the most endangered opportunity in the river corridor. Lack of solitude is also a significant threat to pristine conditions, potentially adversely affecting the visitor experience and biophysical resources.

Temporal congestion. Congestion at access/egress points erodes solitude and scenic conditions during caribou migration and hunting seasons. Hunters and other recreational visitors seek solitude and pristine scenery, and multiple parties use the same access/egress points.

GUIDELINE 4: IDENTIFY CAPACITY

Using monitoring data, visitor use numbers, research, lessons learned from comparable areas, and best professional judgment, the project team identified capacity, indicators, thresholds, and the most limiting attribute. A discussion of user capacity by activity type follows, including a brief explanation of management strategies and actions to achieve and maintain desired conditions.

River-dependent hunting and wildlife viewing floats. User capacity was up to 30 groups per season based on the average 90-day annual summer visitation season. Based on established group size limits of 6 individuals, this equals 180 individuals per season engaged in this type of visitor use. The refuge established visit launch dates to disperse use in 3-day increments. The user capacity and associated management action increase opportunities for solitude by distributing use and relieving temporal congestion at access/egress points.

Hunting (on foot). The project team identified a user capacity for this activity type based on current use and desired conditions. Current use levels were based on reports submitted by commercial air service providers. The project team identified user capacity as 60 hunters each season dispersed across the headwater drainages and divided by the number of drainages sharing a pass. The project team arrived at this number by using the approximate 30-day hunting season, with 10 distinct 3-day hunting segments and a maximum group size of 6 hunters. Accordingly, some drainages have a user capacity of as many as 30 hunters (5 hunting groups) each season, and other drainages have as few as 6 hunters (1 hunting group) each season.

Semi-river-dependent backpacking and packrafting. Use levels for semi-river-dependent backpacking and packrafting are stable and very low. The project team found that for this specific activity, desired conditions could be achieved without identifying a capacity. However, since the activity occurs in the wild and scenic river corridor, it should be included as a part of the user capacities.

The project team established a user capacity based on available information. User capacity will remain at current levels, which is 50 backpacking parties of no more than 6 individuals per party per year.

Basecamping. The user capacity for basecamping within the river corridor was identified as 5 groups of up to 6 individuals per group within sight of any river segment at any one time and no basecamps within 1 mile of access/egress areas or within sight of access/egress areas, whichever is greater. The user capacity for basecamping contributes to maximizing opportunities for solitude and was identified based on best available information to achieve and maintain desired conditions.

Administrative use. Agency personnel will access this area for ongoing monitoring, as well as other visitor and resource protection-related activities (e.g., search and rescue). The user capacity for monitoring each river corridor is 1 group of up to 5 staff per week. Additionally, subsistence hunting occurs within the river corridor. In consultation with tribes, a user capacity of 2 groups of up to 6 people per week was identified to meet subsistence needs, as well as resource and river value protection goals.

After reviewing the total of all user capacities identified for the river corridor, both weekly and annually, agency personnel determined the river corridor could sustain this level of use while protecting both wilderness character and river values.

IMPLEMENT VISITOR CAPACITY

River-Dependent Hunting and Wildlife Viewing Floats. The refuge maintained user capacity from the previous season. As a management action, the refuge established visit launch dates to disperse use by 3-day increments. The user capacity and management action seek to increase opportunities for solitude by distributing use and relieving temporal congestion at access/egress points. Launch dates will be implemented through an online reservation system.

Hunting (on foot). The majority of hunters on foot hunt sheep in high elevations near mountain passes. These hunters hunt above the river corridor on very steep slopes immediately adjacent to the river. As a management strategy, the project team decided to disperse hunting across the headwater drainages for each pass within the wild segment of the river. The project team discussed best practices for managing use levels and decided that, in addition to state-issued hunting permits, visitors should be required to reserve refuge-issued access permits. This conflicts with the intent to offer freedom from regulation. However, since opportunities for solitude ranked highest among hunters, this tradeoff made the most sense in order to not displace users seeking the highest quality wilderness sheep hunt on slopes above the river corridor.

Semi-river dependent backpacking and packrafting. The project team stressed the need to more precisely identify and maintain information about current and appropriate levels of this visitor activity, so that information for effectively evaluating necessary modifications to the user capacity is available in the future. Managers identified educational messaging as a management strategy to explain that, due to their mode of travel, it is expected visitors backpacking and packrafting will leave access/egress areas and major river drainages to find the solitude they seek. Additional messaging may include managing visitor expectations by providing information about high-use times and areas. A future management strategy may involve providing information about areas that are of lesser value to hunters or basecampers but might appeal to backpackers.

Basecamping. Implementing this user capacity included instituting a management action that requires no basecamps within 1 mile of access/egress areas or within sight of access/egress areas, whichever distance is greater. In addition, law enforcement will increase patrols and issue citations as necessary.

MONITORING AND NEXT STEPS

In addition to ensuring the previously described indicators are achieving and maintaining desired conditions, the following monitoring activities also support awareness of wilderness character and river ORVs. If future monitoring reveals that use levels are affecting opportunities for solitude or the river's ORVs, adaptive action may be taken to reallocate or adjust use levels to correct resource or experiential conditions.

River-dependent hunting and wildlife viewing floats. The project team created monitoring plans to assess whether the threshold of encountering no more than two other parties by sight or sound at river access or egress points over a 5-day period (with a 10-day maximum trip length) is approached. The project team also incorporated social and biological research studies to gather impact data and to evaluate whether the refuge can increase the threshold for the encounter rates indicator during caribou migration. The project team created an exit log for groups to document the frequency in which they were camping within sight or sound of other groups.

Basecamping. The project team adopted a volunteer citizen science monitoring effort to collect baseline and ongoing data about basecamp impacts on tundra outside of the immediate river area (i.e., along the outer edge of the minimum required distance of 1 mile from access/egress areas and at sites likely to receive frequent use because they are outside the view of access/egress areas). Future planning efforts will evaluate the potential need to also identify a capacity for basecampers located outside the river corridor.

The project team used professional judgment, the decision support tool, a variety of data, and interdisciplinary involvement. This case study illustrates identification of user capacity that is required by law, even if visitation is low and experiential and biophysical threats are only emerging. The four types of visitor activities offer general considerations to weigh when managing to preserve untrammeled conditions. Management strategies and actions relating to visitor activities support the refuge's overarching desired condition, which is "to preserve unique opportunities to experience solitude in a pristine landscape-scale, wilderness setting," yet the management strategies and actions vary as needed to reflect differences in user group expectations.

CASE STUDY 3: TRAIL CAPACITY CONSIDERING FUTURE COMMERCIAL SERVICES

This case study involves identifying visitor capacity for a trail that is a component of a larger trail system, including determining whether the trail could accommodate commercial services. This case study includes a second scenario that illustrates how the limiting attribute can influence visitor capacity and can be used to identify management actions. This case study provides an example in which a trail is part of a four-trail system and needs an overall visitor capacity to better manage use and meet desired conditions.

Hiker traveling along a forested trail through fog.

Introduction.

The Greatview Trail is located within Rocky Falls National Forest and is one of four components of a larger trail system. The Greatview Trial primarily receives day use and is situated within a growing community. Monitoring of trail conditions indicates that desired conditions are being achieved. Commercial service providers are interested in providing guided hikes. A visitor capacity is not legally required, as the trail is not a national scenic or national historic trail. However, the agency has decided to identify visitor capacity to determine whether the trail could accommodate commercial services in addition to current visitor use. The Forest Service's Recreation Special Uses Handbook, Forest Service Handbook 2709.14, section 53.1f states this:

> *"When monitoring demonstrates that impacts associated with use may exceed desired conditions, conduct a resource capacity analysis to assess the amount of use and types of activities that may be conducted without detrimental environmental and associated impacts."*

After identifying a visitor capacity, the project team will determine how much, if any, of that visitor capacity may be allocated to commercial services. Because the trail is primarily used during the day and the purpose of this analysis is to determine whether commercial services can be accommodated, the visitor capacity will be identified for 9 a.m. to 5 p.m. (when guides would operate) and when use levels are the highest.

There is relatively high interest among stakeholders regarding current and future use of Greatview Trail. Many of the interested stakeholders are also trail volunteers and have vested interest in protection of the trail and larger trail system. This trail system is one of the few opportunities in the vicinity to connect visitors to the National Forest System and provide interpretation of cultural resources that are no longer present in the analysis area (i.e., a historic trail once crossed through the area but has been revegetated). An archaeological survey of the analysis area highlighted the unlikeliness that current or future use will damage the cultural resources in the area. The project team determined a small interdisciplinary team, with input from the local parks and recreation department, could complete the process to identify visitor capacity. Based on these factors, this analysis area is rated low to moderate on the sliding scale of analysis.

GUIDELINE 1: DETERMINE THE ANALYSIS AREA(S)

Greatview Trail is a 5-mile out-and-back trail in the Rocky Falls National Forest. Greatview Trail connects to other popular trails and is one of four trails in a larger trail system. Visitors access each of the four trails from different parking areas, and the trail system gives visitors opportunities to reach high-elevation scenic vistas and low-elevation meadows. The trails have very little overlap but do have multiple intersections. The parking lot at the trailhead has limited parking spaces and cannot be expanded due to natural features on either side. Because of limited parking spaces, Greatview Trail provides a quiet and reflective experience with a low to moderate number of interactions with other people.

Most visitors who begin on other trails within the system desire to make loops and return to the parking lot from which they originated. Some visitors connect to the Greatview Trail, but the trail is most often used by visitors who travel out and back from the Greatview Trailhead parking area. Visitor capacities for the other three trails were determined in previous planning efforts and were considered during this analysis.

The analysis area is the 5-mile Greatview Trail including the trailhead. A visitor capacity is needed to determine whether the trail can accommodate commercial services. The Rocky Falls National Forest staff plans to manage visitor use for the larger trail system. Visitor capacities for the other three trails in the trail system have been identified. The visitor capacity decision is low to moderate on the sliding scale of analysis.

GUIDELINE 2. REVIEW EXISTING DIRECTION AND KNOWLEDGE

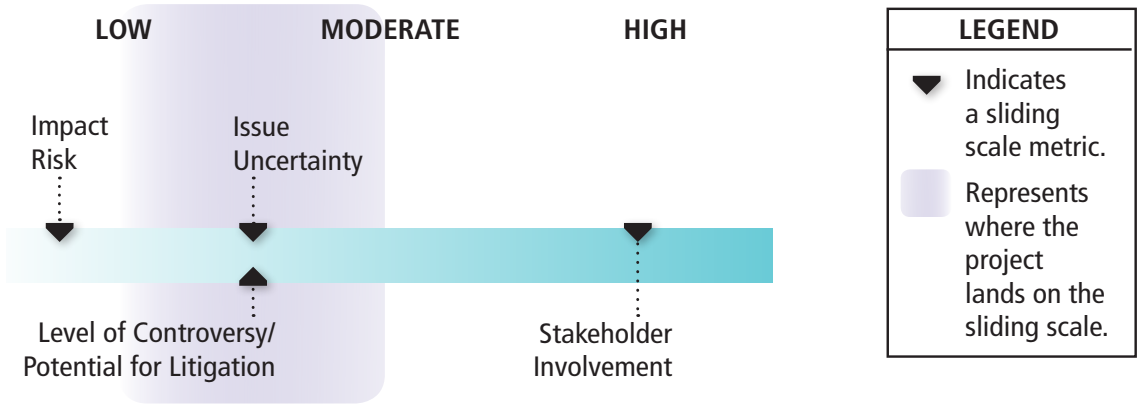
Review prior applicable planning and guidance.

Desired conditions for the Greatview Trail were established through a public process when the Rocky Falls National Forest completed an environmental impact statement for a forest plan revision covering the trail. The forest plan established the Recreation Opportunity Spectrum (ROS) class for the Greatview Trail as roaded natural. The roaded natural class is:

> Characterized by predominantly natural-appearing environments with moderate evidences of the sights and sound of humans. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

The sliding scale of analysis was considered in reviewing applicable existing direction and knowledge. Based on the questions in the decision support tool, the project team determined that significant consequences to natural and cultural resources are not likely. However, some damage to natural resources is occurring at the trailhead parking area from unauthorized parking. Because of increased visitation and interest in providing commercial services, identification of visitor capacity is somewhat time sensitive. The visitor capacity for this trail could displace some visitors in the future, but overall, implementation of the visitor capacity would improve the visitor experience on Greatview Trail. The analysis area does not contain sensitive, rare, or irreplaceable cultural or natural resources or uniquely pristine biophysical resource conditions. Based on the questions in the decision support tool, the trail is an important resource to the local community and day-use visitors. There is a relatively high amount of interest in this trail from local users, nearby communities, and commercial service providers. Most stakeholders favor protection of the area. Overall, the visitor capacity decision is likely to fall in the low to moderate range of the sliding scale of analysis.

Figure 10. Case Study 3: Representation of the four criteria involved in the sliding scale of analysis.



Review existing conditions in the analysis area.

The trail system, of which Greatview Trail is a part, connects the nearby community, population of 30,000, to the Rocky Falls National Forest. Residents are active trail users and use the Greatview Trail for dog walking and running in the early evenings, typically from 4 to 7 p.m. User groups range from single trail users to families, with an average group size of 2.5 people. The community has become a very popular visitor destination because of its relatively short distance from a large urban area. The visitor experience along Greatview Trail is good, and desired conditions have been achieved and are being maintained. However, there are parking concerns and an increasing interest in providing commercial services along the trail because of its great views, short distance, and relatively easy terrain.

Most of the trail use occurs during the day. Monitoring data collected two summers ago suggest people spend an average of 3 hours on the trail. This accounts for the different speeds at which groups or individuals travel; for instance, runners use the trail at a much faster pace than hikers. Groups encounter other groups both coming and going on Greatview Trail. Data also indicate that on weekdays from 9 a.m. to 5 p.m., approximately 5 groups at a time hike the trail. These groups are typically spread throughout the day, and often only 1 group is on the trail at a time. Use increases to approximately 6 groups at a time between 4 and 7 p.m. The Greatview Trail closes at dusk. There is typically only one rush of visitation on weekday evenings, with hikers arriving between 4 and 5 p.m., and there is usually excess parking. Visitor use remained relatively constant throughout the monitoring conducted during the visitor capacity process. The data were used to confirm the baseline condition and to inform the visitor capacity.

On holiday weekends, the parking lot is often full, resulting in one or more cars having to park along the road near the trailhead. During these weekends, the parking lot fills by 10 a.m. and turns over about every 3 hours. Open parking spots typically fill within the next hour. Monitoring data also indicate that one group turns away due to the full parking lot approximately every hour on holiday weekends between 10 a.m. and 3 p.m. When cars park along the road, safety becomes a concern because there is less room for other vehicles to pass. Larger emergency vehicles would be unable to reach the trailhead if there were too many vehicles parked along the road. On average weekends, the parking lot is occasionally full.

The parking lot has room for 10 passenger vehicles. Two major subdivisions are within walking distance of the trail, allowing some hikers and runners to access the trail without driving. During 2 weekends in June 2 years ago, Forest Service volunteers counted approximately 6 groups per day that accessed the trail without a vehicle.

Review indicators and thresholds.

Indicators and thresholds for the Greatview Trail were established through a public process when the Rocky Falls National Forest completed an environmental impact statement for a forest plan revision covering the trail. For the Rocky Falls National Forest monitoring strategy, a "day" is considered between the hours of 9.a.m. and 5 p.m., and this applies to indicators and associated thresholds in both scenarios.

The forest plan guidelines describe the conditions for social encounters as the following: "Visitors meet less than 30 other groups per day on trails and in dispersed areas, during at least 80 percent of the primary use season. Users may meet numerous other groups on roads and developed recreation sites." The forest plan guidelines also describe the conditions for the site design capacity as the following: "Developed recreation sites often are at full capacity but do not exceed 80 percent of the site design capacity over the season of use."

Indicator 1: Number of visitor encounters with other groups on the trail per day.

> **Threshold 1:** Individual groups encounter no more than 30 other groups per day, during at least 80 percent of the primary use season.

Indicator 2: Number of cars in the parking lot per day.

> **Threshold 2:** The parking lot is at full capacity less than 80 percent of the time (10 cars is current supply of parking).

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

The project team identified the limiting attribute as the social encounter rate. The roaded natural ROS class suggests that interaction among user groups may be low to moderate, but with evidence of other users prevalent. The project team discussed selecting site design capacity of the parking lot as a limiting attribute. However, they decided not to do so. Changes to infrastructure and other factors outside the analysis area could induce more visitors into the area without changes to physical characteristics within the analysis area. For example, if the nearby community began a shuttle service that could deliver 40 or more visitors every hour, it could significantly alter the visitor experience at Greatview Trail, while keeping the current parking lot the same. However, the visitor capacity involves the total number of visitors to the analysis area regardless of how it is accessed.

GUIDELINE 4: IDENTIFY CAPACITY

Scenario 1. When identifying visitor capacity for Greatview Trail, it is important to analyze the limiting attribute. Using monitoring data from 2 years ago and assuming that every group travels the same speed, about 25 groups can use the 5-mile Greatview Trail at the same time and still meet the threshold of fewer than 30 encounters per trail visit. Therefore, the project team estimates that 25 groups hiking at one time is within the desired encounter rate. Although runners and fast walkers travel faster and may experience more than 30 encounters, there are many more groups that travel at a slower pace, and those traveling at a faster pace should expect to encounter more people. If each group takes an average of 3 hours on the trail, the project team identified the visitor capacity as 66 groups per day [(8 hours per day/3 hours per trip) x 25 groups = 66 groups per day].

Allocation for commercial service. The visitor capacity process shows that desired conditions would be maintained with higher levels of use than the current parking lot design can accommodate. The analysis found that the trail can accommodate 66 groups per day while maintaining desired conditions, but the parking lot allows for only 32 groups per day to access the trailhead. Because the parking lot is already full by 10 a.m. on holiday weekends, preventing visitors from accessing the trail in personal vehicles, the Rocky Falls National Forest could consider allowing guided hikes during weekdays as a way for additional visitors to experience the trail. Staff will also encourage more visitors to walk or bike to the trailhead to accommodate space for additional visitors in the parking lot on holiday weekends. The total amount of visitation, whether by private car, guided trip, or other means, should not exceed the visitor capacity of 66 groups per day. Staff will continue to monitor visitation and increase monitoring on weekends to ensure that as more visitors use alternative modes of transportation, desired conditions of the Greatview Trail are maintained and resources are protected.

Trail system visitor capacity. The larger trail system visitor capacity is 326 groups per day (including mountain biking groups), which is the sum of the visitor capacities of all four trails in the system. The three other trails in the system already had identified visitor capacities. During the Greatview Trail visitor capacity process, there was no interest in providing commercial services on the other trails, but in the future, a commercial services allocation could be considered for the overall trail system or for other individual trails in the system.

Greatview Trail: 66 groups per day (with an average of 2.5 people per group)

Blue Lake Trail: 90 groups per day (seasonal closures)

Rocky Hill Trail: 40 groups per day; 10 mountain biking groups per day

Interpretive Walking Trail: 120 groups per day

Scenario 2. The variation in this scenario is intended to show how changes to the parking lot could affect the limiting attribute of the visitor capacity, which is the social encounter rate.

The Greatview Trail has a parking lot that accommodates 25 passenger vehicles (as opposed to 10 passenger vehicles in the other scenario). The project team interpreted 25 vehicles as 25 groups per day. Monitoring data suggest 6 groups access the trail without a vehicle. The daily capacity of the parking lot plus the number of groups that access the trail without vehicles result in 72 groups per day [[(8 hours per day/3 hours per trip) x 25 groups] + 6 groups without vehicles = 72 groups per day].

The project team identified the visitor capacity as 66 groups per day in the previous scenario. Therefore, the parking lot in this scenario is too large, since it would allow 72 groups per day on the trail. For this scenario to be within the visitor capacity of 66 groups per day, the parking lot must be modified to accommodate up to 22 passenger vehicles [[8 hours per day/3 hours per trip) x 22 groups] + 6 groups without vehicles = 64 groups per day].

Limiting attribute. The limiting attribute of this scenario is the social encounter rate. The parking lot could support 72 groups per day, whereas the visitor capacity is 66 groups per day (table 3).

Table 3. Indicators, thresholds, and visitor capacity.

SCENARIO	VISITOR CAPACITY
Scenario 1	Visitor capacity is 66 groups per day. Parking can accommodate 32 groups per day.
Scenario 2 (larger parking lot)	Visitor capacity is 66 groups per day. The daily capacity of the parking lot plus 6 groups that access the trail without vehicles is 72 groups per day.

Trail system visitor capacity. There are no new areas open to visitor use or any management strategies or actions that could support increased visitation for the larger trail system. Thus, the visitor capacity for the trail system remains the same, regardless of which scenario is selected.

Commercial services allocation. Now that the project team has identified a visitor capacity, managers can assess whether a portion of the visitor capacity may be allocated for commercial services. In scenario 1, there is sufficient capacity to allow commercial services during weekdays from 9 a.m. to 5 p.m. and still maintain desired conditions; current weekday use is approximately 5 groups per day, and the visitor capacity is 66 groups per day.

In scenario 2, the larger parking lot could create conditions that would not be consistent with desired conditions. Managers would need to evaluate reducing group sizes or reducing the number of parking spaces by restoring portions of the parking lot, if possible. If commercial service opportunities are desired, managers could use a commercial allocation of the visitor capacity to ensure desired conditions are maintained and encounter rate thresholds are not exceeded.

IMPLEMENT VISITOR CAPACITY

In both scenarios, managers could also consider management strategies and actions to allocate visitor use equally among different types of uses. In scenario 1, managers could explore options to provide additional access to different use types to accommodate more visitor use (e.g., by providing bicycle racks to encourage visitors to bike to the trailhead). Monitoring data would also influence subsequent management strategies and actions and would be incorporated into any adaptive management strategies put in place. The national forest will enhance monitoring of encounters between groups and the number of vehicles in the parking lot to ensure desired conditions are being maintained.

MONITORING AND NEXT STEPS

The national forest staff will install pneumatic tube traffic counters at the parking lot to determine how many vehicles are entering and exiting. Staff will also regularly count visitors at the trailhead on a standardized schedule throughout the season to gain a better understanding of the distribution of groups. In addition, every 5 years, the staff will survey visitors at the trail and is considering asking visitors to use the Global Positioning System on their smartphones, which will allow staff to obtain a better sense of changing visitor use patterns, including duration of visits.

This case study explored a relatively common example of identifying visitor capacity for a low- to moderate-use community trail that is receiving increased interest in weekend visitation and generating interest in providing commercial services and that is a part of a larger trail system. Identifying visitor capacity for each trail in the system can occur at different times and stages of area management. For example, identifying visitor capacity may be in response to a visitor-related issue or, in this case, as a good management practice to ensure desired conditions are maintained and to assess visitor capacity for commercial services. This case study also demonstrates how a visitor capacity for a trail can be integrated into the visitor capacity for a trail system.

CASE STUDY 4: REVISITING VISITOR CAPACITIES AFTER DECADES OF USE

Backpacking group breaks at a high alpine wilderness lake.

This case study involves revisiting visitor capacities that were established for a wilderness in the 1990s using the Wilderness Recreation Opportunity Spectrum (WROS), which is the combination of physical, biological, social, and management conditions that gives value to a place. Wilderness managers are revisiting the visitor capacities because of evidence that desired conditions are not being maintained in accordance with a previously prepared needs assessment and extent necessary determination. Heavy use is concentrated at a few popular destinations and trailheads, while large portions of steep off-trail areas remain sparsely used.

Introduction.

The Turquoise Lake Wilderness receives most of its visitation from July through September. Visitor opportunities include hunting, fishing, backpacking, and day hiking. Trail running is becoming more popular, while overnight use and use with stock are declining.

Using the decision support tool, managers determined that the analysis area merits a moderate level of analysis. Issues are well known and documented. However, there is a high level of interest in and controversy associated with any action or change that would restrict or confine visitors in the analysis area. Also, a moderate level of impact on adjacent lands is possible if visitor capacity is not addressed, because visitors are dispersing to other, less used locations. There is a moderate level of threat to resources associated with visitor use, including vegetation loss, a high level of encounters, camping in closed areas because sites in open areas are occupied, and erosion near lakeshores. Encounters refer to the number of people seen or heard as defined by wilderness solitude monitoring protocols developed by the U.S. Forest Service. It is noted that there can be considerable variation on the measurement of encounters, including whether off-trail noise is included; the speed, direction, and other duties being performed by the data collector; and the often random nature of patrols. If possible, other indicators should be used to measure the social experience to account for errors and differences in encounter monitoring. If visitor capacities are not addressed, impacts will continue at a moderate level due to new technology, increased interest through social media, and changing climate, which is allowing for earlier access due to less snowpack.

GUIDELINE 1: DETERMINE THE ANALYSIS AREA(S)

In some wilderness areas, clear patterns of use and desired conditions lend themselves to identifying visitor capacities for different WROS classes, defined at the Turquoise Lake Wilderness as zones. The geographic extent of visitation is primarily local due to the alpine terrain that is not found anywhere else in the subregional area (south of a major mountain range). However, there is a high level of visitation from outside the local community. Visitor capacity decisions made here will affect visitor use patterns in other areas.

Tents set up in a mountainous landscape.

The WROS was developed for wilderness. The wilderness stewardship plan for the Turquoise Lake Wilderness establishes pristine, primitive, and semi-primitive zones, with each having different encounter rates, group sizes, and desired conditions. Following is a brief description of each zone as described in the stewardship plan.

Pristine areas mainly include remote, trail-less portions of the wilderness. Informal (visitor-created) trails may exist in limited numbers. Visiting these areas requires route-finding skills and navigation of steep terrain. While the potential for limiting attributes (impacts to both social and environmental resources) exists, the difficult, mostly seasonal access and varied destination points temper this potential.

Primitive areas encompass many popular lake destinations. In some cases, visitors may experience a high density of visitors, and there are occasional impacts to environmental resources from unskilled or inappropriate use of campsites or stock containment problems. However, there are many destinations to choose from in this area.

Semi-primitive areas occur near high-use trailheads where visitor concentrations are relatively high before dispersing throughout the wilderness. A high density of visitors is occasional, mostly seasonal, but occurs in a rapid manner (groups passing each other and sometimes within sight and sound of campsites). The opportunity for dispersal is lower because most of this zone occurs in the corridors, surrounded by steep terrain, and most parties are traveling to similar destinations.

Visitor capacity is directly related to achieving and maintaining desired conditions. The most meaningful analysis areas are each wilderness zone. The visitor capacity decision is at the moderate to high range on the sliding scale of analysis.

The pristine zone is visited only occasionally and typically by smaller groups seeking a challenge, such as scaling a peak. The primitive zone is mostly too far to reach in a day hike and in many places is unsuitable for recreational livestock grazing because of lack of forage and confinement areas. Most day use and overnight equestrian use occur in the semi-primitive zone.

For several reasons, managers decided to revisit the visitor capacity of each zone, as was done in the original 1990s wilderness stewardship plan. One of the challenges of zone management is visitors can easily pass through one or more zones on a single trip. However, since each zone has its own desired conditions, each zone should have a visitor capacity. Identifying visitor capacities allows managers to achieve and maintain the desired conditions for each zone, such as trail-less, high peaks of the pristine zone where solitude is expected and few campsites are found versus the heavily traveled corridors of the semi-primitive zone.

GUIDELINE 2: REVIEW EXISTING DIRECTION AND KNOWLEDGE

Review prior applicable planning and guidance.

In reviewing applicable existing direction and information, managers also summarized information about visitor use characteristics, including the amount, type, timing, and distribution of visitor use. Managers examined current use patterns through wilderness permit data and encounter information. The current distribution and types of use are very similar to those described in the wilderness stewardship plan.

The project team reviewed the existing wilderness stewardship plan, the applicable forest plan, current visitor use patterns, and known visitor activities.

Forest plan. This plan provides general guidance for wilderness. The following forest plan guideline is relevant to this effort:

> Constrain user group sizes, use of recreational livestock, campsite locations, and certain other activities, as needed, to protect resources and wilderness values. This may include closure of some areas to horse traffic and managing the number of persons allowed to enter the area if other techniques for controlling resource damage prove unsuccessful.

Wilderness stewardship plan: This plan contains a visitor capacity, desired conditions, and indicators and thresholds for each zone. The visitor capacities are based on encounters and the applicable WROS class. The desired conditions in the stewardship plan read as follows:

> Manage under a nondegradation principle, which seeks to maintain the wilderness in at least as wild a condition as it was at the time of classification. The nondegradation principle applies to all values of wilderness: biophysical (i.e., the physical and biological environmental) and social. The evidence of

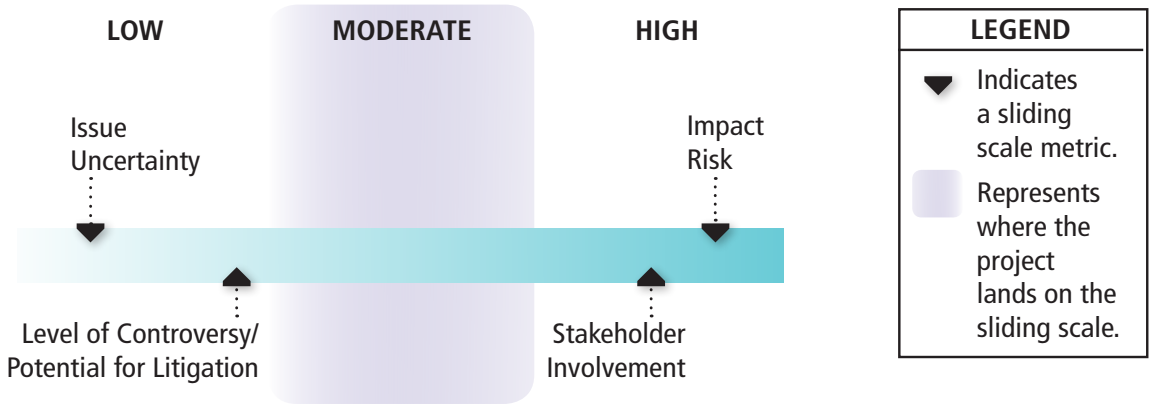
human activity and impact, and the overall characteristics of the area, vary by WROS class. Displacement of recreation use and impacts does not occur from areas of high use to areas of low use within the wilderness for the purpose of accommodating more visitors.

Review existing conditions in the analysis area.

Wilderness rangers patrol the wilderness from May to October. They document encounters, group sizes, visitor activities, and illegal actions. Self-registering permits are required for wilderness visitors, including for day use. These permits are available at most trailheads accessing the wilderness. Group sizes vary by zone where the pristine zone group size is six, primitive and semi-primitive is six-twelve. Monitoring shows that compliance rates are high (85 percent). Recent analysis of the data provided from the permits shows that visitor use continues to be concentrated in the same lake region as described in the wilderness stewardship plan. The majority of use occurs on foot from July through September. Average visitor use is between 15,000 and 20,000 visitors per year. Overnight use appears to have declined in the past few years as evidenced in the decline of observed occupied campsites. Information gained from Forest Service visitor encounter logs indicates more people embark on longer day hikes and runs (16+ miles) rather than spending the night.

Over the past several years, rangers have documented mainly the following issues in their field reports: people camping too close to lakeshores and causing erosion and sedimentation; high levels of encounters in certain areas; and presence of invasive plants. Managers determined the threat to cultural resources is low, based on the limited number of cultural sites and current visitor behavior. Threats to biophysical resources are moderate and include the presence of sensitive plants in the areas where visitors congregate. A moderate level of administrative actions, such as fire suppression, invasive plant eradication, bridge replacement, and search and rescue using helicopters, occurs each year.

Figure 11. Case Study 4: Representation of the four criteria involved in the sliding scale of analysis.



Managers used the decision support tool to determine where the analysis areas are on the sliding scale of analysis. Significant consequences to physical, biological, social, and managerial attributes may be likely without action. The task is clearly stated, and the ability to complete the work is fairly certain. The analysis areas involve sensitive natural resources, and changes to visitor use would affect the wilderness stewardship plan. The risk to resources from not achieving and maintaining desired conditions is high, while the visitor experience most likely will be improved. Campsite closures and other limitations on visitor use likely will affect some visitors and will be controversial, given the wilderness context. Existing data on use levels are adequate to anticipate future use needs in the analysis areas and to identify the visitor capacities. Increased interest through social media has expanded stakeholder involvement. Overall, the analysis areas fall in the moderate to high range of the sliding scale of analysis.

Other information for the updated visitor capacities. A needs assessment for outfitted and guided use prepared in the 1990s shows that approximately 65 percent of wilderness visitors came from outside of the counties surrounding the wilderness. About 25 percent of all visitors used recreation livestock, and nearly half of this use was from local counties. About half of the recreational livestock use was associated with overnight use. Data indicate that overnight use was concentrated in one popular destination area that has multiple lakes during weekends and holidays in July and August. Day use on summer weekends and holidays was concentrated on five main trails. During the fall season, use was concentrated in the lower elevation valleys.

Another study conducted in 1994 determined that 60 percent of all groups entered the wilderness from three trailheads and that nearly 75 percent of all groups traveled by foot. At some trailheads, the groups using the most stock were guided (commercial) groups. Day use by private parties comprised 70 percent of total use.

Visitor capacities were determined in the 1990s using WROS classes. However, the calculations were all written on paper and are missing from the digital files. Therefore, it is difficult to determine exactly how the capacities were identified. The visitor capacities in the 1990s wilderness stewardship plan are as follows:

Pristine: 2,189 recreation visitor days (RVDs) per year

Primitive: 12,281 RVDs per year

Semi-primitive: 20,709 RVDs per year

A recreation visitor day is defined as recreational use of national forest land for an aggregated 12-hour period. It can consist of one person for 12 hours, 2 people for 6 hours each, and so on. For example, one person for 24 hours would be 2 RVDs. The U.S. Forest Service does not currently use this measurement on a regular basis.

Review indicators and thresholds.

Next, managers focused on reviewing the desired conditions, indicators, and thresholds. The highest priority desired condition is to continue to ensure nondegradation of the wilderness, measured by the trends in the four qualities of wilderness character (untrammeled, natural, undeveloped, and outstanding opportunities for solitude or primitive and unconfined recreation). The indicators and thresholds in table 4 were reviewed from the existing wilderness stewardship plan.

Table 4. Indicators and thresholds by zone.

INDICATORS	PRISTINE	PRIMITIVE	SEMI-PRIMITIVE
Number of encounters	There is an 80 percent chance of fewer than 1 encounter off trail.	There is an 80 percent chance of fewer than 7 encounters on trail.	There is an 80 percent chance of fewer than 10 encounters on trail.
Number of occupied sites visible or audible within 500 feet	There is an 80 percent chance of zero sites occupied.	There is an 80 percent chance of 1 site occupied.	There is an 80 percent chance of 2 sites occupied.

Managers developed additional indicators beyond the number of encounters used in the wilderness stewardship plan. They reflect desired conditions and the four qualities of wilderness character. Managers developed the following desired conditions, indicators, and thresholds:

DESIRED CONDITION 1: Preserve opportunities for solitude.

Indicator 1: Number of encounters with other groups per zone per day.

Threshold 1: Individual groups encounter no more than 1 other group in the pristine zone, 7 other groups in the primitive zone, and 10 other groups in the semi-primitive zone during at least 80 percent of the high-use season.

DESIRED CONDITION 2: Preserve naturalness while allowing recreational use.

Indicator 2a: Percentage of change in turbidity, nutrients, bacteria, and temperature in lakes near campsites.

Threshold 2a: There is no measurable change over baseline data in all zones.

Indicator 2b: Presence of new invasive plants per zone.

Threshold 2b: Pristine: There are no new invasive plant populations in this zone. Primitive: Invasive plant population(s) covers a total of 1/4 acre in all core recreation areas (scattered population total estimate). Semi-primitive: Invasive plant population(s) covers 1/2 acre in all core recreation areas (scattered population total estimate).

DESIRED CONDITION 3: Actions to manipulate the biophysical environment or to authorize mechanical transport, motor vehicles, or motorized equipment are limited to emergency situations.

Indicator 3a: Numbers of authorized actions and persistent structures that intentionally manipulate plants, animals, pathogens, soil, air, water, or fire.

> **Threshold 3a:** An increase in authorized actions and persistent structures as measured at the 5-year mark in all zones.

Indicator 3b: Number of administrative authorizations to use motor vehicles, motorized equipment, and mechanical transport.

> **Threshold 3b:** There is a 5 percent increase in administrative authorizations as measured at the 5-year mark in all zones.

DESIRED CONDITION 4: Wilderness remains largely undeveloped, with a low trail density in the primitive and semi-primitive zones. The pristine zone has no trails. Informal trails are restored to natural condition when found.

Indicator 4: Total density of new informal trails per zone.

> **Threshold 4:** There are no informal trails in the pristine zone, no more than 2 of any length in the primitive zone, and no more than 5 of any length in the semi-primitive zone.

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

An interdisciplinary team completed a visitor capacity worksheet to assess the severity of impacts associated with the limiting attribute and the corresponding reduction in visitor capacity needed for each zone. The team asked resource specialists questions about frequency of visitor conflicts, impacts on environmental resources from visitor use, emerging trends including changes in weather patterns, and potential for visitors to disperse in each wilderness zone. Based on the worksheet, the limiting attribute is impacts on solitude (encounters with other groups). In some areas, particularly in the primitive zone, trailhead registration data show shifts in use from one popular lake basin to other, lightly visited areas. Wilderness rangers also confirm from their visitor contacts that visitors perceive the lake basin as too crowded, and visitors are being displaced due to the high level of encounters with others at that location. The recent shift to more day use and less overnight use also contributes to a higher level of encounters at some locations.

Limiting attribute: Encounter rates

Indicator: Number of encounters with other groups per zone per day.

Threshold: Individual groups encounter no more than 1 other group in the pristine zone, 7 other groups in the primitive zone, and 10 other groups in the semi-primitive zone during at least 80 percent of the high-use season.

GUIDELINE 4: IDENTIFY CAPACITY

Due to a high number of encounters (the limiting attribute), resulting concerns over biophysical impacts, and the ranking of "moderate" on the sliding scale of analysis, managers determined that there is a need to revisit visitor capacities for this wilderness to maintain desired conditions relating to opportunities for solitude. The WROS class approach has some limitations, particularly in that it yields a very wide range of visitor capacity. Instead, managers decided to focus on the social experience of visitors. Encounter rates are a common indicator of visitor experience and reveal levels of unacceptable social impacts, such as high levels of visitation and visitor conflicts. Encounters occur when individuals or groups of people recreating see each other on a trail or road, at a campsite, or at another location within the analysis area. The size of groups encountered is also a common indicator of visitor experience. Some visitors prefer encounters with smaller groups rather than large ones, although research suggests tolerance can also be tied to behavior.

Managers used the following basic formulas for each wilderness zone:

- Desired encounters per day x days of useable season = yearly encounter rate
- Yearly encounter rate x maximum group size = visitor capacity
- Based on the formulas, managers identified visitor capacity for each zone as follows:

Pristine: Visitor capacity = 1 encounter per day x 150 days of useable season x 6 group members = 900 visitors per year

Primitive: Visitor capacity = 7 encounters per day x 365 days of useable season x 12 group members = 30,660 visitors per year

Semi-primitive: Visitor capacity = 10 encounters per day x 365 days of useable season x 12 group members = 43,800 visitors per year

The maximum group size of each zone was used to identify the visitor capacities, rather than the average group size of each zone. Using the average group size would unnecessarily limit the number of people allowed to visit the wilderness. In addition, commercial groups, generally, are at the maximum number of people.

After the project team identified the visitor capacity for each zone, it examined how the visitor capacities could be affected by resource impacts and scope of visitor use. Table 5 shows the severity of potential or existing impacts that could limit visitor capacity in the area and shows the reductions in capacity that could occur. The project team determined the percentages of the reductions based on professional judgment regarding the relative impacts.

Table 5. Level of visitor use in terms of potential or existing impacts and percent reduction in visitor capacity for all zones.

VISITOR USE LEVEL	IMPACTS	PERCENT REDUCTION IN VISITOR CAPACITY
Low	Occasional instances of visitor conflicts, perceived crowding, and impacts to environmental resources at isolated locations	None
Moderate	Occasional to frequent instances of visitor conflicts, perceived crowding, and impacts to environmental resources at multiple locations	25%
High	Ongoing instances of visitor conflicts, perceived crowding, and impacts to environmental resources over a large part of the analysis area	50%

Additionally, managers examined the relationship between visitor use and impacts in each zone to assess at what point and under what conditions thresholds may be exceeded and resource conditions, as well as visitor experiences, would receive unacceptable impacts from additional use. An interdisciplinary team developed a set of definitions to aid in determining if current impacts are at the higher or lower end of the scale (table 6). When determining the current and anticipated points at which thresholds may be exceeded, managers took into consideration whether the impacts occur across an entire zone or if they are confined to a portion of the zone. Managers also identified the specific visitor behaviors and activities of concern. For example, a large number of informal trails exist in the primitive zone from campers determined to get to lakeshores. The threshold for on-trail encounters, particularly in the semi-primitive zone, is likely exceeded on weekends. This analysis also aids managers in determining which threshold is the most critical.

Table 6 shows further reductions in visitor capacity based on how visitors use the zone. If visitors consistently use only a small portion of a zone, the visitor capacity is then lower, even if there are "unused acres." For instance, unless preferences change or management actions are implemented, such as quotas, to force people to use the less preferred/lightly used areas, the majority of impacts and use would occur in only this small area.

Table 6. Level of visitor use in terms of scope and percent reduction for visitor capacity in all zones.

VISITOR USE LEVEL	SCOPE	PERCENT REDUCTION IN VISITOR CAPACITY
Low	Typically, only a small portion of the zone (less than 25 percent) is used. Although visitation can occur in the rest of the zone, the bulk of it is on one trail, at one destination.	75% (highest reduction due to concentration of use in a few areas; the demand and use is only for those areas. Thus, capacity is lower for the area)
Moderate	Typically, only about half the zone (about 50 percent is used). Although visitation can occur in the rest of the zone, the bulk of it is located in specifically delineated areas.	50%
High	Typically, most of the zone (75 percent or more) is used.	None (lowest reduction because use is not concentrated)

Table 7 shows the visitor capacities based on the percent reductions in tables 5 and 6. Adding the adjusted numbers for each zone in table 7, the overall visitor capacity for the wilderness is 19,515 visitors per year. Data from wilderness permits, which have been analyzed and determined to have an 85 percent compliance rate, indicate that current use levels range between 15,000 and 20,000 visitors per year. Managers updated the wilderness stewardship plan to include the adjusted visitor capacity and additional desired conditions, indicators, and thresholds.

Table 7. Adjusted visitor capacities for each zone based on percent reductions.

	PRISTINE	PRIMITIVE	SEMI-PRIMITIVE	REMARKS
Visitor capacity based on maximum group size	900 visitors/ year	30,660 visitors/year	43,800 visitors/ year	desired encounters per day x days of usable season x maximum group size
Table 5 reduction capacity	**Low:** no reduction 900 visitors/ year	**High:** 50% reduction 15,330 visitors/year	**High:** 50% reduction 21,900 visitors/ year	**Limiting attribute:** impacts to solitude
Table 6 reduction capacity	**High:** no reduction 900 visitors/ year	**Moderate:** 50% reduction 7,665 visitors/ year	**Moderate:** 50% reduction 10,950 visitors/ year	Concentrated use in about half of the primitive and semi-primitive zones
Adjusted visitor capacity per year	900 visitors/ year	7,665 visitors/ year	10,950 visitors/ year	

IMPLEMENT VISITOR CAPACITY

Next, managers discussed management strategies and actions for implementing the visitor capacities. The wilderness stewardship plan lists a suite of potential actions to take if thresholds are approached, ranging from education to restrictions, such as quotas. Managers intend to implement appropriate management strategies and actions to achieve and maintain desired conditions. Since overnight use has decreased, management strategies and actions will be tailored toward day use and could include emphasizing less popular times and seasons for day users, implementing a rationed daily permit system, and implementing a smaller group size.

Father and son walk by educational signage.

MONITORING AND NEXT STEPS

This case study demonstrates the use of professional judgment, the decision support tool, a variety of data, and interdisciplinary involvement (e.g., completion of the visitor capacity worksheet to assess severity of impacts). Prior to identifying the visitor capacities, managers had a good understanding of visitor expectations, preferences, and use patterns. Additional information, if acquired, would inform future management actions, including an adjustment of the visitor capacities, if necessary. Visitor capacities may need to be assessed to determine if desired conditions are being achieved and maintained. If desired conditions are not being achieved and maintained, visitor capacities need to be adjusted.

This case study illustrates adjustment of visitor capacities for different zones having different desired conditions in a wilderness, thus maintaining the desired condition of nondegradation in the wilderness overall. The visitor capacities in the 1990s wilderness stewardship plan for the Turquoise Lake Wilderness spanned a wide range; they were based on useable acreage and derived with a systematic formula. This method did not take into account the uneven disbursement of visitors due to differing abilities and preferences. In contrast, the visitor capacity process used in this case study takes visitor behavior and expectations into account. Moreover, the 1990s wilderness stewardship plan predates the current description of wilderness character, which focuses on overall ecosystem health and visitor experiences in wilderness. The four qualities of wilderness character and desired conditions in the wilderness stewardship plan were considered in adjusting the visitor capacities for each of the zones in the wilderness.

This page intentionally left blank.

Appendices

This page intentionally left blank.

Appendix: Visitor Capacity Tools

Table A1. Visitor capacity analysis tool.

GUIDELINE 1: DETERMINE THE ANALYSIS AREAS

What is the most meaningful area of analysis (geographic area, specific feature, or destination point)?

GUIDELINE 2: REVIEW EXISTING DIRECTION AND KNOWLEDGE

First, review applicable law and policy, prior applicable planning and guidance, including desired conditions, zoning, and management goals and objectives.

Second, review existing conditions in the analysis area.

> What are the current amounts and types of visitor use (timing, distribution, and visitor activities and behavior)?
>
> What are the major concerns related to amounts and types of use that are impacting resources and desired conditions?

Third, identify indicators and thresholds that are particularly relevant for this area.

> Which indicators and thresholds are directly related to resolving the key issues for visitor use identified above? Are existing conditions within the threshold?

Indicator: _____

Threshold: _____

Indicator: _____

Threshold: _____

GUIDELINE 3: IDENTIFY THE LIMITING ATTRIBUTE(S)

Identify the attribute(s) that most constrain the analysis area's ability to accommodate visitor use? Why?

GUIDELINE 4: IDENTIFY CAPACITY

Using the information from the three previous steps, what is the targeted amounts and types of use to maintain or achieve desired conditions (increase, decrease, or maintain current use levels)?

- How do the strategies or management actions identified in the process so far affect the visitor capacity?
- What additional management strategies are needed to implement visitor capacity?
- How should the visitor capacity be allocated?

Table A2. Commercial allocation worksheet.

QUESTION	HIGH	MODERATE	LOW
1. How frequently are there known conflicts between guided and unguided users or between different groups of guided users?	More than 2 instances per year	2 instances per year	Less than 2 instances per year
Remarks:			
2. How heavily would new commercial services need to rely on the existing transportation system and facilities (e.g., parking lots, toilets)?	75% of the time	25-50% of the time	25% or less of the time
Remarks:			
3. How prevalent is illegal guiding?	Very frequent occurrences (5 or more reports per year)	Occasional occurrences (2-4 occurrences per year)	None or very rare occurrences (1 or less per year)
Remarks:			
4. To what extent are current commercial services negatively affecting the desired condition of social resources?	Frequent issues (more than 5 complaints per year)	Occasional issues (2-4 complaints per year)	None or very rare issues (1 or less complaint per year)
Remarks:			
5. To what extent are current commercial services negatively affecting the desired condition of natural and cultural resources? (Describe the impact to the resource specifically)	Frequent issues in more than one resource; difficult to correct	Occasional issues in one or two resources; easily corrected	None or very rare issues
Fisheries/Aquatics:			
Water:			

QUESTION	HIGH	MODERATE	LOW
Wildlife:			
Plants:			
Soils:			
Cultural:			
Remarks:			
6. What is the potential for unguided visitor displacement from allowing additional commercial services (e.g., campsites, parking areas, destinations)?	Limited resources across entire area	Limited resources on busy weekends/ holidays	Low potential due to abundant resources
Remarks:			
7. How greatly does the commercial service differ from unguided visitor use of the area (e.g., group size, type of activity)?	Group sizes 75% larger; activity typically differs in frequency, length, and type	Group sizes 50% larger; activities occasionally differ from unguided visitors in frequency, length, and type	Group sizes and activities very similar to unguided
Remarks:			
8. How difficult would it be to inspect/ monitor commercial services in this area (access, risk to staff, technical equipment/knowledge needed)?	High risk due to location and type of activity; difficult access (rivers, mountains, off trail)	Moderate risk in some locations due to type of activity and access (mostly on-trail based)	Easy to monitor due to access and type of activity (mainly road based)
Remarks:			

Glossary of Key Terms

Allocation is the process of distributing visitor capacity among a variety of uses or opportunities to achieve or maintain desired conditions.

Desired conditions are statements of aspiration that describe resource conditions, visitor experiences and opportunities, and facilities and services that an agency strives to achieve and maintain in a particular area.

Indicators are specific resource or experiential attributes that can be measured to track changes in conditions so that progress toward achieving and maintaining desired conditions can be assessed.

An **objective** is a specific result that an agency aims to achieve within a specified timeframe. It reflects conditions that are affected directly by agency action.

The **sliding scale of analysis** is used to ensure the investment of time, money, and other resources for a project is commensurate with the complexity of the project and the consequences of the decision.

Thresholds are minimally acceptable conditions associated with each indicator.

Triggers reflect conditions of concern for an indicator that are enough to prompt a management response to ensure that desired conditions continue to be maintained before the threshold is crossed.

Visitor capacity is a component of visitor use management and is the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established.

Visitor experience is the perceptions, feelings, and reactions that a visitor has before, during, and after a visit to an area.

Visitor use refers to human presence in an area for recreational purposes, including education, interpretation, inspiration, and physical and mental health.

Visitor use management is the proactive and adaptive process for managing characteristics of visitor use and the natural and managerial setting using a variety of strategies and tools to achieve and maintain desired resource conditions and visitor experiences.

The **"Visitor Use Management Framework"** provides the analytical elements necessary to address visitor use management opportunities and issues, consistent with applicable law, within existing agency management processes.

References

Anderson, D.H., D.W. Lime, and T.L. Wang. 1998. Maintaining the Quality of Park Resources and Visitor Experiences: A Handbook for Managers. Report No. TC-777. University of Minnesota, Department of Forest Resources, Cooperative Park Studies Unit, St. Paul, MN.

Burns, R.C., A. Arnberger, and E. von Ruschkowski. 2010. Social carrying capacity challenges in parks, forests, and protected areas: An examination of transatlantic methodologies and practices. International Journal of Sociology 40 (3): 30–50.

Cahill, K., R.H. Collins, S. McPartland, A.N. Pitt, and R.I. Verbos. 2018. Overview of the Interagency Visitor Use Management Framework and the uses of social science in its implementation in the National Park Service. The George Wright Forum 35 (1): 32-41.

CEQ (Council on Environmental Quality). 2007. Collaboration in NEPA: A Handbook for NEPA Practitioners. Council on Environmental Quality, Washington, DC. http://energy.gov/sites/prod/files/CEQ_Collaboration_in_NEPA_10-2007.pdf.

Clark, R.N., and G.H. Stankey. 1979. The Recreation Opportunity Spectrum: A framework for planning, management, and research. Gen Tech Rep PNW-98. U.S. Department of Agriculture, U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Cole, D.N., and R.K. Fichtler. 1983. Campsite impact on three western wilderness areas. Environmental Management 7: 275-288.

Cole, D.N., and T.E. Hall. 1992. Trends in campsite condition: Eagle Cap Wilderness, Bob Marshall Wilderness, and Grand Canyon National Park. Research Paper INT-453. U.S. Department of Agriculture, U.S. Forest Service, Intermountain Research Station,
Ogden, UT.

Cole, D.N., and J.L. Marion. 1988. Recreational impacts in some riparian forests of the Eastern United States. Environmental Management 12: 99-107.

Cole, D.N., M.E. Petersen, and R.C. Lucas. 1987. Managing wilderness recreation use: Common problems and potential solutions. Gen Tech Rep INT-230. U.S. Department of Agriculture, U.S. Forest Service, Intermountain Research Station, Ogden, UT.

Cordell, H.K., C. Betz, J.M. Bowker, D.B.K. English, S.H. Mou, J.C. Bergstrom, R.J. Teasley, M.A. Tarrant, and J. Loomis. 1999. Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends. Champaign, IL: Sagamore Publishing.

Daniel, B. 2010. Canvas, catalyst, crucible: Exploring the role of the setting in the wilderness expedition experience. Journal of Outdoor Recreation, Education, and Leadership 2 (2): 133-136.

Driver, B.L. 1976. Toward a better understanding of the social benefits of outdoor recreation participation. pp. 163–189. In: Cordell, H.K., J.W. Rawls, and G.M. Broili, comps. Proceedings of the Southern States Recreation Research Applications Workshop. Gen Tech Rep SE-9. U.S. Department of Agriculture, U.S. Forest Service, Southeastern Forest Experiment Station, Asheville, NC.

Graefe, A.R., K. Cahill, and J. Bacon. 2011. Putting visitor capacity in perspective: A response to the capacity work group. Journal of Park and Recreation Administration 29 (1): 21-37.

Hall, T.E., and D.N. Cole. 2007. Changes in the motivations, perceptions, and behaviors of recreation users: Displacement and coping in wilderness. Res Pap RMRS-RP-63. U.S. Department of Agriculture, U.S. Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

IVUMC (Interagency Visitor Use Management Council). 2016a. Visitor Capacity on Federally Managed Lands and Waters: A Position Paper to Guide Policy. Edition One.

Larson, L.R., J.W. Whiting, and G.T. Green. 2011. Exploring the influence of outdoor recreation participation on pro-environmental behaviour in a demographically diverse population. Local Environment 16 (1): 67-86.

Manning, R.E., and W.A. Freimund. 2004. Use of visual research methods to measure standards of quality for parks and outdoor recreation. Journal of Leisure Research 36 (4): 557-579.

Manning, R.E. 2007. Parks and Carrying Capacity: Commons Without Tragedy. Washington: Island Press.

Manning, R.E., L.E. Anderson, and P.R. Pettengill. 2017. Managing Outdoor Recreation: Case Studies in the National Parks, 2nd edition. Boston: CABI Publishing.

Marchand, G. 2014. Environmental attitudes of students enrolled in adventure programming classes. Journal of Outdoor Recreation, Education, and Leadership
6 (2): 180-182.

Marion, J.L., and L.C. Merriam. 1985a. Predictability of recreational impact on soils. Soil Science Society of America Journal 49: 751-753.

Marion, J.L., R.G. Dvorak, and R.E. Manning. 2008. Wildlife feeding in parks: Methods for monitoring the effectiveness of educational interventions and wildlife food attraction behaviors. Human Dimensions of Wildlife 13: 429-442.

McCool, S.F., and D.N. Cole, comps. 1997. Proceedings—Limits of Acceptable Change and related planning processes: Progress and future directions. Gen Tech Rep INT-GTR-371. U.S. Department of Agriculture, U.S. Forest Service, Intermountain Research Station, Ogden, UT.

McCool, S.F., and D.W. Lime. 1989. Attitudes of visitors toward outdoor recreation management policy. pp. 401-411. In: Watson, A.H., comp. Outdoor recreation benchmark 1988: Proceedings of the National Outdoor Recreation Forum. Gen Tech Rep SE-52. U.S. Department of Agriculture, U.S. Forest Service, Southeastern Forest Experiment Station, Asheville, NC.

McCool S.F., R.N. Clark, and G.H. Stankey. 2007. An assessment of frameworks useful for public land recreation planning. Gen Tech Rep PNW-GTR-705. U.S. Department of Agriculture, U.S. Forest Service, Pacific Northwest Research Station, Portland, OR.

NPS (National Park Service). 1997. The Visitor Experience and Resource Protection (VERP) Framework: A Handbook for Planners and Managers. U.S. Department of the Interior, National Park Service, Denver Service Center, Denver, CO.

Rose, J. 2010. Are social and environmental justice incompatible ideals? Searching for answers in Zion National Park. In K. Paisley and D. Dustin (eds.), Speaking up and speaking out: Working for social and environmental justice through parks, recreation, and leisure. Champaign, IL: Sagamore.

Rose, J., and K. Paisley. 2012. White privilege in experiential education: A critical reflection. Leisure Sciences, 34 (2): 136-154.

Shelby, B., and T.A. Heberlein. 1984. A conceptual framework for carrying capacity determination. Leisure Sciences 6 (4): 433–451.

Shelby, B., J.J. Vaske, and T.A. Heberlein. 1989. Comparative analysis of crowding in multiple locations: Results from fifteen years of research. Leisure Sciences 11 (4): 69–291.

Stankey, G.H., D.N. Cole, R.C. Lucas, M.E. Petersen, and S.S. Frissell. 1985. The Limits of Acceptable Change (LAC) system for wilderness planning. Gen Tech Rep INT-176. U.S. Department of Agriculture, U.S. Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT.

USFS (U.S. Forest Service). Forest Service Handbook 2709.14, Recreation Special Uses

Handbook. U.S. Department of Agriculture, U.S. Forest Service, Washington, DC. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5312824.pdf.

Vagias, W.M., and R.B. Powell. 2010. Backcountry visitors' Leave No Trace attitudes. International Journal of Wilderness 16 (3): 21-27.

This page intentionally left blank.

This page intentionally left blank.

Visitor Capacity Guidebook

Edition One | February 2019