

## 8. USER CAPACITY

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### 8.1 THE NPS APPROACH TO USER CAPACITY

Although many people think of user capacity as a number of people and/or a limit on the number of people in a given area, the concept is much more complex than that. Research has shown that user capacity cannot be measured simply as a number of people, because impacts to desired resource conditions and visitor experience are often related to a variety of factors that include not only the number of people, but also the types of activities that people engage in, where they go, what kind of footprints they leave behind, what type of resources are in the area, and the level of management presence.

The National Park Service defines user capacity as the types and levels of visitor and other public use that can be accommodated while sustaining the desired resource conditions and social conditions and visitor experiences that complement the purpose of the park.

After years of research and management experience, a number of user capacity management approaches have been developed and are now widely used by various land management agencies. The premise behind almost all of the varying user capacity management approaches is that with any use on public lands comes some level of impact that must be accepted; therefore it is the responsibility of the public land management agency to decide what level of impact is acceptable and what actions are

needed to keep impacts within acceptable limits. This means that *all parks*, even those with relatively low levels of use, still need to consider capacity management, because any use causes impacts, and it is much more practical to manage impacts before they result in unnecessary damage to resources, displacement of visitors, and expensive repairs. For these reasons, capacity management is required by NPS policies. The *NPS Management Policies 2006* provide direction for developing and managing user capacities in “Chapter 2, Park System Planning” (sec. 2.3.1.1); “Chapter 8, Use of the Parks” (sec. 8.2.1); “Chapter 5, Cultural Resources” (sec. 5.3.1.6); and “Chapter 6, Wilderness Preservation and Management” (sec. 6.3.4.2).

The NPS approach to user capacity is focused on measuring the success at achieving and maintaining desired resource conditions and visitor experiences insofar as they are affected by people’s use of the parks. Instead of solely tracking and controlling user numbers, superintendents and park staffs manage the levels, types, behaviors, and patterns of visitor use and other public uses as needed to control the condition of the resources and the quality of the visitor experiences. The monitoring

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Park usefulness and popularity should not be measured in terms of mere numbers of visitors. Some precious park areas can easily be destroyed by the concentration of too many visitors. We should be interested in the quality of park patronage, not by the quantity. The parks, while theoretically for everyone to use and enjoy, should be so managed that only those numbers of visitors that can enjoy them while at the same time not overuse and harm them would be admitted at a given time.

— Horace M. Albright, NPS Director, 1929–1933

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component of this user capacity process helps test the effectiveness of management actions and provides a basis for informed adaptive management of public use.

Throughout the process the National Park Service needs to provide opportunities for the public to jointly learn about and contribute to the development and achievement of desired resource conditions and visitor experiences.

The first major step of incorporating the user capacity process into a GMP is defining the desired resource conditions, visitor experiences, and general levels of management, development, and access for different areas of the park. This step is discussed in “Chapter 7, Development of GMP Alternatives.”

The second step is twofold:

1. defining the indicators (measurable variables) and standards that will be monitored to measure success in achieving and maintaining the desired resource conditions and visitor experiences
2. identifying the management strategies that could be taken if the park staff is seeing impacts that exceed a standard

The identification of desired conditions has been part of general management planning to some extent since the 1970s, and this step was more clearly defined with the adoption of *DO #2* in 1998. Until 2005 the selection of indicators and standards for user capacities was deferred to subsequent implementation planning. In response to legal challenges and increased recognition of the benefits of addressing capacity questions, GMPs now include indicators and standards for user capacities. The *NPS Management Policies 2006* state that a GMP “identifies indicators and standards for maintaining the desired conditions” (sec. 2.2; see also sec. 8.2.1). That said, GMPs can clearly state that indicators may be modified if new knowledge is gained about the efficacy of those selected during a GMP planning process. GMPs now also include a general description of how indicators and standards will be monitored (to ensure that the indicators selected are feasible), although the development of a detailed monitoring plan (with specific monitoring protocols) is a park management function beyond the scope of a GMP.

The last step of user- capacity decision making, which continues indefinitely, is the circular practice of monitoring and management action — a needed and appropriate management action is taken to achieve a desired condition, the resulting condition is monitored and assessed, and the management action is either continued or revised, depending on the observed results. In either case, monitoring continues to provide feedback to decision makers about the long- term success of achieving and maintaining the desired condition: Are conditions improving, staying the same, or getting worse? Are the management actions accomplishing what they are intended to accomplish? The importance of incorporating well- designed, long- term monitoring plans and strategies into park management cannot be overemphasized.

The results of the park’s monitoring efforts, related visitor use management actions, and any changes to the park’s indicators and standards will need to be available for public review. In essence, the user capacity process serves as a regular report card, informing and learning from the public about the status of desired conditions and

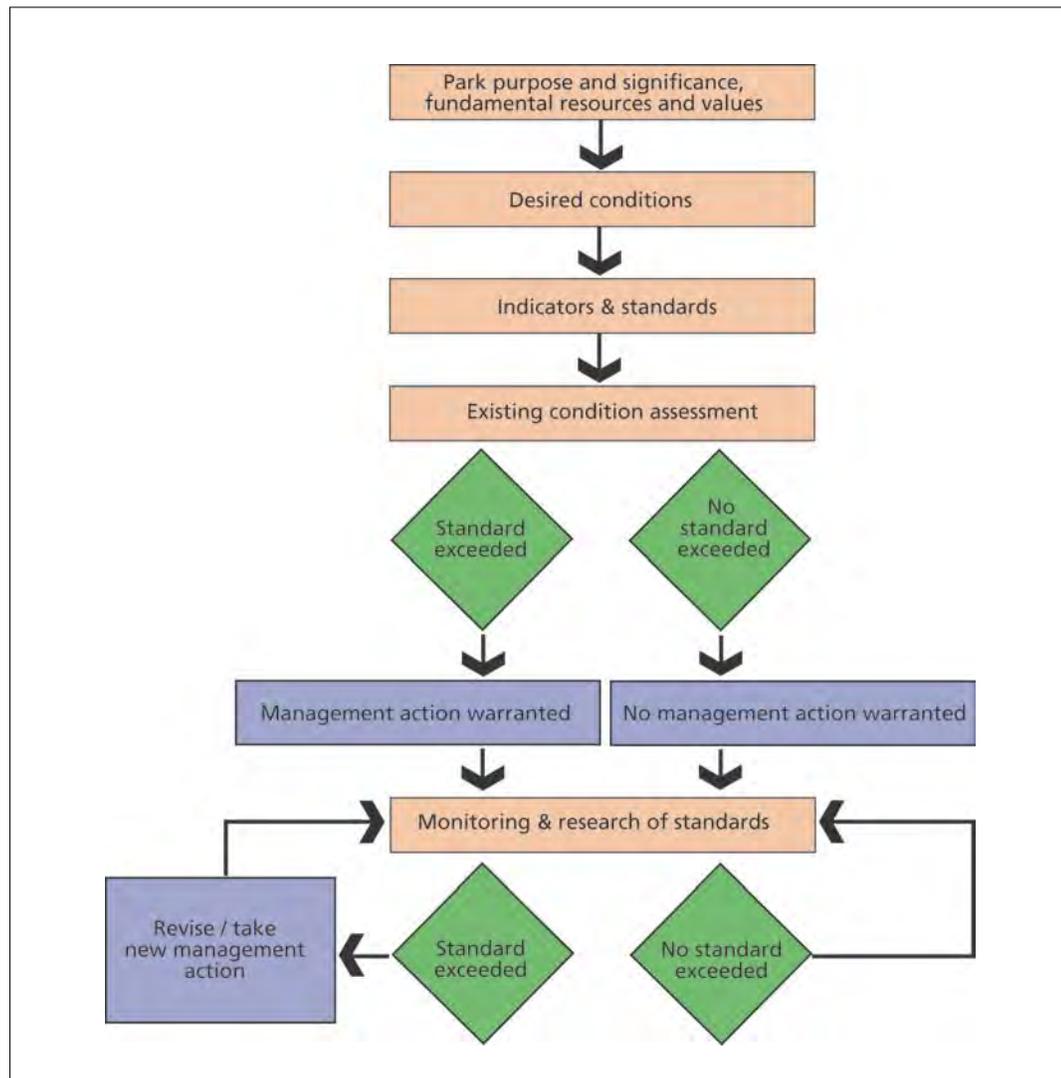
experiences, and about the management actions being taken to protect and enhance them. Table 8.1 summarizes the NPS approach to user capacity; Figure 8.1 summarizes the basic process for user capacity management.

**TABLE 8.1: UNDERSTANDING USER CAPACITY: USE PLANNING AND MANAGEMENT**

What It Is	What It Is Not
A process of defining desired conditions for natural and cultural resources and visitor experiences and establishing a process to achieve those conditions.	Simply defining the allowable numbers of visitors in an area at one time.
Systematic, cyclic steps of data collection, planning, monitoring, and adjusting management actions.	A one-time, easy fix for crowding or other problems related to visitor use.
Public involvement and shared learning related to visitor use and management.	An isolated, arbitrary decision by park managers.
Management decisions made as a result of relevant data collection, monitoring, and public involvement and shared learning.	Research that provides hard and fast conclusions.
Multiple management strategies to achieve desired conditions may include: <ul style="list-style-type: none"> <li>• site management (e.g., fencing, facility relocations)</li> <li>• rationing or reallocating use (e.g., fee structure, reservations)</li> <li>• regulating use (e.g., limiting group size)</li> <li>• enforcement (e.g., sanction visitors to comply with staying on the trail)</li> <li>• visitor education (e.g., whisper in Cathedral Grove to respect other’s needs for contemplative experience)</li> </ul>	A single solution of limiting visitation in order to resolve impacts on resources and visitor experiences.

## 8.2 THE APPLICABILITY OF USER CAPACITY TO ALL PARKS

Park staffs who believe that they do not currently have a “capacity problem” have probably gone through, in an informal way, some or all of the steps outlined above, even if they were not aware of doing so. Saying that they have no capacity problem implies that the park has an indicator — perhaps the number of visitors who report conflicts with other visitors — and a standard (e.g., no more than about five complaints per year). Managers will find that formalizing the user capacity process by requiring identification of indicators and standards, and by regularly assessing whether standards are being violated, provides a more objective and comprehensive assessment of whether they really do not have a capacity problem. In addition, managers will find it much more practical to manage user capacity before it becomes a problem than to wait until the problems require more controversial or expensive solutions once patterns of use have become established. The advantage of following the steps outlined above is that this process creates a defensible rationale for taking action to more effectively manage user impacts before use becomes entrenched and difficult or impossible to change.

**FIGURE 8.1: USER CAPACITY MANAGEMENT**

### 8.3 INDICATORS AND STANDARDS FOR USER CAPACITY

Effective monitoring requires (1) determining the most effective indicator (measurable impact parameter) that can gauge when the desired condition has been achieved, and (2) selecting the standard against which the indicator will be measured. The standard is a management decision the park staff commits itself to defend, about the minimum acceptable condition for that indicator — recognizing that conditions that are better than the standard are even better to achieve and maintain.

More technical definitions and examples of indicators and standards are as follows:

- *Indicator* — a specific, measurable resource or social variable that can be measured to track changes in conditions caused by public use, so that progress toward attaining the desired conditions can be assessed

Example: The waiting period (measured by number of minutes) required to enter a national park during peak use days (defined as Friday to Sunday, from 10 am to 4 pm, May through September)

- *Standard* — a specific, measurable point identified for an indicator that serves as a trigger point for the identification of unacceptable conditions in a zone or specific area. In other words, a standard is a measurable point at which an indicator changes from an acceptable to an unacceptable condition.

Example: No more than 10% of visitors wait 10 or more minutes to enter the park.

For the purpose of establishing and maintaining user capacities, it is recommended that at least one indicator of resource conditions that are affected by public use and one indicator of social conditions be identified for each management zone. Several management zones may share the same indicator(s) for resource and/or social conditions but have different standards based on the desired conditions for the zone. Some zones may share the same indicator and the same standard for a particular attribute affected by visitor use. Administrative areas where public use is discouraged or prohibited do not need indicators and standards for user capacity (although indicators and standards for resource conditions unrelated to public use may still be needed as part of the resource stewardship strategy). For some zones there may be areas that need site-specific indicators and standards, such as an attraction site. There may also be some times, such as during special events, that specific indicators and standards are needed. The approach is flexible, but the objective should be that the bundle of indicators selected will give managers a picture of how use is impacting resources and visitor experiences and whether those impacts are causing current conditions to diverge from desired conditions.

There is no one, absolute “right” set of indicators and standards, so the hard work is in making the management decisions about what indicators and standards will be used to monitor conditions. The rigor of effort in making that decision can vary depending on the circumstances of each park. The more that is known about how public use may impact desired resource conditions and visitor experiences, the more effective management actions will be in maintaining high quality resources and visitor experiences.

After an initial testing period, indicators and standards generally should not change over the expected life of the GMP unless there is a compelling reason. It may be desirable or necessary to change indicators and standards if they do not work as anticipated. Indicators and standards, like management actions, are part of the adaptive management process and may be improved based on the knowledge gained through implementation. Park managers may decide to modify indicators or standards and to revise the monitoring plan/program if better ways are found to measure changes in resource or social conditions, if the indicators prove not to be sufficiently sensitive to measure changes caused by public use, if the indicators do not prove to be cost-effective to check regularly, or if the standards seem unrealistic to maintain. Most of these types of changes should be made within the first several years of monitoring. After this testing period, adjustments should be needed less often.

Frequent adjustments may lead to situations in which the indicators and standards are no longer consistent with the desired conditions for the zone. In no case should an indicator or standard be changed simply because a park is out of standard or because the park staff wants to postpone difficult decisions.

The GMP should acknowledge the potential need to change, delete, or add indicators and standards as a result of monitoring, especially during the initial phases of GMP implementation.

### 8.3.1 Indicators

Indicators can be viewed as a means to translate desired conditions into something that can be measured. Indicators should focus on the most significant impacts caused by public use, or on proxies for those impacts that are both measurable and within management control. The ideal is to find a simple, easy-to-measure variable that covers the major impact of concern.

The impact of concern will be a direct effect on a resource or an experience. The indicator should not focus on management actions (e.g., number of groups that float the river per day), but rather on the impact of concern (e.g., number of encounters with other groups on the river per day). Basing indicators on management techniques rather than on impacts of concern can limit the range of useful management solutions. For example, limiting the number of boaters to some quota per day might be used to ensure low encounter levels per day, but other actions, such as tightly scheduling launch times, could also ensure an appropriate encounter rate and could be less restrictive on the level of visitation to the river.

The relative difficulty of measurement is also important. For example, *Salmonella* may be of concern in water quality, but rather than measure *Salmonella* counts directly, park staffs can measure *E. coli*, which is highly correlated with *Salmonella* counts but is easier and safer to measure. For another example, the overall quality of the visitor experience may be a concern, but rather than querying existing and potential visitors about overall experience, park staffs can measure a single variable, like the number of groups encountered in wilderness, which is known to be correlated with the quality of visitor experiences in wilderness areas.

#### Suggested Tools and Methodology for Identifying Indicators

Suggested Tools	Methodology
<input checked="" type="checkbox"/> Review desired conditions and ask, "How might visitor use affect the desired conditions?" Also consider current effects or impacts resulting from public use.	In selecting indicators of desired conditions during GMP planning focus on those indicators that "rise to the top" in terms of addressing the most relevant and serious potential impacts of public use. Other indicators may be considered in subsequent, more detailed planning efforts for particular areas or topics (e.g., wilderness plans, trail plans, resource stewardship strategies, etc.). At the GMP level the indicators should generally address the park's fundamental and other important resources and values and how they are affected by public use activities in the park, which will be among the major issues

Suggested Tools	Methodology
	<p>addressed by the plan.</p> <p>Some planning exercise questions that might be useful for discussing potential indicators include the following:</p> <ul style="list-style-type: none"> <li>• How is public use currently affecting desired resource conditions and visitor experiences?</li> <li>• How might anticipated future use affect the desired resource conditions and visitor experiences considered in the draft GMP?</li> <li>• Of those effects noted above, which are considered to be of highest priority for the park either because of the importance of the resource or value that is (or may be) impacted, the severity of the impact, and/or the vulnerability of the resource or value that is (or may be) impacted?</li> </ul>
<p><input checked="" type="checkbox"/> Consider the indicators already developed for other applications.</p>	<p>An NPS database has been developed to compile indicators and standards that have been used or suggested for use in monitoring user capacity in various land management plans and literature sources (<a href="http://usercapacity.nps.gov/">http://usercapacity.nps.gov/</a>). It may be appropriate and efficient to adopt indicators already considered and selected for other areas with similar resources and use patterns (although it may not be as appropriate to adopt the exact standard selected for another park). The planning team may also consider what indicators the park has chosen for their resource inventory and monitoring program — if there are indicators in this effort that are affected by human use, these could be acknowledged as part of the park’s user-capacity monitoring as well, increasing the efficiency of data collection for both programs. Whenever possible, draw on information that has already been collected in the park. Rely on the judgment of park planners and managers to identify what categories of existing knowledge about the park might appropriately be used as indicators of user capacity.</p>
<p><input checked="" type="checkbox"/> Obtain additional information <b>if needed.</b></p>	<p>Ask current and potential park users what factors most influenced or would influence their assessment of whether they had or might have a quality experience (this may be done through a formal visitor survey or through various aspects of scoping for the GMP).</p> <p>Ask scientists what factors that might be affected by use are most important to determining the health of natural areas, such as riparian areas. Ask scholars what variables that might be affected by use are most important to determining the integrity of a cultural resource.</p> <p>Consult the large and growing body of scientific literature on impacts of public use. If needed, some baseline data from the area may be collected on potential indicators to help refine the articulation of the indicator And the evaluation of a possible standard.</p>

Suggested Tools	Methodology
<input checked="" type="checkbox"/> Screen potential indicators to determine how useful they might be.	<p>Questions to ask include the following:</p> <ul style="list-style-type: none"> <li>• Does the indicator relate to real impacts of concern about resource conditions or visitor experience? Is it a significant measure of something highly valuable and/or highly vulnerable to degradation or loss?</li> <li>• Is the indicator likely to be affected by at least one of the following use attributes: levels of use, types of use, timing of use, location of use, or visitor behavior?</li> <li>• Does the indicator focus directly on the impacts that affect the quality of visitor experience or resource condition?</li> <li>• Does the indicator relate to a variable that the National Park Service can manage or affect?</li> <li>• Is the indicator specific and objective? Is the unit of measurement clear and defined in unequivocal terms?</li> <li>• Is the indicator easily and efficiently measured? If not, is it worth the extensive effort to measure?</li> <li>• Can the indicator be measured reliably with some training?</li> <li>• Can the indicator be measured without significantly affecting the resource or detracting from the visitor experience?</li> <li>• Does the indicator act as an early warning, alerting managers to deteriorating conditions before unacceptable changes have occurred?</li> </ul> <p>There may be other questions that should be asked to evaluate indicators for a particular park. Consider developing specific criteria (borrowing from the list above) to evaluate potential indicators.</p>
<input checked="" type="checkbox"/> Consider multiple ways of expressing the indicator.	<p>Indicators can be expressed in multiple ways depending on the unit of measurement that best addresses the park setting and related use impacts. For instance, the indicator topic of informal trails can be measured in the following ways:</p> <ul style="list-style-type: none"> <li>• sum of length of informal trail segments</li> <li>• number of informal trails per unit area</li> <li>• number of informal trails that leave the designated trail (total or per mile)</li> <li>• length of informal segments within a certain distance (e.g., 50 ft. or 100 ft.) from the boundary or sensitive habitats</li> </ul> <p>Consider the bottom line of the problem in defining how best to express the indicator. For example, if the real problem is the potential loss of sensitive vegetation and soil compaction in specific areas, then the best</p>

Suggested Tools	Methodology
	<p>indicator might be the sum of the length of all the informal trail segments (total area disturbed). If the problem is the potential fragmentation of certain sensitive habitats, then the best indicator might be the number of informal trails per unit area.</p> <p>Also consider how the park might monitor the indicator. For example, counting the number of informal trails that leave the designated trail is fairly easy and cost efficient to monitor if the data are sufficient for addressing the problem. If the data are not sufficient, then more comprehensive monitoring will be needed.</p> <p>Furthermore, consider whether the indicators need to be time- or space-bounded. Incorporating a time- or space-bounded element into an indicator expresses both how much of an impact is acceptable and how often such impacts can occur. It is often desirable for indicators to have a time period associated with them. This is especially relevant for social conditions such as crowding-related issues. Examples of time periods may include "per day," "per night," "per trip," "per hour," "per year," etc. Indicators for resource conditions may need to be space-bounded. For instance, indicators for informal trails may be expressed in terms of distance or area such as "four social trails per mile," or "four informal trails per acre."</p>
<p><input checked="" type="checkbox"/> Clearly express the indicator. Define all terms.</p>	<p>A clear description of the indicator is essential for effective communication, monitoring, and analysis. For example, the density of use at an attraction might be measured by the number of people actually present or by the number <i>perceived</i> to be present. These two variables differ significantly. Informal trails can be interpreted in a variety of ways. Should they include deer trails, old jeep roads, and abandoned trails? Similarly, an indicator might be the number of different parties seen per day. The definition of a day, however, is not obvious. Is it 12 hours, 24 hours, or daylight hours? Does a hike that lasts from Friday evening to Saturday morning consist of ½ day or 2 days? What is meant by peak hours? If an indicator is not clearly defined, there is the possibility of confusion and misinterpretation in setting a reasonable standard, monitoring the indicator, or predicting the impact of that standard.</p>

**TABLE 8.2: EXAMPLES OF INDICATORS**

Desired Condition	Good Indicators	Poor Indicators
Safe, relaxing, enjoyable nonmotorized river rafting opportunities	Number of encounters with other rafts (nonmotorized) on the river per hour. Number of encounters with other types of users (motor boats, swimmers, etc.) on the river per hour. Number of visitors per month who complain about noise caused by other visitors	Number of rafts on the river per day Number of rafts for rent Number of parking spaces at the raft launch
Natural conditions and processes	Length or number of informal trails per unit area Number of occurrences of noxious weeds in trails and/or along trail edges Number and size of areas of human caused disturbance within X distance of the river Percentage of time that sound levels are above the natural ambient level (for 90% of the area in the zone)	Number of trailheads Number of regulations Number of management-developed trails Number of law enforcement officers

### 8.3.2 Standards

As noted above, standards of user capacity are management decisions about the minimum acceptable condition for an indicator that the park staff is committed to defend. The standards need to be set at a level that will be consistent with the desired conditions for the zone.

#### Suggested Tools and Methodology for Identifying Standards

Suggested Tools	Methodology
<input checked="" type="checkbox"/> Consider the gap between the existing condition and desired condition for the selected indicator.	<p>For indicators selected due to an <i>existing problem</i> in the park, consider the following:</p> <ul style="list-style-type: none"> <li>• How do areas in the park with the problem compare to those without the problem?</li> <li>• Rate how bad the problem really is—how far away is the condition from desired conditions?</li> </ul> <p>For indicators selected due to the potential for a <i>future problem</i>, consider the following:</p> <ul style="list-style-type: none"> <li>• Would most people (park staff, stakeholders, public) consider current conditions acceptable? If so, could more impact occur and still be acceptable? If not, is the current condition the limit for being considered acceptable?</li> </ul> <p>The existing condition may be considered as the point to set a standard <i>if</i> the condition seems consistent with the desired conditions. This judgment should only be made after careful thought and assurance that existing conditions represent agency and public visions for the future</p>

Suggested Tools	Methodology
	<p>of the park. If the existing condition is considerably worse than the desired condition, then the standard should be set at a level that would be more consistent with the desired condition.</p>
<p><input checked="" type="checkbox"/> Identify comparable locations that have set standards for the selected indicator and consider whether that standard seems reasonable.</p>	<p>Many parks and protected areas have established indicators and standards for various areas and issues, and these have been compiled in a data base for reference (<a href="http://usercapacity.nps.gov/is/">http://usercapacity.nps.gov/is/</a>). Identifying indicators and standards for comparable areas with similar issues may be one means of evaluating potential standards under consideration.</p>
<p><input checked="" type="checkbox"/> Identify research studies that are relevant to the selected indicator and consider whether the data help identify a meaningful standard for the park's setting.</p>	<p>Many years of research have been conducted on visitor preferences for various setting conditions. Information has been published about preferences for crowding-related variables (encounter rates on trails, being able to camp out of sight and sound of other visitors, people at one time at attraction sites), user conflicts (incidences of discourteous behavior, noise from other users or park activities such as use of snowmobiles or personal watercraft), resource impact variables (amount and severity of informal trails, trail erosion, damage to campsites, litter, vandalism and graffiti), etc. Reviewing visitor survey research on visitor preferences for any of these setting conditions may provide one source of information for discussions about potential standards for a park. It is important that this type of information be used for generating discussion rather than being considered as <i>the</i> recommendation for the "right standard."</p>
<p><input checked="" type="checkbox"/> Screen potential standards to ensure they meet some basic criteria.</p>	<p>Potential questions to ask:</p> <ul style="list-style-type: none"> <li>• Is the standard quantitative and specific? For example, the statement of "low encounters on the river per day" is not quantitative or specific, so it remains subject to various interpretations. This standard may be rewritten as "No more than three encounters with other groups per day."</li> <li>• Is the standard realistic? Standards must reflect conditions that are reasonable to maintain based on the desired conditions of the area and the ability of the park staff to manage within the standard.</li> <li>• What is the best way to measure the standard? There are many different ways of measuring a standard to achieve the same condition (e.g., "an average of 20" or "below 30 for 90% of the time"). The choice may have public relations, statistical, or operational consequences.</li> </ul> <p>Does the standard need to be expressed as a probability? Since indicators and standards are defined as the point at which certain conditions (indicators) become unacceptable (standards), then the question is how often to avoid this situation. In most cases, a park will be doing well if it can avoid unacceptable social condi-</p>

Suggested Tools	Methodology
	<p>tions 90% of the time. For example, a standard might say, "No more than 10 encounters with other groups per day along trails for 90% of the days in the summer use season." The 90% probability of conditions being at or above standard allows for 10% of the time that random or unusual events (e.g., holiday weekends) might prevent management from providing these conditions. This also allows for the complexity and randomness inherent in visitor use patterns, which is most relevant for social standards. At Arches NP the standards originally included probabilities for conditions related to the peak use season. After a test period of monitoring, the park decided that the probabilities should relate to year-round visitation rather than just the peak season. The current standard is that 90% of <i>all</i> visitors would experience acceptable conditions. The park believes this is a more appropriate trigger point for taking management action. Notably, this change now requires a year-round monitoring program for this indicator rather than monitoring only during peak season.</p>
<p><input checked="" type="checkbox"/> Remember that setting standards is a subjective decision — there is no single "right" standard.</p>	<p>Decisions about standards should be made understanding the tradeoffs and implications of the standards. Input may be sought from scientists, managers, planners, and the public to help evaluate potential standards, but ultimately the decision is the best professional judgment of the manager. No amount of research will conclusively identify a single definitive answer. The right answer cannot be known before the standard is selected. Follow-up monitoring will not disclose what the right answer should have been. Because of this, decisions about standards should be rendered in a logical, traceable manner that is subject to public review. The safest and most defensible position is to thoroughly assess the best available data, pick the standard that seems best, document the thought process, and monitor for the standard. If necessary, it is possible to select reasonable and defensible standards with little or no site-specific data. If questioned, acknowledge that the standard selected is subjective but reflects the manager's best judgment.</p>
<p><input checked="" type="checkbox"/> Consider the reliability and rigor that is needed based on the decision at hand.</p>	<p>If the planning team anticipates that controversial decisions or highly restrictive management action will occur after standards are set, more data and analysis may be needed. However, no matter the level of controversy, the basic rationale for selecting any indicator and standard for any park should be noted and included in the administrative record so that it can be explained to park staff and the public as the need arises.</p>

### **8.3.3 Indicators and Standards for Nonrenewable Resources**

Because the premise behind user capacity is that some level of impact invariably accompanies public use, there has been considerable discussion about how to establish user capacities for nonrenewable resources. How are standards established for resources that will never grow back or grow back so slowly that they are, for all intents and purposes, impacted for the foreseeable future — resources such as cave speleothems, archeological sites, historic structures, petrified wood deposits, or giant sequoias?

Although consensus on this topic has never been reached, some preliminary recommendations from a workgroup were released about how to consider indicators and standards for public use impacts to nonrenewable resources (see NPS 2000a, 2000b). The group generally agreed that the high value of nonrenewable resources could be dealt with by establishing stringent standards and by having management actions triggered before these standards were exceeded. That is to say, the amount of acceptable change — while greater than zero — would be low.

For those sites or resources that may have absolutely no tolerance for resource degradation, policies and related management would have to be implemented to avoid any impacts (which would require severe restrictions on use). In such cases there might be no need to identify indicators and standards for user capacity.

The final decision about the need to include specific sites or resources in the user capacity monitoring program is up to park managers. This is not to say that these sites or resources should not be monitored periodically to ensure that they are maintained in good condition; however, they may not need to be represented in the pool of indicators and standards being monitored as a basis for evaluating public use capacity.

For more information on indicators and standards for nonrenewable resources, see the summary of recommendations from the workshop on nonrenewable resources, referenced above.

## **8.4 POSSIBLE GMP MANAGEMENT STRATEGIES**

In addition to the selection of indicators and standards as part of describing the desired conditions for a park, a preliminary set of likely management strategies and/or tactics also needs to be identified in the GMP. Several decades of research, management experience, and discussion have identified a variety of strategies and tactics that can be taken to address resource or experiential impacts resulting from recreational use. Numerous factors may be responsible for deteriorating conditions, such as the type and level of visitor use, the timing of use, the behavior of visitors, or the design of facilities. It is no longer assumed that limiting visitor use levels is the only tool, or even the most effective tool, for managing desired resource and social conditions. The effective monitoring of resource and social indicators, combined with public participation, provides park managers with the information needed to guide meaningful management strategies.

The process of monitoring and how it relates to management actions can be likened to a traffic light. A green- light condition occurs when monitoring shows that conditions are well within established standards and no additional actions are required. A yellow- light occurs when monitoring shows that conditions are approaching the standard. This early warning sign may call for implementing proactive management actions to protect and enhance desired conditions. Measures taken at yellow- light conditions, when standards are still being met, may be less restrictive and focus on approaches such as public education. A red- light condition is triggered when monitoring shows that conditions violate the established standard, and action must be taken to return conditions to the acceptable standard. Management actions taken at this point are likely to be more restrictive in their approach, including limitations on use levels in various areas, restrictions on certain activities, or closure of certain areas.

To assist park managers in determining what strategies and tactics might be most effective under various circumstances, the National Park Service commissioned the development of a decision- making handbook for addressing visitor use related problems (*Maintaining the Quality of Park Resources and Experiences: A Handbook for Managers*, Anderson, Lime, and Wang 1998). The handbook, posted on the web at [http://www.cnr.umn.edu/CPSP/publications/revtactics\\_handbook.pdf](http://www.cnr.umn.edu/CPSP/publications/revtactics_handbook.pdf), is a good source for considering the major categories of management strategies and tactics that might be considered in a GMP. The handbook identifies five general management strategies that can be considered for addressing unacceptable impacts:

- Modify the character of visitor use by controlling where use occurs, when use occurs, what type of use occurs, and how visitors behave.
- Modify the resource base by increasing durability or maintaining/rehabilitating the resource.
- Increase the supply of recreational opportunities.
- Reduce use in the entire area or in problem areas only.
- Modify visitor attitudes and expectations.

The handbook also outlines general tactics for implementing a strategy:

- site management (e.g., fencing, facility relocations, site hardening)
- rationing or reallocating use (e.g., fee structure, reservations)
- regulating use (e.g., limiting group size, restricting campfires)
- enforcement (e.g., sanction visitors to comply with staying on the trail)
- visitor education (e.g., visitors are asked to whisper while in Cathedral Grove to respect other's needs for a contemplative experience)

Major strategies and/or general categories of tactics (not specific actions) that might be needed for keeping conditions within standards should be included in the GMP. This may be done as part of the management zone descriptions, or as part of the description of the specific alternatives. Not all strategies and tactics would be appropriate in all settings and situations. For example, increasing the number of

visitor facilities might not be an appropriate strategy for wilderness and backcountry areas. The range of strategies/tactics should be consistent with the desired conditions in the zone descriptions, and it would likely influence the potential impacts of concern. The purpose is to provide a general indication to the public of the types of strategies and tactics that could be considered for managing resources and visitor experiences, while not being overly specific about actions, which would reduce managers' long-term flexibility when addressing specific problems. However, if a particular public use impact was close to or already exceeding a standard at the time the GMP is developed, then a more specific description of potential actions to resolve the problem might be included in the plan.

The identification of potential management strategies and tactics in the GMP does not limit a manager's ability to act in response to information gained from monitoring. The actual, specific management actions selected will ultimately depend on the particular setting and situation encountered. The National Park Service must provide information about the specific actions being proposed through ongoing or supplemental public involvement processes. In addition, specific management actions proposed for implementation would be required to comply with the requirements of NEPA, the NHPA, and other applicable laws. Those actions that would result in a major change in public use management or result in intensive or intrusive visitor management would require a higher level of compliance. (See "8.6. Environmental Compliance and User Capacity.")

## **8.5 DEVELOPING A MONITORING STRATEGY FOR INDICATORS AND STANDARDS**

Monitoring plays three important roles in the management of user capacities.

1. It helps park managers understand if resource and/or social conditions are changing and if conditions are approaching, are at, or are exceeding standards.
2. It enables park managers to assess the effectiveness of management actions by providing feedback about the actual consequences.
3. It can provide a defensible, quantitative basis for initiating management actions that are consistent with park goals.

Without data, park managers have little on which to base their actions except an instinct that something is not right. With monitoring, managers can show how conditions have changed or document why corrective actions need to be taken.

It is critical that park staff understand the energy and commitment that will be required for monitoring. This is often the most underestimated aspect of developing a plan that includes indicators and standards. Monitoring is an ongoing, long-term undertaking. It requires an implementation schedule and carefully designed protocol or monitoring plan to reduce bias and provide consistent, meaningful information about the dynamics of park resources and visitation. The fundamental purpose of a monitoring plan is to ensure that "the line in the sand" regarding resource condition and/or the quality of the visitor experience is clearly defined and recognized when it is reached.

The GMP should include a monitoring strategy that describes the general level of effort needed to successfully track the selected indicator(s). To determine the feasibility of selecting a particular indicator, the team should consider how each indicator might be monitored, including the rigor necessary to successfully monitor the indicator, and how frequently and systematically the indicator will need to be monitored. This discussion could be facilitated and documented by developing a table like the one shown below.

**TABLE 8.3: EXAMPLE OF GENERAL DESCRIPTION OF MONITORING STRATEGY**

Indicator	Standard	Monitoring Strategy
Linear feet of informal trail per square mile	20 linear feet of informal trail per square mile	Non systematic monitoring as part of regular staff and volunteer patrols. Systematic trail assessments for a section of the trail system every 1-2 years.
Percentage of cars above posted speed on park roads	No more than 10% of cars traveling more than 5 mph above the speed limit on park roads	Part of regularly scheduled patrols and/or sample days with speed tracking technology
Number of encounters between groups per hour	90% of the time, no more than 5 encounters between groups per hour	Observe number of people seen at one time on random days during the peak season based on a sampling scheme

Some teams may find it advantageous to include a preliminary monitoring plan as an appendix to the GMP. (This is not required.) All discussions of monitoring strategies and/or plans should include a disclaimer that the plans are subject to change as a result of knowledge gained through implementation of the monitoring program. Since most GMPs will not include a detailed monitoring plan, one will need to be developed once the GMP has been completed in order to guide long-term monitoring efforts. The monitoring plan should be available to the public. For more information on monitoring protocols and plans, see the VERP handbook, *Identifying and Monitoring Indicators of Visitor Experience and Resource Quality: A Handbook for Recreation Resource Managers* (Lime, Anderson, and Thompson 2004), the discussion of visitor impact monitoring in *The George Wright Forum* (2006), and examples of monitoring protocols developed by specific parks (e.g., Yosemite, Acadia, Arches, Mount Rainier, Isle Royale, Grand Canyon, Shenandoah, Denali, and Zion).

Four main criteria should be kept in mind in developing a monitoring program. A monitoring program needs to be

- *Feasible* — People and equipment are available to do the monitoring where and when it is called for and, later, to do the analysis of the data.
- *Objective* — The data are recorded in an objective, reviewable manner.
- *Timely* — Monitoring data provide information when park managers need it.
- *Repeatable* — The protocols are clear enough for different people to implement them in the same manner.

Other important factors to consider in developing monitoring strategies and plans include the identification of locations, frequency, and timing of measurements; data sampling and statistical methodology; how the data will be analyzed and displayed;

what to do with the data collected; estimated costs of monitoring; and identification of the individuals responsible for data collection, analysis, and reporting.

The rigor of monitoring for each indicator might vary considerably, depending on how close the existing conditions (determined from the existing condition assessment) were to violating the standard. If the existing condition was far from exceeding the standard, the rigor of monitoring might be less than if the existing condition was closer to the standard. Some options for varying the rigor of monitoring include the frequency of monitoring cycles, level of systematic monitoring, or the geographic area monitored, as described below:

- *Frequency of monitoring* — Some indicators might only be monitored every 7–10 years if existing conditions were far from being out of standard. If conditions started to trend toward the standard, monitoring might become more frequent to ensure that impacts were stopped before the standard was violated.
- *Level of systematic monitoring* — Some monitoring could be included as part of regular park staff or volunteer patrols or other management activities. This monitoring would occur when the patrols or activities were scheduled rather than according to a specific monitoring schedule. If monitoring indicated that conditions were beginning to change, then more systematic monitoring should be conducted to identify any problems.
- *Geographic area* — Another option for varying the level of rigor might be related to the geographic area or overall scope of the monitoring effort. An example might be measuring “off-shoots” of informal trails that branch off from main trails to determine the extent of informal trails. If the number of intersections of informal trails from main trails began to increase greatly, park managers might consider doing a census on the length and number of all informal trails to determine the full extent of the problem, and to select the most effective management actions.

The rigor of monitoring could also vary depending on the sensitivity or importance of particular resources or values that might be threatened. For example, if visitor use in a sensitive riparian area could become a problem with slightly more use or a change in visitor behavior, this area could be targeted for systematic and frequent monitoring.

The rigor of monitoring could vary depending on the level of controversy that surrounds protection of particular resources or values or the resulting management actions that might be needed to manage use levels, types, or patterns. If a park expects a high level of controversy, then rigorous monitoring might be needed from the outset.

The rigor of monitoring could vary in places where the effects of management actions were unknown. For example, if the effects on site conditions of closing a campsite and reseeded with native plants were unknown, this area might be targeted for some short-term systematic monitoring to gauge the effectiveness of this technique in restoring desired conditions.

Due to limited staff and budgets, as well as the desire to engage the public in park management, volunteers should be considered for monitoring activities where

feasible. Many parks have had great success in using volunteers to monitor indicators and standards related to visitor use. Lessons learned from these examples should be sought by parks considering the use of volunteers for monitoring efforts.

## **8.6 ENVIRONMENTAL COMPLIANCE AND USER CAPACITY**

Environmental compliance needed for revising established user capacity indicators and standards, and for taking specific management actions, are usually not topics that are addressed in a GMP. But after a GMP has been completed, park staff may want to revise an indicator or standard, or propose specific actions to address a user capacity problem. These topics are briefly discussed below.

### **8.6.1 Revisions to Indicators and Standards**

Revisions to established indicators and standards could potentially be subject to compliance with NEPA, NHPA, and other laws, regulations, and policies. Each revision to an existing indicator or standard will need to be evaluated on a case-by-case basis to determine the potential for impacts to the human environment using the processes outlined in *The DO-12 Handbook* (see sec. 2.10). The completion of an environmental screening form (ESF) is a key tool in this process. If it is determined that there is no potential for impact, then further activities to comply with NEPA may not be necessary.

Caution should be exercised in assuming that only a slight change to a standard would automatically mean no impacts to the human environment. Since a standard is the measure against which an indicator is considered, and thereby determines the acceptability of conditions, *where* the standard is set has substantial implications on the resulting resource and visitor use conditions. A seemingly minor revision to a standard for a visitor encounter rate, for example, could have substantial implications for visitor use and, in turn, park resources in a particular area. It is necessary to thoroughly consider all *indirect impacts* (meaning later in time and farther removed in distance than the action) of each change in a standard, no matter how small.

### **8.6.2 Taking Management Actions**

If conditions are approaching or exceeding a user capacity standard, specific management actions proposed for implementation must comply with the requirements of NEPA, the NHPA, and other applicable laws and policies. Determining the appropriate pathway for NEPA compliance depends on the proposed management action and the severity of potential impacts to the human environment. For example, educating users about other areas of the park in order to disperse visitation might be an action that could be categorically excluded, depending on the methods used for education. However, actions such as building new trails to disperse visitor use or requiring day use permits might require an environmental assessment. Each management action will need to be evaluated on a case by case basis using the processes outlined in *The DO-12 Handbook*, “Determining the Appropriate NEPA Pathway” (sec. 2.10).