

Preventing Visitor-Caused Damage To National Park

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NPS managers require new information if they are to prevent visitors from breaking park rules and damaging park resources. The preceding article described our survey of NPS managers that showed both extensive damage to park resources due to minor acts of noncompliance and a lack of agreement among resource managers concerning the usefulness of various methods used to deter noncompliance. In conjunction with the survey we also reviewed social science literature relevant to the question, "How can NPS managers get visitors to follow park rules?" (i.e., How can managers *deter noncompliance*?) This article summarizes twelve recommendations to NPS managers suggested by the review, and also proposes a research program to develop a complete strategy for deterring noncompliance. (A full report of the review is available from the University of Washington (U/WA) CPSU -- see references)

The literature we reviewed was gathered from several social sciences including sociology, leisure and recreation science, social psychology, and environmental psychology, and fell into many theoretical traditions ranging from applied behavior analysis to sociological deterrence theory. The research could not be integrated into any existing or new theoretical approach. Instead, we searched for general assertions about deterring noncompliance that were relevant to the NPS and were supported by research results. The assertions we found are presented below as twelve recommendations for NPS managers. Let's consider each of these recommendations and their basis in the research.

What We Know

1) In evaluating a deterrence technique (i.e., a method of getting visitors to follow the rules), NPS managers must consider its deterrent effect, its impact on visitor experiences, and the level of noncompliance that is acceptable in their units. If resource preservation were the only requirement of NPS managers, there would be no noncompliance problems. Managers could fence in visitors, institute prison sentences for noncompliance, or simply exclude visitors entirely. However, the dual mandate of the NPS specifies that the national parks should be managed so as to both maximize visitor enjoyment and preserve park resources for future enjoyment. The delicate balance between these mandated goals is inextricably linked with decisions concerning noncompliance. For example, in an NPS unit where moderate levels of noncompliance produce acceptable levels of resource damage, a deterrence technique that achieved such moderate levels would be preferable to a more effective tech-

nique that had greater negative impacts on visitor experiences.

2) Multiple deterrence techniques should be used when attempting to deter noncompliance because no single technique is likely to deter all forms of noncompliance, or even to counteract the many motives for a single form of noncompliance. The diversity of the literature cited in our review suggests that using a single label -- noncompliance -- to describe the huge set of behaviors that are against some rule in a given environment conveys a false sense of simplicity. Noncompliance is even more complex because there can be many motives for any given noncompliant act. A single NPS environment may be affected by many noncompliant behaviors, each of which occurs for a number of reasons. Because of this, no single deterrence technique should be expected to deter a major portion of noncompliance, even in a single environment.

3) Decisions about deterrence techniques should not be based solely on the intuitive assessment of NPS managers using their own reactions to the intervention. In scientific terms, each NPS manager constitutes a sample of one person who is unlikely to represent most visitors to their unit. In addition, research from social psychology suggests that managers, like the rest of us, seldom recognize all the factors that actually affect their behavior. Unfortunately, the current literature is usually insufficient to provide managers with scientific evidence on which to base their decisions about deterring noncompliance. In the absence of scientific evidence, manager decisions could be improved if they were to imagine a variety of visitors reacting to deterrence techniques and then select the method appealing to the broadest range of visitors.

4) NPS managers should consider stationing uniformed employees within sight of areas damaged by visitor noncompliance because the presence of such employees is one of the most promising means of deterring noncompliance. Research suggests that the presence of a uniformed employee strengthens visitor beliefs that noncompliance will lead to negative social or legal consequences, even when that employee is not engaging in enforcement activity. The uniformed employee may also remind visitors of their own attitudes or personal norms that are inconsistent with noncompliance. Research conducted by the U/WA CPSU at Mount Rainier National Park showed that uniformed employees were perceived as a neutral or positive part of the park experience by the vast majority of visitors, while simultaneously reducing noncompliance (off-trail hiking) to very low levels (see references).

5) NPS managers should ask, "Why are visitors breaking this rule?" as a first step in

controlling noncompliance. If an incentive can be readily removed, noncompliance may drop to acceptable levels. A large body of psychological theory (e.g., applied behavior analysis and utility theory) specifies that people generally act to gain rewards or avoid punishments. Accordingly, removing the reward or punishment that prompts noncompliance may be easier than overcoming its presence. For example, a social trail that cuts a switchback may see less use if thorny native vegetation is planted at its entrance and exit.

6) To maximize effectiveness, messages designed to limit noncompliance should be presented as close as possible to the place and time in which noncompliance is likely to occur. Substantial research (e.g., studies from applied behavior analysis, attitude theory, and investigations of social norms) suggests that messages designed to deter noncompliance are most effective when presented as closely as possible to the place and time in which noncompliance is likely to occur. Signs are generally an effective means of communicating such messages. A study in Mount Rainier National Park conducted by the U/WA CPSU found that sign texts varied greatly in effectiveness, but that all signs placed near social trails deterred significant amounts of off-trail hiking.

7) The current NPS focus on deterring noncompliance by instilling beliefs consistent with compliance should be altered to focus primarily on activating such beliefs in visitors who already have them rather than on converting the unconvinced. A broad range of research (e.g., research on attitude theory and personal norms) has shown that it is difficult to change visitor beliefs. However, related research has also shown that activating existing beliefs can alter behavior. Accordingly, more noncompliance will probably be deterred by erecting several trail-side signs that say, "Help preserve the meadow. Stay on the trail.", than by adding a single visitor-center display describing the unique nature of the meadow.

8) Showing visitors that noncompliant behavior damages NPS resources will only deter noncompliance for visitors who hold strong values inconsistent with such damage. Basic behavioral principles suggest that short-term rewards generally have more control over behavior than long-term negative consequences. For example, many visitors will pick up small bits of rock or vegetation as souvenirs even if they are aware that, in the long-term, such actions cause substantial damage. Knowledge about long-term consequences will deter noncompliance only for visitors who have strong values inconsistent with harming the environment. Because visitors who do not hold such values may be responsible for most noncompliance at some NPS units, control of noncompliance at those

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units will require deterrence techniques other than education.

9) Noncompliance can be reduced by removing evidence of prior noncompliance, and by providing evidence that most visitors follow the rules. Research on social norms and related studies of noncompliance suggest that decreasing direct and indirect observation of noncompliance can decrease further noncompliance by observers. For example, several studies have found that littering increases in already-littered environments, and decreases when the environment is cleaned. Also, research by the U/WA CPSU found that off-trail hiking was most likely to occur when visitors were within visual distance of other off-trail hikers. Research on speeding suggests that park noncompliance can also be reduced by providing evidence that most visitors follow the rules. For example, speeding was reduced by signs stating, "Percentage of cars not speeding yesterday: ***", where ** was near 90%.

10) When noncompliance is deterred by threats of punishment, the threats should be accompanied by messages emphasizing visitor benefits from compliance. The U/WA CPSU found that a sign stating, "Off-trail hikers will be fined", was the most effective of several signs used in their study at Mount Rainier National Park. Evidence from social psychology suggests that such a threat of punishment would be most effective and have the least negative impact on visitor experiences when visitors believe that compliance benefits both themselves and NPS managers. Educational programs emphasizing the public benefits of preserving park resources may deter little noncompliance on their own, but may increase the effectiveness and acceptability of threatened punishments.

11) NPS rules can produce a "boomerang effect" of deliberate noncompliance when visitors feel their freedom is threatened. To reduce the probability of such effects visitor options should be emphasized. Reactance theory suggests that when threats of punishment are communicated, messages should emphasize the visitor's freedom to choose ways in which to comply. For example, a regulatory sign might say, "Fine of \$100 for off-trail hiking", and then continue, "Because this is a high traffic area, visitors are not allowed to walk off official trails. If you are interested in walking through an alpine meadow you may take hike #12 to Golden Meadow."

12) When NPS communication is addressed to a group, the effectiveness of messages intended to deter noncompliance will be enhanced by special efforts to address the message to group leaders or to address all individuals within the group. Social psychologists have found that persuasive messages are more effective when addressed to

individuals than when addressed to groups. A message directed at a group leader who is responsible for the group's behavior is likely to be more effective than a message directed at the whole group. Alternately, NPS agents should design messages so that all group members feel they are being individually addressed.

What Should Be Done

Although the above recommendations represent an advance in the information available to NPS managers concerning the control of visitor noncompliance, they are far from complete. Future research can and should focus on the development of a comprehensive strategy that provides managers at all NPS units with guidelines for deterring noncompliance. Highlighted below are the basic characteristics of a future research program that we propose as a means of developing such a complete strategy.

Characteristics of a future research program aimed at developing effective programs to deter noncompliance in the NPS.

1) Program will test multi-pronged interventions that incorporate multiple deterrence techniques and are designed to influence diverse visitors who break rules for diverse reasons.

2) Both effectiveness of deterrence and impact on visitor experiences will be measured and used in designing and evaluating interventions.

3) Program's primary goal will be the development of two to four multi-pronged interventions that vary simultaneously in deterrence effectiveness and negative impact on visitor experiences. NPS managers could select the intervention offering adequate resource protection with minimal negative impact on visitor experience.

4) Program's secondary goal will be the development of a set of guidelines for designing evaluation research that can accurately determine the effectiveness of an intervention in any specific application.

5) Program will be designed and monitored by a multi-disciplinary panel of scientists.

6) Research will be conducted in a variety of NPS settings representing a wide range of visitor populations and park environments.

Characteristic 1. Because noncompliant behavior is very complex and because current theory and research concerning noncompliance are undeveloped, the research program would focus on testing interventions that incorporate multiple deterrence techniques. A range of techniques selected would be selected that appealed to a broad spectrum of motivations for compliance and noncompliance. Although some of the techniques incorporated in such multi-pronged interventions might have only a small deterrent effect, the aggregate effect of the inter-

vention would be more likely to reduce noncompliance to acceptable levels than would any single deterrence technique.

Characteristic 2. Because of the NPS dual mandate it is critical that tests of proposed interventions consider both their deterrent effects and their effects on visitor experiences. Unfortunately, our limited knowledge about the experiences expected by NPS visitors currently provides a poor basis for predicting visitor reactions to deterrence techniques such as threatened punishments. Thus, investigation of visitor expectations and the ways in which deterrence techniques negatively impact visitor experiences would also be high research priorities.

Characteristic 3. Even using multiple deterrence techniques, a single multi-pronged intervention is not expected to perform adequately in all NPS units. NPS units vary greatly in their sensitivity to damage caused by noncompliance, and thus require that noncompliance be reduced to different levels. Where acceptable levels of noncompliance are low, interventions producing some negative impacts on visitor experiences may be justified, but where acceptable levels of noncompliance are relatively high, visitor experiences should be given a higher priority. By developing several multi-pronged interventions that simultaneously vary in deterrence effectiveness and negative impact on visitor experiences, this research program would allow NPS managers to maximize the balance between resource preservation and provisions for visitor enjoyment.

Characteristic 4. The effectiveness of the interventions designed in this research program will vary across applications, and some form of assessment will be necessary to determine if an intervention is performing adequately. However, NPS managers are unlikely to have the knowledge or motivation necessary to perform such assessment. This problem would be minimized by developing simplified procedures for evaluating intervention effectiveness and communicating to NPS managers the importance of using the procedures to conduct evaluation when implementing interventions.

Characteristic 5. A multi-disciplinary advisory panel would be assembled to oversee the research program thus far outlined. The panel would include members representing diverse approaches to the study of noncompliance so that the multi-pronged interventions initially tested would represent a broad spectrum of theories concerning noncompliance and would combine deterrence techniques so as to maximize their effectiveness. The panel would also include biologists and other natural scientists to provide input concerning the limits of acceptable damage for various natural resources.

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Such information is critical for maximizing the balance between resource preservation and visitor experiences.

Characteristic 6. In order to maximize the effectiveness of the intervention strategy developed by the research program, testing would be done in NPS units that represent the diversity of environments and visitor populations regulated by the NPS.

Summary

Several recommendations that are useful to NPS managers can be made based on the existing noncompliance research. However, increased knowledge about the control of noncompliance is critical for the preservation of NPS resources. The creation of the National Biological Survey creates even greater opportunities to apply such knowledge to a resources on a variety of other public lands. Funding allowing, we at the U/WA CPSU hope to continue a leadership role in

the investigation of visitor noncompliance and the techniques used to deter it.

Research concerning methods to control noncompliance should prove to be extremely cost-effective. Based on the survey results presented in the preceding article, research that developed means of deterring just 10% of current noncompliance in the NPS—a modest goal—could save over \$5,000,000 in repairs. Distribution of such knowledge to other public land managers would entail minimal costs and dramatically increase savings. Even more important, any reduction in irreparable damage to natural and cultural resources yields benefits that are priceless.

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The following publications are available from the NBS CPSU, AR-10, U/WA, Seattle, WA 98195:

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