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Natural Resource Stewardship and Science

Managers' Perspectives on the Human Dimensions of Human-Wildlife Habituation in National Parks

Report from a survey of National Park Service managers

Natural Resource Report NPS/BRMD/NRR—2013/629

ON THE COVER
Bison in campground in Theodore Roosevelt National Park
Photograph by: National Park Service

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Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

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Abstract

In 2008 the Biological Resource Management Division of the National Park Service (NPS) launched a multi-faceted inquiry to inform management of human-wildlife habituation across the National Park system. As part of the inquiry, a survey about human-wildlife habituation was conducted with NPS managers and staff. The goal of the survey was to inform a situation analysis and needs assessment about management of habituation in national parks.

The survey was designed to elicit broad and descriptive information about human-wildlife habituation. The instrument contained a series of open-ended questions on the following topics: extent and nature of habituation in parks; causes and effects of habituation; habituation-related management strategies, priorities, and needs; visitor attitudes and behaviors associated with habituation. The questionnaire was distributed via email to natural resource managers in parks throughout the United States for completion online.

The overarching theme of park managers' responses was the interplay of visitor attitudes and behavior with NPS management actions that result in negative human-wildlife interactions. In particular, issues with food conditioning seem to be pervasive and distinguishing this from habituation in an applied context appears to be challenging. Managers described visitor attitudes that lead to problematic behaviors, and the lack of management response to prevent or address such behaviors, as the primary issues associated with the management of habituation. Findings suggest that park managers believe managing habituation in park areas is important and that increased support for research investigations is key to understanding habituation and to identifying successful human and wildlife management strategies.

Acknowledgments

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This project was completed as part of Task Agreement J2340100030 of the Great Lakes-Northern Forest Cooperative Ecosystem Studies Unit under Cooperative Agreement H6000082000 between the National Park Service and the University of Minnesota.

Our research was conducted with approval from Cornell University's Institutional Review Board (Protocol ID 0910000976). Daniel J. Decker, Professor and Director, Human Dimensions Research Unit, was the Principal Investigator of this project.

Introduction

Wildlife habituation from the human perspective

Interactions between humans and wildlife are growing in the United States (U.S.) as: (a) exurban development and suburban expansion increasingly place humans in wildlife habitat and (b) some populations of wildlife expand into or adapt to living in human-dominated environments. Human-wildlife interactions occur in a variety of contexts, ranging from backyards to parks and protected areas. While many interactions may have benefits for both wildlife and humans, those that lead to conflict are a pressing issue for wildlife managers at the local, state, and federal level. A key factor believed to lead to human-wildlife conflict is habituation. Human activity plays a central role in habituation of wildlife, yet little is known about the way in which human beliefs, attitudes, and behaviors may influence this phenomenon. Furthermore, the development of human tolerance for wildlife, and the potential impact of such tolerance on wildlife habituation, has not been explored. Researchers and managers nevertheless have identified the possible relationship between habituation or tolerance in both humans and wildlife as an important component of the growing incidence of problematic human-wildlife interactions in developed landscapes.

Symposia on wildlife habituation were held at the 2005 annual meeting of The Wildlife Society and at the 2007 George Wright Society meeting. Feedback from conference attendees overwhelmingly indicated a need for greater attention to this topic, *especially to the human dimensions.* The conference sessions and a preliminary review of literature indicate that most attention to habituation has been directed at the causes and consequences for wildlife; the response of humans to habituated wildlife has largely been assumed or neglected by previous studies. In these symposia, National Park Service (NPS) managers specifically identified the need to attend to human-wildlife habituation issues in and around protected areas.

A collaborative project between the National Park Service and Cornell University

In recent decades, the changing dynamics between people and wildlife have taken on greater management significance. According to the 2000 U.S. Census, approximately 80% of Americans live in urban areas. Studies have found that urbanization is changing public perceptions of wildlife and that people from urban backgrounds may seek out and value encounters with wildlife. Encounters may range from wildlife viewing to attempts to get close to wildlife, thereby contributing to habituation. Little is known about how people will respond to habituated wildlife in these contexts and how encounters between people and wildlife in one setting may translate to another. This diversity of potential human-wildlife experiences leads to equally diverse expectations for wildlife encounters in parks and protected areas. Such expectations present challenges to management and will require novel approaches to enforcement and interpretation.

Given the pressing need for knowledge on the subject, in 2008 the Biological Resource Management Division (BRMD) of the NPS launched an inquiry into human-wildlife habituation. This investigation explores the issue of habituation from three perspectives: (1) wildlife biology and ecology; (2) human dimensions; and (3) policy and legal considerations. A steering committee of NPS natural resource specialists was formed in spring of 2008 to guide the exploration of this topic. The steering committee advised on projects related to these three aspects of the NPS habituation investigation. To begin the research agenda, a Task Agreement

between the NPS and Cornell University was established to explore the human dimensions component of human-wildlife habituation (Figure 1).

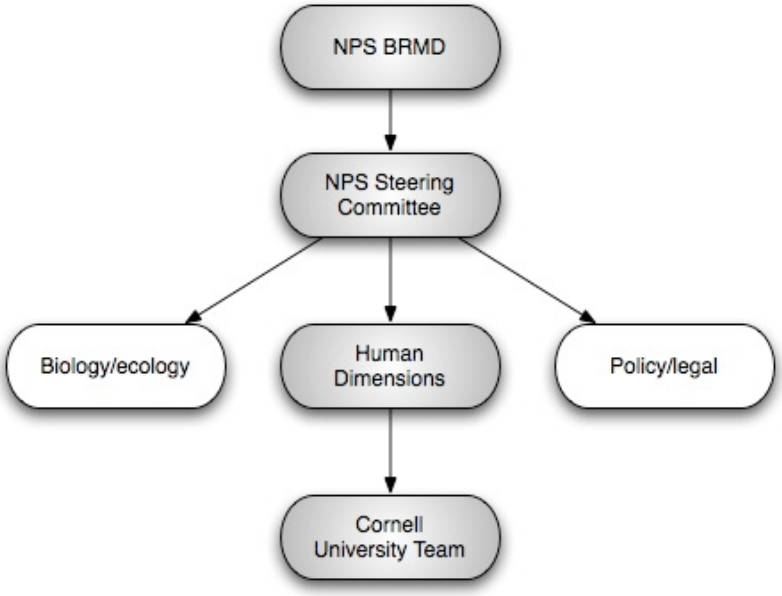

Figure 1. Organization of the NPS BRMD investigation of habituation. Shaded areas represent those related to the joint NPS and Cornell University human dimensions inquiry.

The human dimensions inquiry seeks to improve scientific understanding of the human cognitive processes and resulting behaviors that contribute to human wildlife habituation. The knowledge gained during this project will provide benefit to parks and communities by exploring the causes and effects of human-wildlife habituation. Such information will improve the capacity of federal and state land management agencies, local stakeholders, and local municipalities and communities to develop shared communication messages, policies, and management strategies to address human-wildlife habituation and promote coexistence of humans and wildlife. Objectives of the human dimensions investigation were to:

1. Determine and examine the diversity of experiences with, beliefs about, and management priorities related to wildlife habituation in parks and surrounding communities across the National Park system.

2. Identify and prioritize the most urgent management needs related to the human dimensions of human-wildlife habituation in and around protected areas in the US.

3. Synthesize existing literature related to human-wildlife habituation in and around protected areas and identify knowledge gaps.

4. Develop a recommended strategy for initiatives to aid managers addressing stakeholder beliefs, attitudes, and behavior that contribute to human-wildlife habituation.

5. Share these findings with other federal and state wildlife management agencies, universities, private land managers, conservation groups, and local municipalities.

To achieve these objectives, the Cornell University researchers and the NPS Habituation Steering Committee research team completed the following activities (and products).

1. A workshop with NPS steering committee and human dimensions of wildlife researchers and practitioners to advance understanding of habituation and identify and prioritize the most urgent *research* needs related to human-wildlife habituation in and around protected areas.

2. A workshop with NPS steering committee and park and protected area researchers, managers, and staff to advance understanding of habituation and identify and prioritize the most urgent *management* needs related to human-wildlife habituation in and around protected areas.

3. A situation analysis and preliminary needs assessment based on: the co-tolerance workshops, site visits to parks, web- or telephone-based inquiry with NPS staff, and coordination with NPS steering committee.

4. A comprehensive, literature-based background report that: examines key aspects of the human dimensions of human-wildlife habituation identified in a preliminary needs assessment (likely including topics such as: tolerance, acceptance, and risk); identifies knowledge gaps; and provides recommendations for management actions and public outreach to disseminate information.

5. A system for classifying parks and park contexts based on human wildlife interaction characteristics (identify possible management approaches to managing interactions).

6. A catalog of parks and issues using the classification system.

7. Recommendations for prioritization of further inquiry based on synthesis of catalog.

Description of Survey

Purpose and design

As part of the situation analysis (i.e., activity 3), the NPS Habituation Steering Committee and the Cornell University research team conducted a survey of park managers. The survey was designed to be exploratory in nature and to cover a diversity of topics related to the management of habituation in parks. In particular, we began to explore the extent and nature of human-wildlife habituation in parks (Project Objective 1). We queried managers about their perceptions of visitor expectations, attitudes, and behaviors with respect to wildlife encounters in the parks. Our goal also was to gain a basic understanding of current management protocol as well as park management priorities related to habituation (Project Objectives 1 and 2).

The survey was one of the first activities associated with the NPS-Cornell Habituation Project. Consequently, we wanted the survey to generate broad and descriptive information about human-wildlife habituation. We sought information that highlighted the habituation-related topics most important to park managers. We intended to use this information in the design of workshops that would explore these topics in greater detail. To achieve this, we created a survey instrument with exclusively qualitative, open-ended questions about general topics related to habituation in parks. The questionnaire contained eight questions addressing the following themes: extent and nature of habituation in parks; causes and effects of habituation; habituation-related management strategies, actions, priorities and needs; visitor attitudes and behaviors associated with habituation. The survey instrument is included in this report in Appendix A.

Implementation

The survey was conducted July-September, 2008. The questionnaire was distributed via email to natural resource managers in parks throughout the United States. To maximize participation, each NPS Habituation Steering Committee member utilized the standard communication channel for natural resource questions within his or her NPS region. Some sent out a formal memo with a required response to all parks in the region, others sent out a personal request to natural resource managers in their region. Members further encouraged park managers to respond using a variety of additional methods including: telephone calls; announcements at regional meetings; personal contact; and follow-up emails.

The survey included a letter of introduction explaining the survey and its intent. The introductory note also pointedly distinguished between habituation and food conditioning[1] and asked respondents to separate issues associated with each phenomenon. The NPS Habituation Steering Committee wished to clarify this distinction with respondents because it had determined that separation of the two phenomena would facilitate understanding of the management issues and identification of solutions. Managers were encouraged to respond to the survey even if

[1] The distinction between habituation and food conditioning often is not made clear in wildlife research and management. Under this TA, we define the terms as follows. Habituation is the waning of a behavioral response following exposure to a repeated stimulus. Food conditioning is a process of classical conditioning through which animals learn to associate food with the presence of humans or human activity. For further explanation please see the report Perspectives on human dimensions of wildlife habituation available on our project website.

habituation was not a major issue at their park. Managers participating in the survey clicked a link in the email and were directed to the NPS SharePoint website to complete the survey.

Findings[2]

A total of 78 natural resource managers responded to the survey, representing 76 different NPS units and all seven NPS regions (Figure 2).

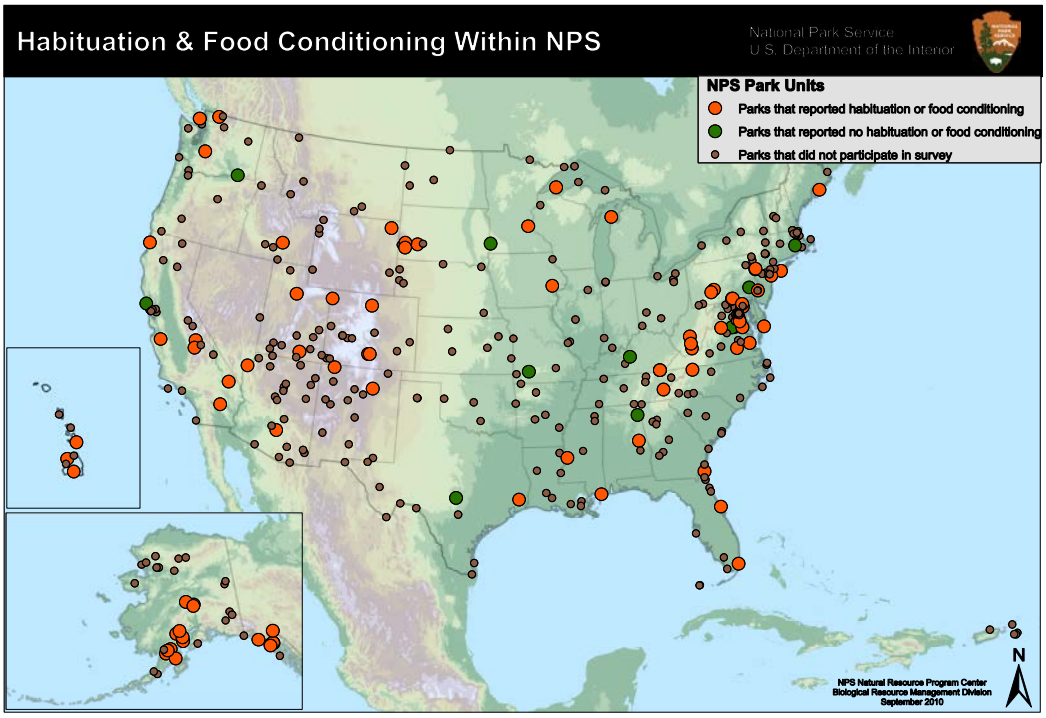

Figure 2. Map of NPS units and responses to survey[3].

While we encouraged responses from all managers, whether or not they perceived habituation to be an issue, we recognize that those with an interest in habituation may have been more likely to participate. Conversely, those who believed they already had the capacity to address habituation may have been less likely to respond. Finally, the survey was conducted during the summer season, possibly limiting the number of staff available to take part in the survey. While these circumstances influence our ability to make general statements about the state of habituation issues servicewide, our respondents nonetheless represented a diverse group of park unit types and a broad geographic range. As such, this survey not only provided important data for our situation analysis and associated workshops, but also yielded additional information that we capture in this report. Our results and conclusions provide a framework for understanding habituation in parks across the service, and for guiding future exploration of the issue. With this in mind, we organized responses to the survey around several themes and discuss those below.

[2] While we requested that managers distinguish between habituation and food conditioning in their responses, doing so can be challenging from an applied perspective. Consequently, many responses to our survey questions about habituation addressed both habituation and food conditioning issues. We report responses to the questions in the manner that they were provided by managers. Thus, the term habituation is used in this section as an umbrella term that often includes elements of food conditioning and does not match precise animal behavior definitions. We will discuss and reflect on this discrepancy in our conclusions.

[3] This map was created by Lauren Barish, BRMD student employee and Antioch Univ. New England MS student.

Extent and nature of habituation

Wildlife species

Managers identified over eighty different species for which habituation is an issue in their parks. Habituated species ranged from chipmunks to wolves. Responses from managers varied in their level of specificity. For instance, some respondents to the survey identified "birds" as habituated animals in their park, while others specifically mentioned black backed gulls, red-tailed hawks, or brown pelicans. The most commonly identified habituated species were white-tailed deer, black bears, raccoons, and various birds. A variety of other small to mid-sized mammals often were mentioned as well, such as coyotes, foxes, and squirrels. A complete list of the animals managers identified and the number of parks that mentioned each species is in Table 1. Seven parks did not identify any issues with habituation.

Evidence of habituation

Many parks cited past or current wildlife studies that yielded evidence of habituation. Most of these were studies focused on changes in wildlife behavior due to exposure to humans or human food (e.g., altered habitat use, foraging). Several parks in the Alaska region specifically mentioned studies of bear-human interactions that demonstrated habituation. Respondents noted that both human use of key wildlife habitat and wildlife use of areas of human activity led to wildlife habituation in their parks. Certain characteristics of administrative and visitor areas were perceived to attract wildlife, as these areas may offer protection from predators and easier access to food and water than natural areas.

Change over time

Responses to a question about whether the extent or nature of habituation had changed over time ranged widely. Many managers suggested that rates of habituation in their parks had increased. Reasons for this increase included visitor-related factors such as an increased desire to be close to wildlife and a lack of understanding of or respect for wildlife. Respondents believed that visitors do not know or understand what to expect from their interactions with wildlife in parks. Management of visitors (e.g., visitor use of certain areas, numbers of visitors, increased commercial activities) was believed to be a factor in increased habituation rates. Respondents also reported other management-related issues contributing to habituation such as placing buildings in key habitat, maintenance of grounds in a manner that creates prime habitat in human spaces, and a lack of active management of habituation. Wildlife-related changes also were thought to have led to an increase in habituation. Bears were a commonly cited example: as bear populations grow, so does the probability that an increased number of animals will be in high visitor use areas. Such increases may lead animals to tolerate higher levels of disturbance (particularly if the area is quality habitat) and lead people to become tolerant of bears in these spaces. Some managers thought that loss of wildlife habitat due to new or expanded development in natural areas (e.g., parks) or development of communities near natural areas also creates more opportunities for habituation to occur.

Table 1. Habituated species identified by natural resource managers.

Species	Number of parks	Species	Number of parks
Carnivores		**Birds**	
Black bear	19	Unspecified “birds”	9
Raccoon	18	Corvids	5
Coyote	6	Canada goose	4
Red fox	6	Eastern wild turkey	4
Striped skunk	4	Eagle	3
Brown bear	3	Nene (Hawaiian Goose)	2
Mountain lion	3	Gull	2
Bobcat	2	Pigeon	2
Ringtail	2	Scrub jay	2
Grizzly bear	1	Piping plover	2
Wolf	1	Heron	1
Grey Fox	1	Pelican	1
Cascade Fox	1	Brown pelican	1
Pine marten	1	Owl	1
Ungulates		Great horned owl	1
White-tailed deer	26	Red-tailed hawk	1
Bighorn sheep	5	Osprey (nest)	1
Elk	4	Black-backed gull	1
Mule deer	3	Herring gull	1
Feral horse	2	Peregrine falcon	1
Wild pig/hog	2	Prairie birds	1
Moose	1	Sparrow	1
Bison	1	House finch	1
Burro	1	Mourning dove	1
Caribou	1	Jay	1
Sika deer (non-native)	1	Steller's jay	1
Black-tailed deer	1	Least tern	1
Mountain goat	1	Yellow-billed magpie	1
		Hummingbird	1
Small mammals		Waterfowl	1
Squirrel	8	Titmouse	1
Ground squirrel	4		
Unspecified “small mammals”	3	**Aquatic Mammals**	
Chipmunk	3	River otter	1
Rodent	3	Sea lion	1
Marmot	2	Manatee	1
Rabbit	2	Spinner dolphin	1
Prairie dog	2	Whale	1
Round-tailed ground squirrel	2		
Bat	2	**Reptiles**	
Groundhog	1	Snake	1
Opossum	1	Hawaiian green turtle	1
Weasel	1	Alligator	1
Red squirrel	1		
Grey squirrel	1	**Other**	
Least Chipmunk	1	Fish	1
Mouse	1	Green iguana	1
Rat	1		

Some parks reported that levels of habituation had remained constant or even decreased. Many attributed this to education programs, and resulting "self-policing" of educated visitors. Active park management to reduce the likelihood of habituation (e.g., aversive conditioning to increase separation between people and wildlife) or food conditioning (e.g., improved trash management to remove food rewards) also was believed to be a factor.

Management activities and habituation

Activities that foster habituation

Parks across the region identified a number of common management practices that they believed led to habituation of animals. Many of these activities pertained to waste disposal and containment that were the result of both park management actions (e.g., waste containment, garbage pick-up, road kill collection), as well as visitor behaviors (e.g., food storage on trails and in campgrounds, deliberate feeding).

The lack of enforcement of regulations pertaining to visitor behavior (e.g., approaching wildlife, trail use, feeding) was often cited as a practice that fostered habituation. This seemed to be a particular problem with campground management. Several reasons were given for the lack of enforcement including concerns about visitor enjoyment, staffing issues, and lack of resources.

A number of issues were raised with respect to key wildlife habitat. Some respondents suggested that wildlife are encouraged or obligated to use spaces closer to people because of park planning activities or because administrative operations have been sited in important wildlife habitat. The situation may be compounded by high numbers of people in critical wildlife areas and/or at crucial life stages (e.g., mating, wintering, migration staging). High visitation, visitor behavior, and specific park operational activities (e.g., landscaping, building maintenance) in these areas also were believed to contribute to habituation.

Respondents also discussed issues related to general park management. In particular, the challenges associated with regulating visitor behavior were often mentioned. In some parks, the management of endangered species (e.g. intensive research that habituates animals), the actions of in-holders (e.g., human presence in areas where park management prohibits visitors), and the management of concessions (e.g., trash disposal) were believed to foster habituation. Finally, respondents noted that management issues beyond park boundaries (e.g., state game management, behaviors in neighboring communities, actions of local agencies and landowners) also contributed to habituation of wildlife in parks, which in turn affected visitor experiences and area residents. These experiences were thought to affect stakeholders' understanding of wildlife management and their support for various land use and wildlife management programs.

Activities that address or prevent habituation

Many parks also engaged in a number of activities specifically to address or prevent habituation. Resource managers most often identified two categories of activities, those that are wildlife-directed and those that are visitor-directed. Wildlife-directed actions included removing access to human food (e.g., waste collection, animal-proof storage, trash cans), hazing, and aversive conditioning. Education and communication-related activities such as signage, interpretive messages, NPS media, educational and outreach programs primarily comprised the visitor-

directed category. While educational activities were the main focus of visitor-directed actions, several park managers identified intensified law enforcement and regulations (e.g., restricting visitor use or access) as key to preventing habituation in their parks.

A few parks also had administrative and landscape-level activities that directly and indirectly addressed habituation. These types of efforts included habitat management (e.g., landscaping, mowing), policies on hunting, monitoring and managing activities in high-use areas, siting buildings away from key wildlife habitat, additional training for staff, and proactive park management plans.

A number of parks acknowledged potential benefits of habituation. These parks used strategies such as wildlife viewing areas and platforms, education via personal contact with NPS staff, and enforcement of regulations (e.g., restricting human activity near wildlife) to foster a sustainable level of human-wildlife habituation.

Effects of habituation

We asked managers to identify the effects of habituation that were of interest or concern. In the human dimensions of wildlife literature, effects recognized as important by stakeholders in wildlife issues are called "impacts" and may be the focus of management activities. To facilitate management and planning, impacts can be grouped into five broad categories: (1) ecological, (2) economic, (3) health and safety, (4) psychological, and (5) social. The effects of habituation on wildlife and humans identified by NPS natural resource managers in our survey can be grouped into these categories.

Wildlife-related impacts

Respondents most often mentioned ecological impacts associated with habituation. Managers believed that habituation can cause ecological shifts at the individual, population and community levels such as changes in behavior, foraging, distribution, life history, and predator-prey relationships. Such changes may also indirectly affect key habitat, increase populations near cultural sites, and displace other, more sensitive species. Respondents suggested that habituation may lead to food conditioning and that this could foster reliance on humans and would cause animals to alter their natural behavior or character. Park managers expressed concern that food conditioned animals may be considered a nuisance or pest species, or may model "bad" behaviors to other animals in the population. Health and safety impacts to wildlife mentioned in response to the survey include: animal injury or death from close encounters; wildlife mortality due to an increased susceptibility to poaching, management actions (i.e., removal) and vehicle collisions; and compromised health of individuals or populations. A positive health and safety impact noted by respondents was the potential reduction in physiological stress to habituated animals when they encounter people. The only social impact related to wildlife mentioned by survey respondents was any potentially undesirable or controversial management actions that must be taken to address habituation. A number of park managers noted that little is known about the long-term consequences of most of these effects on wildlife populations.

Human-related impacts

Health and safety impacts associated with habituation, such as injury or disease transmission, were often mentioned by managers in our survey. Impacts in this category also extended to concerns about risk assessment by visitors in future situations. Managers suggested that some

degree of habituation might improve visitor safety. For instance, a habituated animal may not be startled and may be less likely to charge or act aggressively when encountering a human. Habituated animals may cause economic impacts such as property damage or loss, cultural resource damage, and operational cost for parks.

Respondents identified both positive and negative psychological impacts of habituation. Habituated wildlife allow visitors increased viewing and photo opportunities. Such "closeness" is likely to increase their satisfaction with the encounter and their park experience. This may lead to increased support for wildlife protection and preservation. Conversely, a close encounter may be frightening and therefore perceived as negative by some visitors and therefore lead to decreased support for wildlife. Respondents noted that these negative perceptions might arise because of concerns about safety or nuisance issues as well as from a belief that close encounters are "inauthentic" park/wildlife experiences. Furthermore, habituation may lead people to develop inaccurate perceptions about wildlife. Managers expressed concern that people may view habituated wildlife as tame or no longer wild. This interpretation of wildlife behavior may encourage inappropriate actions during future wildlife encounters.

A wide variety of social impacts may occur as a result of wildlife habituation. Visitors or area residents may develop negative impressions of NPS management activities due to the behavior of "problem" habituated animals, or because of actions NPS must take to deal with habituated individuals. For example, a habituated animal may seem safe to approach, leading a visitor to disregard park regulations associated with approach distances. Park staff may then be compelled to enforce the regulations, potentially affecting visitor satisfaction and the park's image. The managers we surveyed worried that this type of negative experience may lead to lack of support for parks. Habituation may foster divisive opinions about wildlife and the way they should be managed not only internally in parks, but also among visitors and other interest groups. Additionally, internal NPS conflict over management actions needed to resolve wildlife habituation could result. The presence of habituated animals may increase visitor use of an area because people want to capitalize on viewing opportunities. It may also decrease visitor use, however, if people try to avoid areas where other visitors concentrate. Finally, respondents described concerns about "fair chase" issues for habituated wildlife found in parks that allow hunting. This issue was also a concern for wildlife that may habituate in a park and then use habitat outside of the park where hunting is permitted.

Visitors and habituation

Attitudes

Positive human-wildlife interactions that result from habituation (e.g., viewing and photo opportunities) may contribute generally to visitors' positive park experience. Managers in our survey believed that this could lead visitors to have positive attitudes about wildlife protection. Visitors are likely to think that these opportunities are the result of park management actions and this may lead to positive attitudes about parks and support for parks. Furthermore, interactions with habituated wildlife may pique a visitor's interest in the natural world and in parks and promote learning.

Despite these potential positive influences on visitors' attitudes, respondents identified a greater number of negative effects of habituation on attitudes. When people are aware that animals in a

particular area are habituated, they may be fearful and avoid using certain areas. In contrast, some individuals may be excited by the challenge or opportunity of getting close to wildlife, but this may lead to risky behavior that endangers the individual and staff responding to the incident. Visitors that observe habituated wildlife may feel concern or sympathy for them and feel compelled to feed or approach the animals, leading to food conditioning. They may also believe that habituated wildlife are tame, domesticated or harmless. This may upset some visitors because they are unable to view wildlife in their "natural" or "wild" state. Managers noted that habituated animal behavior may emulate what people have seen on the television and this may lead people to desire to be close to the animals, which will likely result in visitors violating park regulations and causing harm to wildlife or habitats. These situations may lead visitors: to misunderstand the effect of their actions on wildlife; to view parks as petting zoos; and to assume the parks do not enforce regulations. Such circumstances, and the potential management response (or the time it takes park staff to be able to respond), may generate negative perceptions about parks and erode support for parks. Managers believed that most of the negative effects of habituation on attitudes represented uninformed beliefs and attitudes resulting in "inappropriate" decision-making and behaviors.

Behaviors

Respondents most often identified visitor feeding of wildlife as the visitor behavior leading to habituation[4]. Both purposeful feeding and inadvertent feeding (through careless camping and picnicking) were identified as prolific in parks throughout all regions. Purposefully approaching wildlife to view or photograph it, and to thrill seek was the next most common human behavior identified by survey respondents. Several parks mentioned the relatively recent upsurge in interest in photography as a factor contributing to habituation. This often involved the problematic behavior of visitors hiking off established trails. Hiking on trails or angling in key habitat are common visitor behaviors that lead to habituation, particularly in areas of high use and where crowding occurs. Respondents expressed concern about high use and careless behavior with respect to vehicle use. Respondents believed that when visitors experience repeated instances of non-threatening wildlife encounters they are likely to be more bold with future interactions – contributing to a cycle of human-wildlife habituation.

Park management that lacks enforcement or management support to address habituation or alter visitor behavior (e.g. altering seasonal use, visitor restrictions) also was a concern for managers. Other management activities at the intersection of management decisions and visitor behavior were mentioned when we asked about visitor behaviors that led to habituation. For example, respondents suggested that the lack of: trash management (e.g., disposal, storage), comprehensive management planning, visitor monitoring, sound concession activities, and understanding about wildlife and habituation all contributed to visitor behaviors that led to habituation. Nevertheless, the lack of enforcement was the number one concern under this theme.

Park managers discussed the most difficult human behaviors to manage. These included behaviors associated with food such as improper camping and picnicking and purposeful

[4] As we report this response we would like to reiterate that we observed a significant overlap in respondents' use of the terms habituation and food conditioning. Once again this emphasizes the apparent challenge in separating the two processes in an applied setting. We have reported this response to a question about "human behaviors leading to habituation" in the manner in which it was provided by respondents.

feeding. Managers believed that visitor misunderstanding of regulations and of basic wildlife behavior are difficult issues to address. In addition to lack of knowledge, managers were concerned about visitors who disregarded regulations, even if they understood them. Respondents identified the large numbers of visitors at key times and in significant habitat areas as a particularly difficult issue to address. Finally, neighbor activities (e.g., wildlife feeding, development, recreation) pose a unique challenge for managers wishing to address habituation in their parks.

Management needs

How important is managing habituation?

Many managers reported that attention to habituation is important to them and to other park staff, although responses ranged widely on this issue, and a number of respondents said that it was not important. A variety of human- and wildlife-related reasons were provided as justification for the importance of active management of habituation issues. Human-related reasons included: visitor safety; the possibility of disease transmission; the visibility of the problems and the potential impact on support for parks and wildlife; and relations with nearby communities and residents. Concerns about wildlife health (e.g., reliance on poor quality food) and mortality (e.g., susceptibility to poaching) were also given as support for the importance of managing habituation in parks. Respondents also identified broad impacts such as alterations in community ecology and a shift in human perspectives about wildlife toward a pest framework that suggest that attention to habituation is warranted. Respondents who did not believe habituation was a management priority for their park often suggested that this was because current practices prevented habituation or that habituation was unlikely to occur because of the nature of the park unit.

What do parks need to more effectively manage habituation?

The management needs that respondents identified fell into two primary categories: (1) technical guidance to address multiple dimensions of habituation and (2) management support.

Park managers are interested in technical guidance on wildlife and human research (e.g., design, data analysis). They specifically mentioned the need for studies evaluating outreach and education methods, examining wildlife feeding issues, and on wildlife behavioral and biological response to habituation. Respondents also said they need guidance on communicating with visitors and neighbors (i.e., information is needed regarding effective content for signs, brochures, and educational programs). When information in this arena is acquired, park managers would like to have educational programming for visitors, staff, seasonal employees, and concessioners revised and updated. Natural resource managers would like to have workshops and training programs that increase their knowledge of habituation and train them to address habituation in parks. Many park managers identified the need to improve internal communication about habituation. They suggested an online forum for active dialogue, a website with information about habituation, and a newsletter. Several individuals mentioned the need for human dimensions information to be available to natural resource managers. Finally, a few respondents stated that guidance about legal issues associated with habituation and strategies for dealing with neighboring communities were needed.

Needs related to management support centered on increased resources and internal, upper-level support. Many park managers stated that they needed increased operational assistance. Specifically they identified the need for more staff and more funding for wildlife- and human-directed interventions. Support of this kind also would include the flexibility to create more restrictive regulations and to more rigorously enforce existing regulations. Managers would like more support and receptivity from upper management on this issue; they believe upper management might not understand the importance or utility of managing habituation. Some suggested that a support system to train and coordinate managers and planners would be beneficial. Significant emphasis was placed on the need for a servicewide policy on habituation. Respondents believed a servicewide policy would provide the guidance, consistency, and justification needed for active, and perhaps proactive management of habituation. Managers believe that more active communication about policy related to human-wildlife interactions is needed, both within NPS and with visitors and neighbors.

Conclusions

We queried park managers on a variety of topics related to habituation, and the same key issues came up repeatedly in their responses, regardless of the particular question. The overarching theme of their responses focused on the interplay of visitor attitudes and behavior with NPS management actions that result in negative human-wildlife interactions. In particular, issues with food conditioning seem to be pervasive and distinguishing this from habituation in an applied context may be challenging. Managers described visitor attitudes that lead to problematic behaviors, and the lack of management response to prevent or address such behaviors, as the primary issues associated with the management of habituation. Below, we discuss these key issues highlighted by managers.

Food conditioning

While we asked respondents in the survey to distinguish between food conditioning and habituation, their responses indicated that such a distinction is challenging to make in an applied setting. The majority of responses to questions about habituation were dominated by food-related issues (e.g., visitors feeding wildlife, management of trash in parks, the availability of anthropogenic food in high use areas). Many parks identified issues related to waste management and food storage as practices that fostered habituation in wildlife. Aversive conditioning was often mentioned as the solution to this problem. Yet, these causes and solution may be related more to food conditioning in wildlife than to habituation. This highlights the complexity associated with managing habituation and echoes findings from other activities associated with the habituation project (for more information see the reports from workshops at the Human Dimensions of Wildlife [Natural Resource Report NPS/BRMD/NRR—2013/627] and George Wright Society [Natural Resource Report NPS/BRMD/NRR—2013/630] conferences).

Visitor attitudes and behaviors

Natural resource managers responding to the survey were concerned about visitors' perceived lack of knowledge about or respect for wildlife in parks as well as visitors' attitudes about the management objectives of the NPS. They believe that many of the problematic behaviors exhibited by visitors are the result of this lack of knowledge about wildlife and park management. Respondents perceive that visitors misunderstand the park context and have expectations that wildlife will be "tame" or "like zoo animals." Consequently, visitors are more likely to approach animals (which are likely to be habituated to some degree already if they are near people or developed areas), leading to further habituation and increased risk to both people and the animal. Regardless of the visitors' motivations, whether it is a close photo or the thrill of approaching wildlife, the results are the same and the chances for negative outcomes exist. Managers suggest that these visitors lack a basic understanding of wildlife behavior and that this limits their ability to judge the risks that their actions pose, either to themselves, to future visitors, or to wildlife. Of particular concern are situations in which visitors want to feed animals, thereby fostering food conditioning. In addition to these more deliberate visitor behaviors, managers also highlighted inadvertent behaviors that may foster habituation and food conditioning such as poor camping, hiking, or picnicking practices. Some respondents suggested that "educated" visitors have a negative experience when they witnessed habituated wildlife or close interactions between visitors and wildlife, while uninformed visitors may have positive experiences in their interactions with habituated wildlife.

Visitor management

Problems associated with visitor behavior potentially could be addressed via more specific regulations (e.g., Superintendent's compendia) and enforcement. Managers note that unfortunately, however, regulations to address habituation-related problems often either do not exist or are not enforced. They highlight these regulation-related issues as particularly salient factors contributing to habituation, but also as a potential key to solutions. Enforcement and personal contact by NPS staff were believed to be the most effective means for managing habituation and food conditioning in parks.

Managers perceive that high visitation and high use areas in key wildlife habitat encourage humans and wildlife to interact in close proximity, and consequently to habituate to one another. This is viewed as primarily a park management issue. Managers believed that these problems could be avoided via regulations to address seasonal flux in visitation and corresponding visitor and wildlife needs. They also identify the location of buildings and other park infrastructure in important wildlife habitat as contributors to habituation.

Increased visitor use and lack of regulations or regulation enforcement seem to be the key issues highlighted by survey respondents. Many suggested that problems related to these issues have been noted but little has been done to manage the situation either because of resource limitations or unreceptive upper level management. This may be linked to the perceived struggle in the NPS mission between visitor enjoyment and resource preservation.

Implications

Continuum of tolerance

Responses to the survey were dominated by concerns about habituation, yet a number of positive impacts also were discussed. When describing research needs, many managers alluded to the potential positive effects associated with habituated wildlife. That both positive and negative impacts are identified may be related to the nuanced distinction between habituation and food conditioning once again. If most habituated wildlife end up becoming food conditioned, or managers are unable to practically distinguish between the two behaviors, then habituation may indeed be a negative or downward spiraling process that increases the risks to all involved. However, if a practical way to separate the two can be found, benefits of habituation may become the focus of management.

A current theory that has emerged in our discussions with researchers and managers is that perhaps habituation and food conditioning are behaviors along a continuum of tolerance between people and wildlife. Wildlife that become tolerant of people may then become either habituated or food conditioned. Food conditioning typically produces negative impacts, but habituation may lead either to conflict or to coexistence. (For more detailed description of this discussion see the reports from workshops at the Human Dimensions of Wildlife [Natural Resource Report NPS/BRMD/NRR—2013/627] and George Wright Society [Natural Resource Report NPS/BRMD/NRR—2013/630] conferences.) Many survey respondents suggest that habituation is inevitable. If this is true, rather than focusing efforts on trying to prevent habituation, parks could instead consider ways to foster a level of habituation that produces positive impacts, minimizes negative impacts (e.g., prevents food conditioning), and allows humans and wildlife to coexist.

When is habituation an issue?

A number of survey respondents suggested that habituation was not currently a management issue in their parks. Such an evaluation may indicate successful management of habituation in those parks and may highlight some of the challenges for others.

Over the last several decades, many parks have engaged in active management to reduce food conditioning, however fewer parks have actively attempted to manage or lessen habituation. Most parks that have actively worked to reduce food conditioning and/or habituation have seen a corresponding decrease in negative human-wildlife interactions. Other parks may not specifically manage habituation, because they simply do not have or do not perceive they have the kinds of circumstances that create habituated wildlife. Additionally, parks that either experience positive impacts from habituation or view habituation as inevitable may not believe that any management intervention is warranted. These parks may not wish to actively promote habituation, but perhaps they do not wish to prevent it either.

Finally, many managers recognize the cost-benefit tradeoff between the increased wildlife viewing opportunities associated with habituation and the potential for food conditioned animals or other problems that may not be able to be managed given the increased risks to resources or visitors. This tradeoff is commonly recognized between what has been described as potentially contradictory parts of the NPS mission: visitor enjoyment and potential detriment to the resource. The situation leaves many managers in a “no action is a good action” dilemma and leaves them

to take a passive approach to managing habituation. This is compounded by the fact that often managers do not have the science to establish benchmarks from which they can measure the situation or evaluate their actions. Those parks with programs in place to manage pest animals, but have resource constraints (i.e., staff, funding), may be less likely to place emphasis on something with ambiguous effects such as those associated with habituation. Park managers also may be less likely to consider habituation an issue of management concern if it would impose restrictions on visitor behaviors and activities or upon park operations or traditional management practices. In either situation, the risk of losing visitor approval and the potential lack of agency support would likely favor no change in the current management approach.

Information needs

While managers in the survey identified many needs associated with managing habituation, education for staff and visitors and improved internal support were two key themes across responses.

To understand important elements of communication and education for NPS staff, more descriptive information about the causes and effects of habituation is needed. In particular, managers need to understand the role human attitudes and behaviors play in the development of habituation. Finding a way to distinguish points or thresholds along the continuum of habituation would be beneficial. This could help managers to separate habituation and food conditioning and potentially allow for management activities that foster the potential benefits of habituation while preventing the negative effects of food conditioning.

Points along the habituation continuum that yield positive and negative effects are likely to vary with context and species specificity. The threshold of habituation leading to coexistence that is appropriate for one species may not be for another, or the threshold for the same species may vary seasonally. For instance, a bear may be more tolerant of people when ample food is available (e.g., during the salmon run). On the other hand, it could be more or less tolerant of humans when food is limited and it is forced to forage over a wider portion of its home range that might include areas of high human activity. Information about these types of circumstances may help managers and other park staff to address habituation.

We learned that managers perceive that problematic visitor behaviors result from a lack of knowledge, and that this may be addressed through information and education campaigns. Their responses to the survey suggested that information regarding design and technique for developing these programs and support for implementing them are two key needs. Research efforts need to assess: if the perceived lack of knowledge exists and at what levels and scales; if the level of knowledge or understanding is directly or indirectly contributing to visitor behavior in natural areas and around wildlife; and how education programs can address these issues.

Our findings suggest that park managers believe managing habituation in park areas is important. They stated that increased support for research investigations was key to understanding habituation and to identifying successful human and wildlife management strategies. Managers raised a variety of concerns about the effects of habituation including: the health and safety of visitors and wildlife; visitor enjoyment; the economic costs of dealing with problems; and future support for the NPS and wildlife. The broad nature of these concerns suggests that inquiry into the causes and effects of habituation, and mechanisms for addressing habituation is needed. NPS

managers would benefit from insight about visitor perceptions and knowledge about acceptable behavior around wildlife and in natural areas. Such inquiry could help the NPS in the development and evaluation of outreach and education programs. However, even if descriptive research into these topics can identify ways to achieve sustainable levels of habituation that have either neutral or positive results, managers indicated that they may be unable to utilize such information. This indicates a commensurate "capacity" need with respect to resources and support from NPS management.

Appendix A: Human-Wildlife Habituation in Parks

The Biological Resource Management Division of the National Park Service (NPS) and the Human Dimensions Research Unit at Cornell University are studying human dimensions of human-wildlife habituation in and around NPS units. A national steering committee has been formed to provide guidance for this study. Bill Stiver from Great Smoky Mountains National Park is the committee representative from the Southeast Region. The first step for Bill and the other steering committee members is to identify the extent and general nature of human-wildlife habituation issues.

Many park service units have, to varying degrees, considered or pursued actions to address impacts associated with habituation. We are requesting your help in determining how human-wildlife habituation affects your park, if at all. (Note: even if you have not had and do not anticipate attention to human-wildlife habituation, we'd like your input). Your responses to 8 key questions will help us gain an initial understanding of NPS management perspectives on human-wildlife habituation issues. This survey is being distributed natural resource managers in parks throughout the U.S.

Please fill out the survey electronically on Sharepoint via the following link. You do not need to complete all questions in one session, instructions and an overview are provided:

http://nrpcsharepoint/brmd/humdim/Lists/Wildlife%20Habituation%20Survey/overview.aspx

As you respond to the questions, please distinguish between habituation and food conditioning as follows: wildlife habituation is the reduction of an animal's response to a repeated, inconsequential stimulus (usually resulting in loss of fear response to people). Food conditioning is when an animal learns to associate food with the presence of people, due to positive experiences of acquiring food easily.

Please respond by August 8, 2008.

These are the key questions presented in the survey:

1. To what extent does habituation occur at your park? Please include species, description of behavior, and evidence to support your response (e.g., studies, professional judgment)?

2. What is being done in your park that fosters or prevents habituation?

3. How important is managing habituation at your park to you, resource managers, other park staff, or the public? Why?

4. What effects from habituation are of interest or concern regarding:

    a. Wildlife?

    b. People (NPS managers, park visitors, park neighbors)?

5. Which human behaviors leading to habituation are most common in your park (e.g., approaching wildlife for different reasons, other recreational activities)?

    a. Which of the above human behaviors are most difficult to manage?

    b. Do you feel any of these are unique to your park?

6. How has habituation changed over time (e.g., change in causes/effects, intensity, frequency, species)?

7. How does habituation reflect people's attitudes about wildlife? Please explain.

8. What kind of support would best help your park address habituation (e.g., technical support for specific problems, general training on habituation, assistance in interpretation/communication)?

Results will be synthesized and made available on the Sharepoint site. They also will provide the context for a workshop on human-wildlife habituation in protected areas at the upcoming Human Dimensions of Fish and Wildlife Management conference in September/October http://welcome.warnercnr.colostate.edu/nrrt/hdfw/ Workshop outcomes also will be made available via Sharepoint.

Thank you for your input!

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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