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Natural Resource Stewardship and Science

Management of Habituation and Food Conditioning in the National Parks

Report from a content analysis of NPS guidance documents

Natural Resource Report NPS/BRMD/NRR—2013/626

ON THE COVER
Sign posted in Yosemite National Park
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Management of Habituation and Food Conditioning in the National Parks

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Natural Resource Report NPS/BRMD/NRR—2013/626

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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 and human-wildlife interactions across the National Park system. The NPS created a Task Agreement with Cornell University to complete several parts of the inquiry. To clarify current management of food conditioning and wildlife habituation across the system, Cornell staff completed a content analysis of 22 unit management plans and 46 other NPS documents that provide NPS managers with guidance on those topics. The results of that work are reported here.

The analysis revealed that the NPS places highest priority on addressing food conditioning and habituation situations that threaten human safety and wildlife conservation in park units. The NPS management efforts are multi-faceted, but most often are directed at reducing negative human-wildlife interactions linked to food conditioning in a few species (e.g., bears, elk) and in specific park units. Response to habituation and food conditioning issues was often a collaborative effort among multiple park divisions. NPS strategies to address habituation and food conditioning centered on: (1) aversive conditioning for wildlife; (2) regulations restricting visitors; or (3) communication initiatives to influence visitor behavior.

A recommended next step related to this analysis would be a synthesis of evaluative information about the efficacy of common park actions and a comparison with management guidelines. Such synthesis may reveal suggestions for a comprehensive set of best practices to promote positive human-wildlife interactions to achieve visitor safety and wildlife conservation.

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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).

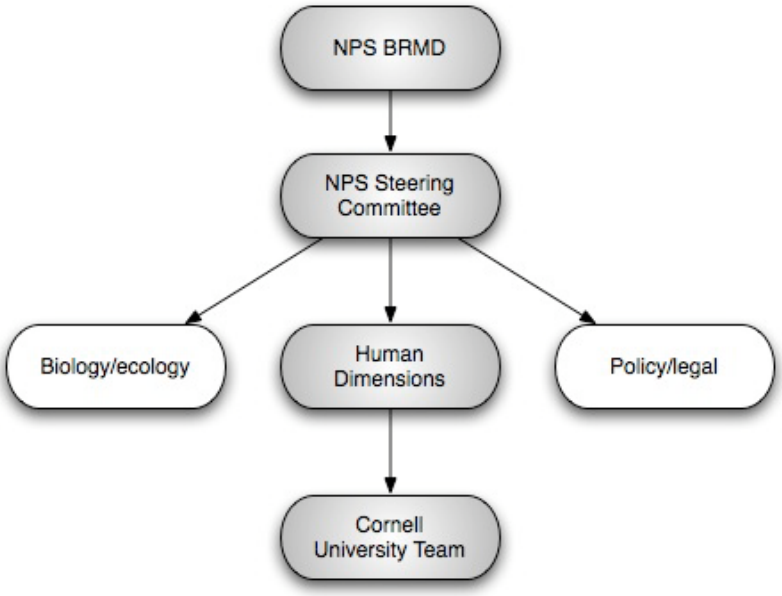

Figure 1. Organization of the NPS BRMD investigation of habituation. Shaded areas represent those related to the joint NPS and Cornell University human dimensions inquiry.

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.

Overview of Content Analysis

Purpose and design

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. The goal of the task agreement was to explore the issue of human-wildlife habituation in and around protected areas. The two workshops (activities 1 and 2) advanced understanding of habituation and identified research and management priorities related to habituation. The literature reviews (activity 4) included an examination of theory and empirical research related to human-wildlife interactions that may lead to habituation and an examination of interventions designed to influence human-wildlife interactions in parks. A survey of NPS managers (part of activity 3) helped to ground the exploration in the NPS context by querying NPS staff about issues in individual park units. Activities 5-7 were intended to further examine the NPS context by developing a systematic approach to understanding the management of human-wildlife habituation and human-wildlife interactions across the National Park system. To meet this objective, the team decided to collect and examine NPS guidance documents. The overarching goal of the document analysis was to establish context for future inquiry. Specifically, we sought to identify the current focus and scope of issues and management activities related to habituation and food conditioning in parks[1]. Objectives of the document analysis included:

1. Explore the types and nature of management strategies.

2. Examine the treatment of habituation and food conditioning (via document language or management techniques).

3. Identify the level of focus (e.g., individual animal, species, geographic area).

4. Examine the extent of collaboration among park divisions in addressing human-wildlife interactions.

5. Identify commonalities across park approaches.

Activity 5 of the Task Agreement included the development of a classification system to identify and explore characteristics of human-wildlife interactions and related management issues in parks. The classification system is the basis of the coding scheme that was used in the analysis of

[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.

the document collection (Appendix A). Due to the nature of some documents, the quantitative coding scheme was not an appropriate tool for the entire set of documents we reviewed; therefore some documents were examined qualitatively. The catalog of parks and issues (Activity 6) consists of the coded results from the application of the classification system (coding scheme), and the qualitative analysis of the guidance documents. This report presents the approach and findings associated with the document analysis and makes recommendations for prioritization of further inquiry (Activity 7).

Approach to document collection

In late May 2009 a call for guidance documents was issued by BRMD. This call was distributed via memo to regional Natural Resource Chiefs, and then passed on to contacts at individual parks. The complete text of the call is included in this report as Appendix B.

Follow-up calls for documents were issued via the *Natural Resource Stewardship and Science Monthly Report* and an *Inside NPS* article. In addition, each Habituation Steering Committee member coordinated additional document solicitation within his or her region and generated a list of parks that could potentially have documents of interest for the project. Each region's response and approach to collections was different.

In the Fall 2009, Lauren Barish (MS student, Antioch University New England and BRMD student employee) collected additional documents from online sources (internally- and externally-facing NPS websites). The goal of this effort was to find management, planning, and policy documents that provide guidance for management strategies or actions related to habituation or food conditioning. Lauren identified the subset of park websites to review using: lists of parks in each region generated by Habituation Steering Committee members; parks that uploaded documents to SharePoint in response to the document call; and parks that responded to the Summer 2008 BRMD online survey (if the park expressed concerns about habituation). Websites were searched for documents using the following keywords: *habituat(e)(ion), wildlife, wild life, disturbance, attraction, avoidance, food conditioning, tolerance, tolerate, sightings, interact(ion), feeding, nuisance, overabundance, viewing,* and *photo*.

Additionally, Cay Ogden (Wildlife Biologist, Intermountain Regional Office) from the Habituation Steering Committee searched the NPS Planning, Environment and Public Comment (PEPC) database for documents and identified documents using protocol similar to that used for the other online document search.

We recognize that the final set of documents identified likely does not encompass the universe of guidance documents that exist across the National Park System, however, the Steering Committee believed that our search process should reveal the suite of plans generally accessible to NPS managers.

The coding scheme

Development

The coding scheme was created to identify and explore characteristics of human-wildlife interactions and related management issues in parks. The coding categories were developed using information from: the 2008 online survey of NPS staff; the two habituation workshops; the

literature reviews; Habituation Steering Committee meeting notes and memos; and discussions between the HD research staff, the Habituation Steering Committee, and Kirsten Leong (Human Dimensions of BRM Program Manager, NPS Technical Representative to the project). The coding scheme was developed through an iterative process between the Cornell research team, Kirsten Leong, and the Habituation Steering Committee. Moreover, where appropriate, we added, merged, and further defined categories as the coding process progressed. All items in the coding scheme were written as presence/absence questions and coded as binary variables. The complete coding scheme is included as Appendix A.

Coding categories

Descriptive information

This included the title, date of issue, whether or not the document was a draft, and the document's park of origin.

Problem-focused information

We explored the types of problems identified in the document such as: harm to wildlife (e.g., feeding, harassment, poaching); human-wildlife interactions; human injuries and fatalities caused by wildlife; food conditioning; habituation; and negative habitat impacts (such as threats to the larger biotic community within a park).

We also coded whether the plan addressed these problems proactively (i.e., with the goal of preventing their occurrence) and/or in response to specific issues that already occurred. We coded documents as proactive or responsive with respect to the language in the document and whether mention was made of prior incidents or issues that may have created a need for the specific management plan. We sought to identify those documents that were created to address a particular situation versus those that were meant to be preventative generally. If a document was written proactively, but mentioned past problems, we coded the document as both proactive and responsive.

We identified whether each document specified an action threshold at which different management solutions would be implemented. We coded whether the threshold was based upon the type of wildlife behavior (e.g., animal coming into campground, acting aggressively toward humans); the number of problems/incidents between humans and wildlife; and/or the number the visitor complaints about such incidents.

Solution-focused information

Items in this category included the solutions identified in a document. These actions included: aversive conditioning; animal removal and/or destruction; trail closures and other environmental modifications; refuse containment and garbage management (i.e., using wildlife-proof garbage receptacles); visitor education strategies such as ranger-visitor interactions, and the use of brochures, pamphlets, and signs in support of education goals; monitoring and reporting human-wildlife interactions; and employee training programs.

We coded whether the outcomes of the aforementioned solutions identified in the document were wildlife-focused (e.g., animal or habitat protection) and/or human-focused (e.g., visitor enjoyment and safety).

Habituation and food conditioning

We coded for specific mentions of food conditioning and habituation. First, we determined whether these two terms were present verbatim in a given management plan. If so, we coded the reference as "*specific*." If not, but the plan alluded to either term (such as "wildlife losing fear of humans" for habituation and "wildlife associating humans with food" for food conditioning), we indicated the reference as "*implied*." Furthermore, we assessed whether the two terms were distinguished conceptually, used interchangeably, and if they always appeared together when used.

Management activities

The types of management approaches discussed in the documents were coded as animal directed, landscape directed, or visitor directed. We also examined the level of focus or scope of these management actions by coding whether they were geographic (e.g., specific policies designed for particular locations, such as campgrounds or trails), temporal (e.g., seasons, or daily use), wildlife species specific, or behavior specific (e.g., aggressive versus non-aggressive behavior toward humans).

Finally, we noted whether a document specified actors and organizations involved in addressing the management problems or implementing the aforementioned actions. These groups involved in management included existing NPS divisions and partners (e.g., Superintendent, resource management, interpretation, law enforcement, maintenance, volunteers, and park concessionaires) as well as external, non-NPS entities such as other federal, state, and local agencies.

Implementation

The coding scheme was directly applied to all plans that included a significant focus on native wildlife management. An individual experienced with content analysis worked with the Cornell Human Dimensions Research Unit staff to code these documents. Each document was reviewed using the coding scheme as a guide with examples. Variables were coded as present or absent and entered into a database. As we encountered situations that warranted modifications of the coding sheet, we incorporated those changes and re-analyzed plans when necessary.

The remaining documents (i.e., plans that mentioned native wildlife management but did not focus on it) were reviewed with the coding scheme as a guide. These documents included: broader management plans that included wildlife components; Superintendent's Compendiums; and guidelines and protocols. We began by searching each file for use of the terms habituation, feeding, food, and food conditioning. We qualitatively examined the content associated with these terms and excerpted related text. We also examined each document to explore topics from the coding scheme.

Findings

A total of 68 documents were coded: 22 with strict application of the coding scheme, and 46 using a qualitative application of the coding scheme.

Wildlife-focused plans (Quantitative coding)

Nineteen plans came from National Parks, two were from other park unit types (e.g., National Seashore), and one was an interagency document. Some plans were collaborative efforts between multiple park units (e.g., Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway) or multiple agencies (e.g., U.S. Fish and Wildlife Service, state agencies). Fourteen plans had a complete or partial focus on bears (brown or black), three focused on mountain lions, two on wolves, and one each on deer, feral horses, and elk and bison. Plans that were not species-specific mentioned these species as well as a host of others such as: wild goats, a variety of birds (including shorebirds and eagles), sheep, moose, jaguar, and turtles.

A detailed list of coded management plans is provided in Table 1.

Problem-focused information

We examined the documents to determine whether they were written to prevent problems between people and wildlife or in response to existing problems. We found that 46% of the documents were written proactively (i.e., with the goal of preventing potential problems), and 9% addressed existing issues. The remaining 46% of the documents mentioned problems that had led to the need for management action as well as strategies to prevent future issues and were therefore coded as "both" proactive and in response to a particular problem.

Documents were reviewed to explore the types of problems parks identified. We coded problem type, including whether the problem was an existing issue or a potential problem. Most (77%) of the management plans mentioned concerns about harm to wildlife such as harassment, mortality, and disease. A similar number of documents (82%) identified concerns about wildlife threatening park visitors either directly (e.g., encounters) or indirectly (e.g., property damage). Habituation and food conditioning also were discussed in more than three quarters of the documents. Additional types of problems identified in the coding process are described in Table 2. Over 60% of the plans mentioned between four and six of the possible eight problems contained in our coding scheme.

Most management plans (86%) identified an action threshold at which point a problem required management intervention. All of the plans we reviewed based the action threshold on specific animal behaviors (e.g., animal is curious, animal takes human food, animal attacks human). An example of a table describing animal behaviors that serve as management action thresholds is excerpted from the Denali Bear-Human Conflict Management Plan, and appears in Appendix C.

Table 1. Descriptive information about management plan documents included in the content analysis.

Document #	Title	Year	Park of Origin
1	Denali National Park and Preserve Wolf-Human Conflict Management Plan	2007	Denali National Park And Preserve
2	Feral Horse Management at Assateague National Seashore	None	Assateague Islands National Seashore
3	Mountain Lion Encounter Plan	2006	Big Bend National Park
4	Denali National Park and Preserve Bear-Human Conflict Management Plan	2003	Denali Nation Park and Preserve
5	Wildlife Aversive Conditioning and Hazing	2008	Shenandoah National Park
6	Nuisance and Hazardous Animal Management Plan	1998	Olympic National Park
7	Bear management plan	1999	Big Bend National Park
8	Black Bear Management Guideline	2002	Great Smoky Mountains National Park
9	Management of Habituated Wolves In Yellowstone National Park	2003	Yellowstone National Park

Table 1. (continued)

Document #	Title	Year	Park of Origin
10	Denali National Park and Preserve Resource Stewardship Strategy 2008-2027	2009	Denali National Park and Preserve
11	Bear Incident Management Plan	2007	Gates of the Arctic National Park and Preserve
12	Yellowstone National Park Bear Management Plan	1994	Yellowstone National Park
13	Mountain Lion and Black Bear Management Guidelines	2007	Saguaro National Park
14	Black Bear Conservation Step-Up Plan	2000	Mesa Verde National Park
15	Bear Management Plan	1999	Big Bend National Park
16	Kenai Fjords National park 2009 Interim Bear Management Plan	2009	Kenai Fords National Park
17	Environmental Assessment the Interagency Florida Panther Response Plan	2008	N/A

Table 1. (continued)

Document #	Title	Year	Park of Origin
18	Bear-Human Conflict Management Plan	2006	Katmai National Park and Preserve Aniakchak National Monument And Preserve Alagnak Wild River
19	Draft White-tailed Deer Management Plan	2009	Indiana Dunes National Lakeshore
20	Bear management plan	2009	Katmai National Park
21	Winter Use Plans Final Environmental Impact Statement	2005	Yellowstone National Park Grand Teton National Park John D. Rockefeller, Jr., Memorial Parkway
22	Final Bison and Elk Management Plan		National Elk Refuge Grand Teton National Park John D. Rockefeller, Jr., Memorial Parkway

Table 2. Problem-focused information in analyzed documents.

What specific problems are identified in the document? (existing or potential)	(out of 22)	(% of 22)
Food conditioning	19	86.4
Habituation	18	81.8
Wildlife threatening people	18	81.8
Harm to wildlife	17	77.3
Wildlife attacking people	15	68.2
Negative habitat impacts	5	22.7
Visitor safety	8	36.4
Visitor enjoyment	3	13.6

Solution-focused information

Just over half (55%) of the management plans described a multifaceted approach to solutions and mentioned eight of the solution categories in the coding scheme. Nearly all of the plans identified restricting visitor access and interpersonal education programs as existing or potential solutions to address human-wildlife problems. The use of signage was also mentioned frequently (82%). Over 85% of the plans identified wildlife-directed solutions such as animal removal and aversive conditioning. Monitoring and reporting human-wildlife interactions was emphasized as an important component of management solutions in 82% of documents.

Most plans identified visitor safety (96%) and wildlife protection (91%) as the desired outcomes of management. Over half also mentioned visitor enjoyment and habitat protection. Additional details about solution-focused information are in Table 3.

Table 3. Solution-focused information in analyzed documents.

What specific solutions are identified in the document? (existing or potential)	(out of 22)	(% of 22)
Modification of environment (space use)	21	95.5
Interpersonal education program	20	90.9
Animal removal	20	90.0
Aversive conditioning	19	86.4
Signage	18	81.4
Modification of environment (refuse containment)	15	68.2
Brochure/pamphlet	16	72.7
Monitor and report incidents	18	81.8
Employee training	3	13.6
What desirable outcomes of the solution are identified?	**(out of 22)**	**(% of 22)**
Visitor safety	21	95.5
Wildlife protection	20	90.9
Habitat protection/ecosystem effects	13	59.1
Visitor enjoyment	11	50.0

Habituation and food conditioning

Nineteen (86%) of the management plans referred to habituation. In 18 of these documents, habituation was referenced verbatim. One additional plan made implied references to habituation such as "losing fear of people." Similarly, 12 (55%) of the documents made specific mention of food conditioning and an additional 7 made implied references. Eighteen (82%) of the management plans discussed both habituation and food conditioning. Eight (36%) of these documents specifically distinguished habituation and food conditioning conceptually from one another.

Management activities

As discussed previously, most management plans proposed multifaceted solutions. Consequently, most plans identified more than one type of management approach: visitor directed (86%); modifications of the environment (human directed such as trail closures) (91%); and animal-directed (86%). Only one plan identified landscape modifications such as habitat alteration that were not human directed.

The management plans most often had a species-specific focus (91%). A high proportion of the plans (86%) also linked specific animal behaviors to management actions or focused on a particular geographic area (82%).

Of all park staff divisions, natural resource managers were most likely to be involved in the management activities described in the plans; 91% of the plans identified this group. Interpreters, law enforcement officers, Superintendents, maintenance staff, and external partners were identified in more than 50% of the documents. Other divisions and collaborators were mentioned as well; specific information can be found in Table 4. More than half of the plans identified at least five different divisions involved in management activities.

Table 4. Park divisions involved in management activity.

Which park divisions are involved in the management activity?	(out of 22)	(% of 22)
Natural resource management	20	90.9
Interpretation	12	54.5
Superintendent	13	59.1
Law enforcement/visitor protection	12	54.5
Maintenance	13	59.1
Concessions	11	50.0
Volunteers	8	36.4
Cultural resource management	1	4.5

Broader management plans with wildlife components (Qualitative coding)

Habituation

Only three of the documents in this category (i.e., Assateague Island National Seashore feral horse environmental assessment of alternative, Denali National Park and Preserve [NPP] environmental assessment for snowmobile use, and Denali NPP environmental assessment for

Spruce Creek access) mentioned habituation specifically. Discussion of habituation was not extensive even in these three documents.

Habituation was discussed most extensively in the environmental assessment to analyze alternatives relating to future management of the feral horse population inhabiting the Maryland portion of Assateague Island. The word habituation appeared in the report three times (on page 7-8, 18, and 43). Both food conditioning and habituation were recognized problems. The document mentioned "degree of habituation" as a criterion for the selection of horses to remove, if the management alternative of "one-time capture and removal" was used. The environmental assessment mentioned that supplemental feeding was not a preferred alternative because it would lead to food conditioning and loss of "wildness" in horses, among other negative effects.

Assateague Island National Seashore developed two mechanisms to manage problems related to food conditioning and habituation of feral horses. The first mechanism was a response protocol to "minimize opportunities that could result in horses developing problematic behaviors that result in human injury or excessive property damage." The protocol describes potential problems and possible solutions including, "the major interactions between feral horses and people, levels of habituation, and management recommendations to reduce inappropriate contacts between the two groups." Management options were described as dependent upon the extent to which horses are habituated or food conditioned.

The second mechanism in the Assateague Island National Seashore environmental assessment highlighted education of visitors as a key management technique to reduce problems between people and horses. The document proposed to do this via a volunteer "Pony Patrol" group that would educate visitors about issues associated with petting and feeding horses. The environmental assessment stated that:

> As more feral horses lost their natural wariness and became habituated to the presence of humans, they were becoming very aggressive in seeking food from visitors, and were more likely to bite or kick when demanding food. Even when food was not involved, biting and kicking were more likely to occur simply because these feral horses were allowing visitors to approach and touch them. …
>
> Helping visitors understand that feeding and petting teaches the feral horses behavior patterns that ultimately endanger them can be the deciding factor in convincing visitors to keep their distance and respect the feral horses' wildness.

Habituation was briefly discussed in the environmental assessment for permanent closure of the former Mount McKinley National Park to snowmobile use. This discussion of habituation, however, was in the context of wildlife disturbance. In the report, impacts of snowmobile use on wildlife were outlined. The impacts listed suggest that some species were disturbed in ways that affect distribution and habitat use. Snowmobile paths create some of the effects that one would see from building a road in a wilderness area. The document discussed the possibility that some species could habituate to snowmobile-related disturbance, but noted that effects on species were

not always clear from simple behavioral observations, and that animals that appeared habituated might still experience significant stress.

Wildlife disturbance

Four of the documents in this category included discussion of wildlife disturbance that was potentially relevant to our analysis. These documents did not mention habituation, but rather the possibility that road building and other activities could cause short-term or long-term disturbance of wildlife.

Food attraction or conditioning

Two of the broader management documents mentioned food attraction or food conditioning. Food attraction was noted as a source of problems with feral horse management.

> On Assateague, interactions between feral horses and humans result from both the feral horse's curious nature and the propensity for people to, intentionally or through neglect, interact with them. Most interactions involve the availability of human foods. The extent to which a feral horse is conditioned to humans and their food can influence its behavior and the level of management needed to offset the interaction with people.

Food attraction also is discussed related to large carnivores in Denali NPP.

Superintendent's compendiums (Qualitative coding)

Habituation and food conditioning

Issues associated with habituation and food conditioning in the Superintendent's compendiums were most often addressed in the context of food storage regulations. The compendium from Acadia National Park (2008) stated that: "This [food storage] regulation reduces the likelihood of habituated wildlife and nuisance animals by eliminating human-caused wildlife attractants." The terms habituation and food conditioning were used most frequently in documents from the Alaska region. For instance, in the food storage section of compendiums from Denali NPP (2006), Glacier Bay NPP (2007), Katmai NPP (2006, 2007), Klondike Gold Rush National Historical Park (2008) and Yukon Charley Rivers National Preserve (2008) the following statement was made regarding the required use of bear-resistant containers: "The intent of these designations is to prevent bears and other wildlife from obtaining and habituating to food and garbage, thus protecting wildlife and park visitors alike." Similarly, a number of these same documents mentioned habituation in supplemental materials (e.g., appendices) addressing the determination of need for food storage. The two most common phrases used by the Alaska parks were:

1. Bears are extremely susceptible to habituation to human food sources. Once they have learned to associate a site or item (e.g. tent, kayak, boat, etc.) with acquisition of food, they may return to that source repeatedly for further food rewards.

2. Bears which become habituated to human food are likely to be killed by humans in defense of life or property inside the parklands or on adjacent lands.

As evidenced by the description of associative learning, the term habituation is used in these instances to describe food conditioning.

While precise language around habituation and food conditioning did not always reflect a conceptual or behavioral distinction between the two, the Alaska parks' use of these terms changed over time. The 2009 version of the food storage regulations from Katmai were changed to state: "The intent of these designations is to prevent the food conditioning of bears and other wildlife by not allowing bears to associate people with food; thus protecting wildlife and park visitors alike." The 2009 document from Glacier Bay reflected a similar, but more subtle, change, stating: "…obtaining and becoming conditioned…" The determination of need appendices described above reflected this change in use of the term habituation as well. Katmai's 2009 document and the 2008 documents from Klondike Gold Rush and Yukon Charley changed "habituation" and "habituated" in numbers one and two (above) to "conditioning" and "conditioned." Interestingly, these changes in terminology occurred only in the appendices for Klondike Gold Rush and Yukon Charley; the text of the compendiums' food storage regulations still used the term habituation.

Distinct references to habituation were made in several other contexts in the compendium documents as well. Again, under food storage regulations, the compendium from Acadia (2008) stated that: "Reducing habituated and nuisance wildlife also reduces the potential for wildlife bites and provides for the safety and well-being of park visitors and wildlife." Similar statements about concern regarding habituation and risk to human safety appeared in the determination of need for food storage in many of the Alaska documents as well. The compendium from Denali addressed habituation under wildlife viewing regulations.

> These distance restrictions are meant to apply a minimum buffer around wildlife to prevent negative encounters between humans and wildlife and to protect wildlife from habituation to humans. See attached determination of need.

It is noteworthy that the focus of habituation in this instance is to protect wildlife from habituation, rather than to protect humans from the threat posed by habituated wildlife.

Finally, the 2006 Katmai document had an extensive discussion about angler behavior near bears. In this discussion, concerns specifically related to food conditioning were raised: "This poses resource and safety concerns since it may condition bears to associate humans and food." Anglers are required to relocate if a bear is in their vicinity.

Wildlife viewing

As described in the previous section, regulations associated with wildlife viewing often addressed issues related to habituation. While this association was explicitly stated in the instances noted above, it was implied in others. Denali (2006) had designated wildlife distance conditions for bear, moose, caribou, sheep, wolves, and raptors. In addition to the reasons quoted above, the compendium stated that:

> Viewing from a close proximity can alter wildlife behavior and cause hazardous circumstance for park visitors and wildlife. … Disruption of natural wildlife movements can also reduce or eliminate the viewing opportunities that attract many visitors. The restrictions are intended to mitigate the risks associated with humans in close proximity to wildlife while accommodating large numbers of visitors drawn for wildlife viewing.

This language implies a relation between human and wildlife behavior. The "hazardous circumstances" may result from wildlife habituation to human presence, or from more aggressive wildlife behavior in response to the proximity of people. However, the phrasing also suggests that some degree of wildlife habituation to human presence (at the acceptable specified distance) could be beneficial because it creates viewing opportunities. Katmai's 2006 compendium describes the development of a "50 yard rule" for wildlife viewing.

> Areas that possess abundant fish and wildlife attract large numbers of visitors and present high potential for personal injury and altering wildlife behavior. These restrictions on activities that bring people in contact with wildlife are intended to apply a minimum buffer zone around wildlife. It does not imply that 50 yards is always a safe distance from which to observe wildlife. It also does not imply that retreating from a bear is always the best course of action.

This rule was developed so that an "easily understood guideline" or "rule of thumb" would exist for visitors regarding wildlife viewing and approaching wildlife.

In addition to distance conditions, wildlife viewing platforms, with specified hours of use were described in several documents from Alaska. These platforms were designed to provide a safe way for visitors to watch wildlife (e.g., bear) at a close distance, while continuing to protect the resource. The limited hours provide a pattern of human use that provides bears predictable times to forage without human presence. Some road closures and other modifications were designated specifically to enhance wildlife viewing opportunities (e.g., by limiting traffic on a road).

Food storage

In addition to specific mention of food conditioning and habituation, the compendiums also addressed other topics from the coding scheme. Most compendiums noted that food storage regulations exist to prevent wildlife from developing "problem" behaviors and to protect visitor safety (i.e., prevent direct encounters between people and wildlife). The river launch operational guidelines appendix in the New River Gorge (2004) compendium explained that food scraps lead to nuisance wildlife issues as well as dangerous human-wildlife interactions and risk of disease. This section also included the "help keep wildlife wild – do not feed wildlife" adage. Similarly, appendices from the Alaska parks stated: "Humans are at risk of injury or death when bears attempt to obtain food from tents, packs, vessels, or other similar areas." Many parks required the use of bear resistant containers for food storage and recommended that dishes, cooking equipment, toiletries, and any other odiferous items be securely stored. Bears were most often mentioned in the context of food storage issues. Compendiums from the Alaska parks noted that the curiosity and intelligence of bears often lead them to human food, campgrounds, and other human property/areas, ultimately causing conflict unless food is stored properly. Concerns about the impact of improperly stored food on wildlife health (e.g., diet, stress) were mentioned in several documents. In the determination of need for food storage regulations, a number of the

Alaska documents stated that less restrictive measures were insufficient. For instance, they note that while education efforts may help to reduce food storage problems, incidents still occur and constraints on enforcement limit a park's ability to respond.

Closures and other restrictions

Finally, a few other regulations were marginally related to themes from the coding scheme. To protect wildlife from disturbance by humans, areas such as roads, trails, campsites, and caves may be closed. Such closures often were designated during nesting or other critical time periods. These measures reduced stress to animals, and gave them predictable access to important habitat and food sources. Particularly during times or areas of high human or wildlife use, these regulations helped to prevent negative human-wildlife interactions. Many parks had regulations prohibiting or limiting the use of artificial light to view wildlife, both to prevent illegal hunting as well as to minimize disturbance. Restrictions on pets in the park, on baiting or attracting wildlife, and on fruit, nut, and berry collection were described in the compendiums as well. These limitations were prescribed in an effort to achieve both visitor use and enjoyment and the protection and safety of both people and wildlife.

Guidelines and protocols (Qualitative coding)

We reviewed various NPS guidelines and protocols, again examining documents for specific use of habituation and food conditioning as well as other topics from the coding scheme. Most of the documents in this category were related to aversive conditioning, and primarily focused on bears. Additionally, one document dealt with wildlife viewing protocol, and one was a risk assessment of human-bear interactions. The documents varied in the extent to which they discussed underlying issues associated with the need for aversive conditioning, so each document is presented individually.

The Big Bend National Park 2006 Bear Aversive Conditioning Protocol included a precise definition of aversive conditioning and described the conditions warranting the practice. Included in these conditions were situations in which a bear might obtain food (implying the potential for food conditioning) or lose fear of people (implying habituation). This park used a similar approach and language in its mountain lion hazing guidelines, although the focus of problematic conditions was on habituation rather than food conditioning.

The Great Smoky Mountains National Park Wildlife Aversive Conditioning Guidelines (2005 and 2009) explained that due to potential conflicts between wildlife and visitor use, wildlife must sometimes be "excluded from repeatedly frequenting specific areas." Aversive conditioning was used to reduce the likelihood of food conditioning and to "reestablish the natural fear of humans in wildlife" to minimize conflict. In a description of animal behaviors that warrant aversive conditioning, the documents stated:

> Animals that are still afraid of people may only require a loud noise (e.g., the sound of a car horn) to scare them away, whereas, animals that are food-conditioned (e.g., have a dependence of garbage or human foods) may require multiple encounters and more forceful projectiles.

This excerpt emphasizes the difference between the behavioral responses of animals that are food conditioned and habituated. This language suggests that these behaviors may represent a continuum of severity.

The Great Smoky Mountains documents addressed the importance of employing varied aversive conditioning techniques so that animals do not habituate to particular methods. They also suggested that food conditioned or habituated animals may require a variety of aversive stimuli to alter behavior. The documents suggested shouting and arm waving be used prior to more significant methods so that "the animal will associate the potential negative stimulus with people, thereby learning to avoid people at close distances." The 2009 document cautioned NPS staff that negative experience (i.e., aversive conditioning) must exceed the positive experience (i.e., human food) if wildlife are to stay away from developed areas. The protocol also required staff to instruct visitors about what is being done and why, and to involve visitors in the effort where appropriate (e.g., in shouting, arm waving).

The Olympic National Park shell protocol for wildlife management (2001) noted: "The idea is to not teach a bear to stop at specific distances from people, but rather to move as a wild bear would: using cover and moving away from people when confronted." While some parks provided distance viewing and approach guidelines for visitors, in this case, distance was not the focus of animal-directed management activities.

Glacier National Park provided a brochure with a brief description of their proposed 2009 Wildlife Viewing Plan. The document stated that the plan was being developed due to concerns about increased human-wildlife interactions and the potential for these encounters to lead to excessive habituation or conditioning of wildlife. Objectives of the plan were to "reduce opportunities for wildlife to become habituated along the Many Glacier Road corridor." Proposed solutions ranged from visitor-directed activities such as brochures and interpretive programs to alterations in the physical environment such as changes to road pullouts.

Conclusions

Type, nature, and focus of management strategies

Through the content analysis of documents, we explored the type and nature of management strategies designed to influence human-wildlife interactions. We found that the documents generally focused on issues familiar to NPS[2] and the Habituation Steering Committee. The topic most often addressed in the management plans was negative interactions between people and wildlife associated with food. Interactions that occurred around food sources were typically considered "conflict," and often described as leading to human injury, negative health impacts to wildlife, and/or damage to property. Despite the pervasiveness of these issues in discourse about human-wildlife interactions, most of the documents were written proactively. Although approximately one third of the management plans described some level of existing problems, the focus of documents tended to be actions that could be taken proactively to avoid an escalation of the situation.

Bears were most often discussed in the plans we reviewed. Wolves and mountain lions were the focus of at least two plans. This make up of species likely reflects both historical problems as well as the ability of these particular species to cause significant negative impacts (e.g., human injury, property damage).

Most documents identified an action threshold, and the overwhelming focus of these thresholds was the behavioral severity demonstrated by an animal during a particular event. As opposed to the "three strikes and you're out" rule that many state wildlife agencies follow, it seems from the documents that the NPS approach focuses on the level of potential threat posed by an animal's actions (the "threat" posed by a particular behavior may affect human or wildlife health and safety). If a particular type of behavior was observed (i.e., the action threshold was reached), then managers would engage in techniques to address the issue.

In our review of documents, we found that management strategies to address and mitigate existing or potential negative human-wildlife interactions were multifaceted. Documents typically described management strategies with both a wildlife and a visitor component. The most common wildlife-focused approach was aversive conditioning. Aversive conditioning techniques varied with respect to the nature and severity of wildlife behavior and the resulting human-wildlife encounters. Protocols, guidelines, and determinations of need associated with aversive conditioning accounted for a substantial number of the documents we reviewed. Nevertheless, even these documents typically included a "visitor education" component. Like aversive conditioning techniques, the approach to visitor education varied relative to circumstances. The documents we reviewed most often focused on interpersonal interactions

[2] As suggested by the two workshops and the manager survey conducted previously by the research team.

with visitors. This was described as either one-on-one interactions between staff and visitors or more broad-based educational programming. One-on-one interactions ranged from communication between staff and visitors during the permitting process to "teachable moments when natural resource specialists engaged visitors while conducting aversive conditioning. In addition to interpersonal interactions, signage also was a commonly used approach to park information and communication efforts. The other visitor-directed strategy that appeared in a significant proportion of the documents was restrictions to visitor activities. Restrictions typically included trail or campsite closures, food storage and wildlife feeding regulations, and wildlife viewing requirements (e.g., approach distance).

The desired outcomes of management strategies reflected the two-pronged (i.e., wildlife and visitor) approach to solutions. The most commonly identified desired outcomes were visitor safety and wildlife protection. The management documents emphasized the need to provide opportunities for wildlife viewing and to protect the safety of wildlife and visitors.

Habituation and food conditioning

Habituation and food conditioning were addressed in the majority of the wildlife-focused management plans we reviewed. These topics were mentioned in most of the superintendent's compendiums, guidelines, and protocols, but in relatively few of the broader management plans. In general food conditioning was discussed more extensively than habituation and most management techniques described were designed to address problematic wildlife-visitor interactions that arose from food conditioning. Documents often addressed this focus on food-related issues and explained that the aggressiveness of animal behavior, and therefore potential danger to both wildlife and people, was greatest when animals become food conditioned. Food conditioning was described as a threat to wildlife both because of potential negative health impacts associated with diet, but also because of the danger of human-caused injury or death. Visitor-related problems associated with food-conditioned animals included visitor safety as well as property damage.

Habituation was often mentioned in association with food conditioning. At times, a conceptual distinction was not made between the two processes; habituation was occasionally used interchangeably with food conditioning. This occurred most often when documents referred to "wildlife becoming habituated to food." Interestingly, some of the documents specifically discussed associative learning processes (the learning process that leads to food-conditioning) and food storage issues but labeled it habituation.

In contrast to those instances where the use of habituation and food conditioning were not distinguishable, many other documents specifically defined the two and made distinctions about the resulting wildlife behavior and potential management strategies. In these instances, habituation was considered as less likely to lead to serious human-wildlife conflict than food conditioning. Typically the two were discussed as a continuum of behavior; and documents suggested that more "forceful" management actions need to be taken to address food-conditioned animals. It also was acknowledged that habituation could predispose animals to becoming food conditioned and lead to more serious problems. Despite this risk, some of the documents we evaluated discussed possible benefits of habituation including reduced stress to wildlife and opportunities for visitors to view wildlife (leading to visitor enjoyment in the parks). Some documents addressed this issue overtly and described benefits to habituation and strategies for

managing habituation at levels to achieve benefits and avoid problems. Other documents alluded to the idea of an acceptable level of habituation, implying that some habituation might be appropriate (e.g., Glacier Wildlife Viewing plan refers to “excessive habituation”).

Of particular interest to this project was the change in use of the terms habituation and food conditioning over time. A few parks provided annual versions of the same document for multiple years. For instance, we reviewed two to three years worth of superintendent’s compendiums from several Alaska parks. In early versions of these documents, habituation and food conditioning were used interchangeably (e.g., bears habituating to food). However in 2008 and 2009 versions, the documents changed the language to clarify that food conditioning occurs when bears undergo associative learning. This change may reflect increasing awareness among managers of the varied impacts of food conditioning and habituation and may influence the manner in which managers approach the two issues.

Collaborations

Natural resource management was the most commonly identified division of a park involved in management actions to prevent or mitigate habituation and food conditioning. Given that many of the documents we reviewed were either species specific management plans, or aversive conditioning protocol, this was not an unexpected finding. Even in these plans, however, roles for other divisions often were discussed. Of the additional divisions, interpretation was one of the most frequently identified. Aversive conditioning protocol described ways in which interpreters could work together with natural resource managers on the same activity. For example, interpreters could discuss the “what” and “why” of natural resource managers’ activities while they aversively conditioned a bear in a campground. In other documents, natural resource and interpretation worked together to achieve the same objective (e.g., keep wildlife away from human food), but with separate activities. Several of the documents were written in collaboration with other agencies external to NPS and many acknowledged the importance of such efforts due to the “boundary-less” nature of animal movement patterns and therefore possible problems. More than half of the plans included at least five different divisions in management activities, indicating a fair degree of collaboration among park divisions with respect to the management of human-wildlife interactions.

Commonalities

We observed a number of commonalities across park approaches in the documents we reviewed. As discussed previously, the majority of the documents were management plans focused on bear. Consequently, significant overlap in approaches occurred in the documents. Issues associated with food, such as food storage, problems with food-conditioned animals, and aversive conditioning were addressed most frequently. With respect to human-focused management, we identified a focus on information and education initiatives and regulations to restrict visitor behavior. Based on the documents from the Alaska parks, it is clear that some parks coordinate in their approach to managing human-wildlife interactions. Most Alaska parks had similar procedures to prevent and address problems and the documents typically contained verbatim language across the parks. The conceptual treatment of habituation and food conditioning was less consistent across all documents; some made more precise distinctions between the two concepts than others. Despite this, it seemed that food conditioning universally was believed to lead to problems and typically required immediate management attention. Protocol around habituation was less consistent; some parks made reference to acceptable levels of habituation

and possible benefits, while others described it as a problem. The documents that treated habituation exclusively as a problem tended to be the ones that did not distinguish conceptually between habituation and food conditioning. Finally, several parks changed their language over time with respect to habituation, more clearly separating it from food conditioning, possibly indicating a shift in the management of habituated wildlife.

Next steps: Addressing management needs and information gaps

This content analysis was one component of a multi-faceted human dimensions investigation. Characterizing the content of NPS documents allowed us to draw a few important conclusions about NPS priorities, management needs, and information gaps related to management of impacts associated with wildlife habituation and food conditioning in national parks.

The prevalence of content about protecting human safety and conserving wildlife leads to the conclusion that concern about impacts on human safety and wildlife conservation are the priorities that have driven recent NPS actions to manage wildlife habitation and food conditioning in national parks. Content about addressing impacts on habitat or visitor enjoyment of parks is less prevalent, leading to the conclusion that NPS staff usually consider those issues a lower priority for management. In a survey associated with this project, NPS personnel identified more than 80 species of wildlife that are susceptible to habituation and food conditioning in parks. Very few of those species were the focus of management attention in the documents we reviewed. It may be that issues associated with the majority of these species go unaddressed because they do not involve impacts on human safety or wildlife conservation within a park.

The second objective for the investigation was to 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. As mentioned above, NPS documents reflect a clear priority on human safety and wildlife conservation (e.g., in cases such as grizzly bear management, where habituation or food conditioning exposes bears to mortality rates that could compromise bear population viability). Given those priorities, identifying effective means of modifying human behavior to reduce food conditioning of wildlife in parks may be one of the most urgent wildlife management needs facing NPS.

A third objective for the investigation was to identify important knowledge gaps related to human-wildlife habituation in and around protected areas. This content analysis documents the most common actions that some parks take in an attempt to manage the impacts of wildlife habituation and food conditioning (e.g., measures to restrict human access to particular trails or portions of parks and actions to inform park visitors about park policies and regulations on topics such as food storage, wildlife viewing, camping, or trail use). If resources are available for research on human dimensions aspects of habituation and food conditioning, studies to document the relative effectiveness of these commonly-used management actions should receive priority.

This analysis of NPS documents clarifies what NPS is doing to address impacts of wildlife habituation and food conditioning, but important information gaps remain. In particular, there is a need for evaluative information on NPS management actions. Critical evaluations, provided through new research or through synthesis and communication of existing studies, would be of great value to NPS staff considering how to respond to a habituation or food conditioning issue in their park unit.

Many studies have been done in parks that would have bearing on recommendations for managers, for example, a risk assessment for bear-human interactions at campsites on the

Tatshenshini River and Lower Alsek River, Yukon, B.C., and Alaska was conducted in 2000. This study evaluated the potential impact of campsites on bears and bear-human interactions. The associated report defined and distinguished between different types of bear-human contact and emphasized the difference between habituation and food conditioning. The authors outlined

potential benefits and problems for both bears and humans associated with habituation and discussed the possibility of a threshold of human use that could lead to a desirable level of habituation in bears (i.e., a level at which bears are not disturbed by human presence but problematic interactions are kept to a minimum). The study report also highlighted the long-term benefits to proactively managing bear to prevent food conditioning. Recommendations included the need to focus on interagency collaboration and monitoring associated with human-bear interactions and increased education efforts. The authors suggested that education materials include an emphasis on the distinction between the processes of habituation and food conditioning. A review of studies like this and a comparison of study findings and recommendations to existing guidance documents could help address an important information need.

This review of park management documents revealed a focus on issues related to human health and safety and wildlife conservation. Habituation and food conditioning were mentioned frequently in the documents (although not always as separate issues) and management strategies to address these phenomena centered on aversive conditioning for wildlife and regulations restricting visitors or communication initiatives to influence visitor behavior. A valuable next step related to this analysis would be a synthesis of evaluative information about the efficacy of common park actions and a comparison with management guidelines. Such synthesis may reveal suggestions for a comprehensive set of best practices to promote positive human-wildlife interactions to achieve wildlife conservation and visitor enjoyment.

Appendix A: Coding Scheme for NPS Habituation Document Analysis

	Descriptive information	
V1	Document number	
		Assign number
V2	Title of document	
		Qualitative
V3	Type of document	
		1 = 2 = 3 =
V4	Document date - month	
		1-12; 1 = January 12 = December
V5	Document date - year	
V6	Document's park of origin	
		1 = 2 = 3 = 4 =

	Problem-focused information	
V7	Is the document written proactively or in response to a problem?	
		0 = response 1 = proactive 2 = BOTH
	What specific problems are identified in the document? Document mentions (existing or potential):	
V8	Harm to wildlife	
	e.g., visitors feeding animals; harassing wildlife; human-caused mortality; infectious diseases; illegal activities by people (poaching)	1 = Yes 0 = No
V9	Wildlife threatening people	
	e.g., human-wildlife conflicts; confrontations; aggressive encounters; wildlife damaging property; raiding campsites	1 = Yes 0 = No
V10	Wildlife attacking people	
	e.g., interactions resulting in human injury or mortality	1 = Yes 0 = No
V11	Visitor safety	
	e.g., encounters; traffic jams; wildlife-vehicle collisions	1 = Yes 0 = No
V12	Food conditioning	
	May be verbatim reference or implied – make note of which	1 = Yes 0 = No

V13	Habituation	
	May be verbatim reference or implied – make note of which	1 = Yes 0 = No
V14	Negative habitat impacts	
	e.g., human disturbance to landscape; impacts to soil, water, vegetations, biotic community	1 = Yes 0 = No
V15	Visitor enjoyment	
		1 = Yes 0 = No
V16	Is an action threshold identified?	
		1 = Yes 0 = No
V16a	Threshold based on type/nature of animal behavior	
	e.g., foraging near humans; exploring campgrounds; approaching humans for food	1 = Yes 0 = No
V16b	Threshold based on number of problems/incidents	
		1 = Yes 0 = No
V16c	Threshold based on visitor complaints/responses	
		1 = Yes 0 = No

	Solution-focused information	
	What specific solutions are identified in the document? Document mentions (existing or potential):	
V17	Aversive conditioning	
	e.g., use of projectiles; shouting; trap and release	1 = Yes 0 = No
V18	Animal removal	
		1 = Yes 0 = No
V19	Modification of environment – space use	
	e.g., restricting visitor access to area; trail closure; sealing buildings to prevent wildlife access; road use	1 = Yes 0 = No
V20	Modification of environment – refuse containment	
	e.g., trash handling and containment at campsites and other developed areas; removing unnatural food sources; bear-proof garbage containment	1 = Yes 0 = No
V21	Education program – staff communicating with visitors	
	e.g., interpersonal interactions; instructions delivered to permitees	1 = Yes 0 = No
V22	Brochure/pamphlet	
		1 = Yes 0 = No
V23	Signage	
	e.g., bulletin boards; signs; stationary visual communication	1 = Yes 0 = No
V24	Monitor and report incidents	

		1 = Yes 0 = No
V25	Employee training	
		1 = Yes 0 = No
	What desired outcomes are identified?	
V26	Visitor enjoyment	
	e.g., opportunities to view wildlife; attachment to place; access to particular areas/resources	1 = Yes 0 = No
V27	Visitor safety	
	e.g., preventing negative human-wildlife interactions; injury to visitors; attacks	1 = Yes 0 = No
V28	Wildlife protection	
	e.g., preventing food conditioning; wildlife health; natural diet; disturbance	1 = Yes 0 = No
V29	Habitat protection/ecosystem effects	
	e.g., soil; water; vegetation; other species; biotic community	1 = Yes 0 = No

	Habituation and food conditioning	
V30	Is habituation specifically discussed?	
	e.g., verbatim use of term; implied - wildlife lose fear (specify verbatim or implied when coding)	1 = Yes 0 = No
V31	Is food conditioning specifically discussed?	
	e.g., verbatim use of term; implied – wildlife associating food with people (specify verbatim or implied when coding)	1 = Yes 0 = No
V32	Is habituation distinguished conceptually from food conditioning?	
	e.g., specific attempt to differentiate – glossary, definitions; one leads to other – habituated wildlife may become food conditioned	1 = Yes 0 = No
V33	Are the words habituation and food conditioning used interchangeably?	
		1 = Yes 0 = No
V34	Do the words habituation and food conditioning always appear together?	
		1 = Yes 0 = No

	Management activities	
	What types of management approaches are employed?	
V35	Animal directed	
	e.g., aversive conditioning	1 = Yes 0 = No
V36	Landscape/environment directed re: wildlife	
	e.g., habitat alteration	1 = Yes 0 = No
V37	Landscape/environment directed re: humans	

	e.g., trail or road closures	1 = Yes 0 = No
V38	Visitor directed	
	e.g., regulations for approach distance, education initiatives	1 = Yes 0 = No
	What is the level of focus/scope of the planned management activity?	
V39	Geographic area	
	e.g., campsite; trail; backcountry	1 = Yes 0 = No
V40	Temporal - seasonal	
		1 = Yes 0 = No
V41	Temporal - daily	
		1 = Yes 0 = No
V42	Species specific	
		1 = Yes 0 = No
V43	Behavior specific	
	e.g., animal has physical contact with human; human feeds wildlife	1 = Yes 0 = No
	Which park divisions are involved in the management activity?	
V44	Superintendent	
		1 = Yes 0 = No
V45	Natural resource management	
		1 = Yes 0 = No
V46	Cultural resource management	
		1 = Yes 0 = No
V47	Interpretation	
		1 = Yes 0 = No
V48	Law enforcement/visitor protection	
		1 = Yes 0 = No
V49	Maintenance	
		1 = Yes 0 = No
V50	Volunteers	
		1 = Yes 0 = No
V51	Concessions	

		1 = Yes 0 = No
V52	External partner	
		1 = Yes 0 = No

Appendix B: NPS Memo Requesting Management Documents Related to Human-Wildlife Interactions

United States Department of the Interior
NATIONAL PARK SERVICE
Biological Resource Management Division
1201 Oakridge Drive, Suite 200
Fort Collins, CO 80525

IN REPLY REFER TO:
N1615 (2340)

May 1, 2009

MEMORANDUM

To: Associate Regional Directors, Natural Resource Stewardship and Science
Attention: Park Chiefs of Natural Resource Management

From: Chief, Biological Resource Management Division, NRPC, NRSS

Subject: Collection of Documents Related to Management of Human-Wildlife Interactions

In response to suggestions made at recent conference workshops and by park staff across the service, the Human-Wildlife Habituation Steering Committee is building a reference source of existing management documents, guidelines, regulations, educational interventions, and action plans pertaining to the management of problem animals, habituation, food conditioning, and visitor behaviors around wildlife. The intent of this reference collection is to provide a site where NPS employees can learn about the strategies, action thresholds, and procedures that parks use to anticipate problems, establish decision points, and identify management actions that protect park wildlife, maintain quality visitor experiences, and ensure visitor safety.

We are seeking existing guidance documents used by parks to address human-wildlife interactions. We recognize that parks utilize numerous approaches to address problem animals, habituation, food conditioning, and visitor behaviors around wildlife. Such approaches may originate in or include collaboration between natural resource management and other divisions, such as law enforcement, interpretation, or maintenance. We very much want to be aware of efforts to address human-wildlife interactions regardless of division and welcome contributions from all perspectives.

We invite contributions from park managers across the system. Submitted documents can be in any stage of completion, from draft to those completed with regional director signature and published in the federal register. Regardless of formality, contributions should be current working documents or operational documents that guide efforts in your park.

We are collecting documents via the BRMD Human Dimensions SharePoint website (http://nrpcsharepoint/brmd/humdim/habit/default.aspx), which is not accessible to the public. Specific operational information within the document, such as names, contact information, and wildlife location,

should be removed; however, it is important that an individual on the park staff is identified as the point of contact for questions or further information.

Please upload documents into the NPS Shared Guidance Documents directory:
http://nrpcsharepoint/brmd/humdim/habit/Shared%20Documents/Forms/AllItems.aspx
You may also send hard copies to BRMD that we will convert to pdf.
We will organize documents on an intranet site to serve as a reference resource for managers. In addition, BRMD will use the documents as a database to explore commonalities across park approaches. We aim to identify areas of focus among parks and synthesize learnings from successful approaches and strategies. To be included in this analysis, documents need to be received by July 1, 2009, although we encourage continued submission of documents after this date as they become available. Ultimately, this set of resources will provide the NPS with valuable information to develop best management practices, strengthen policy guidance, and determine how best to support park activities and operations.

Thank you for contributing to this important project.

For more information, or to send hard copies please contact:

Kirsten Leong, Human Dimensions Program Manager, Biological Resource Management Division, kirsten_leong@nps.gov, 970-267-2191

Or a steering committee member:

AKR: Pat Owen, Denali National Park
AKR: Dave Schirokauer, Klondike Gold Rush National Historical Park
IMR: Cay Ogden, Intermountain Regional Office
NCR: Scott Bates, Center for Urban Ecology, National Capital Region
NER: Rolf Gubler, Shenandoah National Park
MWR: Dan Foster, Niobrara National Scenic River
PWR: Bill Merkle, Golden Gate National Recreation Area
SER: Bill Stiver, Great Smoky Mountains National Park
Frank Turina, Natural Sounds Program
Bruce Connery, Acadia National Park (Former Eastern Parks Representative)
Jim Schaberl, Shenandoah National Park (Former Western Parks Representative)

Appendix C: Description of Action Thresholds from Denali Bear-Human Conflict Management Plan

Behavior Category	Human-Bear Interactions	Management Response
FORAGING		
Mistaken Prey	Human behaving like bear prey, or bear attacks in brush.	None
DEFENSIVE		
Intolerant	Bear leaves the area as soon as it becomes aware of people.	None
Dominance	Bear challenges intruder of its personal space by approaching, charging or body language displays.	None
Surprise	Close, unexpected encounter; bear reacts, then leaves once person is no longer considered a threat.	None
Provoked	Person intentionally approaches close or harasses bear. Bear responds then leaves immediately.	None
HABITUATED		
Curious	Bear shows inquisitiveness one time to identify a scent or object, then moves away.	None
Tolerant	Bears in areas also used by people; tolerates people nearby but ignores them and their facilities.	Monitor
Conditioned	Repeat interest in people or their facilities; if allowed to continue, likely to result in obtaining unnatural food or reoccurring approaches towards people or facilities.	Aversive Condition Relocate Remove
Rewarded	Bear has obtained unnatural foods.	Aversive Condition Relocate Remove
AGGRESSIVE		
Threat	Made repeated offensive charges or caused injury.	Destroy
Predation	Kills and/or consumes victim.	Destroy

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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