The Tragedy of Becoming Common: Landscape Change and Perceptions of Wildlife

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Some wildlife species are adapting to urbanizing settings made more attractive due to changes in land-use practices, human attitudes and behaviors, and conservation efforts. People who live in communities near suburban parks are encountering wildlife more frequently than in the past, with varying reactions. In-depth interviews conducted with residents living near three national parks yielded insight on "suburban deer" as an emerging social construct. Interviewees described expectations about deer abundance and behavior that guided their interactions with suburban deer and affected deer behavior, which in turn affected interviewees' evaluations of deer and subsequent responses to interactions. Left unchecked, this process may result in the ultimate "tragedy of becoming common," when species are no longer viewed as wildlife, but as pests or pets. In the absence of an established cultural construct for suburban wildlife, stakeholder engagement will continue to play an important role in understanding and addressing these diverging views.

Keywords folk model, habituation, human–wildlife interactions, *Odocoileus virginianus,* social construction

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The fields of conservation policy and wildlife management increasingly recognize the role of social construction in management controversies (Soulé and Lease 1995; Czech et al. 1998; Scarce 2000; Peterson et al. 2005b). Social construction is the process by which people collectively ascribe meaning to phenomena or concepts; for example, our understanding of "nature" is as much based on cultural symbols and norms as it is on the physical attributes of the environment (Evernden 1992; Eder 1996). Nash applied this idea to wilderness, which he described as a "state of mind" (2001, 5). Others recognize that this process affects the way people think about animals:

> Whenever a human being confronts a living creature, whether in actuality or by reflection, the "real life" animal is accompanied by an inseparable image of that animal's essence that is made up of, or influenced by, preexisting individual, cultural, or societal conditioning. Thus "nature," as represented by the actual biological and behavioral traits of a particular animal, becomes transformed into a cultural construct that may or may not reflect the empirical reality concerning that animal. (Lawrence 1997, 1)

Anthropologists have long recognized that animals are archetypes for human values and traditions (Lévi-Strauss 1964). However, few studies have examined wildlife management issues using a social construction framework, with the notable exception of those featured in *Mad About Wildlife* (Herda-Rapp and Goedeke 2005). These studies regard wildlife issues as social problems and illustrate how competing social constructions of wildlife can fuel claims making and power struggles between different stakeholders involved in wildlife controversies.

Such wildlife controversies are gaining prominence in urban and suburban areas where generalist species, such as white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), beaver (*Castor canadensis*), and Canada geese (*Branta canadensis*), are interacting more frequently with humans as they adapt to changes in the physical environment (Foster et al. 2002; DeStefano and DeGraaf 2003; Glennon and Kretser 2005). Yet urbanization also changes the sociocultural landscape; in urbanized societies, the cultural context in which people construct meanings of animals has become more individualized, with greater emphasis on symbolic meanings and personal relationships, and less grounded in culturally shared utilitarian/instrumental meanings (Patterson et al. 2003). The resulting diversity of values and meanings ascribed to wildlife may be one source of conflict over appropriate wildlife management goals, socially acceptable wildlife uses, and wildlife management practices. As Madden (2004) observes, human–wildlife conflict often is "not only conflict between humans and wildlife, but also *between* humans *about* wildlife" (248–249).

The National Park Service (NPS) administers many units[1] in urban or urbanizing areas where wildlife conflicts occur. In the northeastern United States, NPS managers and local community members have expressed concerns about white-tailed deer for over two decades. As a result, several parks have engaged in biological studies to determine deer population density, movement, and impact on park resources (e.g., Warren 1991; Frost et al. 1997; Shafer-Nolan 1997; Porter and Underwood 1999; Lovallo and Tzilkowski 2003; Underwood 2005). While NPS managers recognize that local stakeholders often play a crucial role in wildlife controversies associated with parks (Leong and Decker 2005), few studies have examined the personal meanings stakeholders attribute to suburban wildlife and wildlife-related impacts or their cultural expectations for wildlife in or near suburban parks.

The goal of this study was to gain in-depth understanding of the variety of meanings stakeholders ascribed to their experiences with deer and deer-related impacts in and around suburban national parks in the northeastern United States. Impacts are the socially determined important effects (e.g., ecological, economic, psychological, health, and safety) of events or interactions involving (a) wildlife and other natural resources, (b) humans and wildlife, and (c) wildlife management interventions (Riley et al. 2002). I conducted semistructured in-depth interviews with residents of communities near three parks to identify stakeholders' expectations for deer and associated impacts in suburban environments. These expectations comprise folk models of suburban deer and related issues: that is, socially constructed shared understandings of suburban deer based on common experience that guide people's reactions and responses to deer encounters and to each other (Holy and Stuchlik 1981). Insight into the different ways stakeholders make sense of their experiences with wildlife and wildlife management will improve NPS ability to address the source of conflicting desires for management outcomes and interventions.

Methods

Philosophical Underpinnings

Qualitative research examines "things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them" (Denzin and Lincoln 2000, 3). Given that the way people think about and interact with wildlife may be less a product of biology and more influenced by human culture and consciousness (Arluke and Sanders 1996), I adopted a phenomenological and hermeneutic philosophy and grounded theory methodology. A phenomenological study examines people's experiences and the ways they make sense of those experiences to identify basic, common elements that make up shared worldviews (Patton 2002). Like hermeneutics, phenomenology maintains that there is structure in the environment and recognizes that individuals may experience this structure differently; this process results in multiple realities, or constructs, when different individuals or cultures assign different meaning to structure in the environment (Patterson and Williams 2002). Similarly, grounded theory is an interpretive methodology whereby the researcher discovers relationships between cultural concepts from empirical data (Corbin and Strauss 1990). In grounded theory, the unit of analysis is the concept, which is used to understand "incidents": that is, sets of phrases, sentences or other cultural objects that describe one event or observation. The purpose of analysis in this tradition is to discover associations between concepts that occur within and/or across incidents, as well as the broader categories they describe (Corbin and Strauss 1990). Constant comparison of these associations iteratively reveals the essences of the phenomena of interest, in this case, human–deer interactions in and around suburban parks.

Description of Study Sites

Three study sites served as examples of suburban deer issues with varying maturity and amount of related outreach effort by parks. Fire Island National Seashore (FINS), on Long Island, New York, is a park with a long history of deer issues and experience with community outreach about deer and deer management needs

in the park. Valley Forge National Historical Park (VFNHP), in southeastern Pennsylvania, is a park with a long history of deer issues and limited outreach activities regarding deer. Prince William Forest Park (PWFP), in Virginia, is a park where deer issues are emerging only recently and few deer outreach activities have occurred.

Established in 1964, FINS is 7832 ha in size, encompassing approximately 42 km of Fire Island (including 17 communities), 24 smaller islands, and the estate of one of the signers of the Declaration of Independence on Long Island. Since the 1980s, local community members, biologists, and park staff have voiced concerns related to the growing population of white-tailed deer. A number of projects have addressed these concerns, including a study to assess deer health, an ongoing immunocontraception research project to reduce population size, and an interdisciplinary outreach project to discourage deer feeding and decrease human–deer conflicts. Most of these efforts involved local community members and received local and even national media attention.

VFNHP is a 1300-ha park located 29 km northwest of Philadelphia. Initial studies of deer in the park conducted in the early 1980s indicated a healthy, relatively small deer population and no significant impacts to vegetation (National Park Service 2009). Negative impacts from deer herbivory were documented in the early 1990s, motivating the ongoing, long-term monitoring of deer abundance and impacts to vegetation within VFNHP (National Park Service 2009). In June 2000, Congress directed NPS to initiate cultural and natural resource studies, in the context of deer impacts on the cultural landscape. In 2006, VFNHP initiated a White-Tailed Deer Management Plan/Environmental Impact Statement.

Located approximately 55 km south of Washington, DC, PWFP covers 6000 ha and is the largest example of a Piedmont forest system preserved by the NPS. The park was originally established as the Chopawamsic Recreation Demonstration Area in 1933, and the NPS assumed administrative and operational responsibility in 1936. As part of an ongoing monitoring effort, the NPS National Capital Region (NCR) conducts annual white-tailed deer surveys. In 2006, deer density at PWFP was 11.03 per km^2, lower than any other NCR park and not high enough to merit immediate management concern about impacts to vegetation or other wildlife species (Bates 2007). Similarly, residents of local communities have not contacted the park about severe problems caused by deer. Nevertheless, PWFP managers believe that deer impacts likely will increase in the future, both within PWFP boundaries and in adjacent and nearby communities, based on experiences in ecologically similar NCR parks and on current trends in development of surrounding communities (Prince William County was one of the 100 fastest growing U.S. counties in 2007; U.S. Census Bureau Population Division 2008).

Data Collection and Analysis

A qualitative, inductive, interview-based approach elicited local community residents' personal understandings of deer and deer impacts in the parks and surrounding communities. Open-ended questions followed an interview guide, with follow-ups and probes used as necessary to encourage interviewees to elaborate on responses and to clarify intended meaning. Individuals or small groups participated in two types of interviews: (a) in-depth semistructured interviews with known stakeholders and influential community residents ($n = 22$, 20, and 19 for FINS,

VFNHP, and PWFP, respectively) and (b) short interviews with residents intercepted in local gathering places ($n = 65$, 42, and 47 for FINS, VFNHP, and PWFP, respectively).

Interviews with influential stakeholders assured that the study included community leaders and individuals with a known stake in deer issues. Snowball sampling identified potential subjects. To encourage candid discussions, I conducted interviews in a comfortable environment selected by interviewees. Potential subjects sometimes preferred group interviews or telephone interviews; thus, I interviewed subjects individually or in groups at a day, time, and location of their choosing. Interviews lasted from 30 to 165 minutes and 61% were audio-recorded with sufficient audio quality for later transcription. Some interviewees preferred not to be audio-recorded; in other cases, environmental conditions (e.g., wind, music, other background noise) precluded effective recording.

I conducted interviews with other local residents at informal gathering places in the area (e.g., recreation sites, community events, cafes and quick-service restaurants, retail sites), using convenience sampling to identify potential interviewees. Local residents encountered at these locations participated in face-to-face interviews, which typically lasted 15–20 minutes. Only eight of these interviews were audio-recorded, due to background noise.

I recorded hand-written notes during all interviews and prepared detailed field notes as soon as possible following the interview (usually within 1 day). For interviews that were not audio-recorded, care was taken to document the specific language used by interviewees, as well as voice inflection, tone, gestures, and body language that conveyed meaning.

I used ATLAS.ti (version 5.2.18, Scientific Software Development GmbH, Berlin) to code interview transcripts and notes for concepts and categories related to expectations for deer in suburban environments. An iterative process generated codes as thematic concepts and categories emerged in the interviews. I assigned codes to incidents (i.e., segments of text) in the first interview as themes appeared. I then applied each of these codes to text from the next interview. If the next interview introduced new themes, I added these themes to the coding scheme and re-scored previous interviews to assure that codes were applied uniformly. One incident could contain multiple codes. For example, the incident, "They don't bother anybody. They knock over the garbage, but people are used to it," contains the codes: there is not a problem, effects from deer, food conditioning, deer are source of impacts, and human habituation. Throughout the coding process, I sorted incidents to reveal key concepts, relationships between them, and the broader phenomena (categories) they described, as steps in fine-tuning the coding scheme. The final coding scheme included 27 concepts and categories related to folk models of suburban deer issues, which appeared in 1057 incidents (Table 1). A single researcher performed all coding and analysis, with the intent that validity of the findings from this study will be assessed in future discussions between managers and stakeholders and by a mail survey designed after these interviews.

Grounded theory methodology produces qualitative insight about social phenomena in the process of identifying concepts and categories and developing hypotheses about the relationships between them. I tested these hypotheses using chi-square tests that compared the frequencies of concepts and categories that occurred together within incidents. I used SPSS version 15.0.0 (SPSS, Inc., Chicago) to conduct all statistical analyses.

Table 1. Codes and definitions of final coding scheme

Code	n	Definition
Concept		
infrequent encounters	36	statements that encounters with deer did not occur often
frequent encounters	202	statements that encounters with deer occurred often
effects from deer	51	neutral language associated with deer encounters
positive impacts from deer	155	positive language associated with deer encounters
negative impacts from deer	330	negative language associated with deer encounters
negative impacts to deer	134	negative language associated with condition of deer
deer are source of impacts	126	statements identifying deer as the source of related impacts
deer are not source of impacts	59	statements attributing deer-related impacts to sources external to deer
identification with deer	64	descriptions of impacts shared by both deer and interviewees, or assertions that interviewees were more similar to deer than to other people
management is needed	169	assertions that deer or related impacts need to be managed
natural	38	assertions that deer or the local environment/ecosystem were natural/part of nature
unnatural	56	assertions that deer or the local environment/ecosystem were not natural/part of nature
abnormal deer behavior	74	observations of behavior not usually associated with deer or characterized as unusual
habituation (of deer)	80	observations that deer response to people is reduced
food conditioning	110	observations that deer were attracted to people or anthropogenic food sources
human habituation	31	observations that people's responses to deer are reduced
there is not a problem	64	assertions that there is no problem related to deer
things are getting better	43	descriptions of decreasing deer populations or impacts

(*Continued*)

Table 1. Continued

Code	n	Definition
things are getting worse	43	descriptions of increasing deer populations or impacts
positive evaluation of deer	98	positive language describing deer
negative evaluation of deer	42	negative language describing deer
Category		
abundant	113	observations of large deer populations
overabundant	137	observations of deer populations that were too large
pest	44	statements that deer were pests, nuisances, or pest species (e.g., mice, rats, pigeons), or that described deer using language typically associated with pests (e.g., infestation)
pet	27	statements that compared deer to pets (e.g., dogs, cats)
wild	79	assertions that deer were wild animals, wildlife
tame	54	assertions that deer were tame, domesticated, not wild, or used language associated with domestic animals

Findings

Interviewees held varying opinions and attitudes about deer, deer-related impacts, and management preferences. Variation in expectations for deer abundance and behavior, as well as categorization of deer as wild or tame, affected the evaluation of these topics.

Expectations of Rarity: Perceptions of Abundance

One interviewee summarized general expectations for deer in suburban environments: "To see a deer should be a rare and wonderful event." Interviewees at all sites expressed this norm, although with a variety of preferences and thresholds of tolerance for both conditions. Although most interviewees encountered deer frequently, these encounters still met expectations when positive impacts (e.g., enjoyment of viewing deer) outweighed negative impacts (e.g., damage to native vegetation, landscaping, and gardens; deer–vehicle collisions; concerns about Lyme disease and ticks; presence of feces; interactions with pets). In this situation, interviewees described deer as abundant but tolerable, or even desired—for example, "I know that there is a healthy population of deer. Now I don't think the numbers are enough to cause damage to the flora, trees, bushes…I don't think deer are causing harm. It's good to see deer, it's part of the experience." On the other hand, when interviewees

encountered deer more frequently with fewer positive associations, they described deer as overabundant—for example, "It's overpopulated. It's no big thing to see eight or ten every time of day. A lot are hit, laying by the road. They're everywhere. They eat bushes. It's heavily populated. There are too many."

Comparing the frequencies of concepts that co-occurred with the categories abundance versus overabundance corroborated these observations. Positive impacts from deer ($\chi^2 = 8.92$, $p = .003$) and effects from deer ($\chi^2 = 8.75$, $p = .003$) occurred more frequently with abundance. Overabundance was associated with: negative impacts from deer ($\chi^2 = 15.86$, $p < .001$), concern about negative impacts to deer (e.g., concerns about deer health, starvation, $\chi^2 = 9.31$, $p = .002$), evaluation that management was needed ($\chi^2 = 42.03$, $p < .001$), and assertions that the environment was not natural ($\chi^2 = 7.99$, $p = .005$).

Expectations of Wildness: Perceptions of Behavior

Interviewees also spoke of deer as symbols of wilderness and nature that contrasted with an urban setting. Examples are, "[Deer are] in my neighborhood because there are trees. I really like seeing them because it's more like nature," and "[Deer make] you feel like you're out in the middle of wilderness, more so than geese, squirrels or fox." Many also expected deer to display "wild" behavior; that is, to flee from humans and not seek human food sources. Often, interviewees verbalized expectations in contrast to observed deer behavior: for example, "if I was in the wild, if I was up in the mountains and I was walking through the woods and a deer saw me it would be gone. The deer here . . . watch [people walking the trails] and then continue on . . . That doesn't happen in the real wild. These deer are used to seeing people." Similarly, "You cannot believe how absolutely unimpressed they are with us. And deer are supposed to be, 'Oh, I'm so afraid of mankind.' Not really. [They] do everything but say, 'Where's my carrot? Do you have a cookie for me? I'm sorry, I don't like oatmeal.'" These observations are indicative of two processes that result in changes to wildlife behavior: wildlife habituation and food conditioning.

Wildlife biologists define habituation as the reduction of an animal's response to a repeated, inconsequential stimulus (usually resulting in loss of fear response to people) and define food conditioning as an animal learning to associate food with the presence of people, due to positive experiences of acquiring food easily (McCullough 1982; McNay 1998). Interviewees introduced three concepts related to these ideas: habituation (e.g., deer are used to people, not afraid of people); food conditioning (e.g., deer seek human food sources, beg, get into garbage/gardens); and assessments of abnormal behavior (e.g., they don't act like deer, they're different here, they act like domestic animals). About half of all interviews (51.9%) included at least one of these concepts. Interviews conducted near parks with a longer history of deer issues were more likely to include these concepts than were interviews near parks where deer issues were more recent (FINS: 67.8%, VFNHP: 50.8%, PWFP: 31.8%; $\chi^2 = 19.52$, $p < .001$). For some interviewees, abnormal behavior defined the threshold between abundance and overabundance. As one interviewee described, "There are too many when they're in closer contact with people on a regular daily basis during the day."

These unexpected behaviors also affected interviewees' evaluations of deer, although inconsistently. Some indicated that this behavior change was negative, using language such as "pests" or "vermin." As one interviewee opined, "I would

Table 2. Codes that co-occurred with "pest" or "pet" in more than 10% of incidents

	Percent co-occurrence	
Code	Pest	Pet
negative impacts from deer	*65.91	11.11
deer are source of impacts	*31.82	
food conditioning	22.73	29.63
negative evaluation of deer	*20.45	
habituation (of deer)	18.18	22.22
negative impacts to deer	15.91	25.93
abnormal deer behavior	15.91	22.22
frequent encounters	13.64	14.81
human habituation	13.64	
unnatural	11.36	
positive impacts from deer		14.81

Note. Asterisk indicates significant difference ($p < .05$).

say you cross the line when the white flag[2] is no longer showing, when they are so familiar with people . . . so unafraid of people and no longer wildlife. They are pests." Others used positive language and spoke of habituated deer as pets: for example, "I think it's really great because they're so tame they're almost like pets." More interviews included the category pest ($n = 28$) than pet ($n = 16$, $\chi^2 = 22.087$, $p = .041$). All three concepts reflecting deer behavior change co-occurred with both categories. Food conditioning occurred most often, followed by habituation and abnormal behavior. These concepts occurred in a higher percentage of incidents containing the category pet than pest; however, this difference was not statistically significant (Table 2). The concepts negative impacts from deer ($\chi^2 = 17.32$, $p < .001$), deer as a source of impacts ($\chi^2 = 10.62$, $p = .001$), and negative evaluation of deer ($\chi^2 = 4.71$, $p < .001$) occurred more frequently with pest; no concepts occurred more frequently with pet.

Habituation of interviewees to deer also appeared to affect their evaluations. Similar to the definition for wildlife habituation, habituation in humans is a

Table 3. Codes that co-occurred with "human habituation" in more than 10% of incidents

Code	Percent co-occurrence
frequent encounters	51.61
negative impacts from deer	41.94
deer are source of impacts	22.58
habituation (of deer)	19.35
food conditioning	19.35
positive evaluation of deer	19.35
effects from deer	16.13
positive impacts from deer	12.90

decreased response to a stimulus that is presented repeatedly or for a prolonged time (McSweeny and Swindell 2002). As one interviewee described, "Growing up here, when you saw a deer, people ran out of their houses, 'Look, a deer!' Now it's like a squirrel." The concept human habituation often co-occurred with negative impacts from deer. However, positive evaluations of deer, as well as effects from deer (i.e., neutral evaluations of encounters) and positive impacts, also co-occurred frequently (Table 3), further indicating a potential dichotomy in folk models for deer in suburban environments.

Interviewees often described a loss of positive emotional value associated with deer as they habituated to deer and deer habituated to people:

> They've lost the instinct to run away. They're de-deerified [sic], humanized. When I first came here, it was thrilling to see a deer bounding across the main. Now, they knock over garbage cans and stand their ground.

> I don't even think of them as wildlife. And I think that's unfortunate. I did when I first came here. I'll never forget one time . . . there were three bucks that came up over the dune . . . and there was all this mist around and they were so magnificent . . . I mean you really were in awe of them and that's no longer the way it is out here anymore. People don't even look at the deer the same way . . . in some cases they can even practically walk up and pet them and take photographs . . . that's giving the wrong idea of what these animals are all about.

In addition to evaluations of deer, changes in deer behavior affected evaluations of appropriate means for population control. FINS conducted a research hunt in the 1980s. Many negative reactions to the hunt also related to the idea of hunting deer whose behavior had changed. One interviewee described, "It was the most horrific thing . . . It would be like letting all the neighborhood dogs into someone's fenced-in backyard and shooting them." Another voiced a similar opinion: "People would kill them with a bow and arrow right in front of kids . . . It was like shooting neighborhood cats."

Even those who did not have negative associations with the research hunts at FINS (including interviewees at other study sites) described hunting as inappropriate for habituated animals—for example, "You can hunt here with a baseball bat. You shouldn't hunt them, they're like pets. People who hunt upstate say this. Here, they beg." Others thought that any form of direct reduction, including agency sharpshooters, would be "unfair because the animals are so tame, so used to people."

Wild, Tame, or a Human-Made Subspecies?

While most interviewees observed deer behavior that did not meet expectations, they did not consistently identify suburban deer as wild or tame, further supporting divergent folk models. This effect was evident in comparison of concepts that co-occurred with the categories wild (e.g., they're wild animals, wildlife) versus tame (e.g., they're domesticated, tame). Tame was more likely than wild to co-occur with frequent encounters ($\chi^2 = 12.35$, $p < .001$) and all concepts related to changes in behavior (habituation: $\chi^2 = 25.72$, $p < .001$; food conditioning: $\chi^2 = 19.86$, $p < .001$; abnormal

behavior: $\chi^2 = 20.73$, $p < .001$), yet concepts describing evaluation of encounters were equally likely to occur with both categories.

The diverse evaluations of deer encounters and beliefs about appropriate management appeared to stem from ambiguity over how to classify "wild" animals encountered in human-dominated landscapes and exhibiting behaviors typically not associated with being "wild." Many interviewees expressed personal difficulty in resolving this ambiguity. One commented, "This is an environment where you can walk up to deer. Deer are in an urban setting, it's very different from the wild. They're not like a cat or dog, but they're not wild. They're somewhere in between." Others believed that the "somewhere in between" was an entirely new category that was not yet recognized:

> I'd like to see deer tied to the Canada goose issue. They are exactly the same. Exactly the same . . . the resident non-migratory Canada goose problem . . . Canada geese are not nature. They're a man-made subspecies and we have created a habitat just like the deer, so it's an identical issue.

An Emerging Folk Model for Suburban Deer

The folk model of suburban deer that emerged from collective interview analysis describes a positive feedback loop between the interactions of people and deer in urbanizing landscapes that creates a "human-made subspecies." Interviewees believed that when deer are perceived as rare and display wild behavior, people value and actively seek encounters with deer. Deer attracted to suburban environments begin to habituate to the presence of unthreatening people they encounter, but are still tolerable and positive assets. As people's encounters with habituated deer increase, they no longer actively seek encounters with deer. They still do not present an active threat to deer, however, which allows habituation and other behavioral changes to continue. Negative impacts increase relative to positive impacts and on balance become intolerable for some people. Further loss of wild character culminates in divergent perceptions of deer as either domestic or nuisance animals, which often incites controversy.

At each site, interviewees described a variety of conflicting opinions about the stage or endpoint of the model that best represented reality. Interviewees expressed different individual beliefs, but also described multiple reactions to deer in their community:

> You get people who get very emotional about it both ways. You get people who are ready to kill the deer because they're destructive and they kind of invaded into territory that's not natural for them, and then you've got other people who love them and have turned them into pets.

Some also indicated internal conflicts: "As a homeowner, I would like to see the population reduced a little, they get in the garbage. As a business person, as a human being, I like to take kids to see them, a fox hole, deer over there, those are the things they don't forget." Others identified management needs: "It's just a question of . . . teaching people how to respect [deer] as wildlife and treat them as wildlife as opposed to thinking of them as their pets or conversely as the enemy."

Often, interviewees who did not perceive a problem invoked knowledge of more advanced stages of the model at other locations, explaining that there was not a problem at their site because current conditions had not yet reached that stage:

> Do you know the [nearby Training] Center? They're everywhere, it's eerie. They're overpopulated there. And they're so gentle. It's weird, spooky. They're so friendly, they come out everywhere. You don't see that here.

> In Fairfax County it's more common, there are bigger issues. Someone was killed by one there. They're screaming at developers. They tried to open parks to hunting. Environmentalists went crazy. They were chaining themselves to trees.

Discussion

Many emerging suburban human–wildlife conflicts likely stem from differences in the way that individuals assign meaning to their interactions with wildlife. While findings from this study must be validated, they suggest that over time, the folk models that collectively guide people's interactions with suburban wildlife are one source of increasingly common human–wildlife interactions. Left unchecked, this process may result in the ultimate "tragedy of becoming common" when these species are no longer viewed as wildlife. This change in perceived value stems from two dimensions of the word common: "occurring or appearing frequently" and "characterized by a lack of privilege or special status,"[3] which can be equated with loss of rare status (i.e., overabundance) and wild character (i.e., unexpected or abnormal behavior).

In general, interviewees did not associate deer with suburban landscapes and expected encounters there to be "rare and wonderful events." As a result, they placed higher value on deer when encounters were less frequent and associated with positive experiences. These findings are supported by studies in economics that provide evidence that people assign hedonic value to items that are perceived to be rare or scarce, such as coins and other collectibles (Koford and Tschoegl 1998). Nash (2001) argued that relative scarcity helped wilderness gain value, and a recent study shows that this type of valuation also applies to wildlife species (Courchamp et al. 2006).

In addition to expectations about where wildlife should be encountered, this study indicates that expectations about how wildlife should act also affect people's evaluations of their experiences. Thompson and Henderson (1998) demonstrated that cervid habituation in urbanizing environments can be seen as an adaptive behavioral strategy to maximize reproductive fitness. Yet, from a cultural perspective, habituation and food conditioning appear to violate expectations for behavior of "wild" animals. As a result, interviewees had conflicting interpretations of deer as wild, tame, or somewhere in between, especially for those who experienced frequent encounters with deer. Moreover, people's assessment of behavior may affect their assessment of ethical wildlife management alternatives, which also was suggested in a recent study on the ethical judgments related to wildlife fertility control (Lauber et al. 2007). These observations indicate that when perceptions of abundance and unexpected behavior reach a level where species management is desired, significant constraints on management action also may emerge. This effect underscores the

potential importance of proactive management attention, before stakeholders perceive species as overabundant.

An increasing body of literature documents the effects of anthropogenic activities on animal behavior, physiological response, or reproductive fitness in various settings. Few studies have examined how these changes in wildlife behavior affect people's attitudes towards wildlife and wildlife management. In New York State, Butler, Shanahan, and Decker (2003) observed a decrease in wildlife problem tolerance over time and emphasized a need to examine reasons behind these changing attitudes. Habituation of people to wildlife that affects evaluations of wildlife behavior may be one potential source of attitude change. Further attention to this area may help identify root causes of conflicting desires for wildlife management in suburban landscapes.

Deer have played a central role in the mythology and symbolism that are the foundation of American culture (Sax 2001), yet this study illustrates that suburban deer do not adhere to traditional cultural constructs. Colpitts (2002) argues that in North America, ideals from the Romantic era resulted in present-day understandings of wildlife as "animate creatures that live beyond the imaginary boundaries of town and city" (12). Society reproduces this artificial boundary between natural and cultural spaces. For example, a recent commercial for Windows Vista includes a man viewing a buck in a suburban subdivision as an example of a "Wow" event that is "so new, so delightfully unexpected" (Raine 2007, C-1), reinforcing expectations that encounters with wildlife in suburbs should be rare. When people's experiences conflict with cultural expectations, they experience cognitive dissonance and may eliminate this dissonance by altering various beliefs or attitudes (Festinger 1957). Colpitts (2002) describes this phenomenon in his belief that when wildlife "violate boundaries and enter civilized spaces, they become either virtuously domesticated or hunted as vermin" (12), an observation echoed by interviewees in this study.

Structural anthropologists describe animals that cross the nature–culture boundary as "anomalous" or "ambiguous," which some argue is the reason they become defined as pests (see Knight 2000 for review). In his examination of Western food taboos, Leach (1964) demonstrated that development of specific sets of cultural rules may resolve ambiguity (for example, livestock or game). This study indicates that suburban wildlife is emerging as an increasingly important class of ambiguous animals for which cultural rules are not yet established. Thus, the "suburban deer problem" resulted not simply from deer being able to exploit a human-made environment, but rather from the interaction between people's responses to deer and deer responses to people in a human-dominated landscape. As deer and people habituated to each other, existing cultural constructs of deer became inadequate referents; instead, interviewees began to substitute established folk models associated with pets or pests to make sense of their experiences.

Just as dirt can be thought of as "matter out of place" (Douglas 1992, 35), animal pests have been described as animals perceived in inappropriate numbers or in the wrong context (Putman 1989). In this study, interviewees evaluated deer that were "out of place" both positively and negatively and identified two dimensions of "the wrong context," namely, "in the wrong location" (i.e., abundant in suburban environments) and "behaving inappropriately" (i.e., no longer displaying wild behavior). The behavior dimension is particularly salient for the NPS, whose mission includes managing for natural behavior in wild life in parks (National Park Service 2006). Loss of wild character can be interpreted to violate this mission. Peterson et al.

(2005a) demonstrated the potential for inadvertent domestication of wildlife through urbanization. Interactions between wildlife and residents of urbanizing communities near parks may reduce wild phenotypes not only in communities, but also in parks that animals include in their home range or use for dispersal. Future achievement of NPS wildlife management objectives may increasingly rely on coordination with neighboring communities.

Even though Americans have predominantly lived in suburbs for over 35 years (Morgan and England 1999), cultural expectations for wildlife encounters in this context clearly are still evolving. In their analysis of changing New England landscapes, Foster et al. (2002) identified sizeable and important lags in habitat transformation and wildlife responses. Given that cultural lags likely will compound ecological lags, it seems reasonable to expect that suburban wildlife conflicts will increase in the future; wildlife managers will have increased responsibilities related to these collateral impacts of restoration. The field of wildlife management traditionally has focused on wildlife population control and habitat or behavioral modification to reduce physical interactions between people (or their property) and wildlife. However, wildlife management actions conducted in a manner similar to ''pest control'' may reinforce the nature–culture division, moving the ''tragedy of becoming common'' toward negative evaluations of ambiguous wildlife, a movement that already was the prevalent tendency among interviewees. Given the potential divergence in folk models related to suburban deer, segments of the public are likely to misinterpret the intent of management actions without ongoing dialogue and open communication that addresses and acknowledges these different perspectives. Thus, one challenge for managers will be to encourage a cultural construct where suburban wildlife is no longer ambiguously associated with either nature or culture, but is recognized as a fundamental part of the nature–culture matrix created by the transformation of suburban landscapes. Establishment of this construct will require dialogue with stakeholders, future studies that examine cultural expectations in more detail, and increased prominence of suburban wildlife in mainstream popular culture. Just as Roderick Nash (2001) describes wilderness as a ''state of mind,'' so too is ''wildness'' in wildlife. The extent to which humans and wildlife continue to coexist may depend on the ability of our cultural conceptions of ''wildness'' to keep pace with the rate at which wildlife adapts to anthropogenic landscape change, as well as the effectiveness and acceptability of interventions that help maintain expected ''wild'' traits.

In *Playing God in Yellowstone,* Alston Chase (1986) questioned the role of man in nature and whether natural areas were made less natural by human presence. He recognized that in many ways, Yellowstone could not be considered a natural area, but contended, ''It was not natural, but it was nice. The park was a place where nature and culture mixed'' (Chase 1986, 374). As wildlife adapt to surburban landscapes, culture and nature are mixing in new ways. Perhaps managers will do the most to retain wild values in ambiguous species by promoting a concept of suburban wildlife as neither nature nor culture, but nevertheless nice.

Notes

1. The NPS administers many different types of units, one of which is National Park. For convenience, I use the terms ''national park'' and ''park'' throughout the rest of this article to refer to any unit administered by the NPS, regardless of actual designation.

2. The white flag refers to the white tail raised as a signal of alarm, usually when a deer is in flight.
3. *Merriam-Webster's Online Dictionary,* s.v. "common"; http://www.merriam-webster.com/dictionary/common (accessed 18 August 2008).

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