

Conservation Implications of the Prevalence and Representation of Locally Extinct Mammals in the Folklore of Native Americans

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Abstract

Many rationales for wildlife conservation have been suggested. One rationale not often mentioned is the impact of extinctions on the traditions of local people, and conservationists' subsequent need to strongly consider culturally based reasons for conservation. As a first step in strengthening the case for this rationale, we quantitatively examined the presence and representation of eight potentially extinct mammals in folklore of 48 Native American tribes that live/lived near to 11 national parks in the United States. We aimed to confirm if these extinct animals were traditionally important species for Native Americans. At least one-third of the tribes included the extinct mammals in their folklore (N=45 of 124) and about half of these accounts featured the extinct species with positive and respectful attitudes, especially the carnivores. This research has shown that mammals that might have gone locally extinct have been prevalent and important in Native American traditions. Research is now needed to investigate if there indeed has been or might be any effects on traditions due to these extinctions. Regardless, due to even the possibility that the traditions of local people might be adversely affected by the loss of species, conservationists might need to consider not only all the biological reasons to conserve, but also cultural ones.

Keywords: attitudes, carnivores, conservation, culture, herbivores, humans, traditions

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INTRODUCTION

Extinction has been a topic of academic concern since at least the beginning of the last century (e.g., Osborn 1906). Accelerating destruction of natural habitat and associated extinctions are part of public debate now, and it is widely accepted that humans are a major cause of the destruction and extinctions (Diamond 1989; Wackernagel *et al.* 2002; Kates & Parris 2003; Ehrlich & Ehrlich 2004).

In response to the perceived extinction crisis, many authors have suggested that conservation efforts need the support of citizens and governments (Orr 2003; Schwartz 2006). Various rationales intended to spur this support have been suggested. For example, that animals and nature have intrinsic value, and that their extinction could be considered morally or esthetically reprehensible (Callicott 1989; Nash 1989). More practically, others have argued that animals are important actors in ecosystems, and that their extinction would have undesirable biological consequences (Soulé 1985). Some have made the case that animals are economically important and

that their extinction would harm humans, especially humans that depend closely on a healthy local ecosystem (Costanza *et al.* 1998; Hawken *et al.* 1999). Finally, some authors have noted that conserving biodiversity and conserving cultures are linked (e.g., Maffi 2001; King *et al.* 2007) and therefore that the conservation of cultures can result in the conservation of biodiversity, and likewise, that the conservation of biodiversity can result in the conservation of culture.

Conserving Cultures in Order to Conserve Biodiversity

While traditions of local people are important in their own right, it has been suggested that an integration of cultural understanding into wildlife conservation can be advantageous (Head *et al.* 2005). For instance, Ramstad *et al.* (2007) indicates that some Maori elders had a strong traditional connection to tuatara (*Sphenodon* spp.) and desired conservation of them. Likewise, Jain *et al.* (2004) describe how Khecheopalri Lake in India had a sacred role in folklore, and consequently the water itself had been protected (even though, the surrounding area

had not). In central Ghana, black-and-white colobus monkeys (*Colobus vellerosus*) have been considered a totemic symbol by the local people and therefore have been protected (Saj *et al.* 2006).

More generally, traditional social taboos (e.g., cannot cut certain trees or kill certain animals) and/or traditional ecological knowledge have been argued as a route to building upon a conservation ethic that is already present (Colding & Folke 2001; Lingard *et al.* 2003; Drew 2005; Cormier 2006). Indeed Gadgil and coworkers have argued that at least in India, conservation management built from such traditions will be and is more successful than conservation imposed by the authorities (Gadgil 1991a, b, 1992; Joshi & Gadgil 1991). However, while some social taboos can aid in conservation, these restrictions are not always static and/or permanent, and under some circumstances a pro-conservation social taboo may be lost or ignored. For example, a social taboo that prohibited the selling of turtles is now ignored by Vezo fisherman in Madagascar (Lilette 2006).

Moreover, some traditional practices may in fact have been central to the cause of conservation problems and/or extinctions in many parts of the world (e.g., Martin 1967; Grayson 2001; Worthy & Holdaway 2002). Similarly, high human densities seem often to correlate with disappearance of wildlife (Parks & Harcourt 2002; Kay 2007), suggesting that traditions are often trumped by necessity. In these types of cases, it must be noted that circumstances may change (e.g., changing wildlife populations), as can cultures (e.g., less subsistence based strategies), and in some cases these adaptations can allow for more pro-conservation behaviors (e.g., Lilette 2006). For example, if people become less dependent on wildlife for survival, then traditional beliefs may play a more substantial role in behaviors and consequently people may be able to live in more accord with conservation goals.

Conserving Biodiversity in Order to Conserve Cultures

On the other hand, rather than focusing on the conservation of biodiversity, some argue that the focus should be on conserving cultures. That is, if wild species are important in the traditions of local people, then the extinction of animals could be detrimental to the already affected traditions of local people (Orlove & Brush 1996; Nabhan 2001). These actual or potential erosions of tradition may be considered worrisome enough that conservationists of all backgrounds might want to consider conserving biodiversity as a means of conserving traditions.

One way that animals may be important to human traditions is as cultural stimulators (Marzluff & Angell 2005a), and therefore the loss of these types of animals could negatively impact human's traditions. For example, native Hawaiians consider the Hawaiian crow (*Corvus hawaiiensis*) to be a sacred bird that is a guardian spirit to certain families, and consider that with its extinction an important part of their traditions will be lost (Walters 2006). Knowing of the possibility of such a loss, might conservationists of all backgrounds be as interested

in helping to conserve this species (and potentially others) as a means to prevent the loss of traditions, as they would be for the more customary rationales for conservation? The same argument could be applied to Native American resource managers who have lamented the loss of species from their local area, even within their own lifetimes (Nabhan 2001).

Moreover, the inclusion of arguments about cultural conservation into discussions about biodiversity conservation may be especially important if the affected people represent the wild species positively and respectfully, because loss of a species might then have an especially strong effect on traditions. For example, based on Köhler's (2005) descriptions of Baka Pygmies' attitudes toward wild animals, one would expect that the extinction of the highly respected chimpanzees (*Pan troglodytes*) would have a stronger negative effect on the Baka's traditions than the extinction of the forest elephants (*Loxodonta cyclotis*), for which they have a subsistence-based relationship. Or similarly, as an example from nonminority world cultures, Reading *et al.* (2006) describe how people with the most positive attitudes toward black-tailed prairie dogs (*Cynomys ludovicianus*) are the same people that have the strongest desire for conservation of these animals, suggesting that those with positive attitudes would be the most affected by the species' extinction.

Additionally, as many traditions are supposed to be protected by law (i.e., the American Indian Religious Freedom Act of 1978), it seems appropriate that human activities that might adversely affect traditions via the extinction of traditionally important animals would be considered illegal and therefore would further stimulate governments to conserve these species (Howell 1994).

As a first step in strengthening the case for the conservation of biodiversity as a means to conserving cultures, we quantitatively analyzed the presence and representation of potentially extinct mammals in the traditions of Native Americans, in order to discover if indeed threatened animals were traditionally important species. We used as the basis for our study, on the one hand, those large-bodied mammal species reported to have potentially gone extinct, even if only temporarily, in national parks in western United States (Parks & Harcourt 2002), and on the other hand, the folklore of Native Americans living in the vicinity of the parks. We asked what potentially extinct large-bodied mammals appeared in the folklore of local Native Americans and what were the attitudes toward the animals, as expressed in the folklore.

METHODS

Data Sources

For mammals potentially extinct locally in historic times, we used Parks and Harcourt's (2002) list of mammals identified as possibly extinct in national parks in western United States as our source (Table 1). They reported that reliable extinction data were very hard to find, largely because the United States Park Service is recreation orientated and in the past did not

Table 1
List of 11 national parks in western United States with possible extinctions (from Parks & Harcourt 2002), their potentially extinct mammals, local Native American tribes, and sources of locations of Native American tribes

National Park	Potentially extinct large mammals ¹	Local Native American tribes	Sources
Crater Lake National Park	Elk, lynx, wolverine	Klamath, Molala, Takelma, Upper Umpqua	(Harman 2002)
Grand Canyon National Park	Wolf	Havasupai, Hopi, Hualapai, Navajo, Southern Paiute, Zuni	(Morehouse 1996)
Lassen Volcanic National Park	Fisher	Atsugewi, Maidu, Yahi, Yana	(Shipley 1991)
Mesa Verde National Park	Bighorn sheep, wolf	Hopi, Pueblos, Utes, various Mesa Verde tribes ²	(Varien & Wilshusen 2002)
Mount Rainier National Park	Elk, fisher, lynx, wolf, wolverine	Cowlitz, Duwamish, Klickitat, Muckleshoot, Nisqually, Puyallup, Snohomish, Snoqualmi, various Puget Sound tribes ²	(Eells 1985)
Olympic National Park	Fisher, wolf	Chehalis, Chemakum, Hoh, Khallam, Makah, Quileute, Quinault, Skokomish, Twana, various Puget Sound tribes ²	(Eells 1985)
Rocky Mountain National Park	Grizzly bear, lynx, wolverine	Arapahoe, Utes	(Buchholtz 1983)
Sequoia/Kings Canyon National Park	Grizzly bear	Western Mono, Tubatabel	(Vankat 1977)
Yellowstone National Park	Mountain lion, wolf	Blackfeet, Crow, Eastern Shoshone, Flathead, Nez Perce, Sheep Eaters, Shoshone	(Janetski 2002; Nabokov & Loendorf 2004)
Yosemite National Park	Bighorn sheep, grizzly bear, wolverine	Miwok, Mono Lake Paiutes, various Yosemite tribes ²	(Clark 1904; Bates & Lee 1991)
Zion National Park	Bighorn sheep	Southern Paiute	(Euler 1964)

¹Liberal extinctions' from Parks & Harcourt (2002); species: bighorn sheep (*Ovis canadensis*), elk (*Cervus elaphus*), fisher (*Martes pennanti*), grizzly bear (*Ursus arctos*), lynx (*Lynx lynx*), mountain lion (*Felis concolor*), wolf (*Canis lupus*), and wolverine (*Gulo gulo*). ²The term 'various' is used for some Native American tribes (e.g., various Puget Sound tribes) because, in some cases, it was not possible to determine the precise tribe associated with folklore accounts.

have data collection as a prime consideration. The researchers therefore used a variety of criteria and sources to determine extinction, and had two definitions of extinction, conservative and liberal. We used the liberal list in this paper as a means of identifying mammals that might have gone extinct in the parks' past, even if the species are in the parks now (either because they have migrated back in, or because they have been actively reintroduced, as is the case for the wolves in Yellowstone, for example).

Nevertheless, whether the animals in fact went extinct or not is not the main issue. Rather their potential extinction is a means of indicating whether they might at some point have been threatened with extinction, and therefore are of interest to conservationists, and of potential importance to local Native Americans as remnants of populations of animals represented in their folklore.

Of 13 national parks examined, Parks & Harcourt (2002) describe 11 parks to have possible mammal extinctions. They list eight historically extinct species in these parks, six carnivores and two herbivores. A median of two mammals were recorded as having possibly gone extinct per national park (range: 1–5 mammals extinct per national park).

We searched the literature to identify the Native American tribes that traditionally use or used the areas in and around the

11 national parks in which Parks & Harcourt (2002) recorded potential extinctions. The tribes identified may have lived permanently in the area, or used the area sporadically; we did not distinguish. Nor did we attempt to distinguish tribes by anything other than their names in the literature.

For the appearance of the potentially extinct mammals in traditions of these local Native Americans, we again searched the literature. As traditions often are told through folklore stories (Ben-Amos 1971), our search consisted of transcribed folklore. In addition to noting presence, we noted the nature of descriptions of the animals. The names of mammals were easily identifiable in the folklore. However, we must note that folklore accounts generally come from only small sample sizes and without validation of accuracy and therefore must be used with caution.

Sources for the presence and descriptions of animals in folklore are listed in Appendix 1.

Categorization of Data

The species were categorized as either herbivores or carnivores, because the behavior of each is quite different, and we assumed that the Native Americans would react to them and treat them differently. We also analyzed data for individual species of

those mammals with greater than or equal to five data points, i.e., at least five mentions in folklore that included descriptions of attitudes.

Categorization of peoples' attitudes from prior verbal description is, of course, inexact. Additionally, it must be considered that any classification scheme that categorizes what is essentially a gradation is inherently subjective. Nevertheless, we applied two types of categorization, broadly comprehensible as a like–dislike category and a respect–fear–despise category. Within both categories, we sub-categorized. These two main categories were not independent and should not be treated as such: a single description of one species by one tribe will have often appeared in both categories, for instance with both a score for like, and a score for respect. We applied both categories, because neither alone fully captured the range of inferred attitudes.

1. Like–dislike. Were the animals represented in a positive or negative role in Native American folklore?

Positive: The Native Americans considered the animal in a positive tone and role, e.g., as a helper or a spiritual guide. Thus, the Zuni considered wolves to be good-natured and helpful guardians (Cushing 1897, 1901).

Neutral: Neither a positive nor a negative attitude was apparent.

Negative: Animals were described in a negative tone and role, e.g., an evil character. Thus, the Yosemite Indians disliked grizzly bears and believed that the spirits of bad humans would have to serve another life as a grizzly bear as punishment (Clark 1904).

Ambivalent: The attitude changed both within and across folklore tales. For example, the Miwok had a positive attitude toward bighorn sheep, as this animal was considered the chief of the animals. Nevertheless, the Miwok also had a negative attitude toward bighorn sheep as shown in a story that depicted them as thieves (Judson 1912).

2. Respect–fear–despise. Were the animals respected, feared, or despised in Native American folklore?

Respected: The Native Americans discussed the animal in respectful roles and/or tones, e.g., a higher power or a god. For instance, the Snoqualmi people believed that they were the descendents of wolves and that wolves protected humans (Haerberlin & Boas 1924).

Feared: For example, a dangerous animal. The Klickitat described wolverines as fierce and savage animals (Trafzer 1998).

Feared, but respected: For example, a dangerous god. The Hoh believed the wolf to be a killer and therefore feared; however, they also respected the wolf and considered it to be a tribal chief (Reagan & Walters 1933).

Despised: The Native Americans described the animal as an inferior. For instance, Puget Sound tribes described the elk as an animal that could be tricked and was not shamanistic (Haerberlin & Gunther 1930).

Unclear: The Native Americans described the animal in their folklore, but no attitude one way or the other could be deciphered.

Data Analysis

The questions to be answered were as follows:

1. How many and which Native American tribes existed in the area of the examined national parks?
2. How many and which Native American tribes existed in the area of the extinct mammals? That is, how many tribe-by-mammal combinations existed (e.g., Arapahoe and Grizzly Bear, Crow and Mountain Lion)?
3. Were mammals that might have gone locally extinct present in the folklore of Native Americans of the region?
4. What was the attitude (like–dislike; respect–fear–despise) of the local Native Americans to the extinct species as expressed in their folklore?

For the analysis of presence in folklore, we summed the number of unique tribe-by-mammal combinations for which the mammal was mentioned in the folklore of the tribes. For the analysis of attitudes, any one tribe-by-mammal combination could be scored in both the like-dislike category and also the respect-fear-despise category if the information was available.

No statistical tests were applied to the results because we have no means of arguing that the attitudes of the Native Americans are independent of one another. That is, different tribes, traditions, or folklores could have inherited, borrowed, and/or copied each other's depiction of animals. Tribes that we have listed separately, such as the Shoshone and Eastern Shoshone could be effectively the same as far as their folklore is concerned. And we can imagine that different species could be depicted similarly because of similar attributes, even if they were identified as different species in the folklore, e.g., all herbivores are food; all carnivores are dangerous.

RESULTS

Native Americans by National Parks

We found in the literature a total of 52 tribes in the area of the 11 national parks identified as having possible mammal extinctions (Table 1; Parks & Harcourt 2002). However, four tribes were recorded as in the vicinity of more than one park (e.g., Utes in Mesa Verde and Rocky Mountain), leaving a unique total of 48 tribes in our sample (Table 1). We identified a median of four Native American tribes per park (range, 1–10) (Table 1).

Native Americans by Extinct Mammals

As multiple Native American tribes were in the vicinity of each national park (see above), and therefore in the vicinity of each extinct mammal, there were numerous tribes that potentially included the examined mammals in their folklore. Furthermore, some of the eight mammal species went extinct in more than one park, and thus were present in the land used by even more Native American tribes. We identified a total of 127 tribe-by-mammal combinations; 124 of them were unique combinations (Table 2). The median

number of local tribes in the vicinity of an extinct mammal was 14 (Table 2).

Presence in Folklore

Of the mammal species recorded by Parks & Harcourt (2002) as extinct in national parks in western United States, all eight appeared in the folklore of Native American tribes (Table 2). We found that 45 of the 124 tribe-by-mammal combinations (36%) mentioned the mammal species in their folklore, with a median of 4.5 tribes mentioning each extinct species (Table 2). The range per species of the number of tribes that mentioned the animals was two (mountain lion/wolverine) to 18 (wolf). These values for presence in local peoples' folklore must be

minimums, because absence in our search does not, of course, mean absence in the folklore.

Carnivores were relatively more likely to be mentioned than were herbivores. The six carnivore species appeared in 36 folklores compared to the two herbivore species in nine folklores (Tables 2 and 3). However, that disparity results from more tribes in or near parks in which carnivores went extinct (Table 2). As a proportion of tribes that could have represented the extinct species in their folklore, carnivores appeared less often (median 31%) than did herbivores (median 44%) (Table 2).

Attitudes

Taking tribe-by-mammal combinations as the datum, attitudes

Table 2

Summary of number of tribes, and appearance in their folklore of the eight mammals potentially extinct in national parks in western United States

Potentially extinct large mammals	Number of tribes in area of extinct animal (total tribe-by-mammal combinations)	Number of tribes that included species in folklore (tribe-by-mammal combinations)	Percentage of tribes that included species in folklore
Bighorn sheep	8	4	50
Elk	13	5	38
Fisher	22	3	14
Grizzly bear	7	6	86
Lynx	15	5	33
Mountain lion	7	2	29
Wolf	34	18	53
Wolverine	18	2	11
Total	124	45	36
Median	14	4.5	35.5

Table 3

Summary of attitudes in local Native American folklore expressed toward all eight mammals, carnivores, herbivores, and individual species listed separately^{1,2,3}

	n	Like-dislike attitudes (%)				Respect-fear-despise attitudes (%)				
		Positive	Neutral	Negative	Ambivalent	Respected	Feared	Feared, but respected	Despised	Unclear
All animals (8)	45	49	22	16	13	47	11	22	9	11
Carnivores (6)	36	53	17	17	14	47	14	28	6	6
Herbivores (2)	9	33	44	11	11	44	0	0	22	33
Bighorn sheep	4	nd	nd	nd	nd	nd	nd	nd	nd	nd
Elk	5	40	40	20	0	60	0	0	20	20
Fisher	3	nd	nd	nd	nd	nd	nd	nd	nd	nd
Grizzly bear	6	33	0	33	33	17	17	67	0	0
Lynx	5	40	20	20	20	40	20	20	0	20
Mountain lion	2	nd	nd	nd	nd	nd	nd	nd	nd	nd
Wolf	18	61	17	11	11	50	11	28	6	6
Wolverine	2	nd	nd	nd	nd	nd	nd	nd	nd	nd

¹nd=not sufficient data for analysis, i.e., less than five data points, ²Data are tribe-by-mammal combinations, i.e., for the eight mammals, there were a total of 45 instances that a tribe mentioned the animals in their folklore, ³Percents do not always add up to 100% due to error created from rounding to whole numbers

to the animals were largely positive and respectful, mainly as a result of the preponderance of carnivores and their mention in folklore (Table 3). Tribes' positive attitudes toward both carnivores and herbivores, especially wolves, were about three times as common as negative ones, and both were recorded as being about equally often respected (Table 3). Moreover, two-thirds of the carnivores for which individual analysis was possible (≥ 5 data points) had attitudes that were more positive than negative and more respected than despised (Table 3).

The main differences between carnivores and herbivores were that positive attitudes about carnivores were expressed more often than they were about herbivores, whereas neutral attitudes about herbivores were far more frequently expressed than they were about carnivores (Table 3). Not surprisingly, carnivores were far more often feared than were herbivores, while herbivores were more often despised or had unclear attitudes associated with them (Table 3).

Concerning particular species, only the elk, grizzly bear, lynx, and wolf had sufficient data to be analyzed separately (Table 3). Elk were evenly described with positive and neutral attitudes, and were highly respected, an unexpected finding considering herbivores as a group. Lynx and wolves were most often viewed positively and with respect. On the other hand, grizzly bears were the only species with a majority of negative and feared attitudes.

While we did not perform an analysis of the household use of the mammals by the Native American tribes, animals were indeed used by the tribes. For example, animals were used as food (e.g., Western Mono ate grizzly bears, Gayton 1948), clothing (e.g., Nisqually used elk skins for moccasins, Haeblerlin & Gunther 1930), tools (e.g., Maidu used fisher skins as quivers, Dixon 1912), medicine (e.g., Navajo used wolf claws as medicine, Goldtooth 1953), and even as pets (e.g., crow apparently kept mountain lions as pets, Lowie 1993).

DISCUSSION

We found that mammals identified as having gone extinct in 11 national parks in western United States appeared in the folklore of over one-third of local Native American tribes. Every mammal species in our study was included in at least a few folklore accounts. Attitudes toward the now-extinct animals were over twice as often positive and respectful as negative or despising, as supported, for example, by individual analyses for lynx and wolves. Carnivores were more often perceived positively than were herbivores, less often perceived neutrally, and far more often feared than were herbivores. The comparison between wolves and elk epitomizes these general differences. Almost all of the animals were used in the household by at least one of the tribes (e.g., as food).

The sometimes positive attitude of Native Americans toward carnivores might differ from the traditions and attitudes of people in some other regions, such as western Europe and southern Asia, in which negative and fearful attitudes appear to prevail in the folklore (e.g., Grimm *et al.* 1903; Boomgaard 2001). Perhaps a difference between Native Americans and

nonindustrial peoples of western Europe and southern Asia could be the greater use of livestock in Europe and southern Asia, and hence greater damage to livelihood by carnivores (Chase 1987; Boomgaard 2001). Perhaps also, the fact that carnivores exist in areas of higher surrounding human densities in Europe and India than they do in the United States (Woodroffe 2000) could also be a factor explaining regional differences in attitudes. In southern Asia, the special influence of man-eating tigers on their fearful representation in folklore seems to be considerable (Boomgaard 2001).

Conservation Implications

While the traditions of local people are valuable alone, the finding that wild mammals that might have gone locally extinct played substantial roles in the traditions of a group of local people may in some cases strengthen conservation arguments, given that preservation of traditions is important (Harrison 2007). Conservation stakeholders might have extra incentive to protect species that are represented in positive and respectful attitudes by local people, as the loss of these species will likely have the strongest effect on their traditions (more so, than would be the case for species that are viewed negatively or that are despised). Of course, attempts to conserve traditionally respected species will have to be tempered with knowledge of, for example, any current problems that the species might be causing.

Our findings are only the first step in developing a rationale for conservation of wildlife based on concerns about impacts on the cultures of local people. Researchers must now take the next step and attempt to answer questions about the presence of an actual effect of the extinctions on the traditions of Native Americans. To do so might require interviewing Native Americans rather than reading the literature, because our literature search indicates that recent accounts of Native American folklore are rare. Also, extinctions in parks do not necessarily match extinctions in others regions where the Native Americans now live or have lived; and this will likely have implications on the prospects of finding an effect on traditions. For example, researchers might not find a tribe-wide effect as a result of a local extinction because the tribe still encounters those animals in other areas.

When viewing this next step of research with a wider focus (beyond Native Americans), we find mixed results regarding actual effects of extinction on peoples' traditions. For instance, given the persistence of feared wolves in western European folklore long after extinction of wolves in, for example, Britain (witness repeated English language editions of 'Grimms Fairy Tales'), it is not necessarily the case that extinction will affect traditions.

Nevertheless, extinction can affect tradition, as shown by the previously discussed case of the native Hawaiians and the Hawaiian crow (Walters 2006). This example (along with the studies mentioned in the Introduction of the tuatara, colobus, chimpanzee, elephants, and prairie dogs, as well as of sacred lakes) indicates that if there is value to the idea that extinctions

might affect traditions, and therefore that we should be concerned about extinctions because of their potential effects on traditions, then the concept might be usefully extended to organisms other than obviously charismatic mega-fauna, and indeed to aspects of the general environment, not just wildlife (Marzluff and Angell 2005a, 2005b).

On the premise that wildlife is present in the traditions of local people and/or that extinctions have the potential to have a detrimental effect on peoples' traditions, it is surely important that conservationists consider not only all the biological reasons to conserve wildlife, but also cultural ones. To be clear, in no way are we implying that local people should be or will be mobilized into conservation efforts because of our findings. Nor are we suggesting that local people are or are not natural conservationists (e.g., Krech III 1999). Rather, we are suggesting that if threatened wildlife is important in peoples' traditions and/or that the extinction of wildlife might adversely affect traditions, then a cultural reason, as well as biological reasons, exists to conserve wildlife.

Cultural anthropologists and social scientists have not often been strong proponents of the conservation of wildlife. Indeed, they have sometimes been antithetical to conservation, seeing greater concern for animals than humans in the endeavor (Bonner 1993; Neumann 1998). However, conservation of biodiversity and conservation of culture can, and probably should, go hand in hand (Maffi 2001; Head *et al.* 2005; Drew & Henne 2006; King *et al.* 2007).

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APPENDIX 1

Sources for the attitudes of the tribe-by-mammal combinations, of which the mammal was actually mentioned in the folklore of the tribe

Locally extinct large mammal	Native American tribe	Source(s)
Bighorn Sheep	Generic Mesa Verdeans	(Noble 2006)
Bighorn Sheep	Miwok	(Judson 1912; Gifford 1917)
Bighorn Sheep	Mono Lake Paiute	(Steward 1936)
Bighorn Sheep	Utes	(Wroth 2000)
Elk	Cowlitz	(Adamson 1934)
Elk	Klamath	(Stern 1953, 1963)
Elk	Nisqually	(Clark 1960)
Elk	Puget Sound tribes	(Haeberlin & Gunther 1930)
Elk	Snohomish	(Erdoes & Ortiz 1984)
Fisher	Cowlitz	(Adamson 1934)
Fisher	Maidu	(Shipley 1991)
Fisher	Yana	(Curtin 1898)
Grizzly Bear	Arapahoe	(Dorsey & Kroeber 1903; Voth 1912; Rockwell 1991; Turtle 1997; Sutter 2004)
Grizzly Bear	Miwok	(Merriam 1910; Judson 1912; Gifford 1917, 1955; Barrett 1919; Wilson 1922; French 1997)
Grizzly Bear	Mono Lake Paiute	(Steward 1936)
Grizzly Bear	Utes	(Kroeber 1901; Mason 1910; Wood 1980; Coffey 1981; Buchholtz 1983; Rockwell 1991; Wroth 2000; Wyss 2005)
Grizzly Bear	Western Mono	(Gifford 1923; Gayton & Newman 1940; Gayton 1948)
Grizzly Bear	Yosemite Indians	(Clark 1904)
Lynx	Cowlitz	(Adamson 1934; Levi-Strauss 1995)
Lynx	Puget Sound Tribes	(Haeberlin & Boas 1924; Haeberlin & Gunther 1930)
Lynx	Takelma	(Sapir 1909)
Lynx	Upper Umpqua	(Dorsey 1889)
Lynx	Utes	(Mason 1910)
Mountain Lion	Blackfeet	(Linderman 1915; Marceau <i>et al.</i> 1981)
Mountain Lion	Crow	(Linderman 1932; Lowie 1993)
Wolf	Blackfeet	(Grinnell 1892; Maclean 1893; McClintock 1910; Uhlenbeck 1912; De Josselin de Jong 1914; Grinnell 1915, 1961; Linderman 1915; Schultz 1962; Marceau <i>et al.</i> 1981)
Wolf	Cowlitz	(Adamson 1934)
Wolf	Crow	(Linderman 1932; Lowie 1993; Erdoes & Ortiz 1998)
Wolf	Generic Mesa Verdeans	(Noble 2006)
Wolf	Havasupai	(Smithson & Euler 1994)
Wolf	Hoh	(Reagan & Walters 1933)
Wolf	Hopi	(Wallis 1936; McNamee 2002)
Wolf	Makah	(Densmore 1939; Miller 1952; Kirk 1986)
Wolf	Navajo	(Matthews 1897; Stephen 1930; Goddard 1933; Klah & Wheelwright 1942; O'Bryan 1956; Landar 1959; Hausman 1975; Locke 1990)
Wolf	Nez Perce	(Spinden 1917; Aoki 1979; Aoki & Walker 1989; Walker 1994; Cheater & Dutcher 1998; Isaacson 2000)
Wolf	Puget Sound tribes	(Haeberlin & Gunther 1930; Eells 1985)
Wolf	Quileute	(Reagan & Walters 1933)
Wolf	Quinalt	(Olson 1936)
Wolf	Snoqualmi	(Haeberlin & Boas 1924)
Wolf	Southern Paiute	(Sapir 1910; McNamee 2002)
Wolf	Twana	(Thomson & Marr 1983)
Wolf	Utes	(Wroth 2000)
Wolf	Zuni	(Cushing 1883, 1897, 1901; Benedict 1935)
Wolverine	Arapahoe	(Sutter 2004)
Wolverine	Klickitat	(Trafzer 1998)

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