



Changes in attitudes toward animals in the United States from 1978 to 2014



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ABSTRACT

More than three decades ago, Stephen Kellert surveyed >3000 Americans to gain a better understanding of their attitudes toward wildlife. We used a web-based questionnaire to survey a nationally representative sample of 1287 U.S. residents, replicating 26 single-item measures of attitudes toward animals from Kellert's study. Attitudes toward all animals were remarkably similar in 1978 and 2014. The average change in rank was 2.1 (of 26), and species mean scores from 1978 and 2014 correlated at $r = 0.95$. Americans' attitudes toward eight species exhibited substantive differences (Cohen's $d > 0.4$). The greatest differences were for historically stigmatized species (e.g. bats, sharks, vultures, wolves and coyotes)—attitudes in 2014 were significantly more positive for these species. The majority of respondents reported positive attitudes toward wolves and coyotes, and the proportion of people reporting positive attitudes toward these species increased by 42 and 47%, respectively. The differences in attitudes witnessed in this study may be indicative of growing concern for the welfare of animals—both wild and domestic.

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1. Introduction

Citing the recent acceleration in anthropogenic impacts on earth's systems, some scholars argue we have entered a new geological epoch dubbed the “Anthropocene” (Steffen et al., 2015), marked by a sixth mass extinction (Barnosky et al., 2011). Indeed, recent estimates suggest that the Earth could lose half of its biodiversity by the year 2100 if negative human impacts are not reduced (Bellard et al., 2012). A major driver of anthropogenic impacts is competition for resources to support a growing human population—now projected to reach 9 billion by the year 2050 (Food and Agriculture Organization, 2013). Supporting 9 billion people will require significantly increasing the productivity of the agricultural sectors (crops, livestock, forestry and fisheries), which is likely to lead to further loss and modification of habitat and the loss of biodiversity (Matson et al., 1997). Moreover, it is commonly understood that feeding 9 billion people will require substantial intensification of agricultural production, which has met with public opposition in the area of agricultural animal production due to the growing concern for animal welfare (Broom et al., 2013). The onset of the Anthropocene epoch thus highlights a growing tension between three important societal goals: (1) the need to increase agricultural production to feed growing human populations, (2) the desire to conserve biodiversity for

current and future generations, and (3) an apparent expansion in concern for the welfare of wild and domestic animals.

Though the conflict between agricultural production and biodiversity is well established (e.g., Young et al., 2007; Henle et al., 2008), the connection to animal welfare has received comparably little attention (see Pinker, 2011 for an exception). Animal welfare refers to “how an animal is coping with the conditions in which it lives” (OIE, 2015), and a variety of evidence suggests that public concern for animal welfare in Europe and North America is increasing (Pinker, 2011). Increased public concern is indicated, for example, by the public desire for the ethical production of meat and eggs, which has led major retailers to demand specific animal production methods from their suppliers (e.g. McDonald's plans to switch to cage-free eggs over the next decade). Other examples include the recent public attention garnered by the killing of “Cecil the lion” (Nelson et al., 2016) and Feld Entertainment's decision to remove elephant performers from the Ringling Brothers and Barnum & Bailey Circus due to a “mood shift among consumers” (Davis, 2015). Additionally, documentaries such as “Blackfish” led SeaWorld to end its orca breeding program, as well as its orca theatrical performances. Finally, the dramatic rise in the use and success of ballot initiatives to protect wildlife from practices such as trapping in recent decades (Minnis, 1998; Pacelle, 1998) suggests that people are increasingly concerned with the welfare of these animals.

However, while such anecdotes make a compelling case that concern for animal welfare is on the rise, surprisingly little empirical research addresses changes in concern for animal welfare over time.

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Perhaps the most direct evidence comes from a now three-decades old study that examined how animals were depicted in the U.S. news media over time (i.e., from 1900 to 1976); in that study, Kellert and Westervelt (1983) found the prevalence of “utilitarian” depictions (those that emphasized material value of animals) decreased substantially over this period, while so-called “humanistic” depictions (those expressing affection for animals) increased following World War II. More recently, research on wildlife values in the U.S. suggests a shift away from a “domination” orientation, which emphasizes mastery over nature/wildlife, to a more “mutualist” orientation, which emphasizes harmony, care-taking and empathy (Manfredo et al., 2003; Manfredo et al., 2009). Manfredo et al. (2009) explain this shift in light of Inglehart’s research on societal value shift, which suggests social and economic development has driven a shift from “materialist” goals – those emphasizing the attainment of basic needs – toward “post-materialist” (or “self-expression”) goals that emphasize the transcendence of basic needs and greater concern for others (Inglehart, 1997, Inglehart and Welzel, 2005). Yet, direct assessments of concern for animals over time are lacking.

One means of assessing changes in concern for animals is by comparing data on attitudes toward animals over time (e.g. Williams et al., 2002; Bruskotter et al., 2007; Majić and Bath, 2010). Attitude theory suggests that attitudes toward a specific entity are comprised of three component parts: cognitive, conative (or behavioral), and affective (Eagly and Chaiken, 1993). In the context of animal welfare, we anticipate that a person holding positive attitudes toward a specific species is more likely to have higher concern for that species’ welfare (an affective response) and, in turn, respond with judgments, decisions and behavior that reflect this concern (Taylor and Signal, 2005). Indeed, research on attitudes toward wildlife generally indicates that attitudes toward species are strongly correlated with support for species restoration (Bright and Manfredo, 1996; Wilson and Bruskotter, 2009; however, see Kaczensky et al., 2004 for contradictory findings) and animal management practices that have direct bearing on the welfare of individual animals (Bruskotter et al., 2009; Slagle et al., 2012). Likewise, animal welfare research shows a moderate to strong correlation ($r = 0.33\text{--}0.54$) between attitudes toward animals and empathetic concern for animals generally (Taylor and Signal, 2005; Apostol et al., 2013). Hence we surmise that attitudes toward species are a good general indicator of concern for the welfare of that species.

In 1978, in one of the first studies of its kind, Kellert and Berry surveyed >3000 Americans about their knowledge of and attitudes toward a wide variety of wild and domestic animals (Kellert and Berry, 1980; Kellert, 1985a). The species ranged from domestic/companion to game and predatory species, and included a variety of taxa (i.e., reptiles, fish, birds, mammals, and invertebrates). These species were chosen such that they varied based upon their general attractiveness, as well as their ability to harm humans. Kellert found that domestic dogs, horses and swans were among the *most* liked animals, while rat, mosquito and cockroach were among the *least* liked (Table 1). Likewise, predator species were not well-liked at the time; out of 33 species presented to participants, wolves and coyotes ranked 21 and 22 respectively, demonstrating Americans’ disfavor of predatory species. Kellert’s study, originally funded by the U.S. Fish and Wildlife Services, led to a variety of papers, including a well-known typology of animal attitudes (e.g., Kellert, 1984 and Kellert, 1985b) that is still cited in both the conservation (Zinn and Pierce, 2002) and human-animal relations literature (Serpell, 2004). However, more than three decades have passed since the publication of Kellert’s (1985a) study on attitudes toward animals without replication, offering an opportunity to reassess U.S. residents’ attitudes toward animals and determine if and how they have changed.

2. Methods

Researchers collected data via an online survey of a nationally-representative sample, accessed through the GfK group (formerly Knowledge

Table 1
Americans’ attitudes toward 26 animals as measured in 1978 and 2014.

Animal	Means		Standard dev.		Sample size		Cohen’s d
	2014	1978	2014	1978	2014	1978	
Dog	1.78	1.70	1.05	0.980	561	2445	0.08
Butterfly	1.86	2.04	1.01	1.010	558	2441	0.18
Eagle	1.94	2.29	1.12	1.340	577	2430	0.29
Horse	2.13	1.79	1.08	0.850	557	2423	0.35
Robin	2.19	1.99	1.07	1.020	548	2413	0.19
Elephant	2.30	2.63	1.15	1.310	591	2397	0.27
Cat	2.33	2.74	1.55	1.700	583	2386	0.25
Turtle	2.45	2.69	1.11	1.280	579	2388	0.20
Swan	2.47	1.97	1.26	0.980	587	2410	0.45
Ladybug	2.49	2.78	1.39	1.490	544	2403	0.20
Salmon	2.57	2.26	1.32	1.110	614	2440	0.25
Trout	2.59	2.12	1.33	1.040	607	2402	0.39
Wolf	3.10	3.98	1.64	1.860	1276	2374	0.50
Coyote	3.34	4.02	1.67	1.700	1270	2431	0.40
Raccoon	3.47	2.80	1.64	1.500	583	2426	0.43
Lizard	3.52	4.13	1.61	1.850	598	2426	0.35
Crow	3.68	4.06	1.54	1.670	618	2411	0.24
Vulture	3.86	4.91	1.53	1.650	553	2402	0.66
Shark	3.90	4.82	1.70	1.770	593	2420	0.53
Bat	3.95	5.35	1.88	1.690	553	2219	0.78
Skunk	4.42	4.42	1.73	1.930	609	2358	0.00
Rattlesnake	5.04	5.66	1.76	1.580	589	2409	0.37
Wasp	5.40	5.68	1.62	1.460	572	2392	0.18
Rat	5.55	6.26	1.53	1.180	562	2379	0.53
Cockroach	6.11	6.45	1.33	1.000	621	2388	0.29
Mosquito	6.12	6.27	1.36	1.060	619	2368	0.13

Least liked species includes neutral or midpoint (4) on a 1 (strongly like) to 7 (strongly dislike) scale.

Note: Species in italics exhibit substantive differences (i.e., Cohen’s $d > 0.40$) between 1978 and 2014 data.

Networks). GfK currently uses address-based sampling (ABS) to recruit and maintain online panel members. GfK switched to ABS from random digit dialing (RDD) to reflect the changes in society telephony, and combat long-term declines in response rates (see Curtin et al., 2005). A key advantage of GfK’s KnowledgePanel over traditional ABS sampling is greater representation of U.S. households, especially historically undersampled groups (The GfK Group, 2013). Samples are drawn from KnowledgePanel using a probability proportional to size weighted sampling approach designed to ensure that each sample can reliably represent the U.S. population (for details, see Appendix A). Post-hoc weights were created using data from 2009 to 2011 American Community Survey, conducted by the United States Census Bureau (www.census.gov/acs/), as benchmarks. Weights were applied to the overall sample in all subsequent analyses. Specifically, weights were developed based upon 7 demographic variables, including: respondent age, race/ethnicity, level of education, household income, census region, metropolitan area residence, and whether or not respondent had household access to the Internet.

The survey was conducted using the Qualtrics platform over the course of 11 days in February 2014. GfK contacted a total of 2020 respondents, resulting in 1287 completions, for an overall response rate of 64%. This sampling approach provides less than a 4% margin of error at the 99% confidence level for the weighted sample (Vaske, 2008; see pp.179–182).

To maximize comparability, our questionnaire replicated 26 species items used by Kellert and colleagues to assess attitudes toward animals in the original 1978 survey. (See Appendix B for illustration of survey instrument.) One additional item, assessing attitudes toward cougar/mountain lion was also included. To minimize ordering effects the presentation of all response items was randomized. Consistent with the original study, attitude toward animals were measured using a bipolar response scale ranging from 1 (strongly like) to 7 (strongly dislike). All respondents rated their like/dislike for wolf, coyote, and cougar/mountain lion. To reduce response burden and survey length, respondents were assigned random subsets of 11 of the remaining

species listed in Table 1, such that each respondent rated like/dislike for a total of 14 species. Missing values were dropped from analyses. The weighted means for each species in 2014 were compared to the means reported for each species in the 1978 survey (Kellert and Berry, 1980) using independent sample t-tests in Microsoft Excel (Microsoft, 2010). Because large sample sizes can inflate statistical significance, we used Cohen's d to gauge the relative size of the effect (Cohen, 1988). We calculated species rank by ordering species based upon their mean attitude scores; rank ranged from 1 (most liked) to 26 (least liked).

3. Results

Attitudes toward animals were quite similar across the two studies (Table 1). The average absolute mean difference across all 26 species was 0.48 on scales ranging from 1 (strongly like) to 7 (strongly dislike), the average change in rank was 2.1 (of 26), and mean scores for species correlated between the studies at $r = 0.95$. Nevertheless, from 1978 to 2014, there were substantive differences in public attitudes toward eight species (Cohen's $d \geq 0.4$). Attitudes toward four species, which are sometimes regarded as harmful or unattractive, were substantially more positive ($d \geq 0.4$) in the current study. Specifically, 2014 respondents reported more positive attitudes toward bats, sharks, vultures, and rats than 1978 respondents. Likewise, attitudes toward two mammalian carnivores (i.e., wolves and coyotes) were substantially more positive ($d \geq 0.4$) in 2014 than 1978. The proportion of respondents reporting positive attitudes toward wolves increased by 42%, and the proportion reporting positive attitudes toward coyotes increased by 47% (Fig. 1). The average mean change for all 6 species exhibiting an increase in positive attitudes was 0.94 on a 7-point scale. Conversely, the proportion of respondents reporting positive attitudes toward two animals—raccoons and swans—decreased by 41% and 21% respectively, with an average mean change of -0.59 (Table 1).

Additionally, we measured attitudes toward cougar, a large-bodied predator found in North and South America that has witnessed a recent range expansion in parts of the United States (LaRue et al., 2012). Sixty-one percent of respondents reported a positive attitude toward the cougar (Fig. 1). This is the first time data on this species has been published at the national level.

Following Kellert (1985a), we ranked (i.e., ordered) animals based on mean attitudinal scores. We found a positive change in rank for eagles ($\Delta + 5$), cats ($\Delta + 4$), butterflies ($\Delta + 3$), elephants ($\Delta + 3$), turtle ($\Delta + 2$), ladybug ($\Delta + 2$), vulture ($\Delta + 2$), wolf ($\Delta + 1$), coyote ($\Delta + 1$), lizard ($\Delta + 1$), bat ($\Delta + 1$), and cockroach ($\Delta + 1$), while swan ($\Delta - 6$), trout ($\Delta - 6$), salmon ($\Delta - 4$), skunk ($\Delta - 3$), horse ($\Delta - 2$), raccoon ($\Delta - 2$), robin ($\Delta - 1$), crow ($\Delta - 1$), and mosquito ($\Delta - 1$) all witnessed negative rank changes (Table 2).

4. Discussion

Despite three and a half decades of elapsed time between studies, attitudes toward animals were generally similar across the studies. However, public attitudes toward six of the eight animals were substantively more positive in 2014 than 1978. To the extent that these attitudinal indicators represent concern for animals generally, these data suggest that concern for animal welfare could be increasing in the United States. Importantly, attitudes toward domestic animals (i.e., horses, dogs, cats) did not change substantively; rather, substantive changes in scores were limited to wildlife. Our study was limited, however, in that it included only common companion animals, as opposed to domestic livestock. Nevertheless, the consistency in attitudes toward domestic animals may indicate that concern for domestic animals was already high when the first study was conducted. Indeed, public policy regarding the care and management of domestic animals had already been in place for more than a decade at the time of the first survey (the U.S.

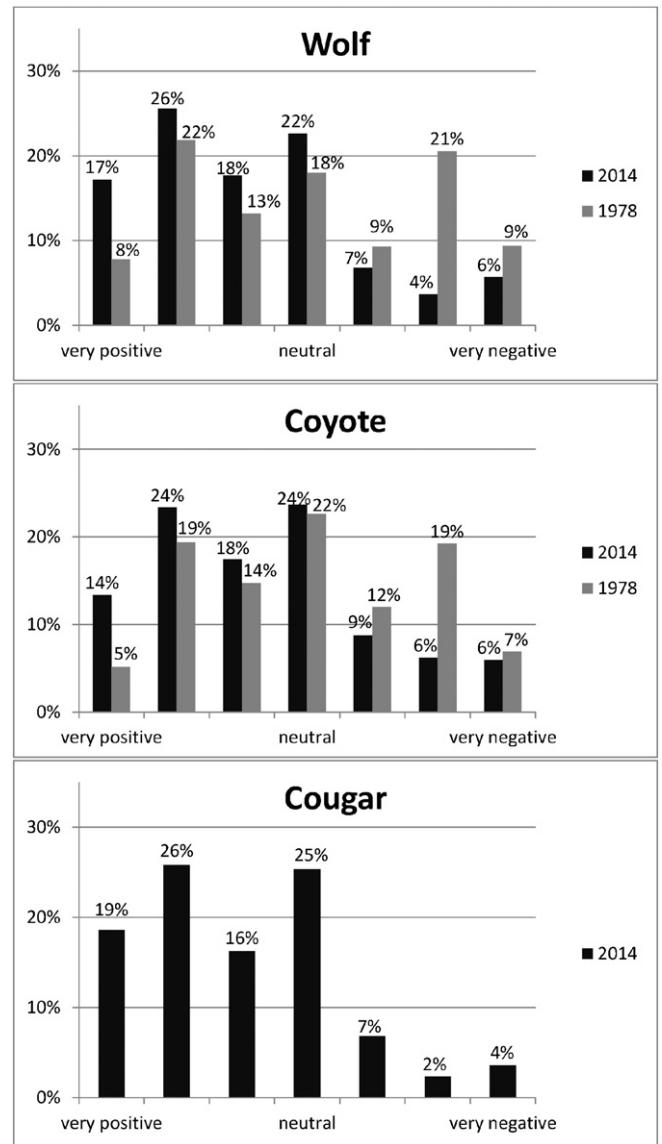


Fig. 1. U.S. Resident's attitudes toward mammalian carnivores: 1978 ($n = 3107$) & 2014 ($n = 1270$). No data for cougar preference were collected in 1978. *Least liked species includes neutral or midpoint (4) on a 1 (strongly like) to 7 (strongly dislike) scale.

Animal Welfare Act was signed into law in 1966); while policy evidence (in the form of ballot measures) demonstrating public concern for the individual well-being of wildlife does not appear until the 1990s (Pacelle, 1998).

Table 2
Rank changes in Americans' attitudes toward animals scores measured in 1978 and 2014.

Rank: '14	Species	Δ Rank	Rank: '14	Species	Δ Rank
1	Dog	0	14	Coyote	1
2	Butterfly	3	15	Raccoon	-2
3	Eagle	5	16	Lizard	1
4	Horse	-2	17	Crow	-1
5	Robin	-1	18	Vulture	2
6	Elephant	3	19	Shark	0
7	Cat	4	20	Bat	1
8	Turtle	2	21	Skunk	-3
9	Swan	-6	22	Rattlesnake	0
10	Ladybug	2	23	Wasp	0
11	Salmon	-4	24	Rat	0
12	Trout	-6	25	Cockroach	1
13	Wolf	1	26	Mosquito	-1

Positive Δ Rank indicates a move up in rank in 2014 compared to 1978. Negative Δ Rank indicates a move down in rank in 2014 compared to 1978. Zero Δ Rank indicates no change.

The work of Manfredo and colleagues (Manfredo et al., 2003; Manfredo et al., 2009; Teel and Manfredo, 2010) provides a plausible explanation for why concern may be increasing. These researchers suggest that the ways in which Americans value wildlife are shifting away from mastery or domination orientation toward “mutualist” orientations, whereby wildlife are viewed “as part of an extended family, and deserving of caring and compassion” (Manfredo et al., 2009:412). Following the work of Inglehart and colleagues (Inglehart, 1997; Inglehart and Welzel, 2005) they attribute this shift to social forces related to modernization; specifically, they hypothesize that increasing levels of urbanization, income and education within societies are changing the way societies value and utilize wildlife. If social forces such as modernization are changing the way in which people value animals generally, then we might expect Americans' concern for both wild and domestic animals to increase with modernization (i.e., rising levels of education, urbanization and income). However, Manfredo and colleagues' work is focused on wildlife. In contrast with their findings, sociological research on concern for animals used in agriculture indicates neither education nor income are associated with concern when other factors are controlled—though childhood residency in rural areas is negatively associated with concern (Deemer and Lobao, 2011). Interestingly, these researchers also found that concern was negatively related to religiosity (measured as church attendance), and positively associated with support for economic equality and tolerance for social outgroups. Although they differ with Manfredo and colleagues about the causes of changes in concern for animal welfare, both groups of researchers expect concern to increase in the future. Our data provide some initial support for the idea that concern, as indicated by attitudes, has increased.

Because our methods differed from Kellert's, some caution is warranted in interpreting differences between 1978 and 2014 respondents. Specifically, while Kellert's 1978 survey used personal interviews, we used a web-based, self-administered questionnaire. Our decision to deviate from Kellert's method was made, in part, because of the labor and costs associated with personal interviews, but also because electronic administration offered other advantages, such as the ability to present response items randomly, thus reducing the potential for ordering effects (Bowling, 2005; Dillman, 2011). Furthermore, GfK ABS methodology entails similar requirements to Kellert's probability random sample approach, but with the added advantage of having less social desirability bias than an in-person or telephone interview. These methodological choices increase our confidence that our data accurately reflect Americans' views about animals. Indeed, recent analyses indicate that probability-based internet samples provide results that can more accurately reflect populations than RDD phone surveys (Yeager et al., 2011). Nevertheless, we are unable to rule out that some of the differences observed between the studies could be explained by methodological differences, as opposed to real change in attitudes over time.

The results of the current study also add to the complexity of already inconsistent findings in the literature on attitudes toward predators, where there is the most longitudinal research on attitudes toward animals (Williams et al., 2002; Ericsson and Heberlein, 2003; Karlsson and Sjöström, 2007; Houston et al., 2010; Majić and Bath, 2010). Studies on attitudes toward wolves exhibit particularly inconsistent results. Some suggest that attitudes toward wolves have remained relatively stable (e.g., Williams et al., 2002; Bruskotter et al., 2007), while others show that hunters and residents who live within wolves' range have become more negative (e.g., Treves et al., 2013; Ericsson and Heberlein, 2003), while still others have shown less polarization (i.e., increased prevalence of neutral attitudes) over time (see Majić and Bath, 2010). In contrast to prior longitudinal research, where the focus has been predominantly on rural residents who live in wolf-occupied areas (e.g., Treves et al., 2013) or hunters (e.g., Ericsson and Heberlein, 2003), our research examined attitudes of the American public in toto, the vast majority of whom do not participate in hunting (Cordell, 2012) and reside in urban settings. Indeed, the U.S. Census Bureau (2014) now estimates that more than four in five of Americans reside in urban areas.

Importantly, existing evidence suggest urban residence is associated with positive attitudes toward wolves (Williams et al., 2002); likewise, Manfredo and colleagues have found that urbanization is associated with greater prevalence of mutualism value orientations, and decreased levels of domination orientations (Manfredo et al., 2009), and Kendall et al. (2006) found that rural residency is negatively associated with concern for animals used in agriculture. Although attitudes toward wolves may indeed be increasingly negative among residents of the areas wolves occupy (especially those negatively impacted by wolves; e.g., hunters, ranchers) (see Treves et al., 2013), our data suggest these changes are not detectable at the national level. Given that (a) the vast majority of the U.S. population lives in urbanized settings, (b) these settings are associated with positive attitudes toward wolves, and (c) urbanization is a hypothesized driver of both value shift and shift in concern for agricultural animals, it is therefore reasonable to conclude that any increased negativity in wolf-occupied areas may be “drowned out” because the areas wolves occupy in the United States are generally remote, and human population densities in these areas are extremely low (see: Bruskotter et al., 2014).

Jackman and Rutberg (2015) reported an increase in acceptance of coyotes in Cape Cod, Massachusetts, U.S. between the years of 2005 and 2012. The increase in positive attitudes toward coyotes found in the current study is consistent with their finding. Coyotes, in contrast to wolves, are often found in urban environments (Gehrt et al., 2009), increasing the chance for human-coyote interactions and potential conflict. However, research indicates that coyotes reduce the potential for negative conflict with humans by traveling through the urban matrix late at night when the risk of contact with humans is lowest (Gehrt et al., 2009; Gese et al., 2012). Thus, although coyotes and humans coexist in the same geographic space, most humans have little experience with these animals. Coyotes' behavioral avoidance of humans in urbanized setting may have contributed to the increase in positive attitudes toward this species.

Positive attitudes were also recorded for four other species: the bat, rat, vulture and shark. Again, all four of these species have been historically stigmatized, however, the past 30 years have also allowed for an increase in scientific study and dissemination of information about these species. As an example, in Peter Benchley's 1974 bestselling novel *Jaws*, as well as the films that followed, sharks were portrayed as a threat to human life, leading to an explosion of public interest and scientific research. The current study of American attitudes mirrors an increase in positive attitudes toward sharks in the U.K., where 64% of respondents reported positive attitudes toward sharks, expressing scientific and ecological interest among their reasons (Friedrich et al., 2014). Similarly, increased public concern and legislative actions regarding animals used in scientific research (Baumans, 2004; Pinker, 2011), might help explain why attitudes toward rats have become more positive. The increased exposure and attention given to these animals—and especially, instances of poor treatment of these animals—may contribute to increased empathy and positive attitudes. Furthermore, the popularization of science-based programming (e.g., Animal Planet and the National Geographic channel), combined with societal shift toward more mutualistic value orientations, could account for the increases in positive attitudes toward animals witnessed in this study. However, we caution the reader that our ideas about potential mechanisms are purely speculative and require future study to determine which mechanisms are driving these changes. The increases in positive attitudes toward wildlife demonstrated by this study could lead to increased support for species conservation activities. Given that attitudes toward companion animals remained very positive over time, we also expect continued support for policies aimed at promoting the welfare of these animals, as evidenced by the continual updating and strengthening of the U.S. Animal Welfare Act (USDA, 2013).

Potential explanations for increased negative attitudes toward raccoons and swans are more challenging. The U.S. Fish and Wildlife Service recognizes raccoons as a common, urban nuisance species, and

the United States Department of Agriculture (USDA) recognizes raccoons as a common crop predator. With increased urbanization in the U.S., human-raccoon conflict is on the rise (Barden et al., 1993). Conflicts include the invasion of and significant damage to human structures (Prange et al., 2003), as well as threats to human health via zoonotic diseases such as *Baylisascaris procyonis*, a large intestinal roundworm (Page et al., 2005). Herzog and Burghardt (1988) have shown that direct experience with an animal affects individuals' attitude toward that animal; thus we would expect negative attitudes toward raccoons to increase as a result of increased exposure bringing the possibility for negative interactions. Swans are not generally seen as urban nuisance animals, but mute swans are not native to the U.S. and are generally considered invasive in many areas throughout the U.S., possibly contributing to the increase in negative attitudes (García-Llorente et al., 2008). However, this is only one possible explanation. Our use of the common name (i.e., "swans") to maintain repetition integrity of the 1978 study does not allow us to determine which species of the genus *Cygnus* is salient for respondents in the U.S. Although each of these explanations for attitude changes is plausible, a limitation to the current study is the lack of data to support the speculations regarding the underpinning mechanisms of attitudinal change. It is recommended that future research examine these mechanisms.

5. Conclusion

Research generally indicates that attitudes toward animals are useful for explaining public support for various animal management practices and policies (e.g., Bruskotter et al., 2009; Sponarski et al., 2015). Likewise, understanding changes in attitudes toward animals may help us to better understand the changing nature of human-animal relationships. Shifts in attitudes toward animals, as well as concern for animal welfare generally, are likely to impact how societies negotiate the trade-offs between conservation, agricultural productivity and animal welfare in the future. Increases in positive attitudes toward predators may foretell increased support for efforts to conserve these species, and support for policies that explicitly consider their welfare (e.g., bans on management practices generally seen as inhumane). Increases in positive attitudes toward predators could also signal increases in social conflicts surrounding their management, especially in areas where these species are abundant or where conflicts with predators are increasing (Treves et al., 2013).

Furthermore, consistent positive attitudes toward companion animals, coupled with continued growth in populations of these animals, may be contributing to both conservation and animal welfare crises. One recent study estimated that free-ranging domestic cats alone kill 1.3–4.0 billion birds and 6.3–22.3 billion mammals annually (Loss et al., 2013) negatively affecting the conservation of bird species and the potential of compromised welfare for the free-ranging cats. Currently, millions of cats and dogs are relinquished annually to U.S. animal shelters (New Jr et al., 2000), while untold numbers are simply abandoned, highlighting the ongoing animal welfare crisis.

Finally, although our study did not measure attitudes toward animals used in agricultural production, other evidence demonstrates high levels of public concern for their welfare (Deemer and Lobao, 2011; Pinker, 2011). Concern for the welfare of production animals may lead to policy that promotes more natural living conditions (e.g., moving livestock from confined facilities to open pastures); however, this may make livestock more vulnerable to predation, exacerbating the existing tension between concern for wildlife and domestic livestock.

Future studies that assess concern for production animals relative to wildlife species of conservation concern, as well as support for policies directed at conservation and animal welfare may be useful for understanding how individuals negotiate these tradeoffs. Ultimately, research suggests the public is increasingly skeptical regarding both the means used to manage wildlife (Slagle et al., in press), and the justifications

provided for their management (Decker et al., 2015; Responsive Management/National Shooting Sports Foundation, 2008). Similarly, the rise in ballot initiatives in recent decades aimed at protecting wild and domestic animals alike (Pacelle, 1998) suggests concern for the welfare of animals is on the rise generally. Coupling concern for animal welfare with the projected growth in the world's human population and increasing demand for animal protein reveals an uneasy conflict between these important societal goals. Increasing concern for the welfare of animals could intensify social conflicts concerning these goals, as well as political pressures to find policy solutions. In this way, rising concern for the welfare of animals could serve as a catalyst for innovation both in the management of wildlife and domestic animals. The innovation may be crucial for developing policies and practices to negotiate trade-offs in the Anthropocene.

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