

# Segmenting Public Beliefs about Conflict with Coyotes in an Urban Recreation Setting

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**EXECUTIVE SUMMARY:** Recognizing the diversity of opinions about wildlife, researchers have emphasized segmenting the public into homogeneous meaningful groups to understand potential responses to wildlife management strategies. This article segmented the public based on normative beliefs about lethal management of coyotes in an urban recreation setting. Data were obtained from a mail survey ( $n = 457$ ) of residents in the South Suburban Park and Recreation District (SSPRD), which encompasses municipalities (e.g., Littleton, Englewood) in the Denver, Colorado metropolitan area. With extensive parks and open-space, this region provides prime habitat for coyotes, and SSPRD was concerned that the presence of coyotes would cause negative interactions with humans and domestic pets. Three groups of respondents were identified—those who believed that lethal coyote management was: (a) unacceptable (23 percent), (b) unacceptable except when coyotes injure or kill pets (42 percent), and (c) acceptable (35 percent). Compared to the other groups, respondents who felt that lethal management was unacceptable were more likely to have protectionist value orientations toward wildlife, positive general attitudes toward coyotes, negative specific attitudes toward lethal coyote management, and were less likely to support a vote in favor of killing coyotes. Segmenting the public helps managers identify different groups of people who make up an agency's constituency and may or may not become involved in decision making regarding wildlife. Agencies can use information about norm-based segments to help predict the proportion of different publics who are likely to support, oppose, or be indifferent toward management actions. This information can also be used to target education efforts. The largest proportion of respondents agreed that lethal management was acceptable under certain conditions (e.g., injure or kill pets), but was unacceptable under other circumstances (e.g., coyote seen in residential area). Given that this segment of the public may not be firmly committed to either a positive or negative opinion about lethal

management, they may be the most likely to be influenced by information and education aimed at attitudes and behavior related to this management action. Attempts to educate and inform individuals with protectionist wildlife value orientations to consider adopting favorable attitudes and vote in support of actions such as lethal trapping are less likely to be successful. Therefore, to have a large and supportive constituency, agencies may need to implement different strategies with different audiences to address conflicts with wildlife in urban recreation areas.

**KEYWORDS:** value orientations, norms, attitudes, behavioral intentions, wildlife management, urban recreation settings, segmentation

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The presence of wildlife in urban areas poses significant management challenges (Knuth, Siemer, Duda, Bissell, & Decker, 2001). Increases in deer populations, for example, have resulted in wildlife-related vehicular accidents (Conover, 1997), damage to ornamental vegetation (McCullough, Jennings, Gates, Elliott, & DiDonato, 1997), and transmission of Lyme disease to humans (Deblinger, Rimmer, Vaske, Vecellio, & Donnelly, 1993). Beavers cause destruction of trees and shrubs, and dams that they construct sometimes flood residential subdivisions (Enck, Connelly, & Brown, 1996; Ermer, 1988; Harbrecht, 1991). The presence of some species (e.g., mountain lions, coyotes) in urban areas can pose a safety risk to humans and domestic pets (Knuth et al., 2001; Wittmann, Vaske, Manfredo, & Zinn, 1998).

Traditional management methods (e.g., hunting, lethal trapping) that can be effective in reducing problem wildlife populations, may not be feasible in areas of dense human population and may not be acceptable to some urban residents (McCullough et al., 1997; Zinn, Manfredo, Vaske, & Wittmann, 1998). Given demographic shifts (Cordell, Bergstrom, Betz, & Green, 2004; Manfredo & Zinn, 1996), changes in value orientations (Manfredo, Teel, & Bright, 2003), and increased effectiveness of interest groups and stakeholders (Campbell & MacKay, 2003; Decker, Brown, & Siemer, 2001), a broader spectrum of the public now

demands and expects involvement in wildlife decision making. When some groups feel that their concerns are not being addressed, they resort to administrative appeals, court cases, and ballot initiatives (Burnett, 2007; Manfredo, Fulton, & Pierce, 1997; Williamson, 1998).

Understanding how different segments of the public perceive particular management actions can help wildlife agencies minimize controversy when choosing among management alternatives (Loker, Decker, & Schwager, 1996; Wittmann et al., 1998). Although researchers (e.g., Bright, Manfredo, & Fulton, 2000; Cole & Scott, 1999; Manfredo et al., 2003; Miller & Graefe, 2000; Zinn et al., 1998) have segmented the public based on socio-demographic (e.g., urban vs. rural residency) and social psychological (e.g., value orientations) characteristics, less empirical research has segmented the public based on normative beliefs (evaluative standards) about specific wildlife management actions. This article: (a) segmented the public based on norms for lethal management of coyotes in an urban recreation area, and (b) examined differences among these segments in value orientations toward wildlife, general attitudes toward coyotes, specific attitudes toward lethal management of coyotes, and behavioral intentions regarding likelihood of supporting lethal coyote management. The objective was to suggest how this information may assist management and inform future research related to the human dimensions of wildlife in urban park and recreation settings.

### **Study Area and Context**

The South Suburban Park and Recreation District in Colorado illustrates types of urban wildlife issues that recreation resource managers face. This district provides park and recreation services to several municipalities in the Denver metropolitan area (e.g., Littleton, Englewood), as well as unincorporated areas in Arapahoe, Jefferson, and Douglas Counties. Since 1950, the population in the Denver area has increased 200 percent (Pitt & Castillo, 2000) to approximately 2.6 million residents in 2005 (Colorado Department of Revenue, 2005). This region's population is projected to grow at an average annual rate of 1.9 percent over the next 20 years (Denver Regional Council of Governments, 2000). New residents are unlikely to be evenly distributed throughout the region, as demonstrated by growth in the last decade (Pitt & Castillo, 2000). Such sprawling development can result in loss of open space and wildlife habitat.

The South Suburban Park and Recreation District maintains over 110 park areas and 100 miles of trails including developed parks, natural areas, greenbelts, and waterways. Increasing presence of coyotes in these natural areas has resulted in human-wildlife problems (e.g., frightening residents, injuring or killing pets) and raised questions among agencies and the public concerning how best to manage this wildlife population (e.g., education, capture and relocation, lethal trapping). Recognizing that more than biological information is necessary for effective management and that public education and wildlife relocation are often supported (Decker et al., 2001; Zinn et al., 1998), the South Suburban Park and Recreation District and Colorado Division of Wildlife sponsored a project to learn about groups of resi-

dents living in the South Suburban District and their beliefs and attitudes primarily regarding lethal trapping of coyotes in this area.

## Conceptual Background

### *Value Orientations, Attitudes, and Behavior*

Social psychologists differentiate concepts such as beliefs and attitudes based on the specificity of objects being measured (Eagly & Chaiken, 1993; Whittaker, Vaske, & Manfredo, 2006). *Value orientations*, for example, refer to general classes of objects (e.g., wildlife, forests) and are revealed through the pattern and direction of basic beliefs (Manfredo, Teel, & Bright, 2004; Vaske & Donnelly, 1999). Wildlife value orientations have been measured by asking individuals how strongly they identify with: (a) protectionist-oriented belief statements (e.g., “wildlife should have same rights as humans,” “an important part of my community is wildlife seen there”) and (b) utilitarian or use-oriented statements (e.g., “we should use wildlife to add to the quality of human life,” “I consider wildlife in my community to be pests”). Patterns of these basic beliefs about wildlife rights and use have consistently factored into a value orientation dimension called the protection-use continuum (e.g., Bright et al., 2000; Dougherty, Fulton, & Anderson, 2003; Fulton, Manfredo, & Lipscomb, 1996; Layden, Manfredo, & Tucker, 2003; Zinn et al., 1998).

Similar to value orientations, *attitudes* are evaluations of an object (Eagly & Chaiken, 1993; Whittaker, Manfredo, Fix, Sinnott, Miller, & Vaske, 2001). Attitudes, however, differ from value orientations in at least three ways. First, attitudes focus on positive or negative evaluations (i.e., affect or emotions), whereas value orientations are derived from basic beliefs (i.e., cognitions or thoughts). Second, an individual may hold thousands of attitudes, whereas value orientations tend to be limited in number (e.g., protection-use, biocentric-anthropocentric). Third, attitudes have a more focused object than value orientations. If the object, for example, is “overall feeling toward coyotes,” the evaluation is a general attitude. If the object is “lethal trapping of coyotes in South Suburban natural areas in 2007,” the evaluation reflects a narrower context and timeframe, and thus represents a more specific attitude. By comparison, the object of a value orientation is more general (e.g., all wildlife in general).

Indicators of an individual’s or agency’s *behavior* may also vary in measurement specificity. Questions regarding the lethal control of wildlife in general may elicit different responses than questions related to the lethal control of coyotes in the South Suburban area (i.e., a more specific object). Table 1 compares evaluation objects used in this article.

Research on attitudes and behavior recognizes these situational elements (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Responses to human-coyote conflict events, for example, may differ depending on the proposed management action (e.g., destroy vs. relocate a coyote), context (e.g., coyote is seen in a neighborhood vs. kills a pet), and location (e.g., conflict occurred in a wildland area vs. suburban neighborhood). Zinn et al. (1998) found that individuals on the protection end of the protection-use continuum were less willing to support agencies destroying an

**Table 1. Specificity of evaluation objects.**

<b>Concept</b>	<b>Specificity of evaluation object</b>
Wildlife value orientation	All wildlife
General attitude	Coyotes
Specific attitude	Lethal trapping of coyotes in South Suburban area, Colorado
Behavioral intention	Likelihood of supporting lethal trapping of coyotes in South Suburban area, Colorado

animal across three different wildlife species (beavers, coyotes, mountain lions) and situation contexts (e.g., seeing the animal in a residential area, human injury, or death caused by wildlife). Respondents on the use end of the continuum were more accepting of this management response. Understanding these conceptual distinctions allows managers to identify the potential sources of human-wildlife conflict. In the South Suburban Park and Recreation District, knowledge of how problems with coyotes may be related to value orientations (e.g., protection or use orientation toward all wildlife), general attitudes (e.g., positive or negative evaluation of coyotes), and / or specific attitudes (e.g., specific problems with coyotes) can provide a foundation for formulating management efforts (e.g., education, lethal control).

### ***Segmenting the Public***

Recognizing the diversity of public opinions about wildlife in different contexts, researchers have emphasized the importance of segmenting the public into more homogeneous and meaningful groups to improve understanding of responses to wildlife management actions (e.g., Bright et al., 2000; Decker et al., 2001). Studies, for example, have differentiated between males and females (Dougherty et al., 2003; Manfredo et al., 1997; McFarlane, Watson, & Boxall, 2003; Miller & Vaske, 2003; Zinn & Pierce, 2002), consumptive (e.g., hunters) and non-consumptive (e.g., non-hunters, wildlife viewers) users (Duffus & Dearden, 1990; Stedman & Decker, 1996; Vaske, Donnelly, Wittmann, & Laidlaw, 1995), involved and uninvolved groups (Cole & Scott, 1999; Miller & Graefe, 2000), residents and nonresidents (Needham, Vaske, & Manfredo, 2004b), and urban and rural residents (Cordell et al., 2004; Decker et al., 2001). Wildlife studies also have segmented the public based on competing views of different interest groups (e.g., Sierra Club, Mule Deer Foundation) and other citizen advocacy organizations (Decker, Krueger, Baer, Knuth, & Richmond, 1996; Needham, Rollins, & Wood, 2004a).

From a social psychological perspective, research has segmented the public based on both general values and more specific attitudes (e.g., Bright et al., 2000; Manfredo, Pierce, Fulton, Pate, & Gill, 1999; Manfredo et al., 1997, 2003; Purdy & Decker, 1989; Zinn et al., 1998). Less research has segmented the public according to normative beliefs about what management action is appropriate in a specific situation. Norms can be defined as evaluative standards or acceptability measures regarding individual or agency behavior in a given context (see Vaske & Whittaker,

2004 for a review). Differences in situational contexts in human-wildlife interactions influence norms for management actions (Decker, Jacobson, & Brown, 2006; Wittmann et al., 1998, Zinn et al., 1998). Wildlife Acceptance Capacity (WAC) advanced by Decker and Purdy (1988), for example, is essentially a normative concept that proposes there is some maximum wildlife population level in an area that is acceptable to people. The WAC concept suggests that a person's acceptance threshold is situation specific and dependent on the severity of the human-wildlife interaction (Decker et al., 2006). Decker (1991) speculated that these problems can be arranged along a continuum ranging from nuisance situations (e.g., raccoons dumping trash cans), to economic or aesthetic impacts (e.g., deer eating ornamental plants), to health and safety threats (e.g., Lyme disease transmitted by deer).

Empirical research has shown that the more severe the problem, the more likely that residents accept lethal methods for managing wildlife. Suburbanites in New York, for example, were more willing to accept aesthetic or economic wildlife impacts (e.g., damage to ornamental plantings) than health risks (e.g., disease) (Connelly, Decker, & Wear, 1987). Similar findings have emerged in related studies (Decker & Gavin, 1985; Enck, Bishop, Brown, & Lamendola, 1992; Loker, 1996; Stout & Knuth, 1995). Taken together, these findings suggest that although exceptions may exist, lethal management actions appear to be more acceptable when human life is in danger than when wildlife are a nuisance or cause economic or aesthetic damage. Different people, however, may use different criteria to determine when an encounter with a coyote is simply a nuisance versus a danger to human life (i.e., some may be more tolerant).

This article segmented the public based on normative beliefs about the acceptability of lethal management of coyotes in an urban recreation area, and examined differences among these segments in value orientations toward wildlife, general attitudes toward coyotes, specific attitudes regarding coyotes and their management, and behavioral intentions regarding coyote management. Based on the literature, the following hypotheses are advanced:

- H<sub>1</sub>: The public will hold a variety of normative beliefs about lethal management of coyotes in urban recreation areas and can be segmented into homogeneous and meaningful groups based on these beliefs.
- H<sub>2</sub>: Segments of the public who disagree with lethal management of coyotes in urban recreation areas will be more likely to have protectionist value orientations toward wildlife and positive general attitudes toward coyotes than those who agree with lethal management.
- H<sub>3</sub>: Segments of the public who disagree with lethal management of coyotes in urban recreation areas will be more likely to have negative specific attitudes toward this management action than those who agree with lethal management.
- H<sub>4</sub>: Segments of the public who disagree with lethal management of coyotes in urban recreation areas will be less likely to support a vote (i.e., behavioral intention) in favor of this management action than those who agree with lethal management.

## Method

### *Data Collection*

Data were obtained from a 16-page mail survey sent to individuals 18 years of age and older residing in municipalities situated within the South Suburban Park and Recreation District in the Denver, Colorado area. A random sample of residents' names and addresses was obtained from tax listings. Three mailings were used to administer the survey. Residents first received a survey, prepaid postage return envelope, and cover letter explaining the study and requesting their participation. Non-respondents were mailed a postcard reminder two weeks after the initial mailing. A second complete mailing (i.e., survey, prepaid postage return envelope, cover letter) was sent to non-respondents two weeks after the postcard reminder. Surveys were mailed to 897 residents. In total, 18 surveys were undeliverable (e.g., incorrect addresses, moved) and 457 completed surveys were returned, yielding a 52 percent response rate (457/[897-18]).

To check for non-response bias, respondents who completed the survey were compared against those who did not. A sample of non-respondents ( $n = 100$ ) was telephoned and asked questions from the mail survey. Responses were not statistically different ( $p > .05$ , effect sizes  $< .10$ ) between mail survey respondents and non-respondents, thus data were not weighted.

### *Analysis Variables*

*Independent variables.* Respondents were segmented into groups based on their responses to six *normative belief* statements regarding lethal management of coyotes. Respondents were asked the extent to which they disagreed or agreed that destroying a coyote would be acceptable and should occur if it: (a) is seen in a residential area, (b) is seen in your yard, (c) is seen in the South Suburban area, (d) injures a pet, (e) kills a pet, or (f) is more expensive to relocate than using lethal trapping. Responses to these statements were measured on seven-point scales ranging from -3 "strongly disagree" to +3 "strongly agree."

*Dependent variables.* First, an individual's *wildlife value orientation* was constructed from nine variables designed to measure protectionist basic beliefs and five variables measuring utilitarian (i.e., use) basic beliefs. Respondents indicated their level of agreement with the following protectionist statements: (a) having wildlife around my home is important to me, (b) I am interested in making the area around my home attractive to wildlife, (c) I enjoy seeing wildlife around my home, (d) I notice the wildlife around me every day, (e) an important part of my community is the wildlife seen there, (f) I enjoy seeing wildlife in my community, (g) it is important that we learn as much as we can about wildlife, (h) I enjoy learning about wildlife, and (i) it is important that all residents in my community learn about wildlife. Responses to these statements were measured on seven-point scales of -3 "strongly disagree" to +3 "strongly agree."

Variables measuring utilitarian (i.e., use) basic beliefs were: (a) I consider wildlife around my home to be pests, (b) it is important for humans to manage wildlife populations, (c) I consider wildlife in my community to be pests, (d) it is acceptable

that human use results in loss of wildlife, and (e) humans should manage wildlife so that humans benefit. Each of these basic belief statements was coded on the same response scale used to measure the protectionist variables. Items measuring respondents' wildlife value orientations were consistent with those used in past research (e.g., Fulton et al., 1996; Vaske & Donnelly, 1999; Whittaker et al., 2006).

Second, an individual's *general attitude toward coyotes* was constructed from four positive statements and three negative statements about coyotes. Respondents indicated the extent to which they disagreed or agreed with the following positive statements: (a) coyotes have a right to exist regardless of their actions; (b) the presence of coyotes is a sign of a healthy environment; (c) I may never see a coyote, but it is important to know they exist; and (d) coyote populations should be left alone. Negative statements related to coyotes were: (a) there are too many coyotes, (b) coyotes are a nuisance animal, and (c) coyote populations should be controlled. Responses to these statements were measured on seven-point scales ranging from -3 "strongly disagree" to +3 "strongly agree."

Third, respondents' *specific attitude toward lethal trapping of coyotes* was determined by asking, "Overall, how do you feel about lethal trapping of coyotes in the South Suburban area?" Responses were coded on a seven-point scale of -3 "extremely negative" to +3 "extremely positive." Finally, *behavioral intention* was measured by asking respondents, "If you had to decide today how to solve problems with nuisance coyotes in the South Suburban area, how likely is it that you would support a vote in favor of lethal trapping of coyotes in this area?" Responses were coded on seven-point scales of -3 "extremely unlikely" to +3 "extremely likely."

### **Data Analysis**

K-means cluster analysis was used to segment respondents into homogeneous groups based on their responses to the six normative belief statements about lethal coyote management (Hypothesis 1). Internal consistency of scales measuring respondents' value orientations toward wildlife and general attitudes toward coyotes was examined using Cronbach alpha reliability coefficients. One-way analysis of variance and post-hoc Scheffe tests were used to examine differences among groups (revealed by the cluster analysis) in value orientations, general and specific attitudes, and behavioral intentions (Hypotheses 2 through 4). Eta ( $\eta$ ) effect sizes were reported where appropriate (Cohen, 1988).

### **Results**

Separate cluster analyses were performed for two, three, four, and five group solutions. The three-group solution provided the best fit for the data. To validate this solution, data were randomly sorted and a cluster analysis was conducted after each of three random sorts. All of these additional cluster analyses supported the initial three-group solution (Table 2); those who: (a) disagreed that it was acceptable to destroy coyotes under any circumstances (cluster 1 "lethal control unacceptable,"  $n = 95$ , 23 percent); (b) agreed that it was acceptable to destroy coyotes if they injured or killed pets, but disagreed that lethal management was acceptable under other circumstances (e.g., coyotes seen in yard, relocation more expensive) (cluster



2 “situation influenced,”  $n = 174$ , 42 percent); and (c) agreed that it was acceptable to destroy coyotes under most circumstances (cluster 3 “lethal control acceptable,”  $n = 145$ , 35 percent).

Responses to each of the six normative belief statements regarding lethal management of coyotes were statistically different among the three cluster groups,  $F(2, 411) = 74.29$  to  $480.19$ ,  $p < .001$  (Table 2). Eta ( $\eta$ ) effect sizes ranged from .52 to .84. Using guidelines from Cohen (1988) and Vaske, Gliner, and Morgan (2002), these effect sizes suggest that the strength of differences among groups can be characterized as “large” or “substantial,” respectively. Taken together, these results support Hypothesis 1; the public holds different normative beliefs about lethal management of coyotes in urban recreation areas and can be segmented into homogeneous groups based on these beliefs.

On average, individuals in cluster 1 (lethal control unacceptable) were slightly younger (45 years) than those in clusters 2 (situation influenced, 49 years) and 3 (lethal control acceptable, 54 years),  $F(2, 406) = 14.46$ ,  $p < .001$ ,  $\eta = .26$ , and had lived slightly fewer years (nine) at their current residence (cluster 2 = 11 years, cluster 3 = 13 years),  $F(2, 409) = 7.23$ ,  $p = .001$ ,  $\eta = .19$ . There were no significant differences among groups in: (a) proportion of males / females,  $\chi^2(2, N = 414) = 3.82$ ,  $p = .148$ ,  $V = .09$ ; (b) education level,  $\chi^2(14, N = 414) = 15.78$ ,  $p = .327$ ,  $V = .14$ ; and (c) whether they participate in hunting or fishing,  $\chi^2(2, N = 414) = 0.161$  to  $0.497$ ,  $p = .780$  to  $.923$ ,  $V = .02$  to  $.04$ .

Reliability coefficients for the nine items used to measure protectionist basic beliefs and five items measuring utilitarian (i.e., use) basic beliefs for respondents’ *wildlife value orientations* were .92 and .65, respectively (Table 3). Analysis of the contribution of each item revealed that all items were important; deletion of any item would not have improved reliability. Reliabilities supported the creation of two composite basic belief scales (protection [reverse coded] and use), which were computed into a single protection-use wildlife value orientation continuum consistent with past research (overall Cronbach alpha = .86; Fulton et al., 1996). Reliability coefficients for the four positive and three negative statements used to measure respondents’ *general attitude toward coyotes* were .77 and .71, respectively (Table 4). Deletion of any item did not improve reliability of each scale. Given these reliabilities, a single general attitude toward coyotes was computed (overall Cronbach alpha = .82).

Further support for: (a) using normative beliefs together in the cluster analysis to segment respondents, (b) creating a wildlife value orientation continuum and a general attitude toward coyotes, and (c) treating constructs (e.g., value orientation, general attitude) separately was obtained from a confirmatory factor analysis using AMOS 5.0 software. Results provided an acceptable fit to the measured constructs and supported combining variables into their associated constructs ( $\chi^2 / df = 5.1$ , NFI = .92, CFI = .93, RMR = .08, factor loadings = .49 to .94,  $p < .001$ ).

Hypothesis 2 predicted that segments of the public who most strongly disagreed with lethal coyote management in urban recreation areas would be more likely to have protectionist value orientations and positive general attitudes compared to those who agreed with this action. On average, cluster 1 (lethal control unaccept-

**Table 2. Acceptability of lethal coyote management actions for three clusters of South Suburban area residents, Colorado.**

	Acceptability of management actions <sup>1</sup>				F-value	p-value	Eta (η)
	Cluster 1 Lethal control unacceptable 95 23 percent	Cluster 2 Situation influenced 174 42 percent	Cluster 3 Lethal control acceptable 145 35 percent				
Cluster – Sample size (n)							
Cluster – Percent							
Destroying a coyote would be acceptable when:							
A coyote is seen in a residential area	-2.48 <sup>a</sup>	-1.92 <sup>b</sup>	1.26 <sup>c</sup>	463.59	< .001	.83	
A coyote is seen in your yard	-2.43 <sup>a</sup>	-1.60 <sup>b</sup>	1.63 <sup>c</sup>	480.19	< .001	.84	
A coyote is seen in the South Suburban area	-2.72 <sup>a</sup>	-2.35 <sup>b</sup>	-0.16 <sup>c</sup>	268.80	< .001	.75	
A coyote injures a pet	-1.92 <sup>a</sup>	1.33 <sup>b</sup>	1.92 <sup>c</sup>	348.46	< .001	.79	
A coyote kills a pet	-1.68 <sup>a</sup>	1.70 <sup>b</sup>	2.11 <sup>c</sup>	315.66	< .001	.78	
Relocating is more expensive than lethal trapping	-1.83 <sup>a</sup>	-0.33 <sup>b</sup>	1.06 <sup>c</sup>	74.29	< .001	.52	

<sup>1</sup> Cell entries are mean scores coded on a 7-point scale from -3 “strongly disagree” to +3 “strongly agree.”

Means with different superscripts across each row are significantly different at  $p < .05$  using Scheffe post-hoc tests.

**Table 3. Reliability analyses of basic beliefs used to measure protection – use value orientations toward wildlife.** <sup>1</sup>

	Item total correlation	Cronbach alpha if item deleted	Cronbach alpha
Protectionist basic beliefs about wildlife <sup>2</sup>			.92
Having wildlife around my home is important to me	.75	.91	
I'm interested in making the area around my home attractive to wildlife	.77	.91	
I enjoy seeing wildlife around my home	.80	.90	
I notice the wildlife around me every day	.68	.91	
An important part of my community is the wildlife seen there	.76	.91	
I enjoy seeing wildlife in my community	.74	.91	
It is important that we learn as much as we can about wildlife	.59	.92	
I enjoy learning about wildlife	.69	.91	
It is important that all residents in my community learn about wildlife	.65	.91	.65
Utilitarian (use) basic beliefs about wildlife			
I consider wildlife around my home to be pests	.36	.62	
It is important for humans to manage wildlife populations	.30	.65	
I consider wildlife in my community to be pests	.44	.58	
It is acceptable that human use results in loss of wildlife	.41	.60	
Humans should manage wildlife so that humans benefit	.52	.53	
Combined scale of protection – use value orientation toward wildlife			.86

<sup>1</sup> Variables coded on a 7-point scale from -3 "strongly disagree" to +3 "strongly agree."

<sup>2</sup> Variables reverse coded.

**Table 4. Reliability analyses of statements used to measure general attitude toward coyotes.<sup>1</sup>**

	Item total correlation	Cronbach alpha if item deleted	Cronbach alpha
Positive statements about coyotes			.77
Coyotes have a right to exist regardless of their actions	.61	.70	
The presence of coyotes is a sign of a healthy environment	.63	.69	
I may never see a coyote, but it is important to know they exist	.52	.74	
Coyote populations should be left alone	.56	.72	
Negative statements about coyotes <sup>2</sup>			.71
There are too many coyotes	.53	.63	
Coyotes are a nuisance animal	.61	.52	
Coyote populations should be controlled	.47	.70	
Combined <i>general attitude toward coyotes</i> scale			.82

<sup>1</sup> Variables coded on a 7-point scale from -3 "strongly disagree" to +3 "strongly agree."

<sup>2</sup> Variables reverse coded.

able) had a stronger “protection” wildlife value orientation and positive general attitude toward coyotes than clusters 2 (situation influenced) and 3 (lethal control acceptable),  $F(2, 409) = 46.59$  to  $86.97$ ,  $p < .001$  (Table 5). Effect sizes (.43 to .55) suggest that relationships between value orientation and general attitude and cluster membership based on acceptance of lethal management were “substantial” (Vaske et al., 2002). Although cluster 1 was more likely to have stronger “protection” value orientations than the other clusters, all three segments of respondents had protectionist wildlife value orientations. On average, however, cluster 3 (lethal control acceptable) had a negative general attitude toward coyotes, whereas cluster 1 (lethal control unacceptable) had a positive general attitude. Results are consistent with Hypothesis 2; segments of the public who disagreed with lethal coyote management were more likely to have protectionist wildlife value orientations and positive general attitudes about coyotes than those who agreed with lethal management.

On average, all three groups had a negative specific attitude about lethal trapping of coyotes in the South Suburban region (Table 5). Cluster 1 (lethal control unacceptable), however, had a substantially more extreme negative attitude toward this management action, whereas cluster 3 (lethal control acceptable) was close to neutral,  $F(2, 407) = 70.32$ ,  $p < .001$ ,  $\eta = .51$ . Consistent with Hypothesis 3, segments of the public who disagreed with lethal coyote management in urban areas were more likely to have a negative attitude toward this action than those who agreed with lethal management.

On average, cluster 1 (lethal control unacceptable) was moderately to extremely unlikely to vote in favor of lethal management of coyotes (Table 5). Conversely, cluster 3 (lethal control acceptable) was likely to vote in favor of this strategy. Behavioral intentions regarding lethal trapping statistically differed among the three groups,  $F(2, 402) = 61.87$ ,  $p < .001$ . The strength of this difference ( $\eta = .49$ ) was “substantial” (Vaske et al., 2002) and supports Hypothesis 4; segments of the public who disagreed with lethal coyote management in urban recreation areas were less likely to support this action than those who agreed with lethal management.

## Discussion

This article segmented the public based on normative beliefs about lethal management of coyotes in an urban recreation area and examined differences in value orientations, attitudes (general and specific), and behavioral intentions among these publics. Consistent with Hypothesis 1, three meaningful groups of respondents were identified: cluster 1 (lethal management is unacceptable), cluster 2 (lethal management is unacceptable except when coyotes injure or kill a pet), and cluster 3 (lethal management is acceptable). Compared to the other groups, cluster 1 was more likely to have a protectionist wildlife value orientation, positive general attitude toward coyotes, negative specific attitude toward lethal coyote management, and was less likely to support a vote in favor of this strategy. These results supported Hypotheses 2 through 4. Findings have implications for research and management.

Research has segmented the public by demographics, general value orientations, and more specific attitudes and behaviors (e.g., Bright et al., 2000; Decker

**Table 5. Value orientations, attitudes, and behavioral intentions regarding coyotes and lethal coyote management for three clusters of South Suburban area residents, Colorado.**

	Mean scores by each cluster <sup>1</sup>			F-value	p-value	Eta (η)
	Cluster 1 Lethal control unacceptable 95	Cluster 2 Situation influenced 174	Cluster 3 Lethal control acceptable 145			
Cluster – Sample size (n)	23 percent	42 percent	35 percent			
Cluster – Percent	-1.96 <sup>a</sup>	-1.54 <sup>b</sup>	-1.01 <sup>c</sup>	46.59	< .001	.43
Value orientation toward wildlife <sup>2</sup>	1.34 <sup>a</sup>	0.34 <sup>b</sup>	-0.29 <sup>c</sup>	86.97	< .001	.55
General attitude toward coyotes <sup>3</sup>						
Specific attitude toward lethal trapping Feeling about lethal trapping of coyotes in South Suburban area <sup>3</sup>	-2.23 <sup>a</sup>	-1.37 <sup>b</sup>	-0.04 <sup>c</sup>	70.32	< .001	.51
Behavioral intention toward lethal trapping Likelihood of supporting lethal trapping of coyotes in South Suburban area <sup>4</sup>	-1.96 <sup>a</sup>	-0.90 <sup>b</sup>	0.69 <sup>c</sup>	61.87	< .001	.49

<sup>1</sup> Means with different superscripts across each row are significantly different at  $p < .05$  using Scheffe post-hoc tests.

<sup>2</sup> Cell entries are means and can range from -3 “protection” to +3 “use.”

<sup>3</sup> Cell entries are means and can range from -3 “extremely negative” to +3 “extremely positive.”

<sup>4</sup> Cell entries are means and can range from -3 “extremely unlikely” to +3 “extremely likely.”

et al., 2001; Manfredo et al., 1997). This study illustrated that the public can be segmented into meaningful groups based on normative beliefs about specific wildlife management actions (e.g., lethal trapping should be allowed when a pet is injured or killed). Normative beliefs are prescriptions or proscriptions of what behavior should or ought to be in specific situations (Vaske & Whittaker, 2004). Given that wildlife managers often want to understand the extent of public approval for specific actions (Decker et al., 2001, 2006), norm-based segmentation proved useful in the context of this study. Knowing the proportion of the public that belongs to each group can be useful for estimating possible reactions to controversial management actions such as lethal trapping.

The findings presented here are specific to one species (coyotes) and one urban-proximate recreation area (South Suburban region near Denver, Colorado). Results may not generalize to all urban recreation environments where human-wildlife interactions occur. In this study, for example, there were no significant differences among cluster groups in terms of respondents' sex (male, female) and whether they participated in hunting or fishing. These findings deviate from some research. Zinn and Pierce (2002) found differences between males and females in their wildlife value orientations and approval of lethal control of mountain lions. Species differences (i.e., coyotes vs. mountain lions) may partially explain the difference. Perhaps species such as mountain lions are considered to be charismatic and unique by some sociodemographic groups more than other groups, whereas because species such as coyotes are more commonly encountered, they may not evoke differences in cognitions among some sociodemographic groups. Future empirical research, however, is required to support or refute this speculation. Fulton et al. (1996) also found links between value orientations and hunting participation, but they employed a state-wide survey that included respondents from both rural and urban areas, whereas data presented here were from a more localized metropolitan area.

Respondents in this study tended to have a protectionist wildlife value orientation. This could be a function of the urban setting (i.e., Denver area) and the state (i.e., Colorado) in which this study was conducted. Manfredo et al. (2003) reported that: (a) more urban residents have protectionist value orientations; and (b) compared to other western states, Coloradans tend to be more oriented toward protecting wildlife. With limited variance on a potential segmentation variable such as wildlife value orientations, however, identifying homogeneous and meaningful subgroups is often difficult. Applicability of the norm-based segmentation strategy and findings presented here to other individuals, species, and settings remains a topic for further empirical investigation.

From a management perspective, research has shown that value orientations are stable and resistant to change (Inglehart, 1990; Manfredo et al., 2003). Attempts to inform and educate individuals with protectionist wildlife value orientations to consider adopting a favorable attitude and vote in support of actions such as lethal trapping are unlikely to be successful (Eagly & Chaiken, 1993). Protectionist oriented stakeholders may find other management actions to be more acceptable (e.g., capture and relocate, frighten animals with rubber bullets or fireworks), but like lethal trapping, these strategies also have advantages and disadvantages. Live

trapping followed by relocation, for example, may be expensive, time consuming, and not always successful. For some species, data indicate low survival rates. For example, only 44 percent of relocated squirrels survived in their new surroundings, 38 percent returned to the problem site, and 18 percent were killed by predators (Van Vuren, Kuenzl, Loreda, Leider, & Morrison, 1997). In other situations, once a problem mountain lion has been removed from a given location, another lion may move into the area (Zinn & Manfredo, 1996).

Segmenting the public helps to identify different groups of people who make up an agency's constituency and may or may not become involved in decision making regarding wildlife (Bright et al., 2000; Decker et al., 2001). Wildlife agencies can use information about different norm-based segments to help estimate the proportion of different publics who are likely to support, oppose, or be indifferent toward wildlife management actions such as lethal trapping in urban areas. Research has suggested that different segments of the population seek out or pay attention to different sources of information (Bright et al., 2000). Although beyond the focus of this article and a topic for future research, awareness of information sources that each segment of the public monitors and how to reach these groups may allow wildlife agencies to more effectively and efficiently target informational materials.

Findings presented here showed that the largest proportion of respondents (i.e., "situation influenced" cluster) agreed that lethal management was acceptable under certain conditions (e.g., pet injured or killed), but was unacceptable under other circumstances. Research suggests that this segment of the public may not be firmly committed to either a positive or negative opinion about lethal management and are the most likely to be influenced by information (Dillard & Pfau, 2003). Managers at the South Suburban Park and Recreation District used this segmentation information to target their communication and education campaigns. It remains a question for future research to examine the extent to which this strategy could be useful for wildlife managers in other park and recreation settings.

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