United States Public Attitudes regarding Predators and Their Management to Enhance Avian Recruitment

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Abstract Wildlife managers need current human dimensions information to develop outreach and management programs that address public concerns about predation and predator management. No human dimensions studies assessing public attitudes toward managing medium-sized predators have been conducted previously. We surveyed a random sample of United States households to assess public attitudes and beliefs about the management of medium-sized predators to enhance avian recruitment. Respondents expressed moderately knowledgeable, but somewhat idealized, beliefs about predator ecology. Although we found strong support for predators' right to exist, respondents did not support an outright ban on predator hunting or trapping. When given specific predator control scenarios, respondents supported control to enhance avian recruitment, except when controlling raptors to protect upland gamebirds. Support for control was greater when prey species were threatened and when the predator species were less charismatic. Respondent support for predator control to protect native versus introduced birds was similar. Our results suggest that the interested public may support predator control more readily when it is used "surgically" than when applied broadly. We discuss implications for political action regarding predator management.

Key words attitudes, avian recruitment, predators, predator management, survey

Wildlife biologists employ direct and indirect methods to manage wildlife populations (Caughley 1994). However, indirect approaches such as habitat protection and restoration alone may not be the most efficient way to increase populations (Lokemoen 1984, Greenwood and Sovada 1996). Conversely, direct management approaches such as stocking, translocation programs, and predator control, although popular with traditional wildlife agency constituents (Trefethen 1975:162-163, Messmer and Rohwer 1996), are becoming increasingly controversial among new wildlife stakeholders (Gentile 1987, Garretson et. al. 1996, Minnis 1997). This controversy has found its way into the political arena as widely divergent interests seek to define the acceptable range of management options through voter ballot initiatives, legislative lobbying, and judicial actions. The social target of this political action is that portion of the public who is "neutral" on these issues. Managers can no longer assume that this majority will remain neutral when faced with controversial management issues and conflicting messages (Decker and Brown 1987, Minnis and Peyton 1995).

As wildlife professionals become increasingly concerned about how people's values affect and are

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affected by wildlife management decisions, they have turned to human dimensions research (Gigliotti and Decker 1992). Human dimensions research in wildlife management initially focused on determining public attitudes about direct management of wildlife populations through trapping and hunting (Kellert 1985, Gentile 1987, Minnis 1997). Recent research has provided additional insights regarding public perceptions of the approaches used to manage large carnivores (e.g., Lohr et al. 1996, Pate et al. 1996). Limited information exists regarding public perceptions on managing red fox (*Vulpes vulpes*), striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), and other medium-sized predators (e.g., snakes, raptors). Management of these medium-sized predators is an important issue relative to sustaining avian populations (Messmer and Rohwer 1996). New evidence suggests that recruitment rates for some avian species are insufficient to sustain historical population densities (Cowardin et al 1985, Klett et al 1988, Martin 1992, Beauchamp et al. 1996, Martin et al. 1996). Predation on nesting hens, their eggs, and young is often cited as a major factor impacting recruitment rates (Ricklefs 1969, Helmers and Gratto-Trevor 1996, Martin et al. 1996, Sullivan and Roper 1996, Witmer et al. 1996).

We conducted this research to determine the United States public's attitudes regarding the management of medium-sized predators to enhance avian recruitment. This research advances our knowledge of public attitudes and beliefs about wildlife and their management in several ways. First, it focuses on medium-sized predators, which have been the subject of little human dimensions research. Second, previous studies of predator management have examined reintroduction of extirpated predators (Bath and Buchanan 1989, Lohr et al. 1996, Pate et al. 1996) or predator control to protect livestock (Buys 1975, Arthur 1981, Reiter et al. 1995). Our study focuses on predator management as a way to protect or enhance populations of prey species. Third, natural resource attitude surveys have been criticized for measuring respondents' support for controversial ideas or actions without presenting them within the context of contemporary policies (Shindler and Brunson, in press). We addressed this criticism by including scenarios in the survey questionnaire that allowed respondents to evaluate wildlife management decisions within a broader context. This approach allowed us to measure differences in attitudes associated with specific aspects of a management context (e.g., different prey species, predator species, or purposes of control). Lastly, our survey provides wildlife managers with contemporary information that can assist them in developing outreach programs to identify and address public concerns about direct approaches used to manage medium-sized predators to enhance avian recruitment.

Methods

Survey design and analysis

Data for this study were obtained from a mail survey conducted in June 1996. The survey questionnaire was developed by Utah State University (USU) researchers affiliated with the Jack H. Berryman Institute for Wildlife Damage Management in conjunction with input from the International Association of Fish and Wildlife Agencies' Wildlife Damage Management Committee, state wildlife agencies, and the Evaluation System of the United States Department of Agriculture's Animal Plant Health Inspection Services. In addition to requesting demographic information, we asked respondents to answer questions regarding: (1) attitudes and beliefs about predators, (2) knowledge of predators and their ecological roles and impacts, and (3) attitudes toward predators and predator management.

After respondents had read all of the general belief and attitude questions, they were told in the management section of the questionnaire that "wildlife populations can benefit if predators are controlled ... [but] because predator control can be controversial, we'd like to know more about people's support or opposition to its use in specific situations." They also were told that in most cases, "control means that predators are killed by shooting, trapping, or with approved poisons, although occasionally a non-lethal method is possible."

We then provided 5 management scenarios regarding impacts of predation on avian recruitment. Support or opposition to predator control was measured on a 5-point scale (1=strongly support to 5=strongly oppose). A "don't know" response also could be given. Three of the scenarios contained 2 different potential predation situations that differed in only one aspect. This allowed us to assess the effect of specific circumstances on respondents' attitudes toward predator control.

In scenario A, we stated that, "Over half the ducks that annually fly south were born in the north-central United States and southern Canada. Land-use practices in this fertile farming region have made it easier for predators to find and raid duck nests. As a

result, duck nesting success has fallen to dangerously low levels in some places." Respondents were first asked if they supported "control of skunks, raccoons, and foxes to improve duck nesting success." Next, they were asked if they would support such control "to protect a duck species in danger of extinction."

In scenario B, we stated that, "Small shorebirds called piping plovers (*Charadrius melodus*) are an endangered species in the United States. One of the threats to this species is predation by red fox." Respondents were then asked if they would support control of foxes in piping plover nesting areas. Next, they were told that "in some areas, predation by gulls (*Larus spp.*) and crows (*Corvus spp.*) on piping plover eggs and chicks is threatening the species," and asked if they would support control of gulls and crows in these areas. Thus, we were able to compare attitudes toward the control of different predators that were impacting the same species.

In scenario C, we specified one condition, stating that, "The Pacific island of Guam has no native predators. A non-native (introduced) predator, the brown tree snake (*Boiga irregularis*), is threatening Guam's unique bird populations." Respondents were asked if they would support control of brown tree snakes.

In scenario D, we stated that, "Many years ago, non-native gamebirds such as ring-necked pheasants (*Phasianus colchicus*) and partridges (*Perdix perdix*) were introduced to North American farmlands. In recent years, habitat loss and nest predation have led to declines in populations of these birds." Respondents were first asked if they would "support control of raccoons, skunks, and foxes to improve pheasant and partridge populations." Next, they were asked about their support for the "control of birds of prey (hawks and owls)" for the same purpose. Thus, we were again able to compare attitudes toward control of two different categories of predators impacting the same species.

In scenario E, we specified one condition, stating that, "Populations of some North American songbirds are declining. One reason is that patches of forest are becoming smaller because of people's activities, making birds that nest in the forest more vulnerable to predators that live on the forest edge." Respondents were asked if they would "support control of nest predators (skunks and raccoons) to increase songbird populations."

We used paired *t*-tests to determine whether individual respondents were more or less likely to support control under different conditions (α=0.05). In addition to the 3 comparisons described above: (1) general protection versus protection of an endangered species (scenario A), (2) control of medium-sized mammals versus gulls and crows (scenario B), and (3) control of medium-sized mammals versus birds of prey (scenario D), we also conducted paired *t*-tests to assess the influence of prey species on public attitudes regarding predation management by comparing the first questions in both scenarios A and D, which asked about control of skunks, raccoons, and foxes, but to protect different taxa (native versus introduced species). We hypothesized that the public would express increased levels of support for predation management based on immediacy of the threat to the prey species (i.e., they would support increased predation management to benefit endangered species), the predator species being managed (i.e., they would support increased management of reptilean and mammalian predators to avian species), and the prey species taxa that would benefit (i.e., the public would be more likely to support increased predation management to benefit songbirds and native ducks than it would introduced upland gamebirds). Data were analyzed using the SPSS statistical package (Norusis 1990).

Survey administration and response

To obtain results reflecting attitudes of the United States public, we purchased names and addresses of 1,500 randomly selected households across the nation from a private research firm (Survey Sampling Inc., Fairfield, Conn.). The study sample was thus limited to households with telephones, but otherwise reflected the spectrum of United States residents. To further randomize responses within households, we asked that the survey be completed by the person, age 18 or older, who had the most recent birthday (Dillman 1978:169-170). The survey was administered following guidelines recommended by Dillman (1978). The initial mailing was followed 10 days later by a reminder postcard sent to all survey recipients. A second survey instrument was sent to those who failed to respond within 10 days after the postcards were mailed.

Selection of the sample size for this survey represented a tradeoff between cost and representativeness. Because mailings and data entry can be expensive, survey researchers seek a sample that is small enough to be affordable, yet large enough that the sampling error does not render the results meaningless. Because the rate of improvement in sampling error diminishes as sample size increases, a relatively

small sample size can accurately represent a population as large as the United States public (Babbie 1992). We chose a sample size of 1,500, which provided a sampling error of 4.4 %.

However, the theoretical assumption of representativeness also assumes that the number of responses to the survey is sufficient and that failure to respond results from random rather than systematic error (Stinchcombe et al. 1981, Brennan and Hoek 1992). Of the 1,500 questionnaires mailed, 204 were undeliverable (due to invalid addresses) and 514 usable surveys were returned, giving an overall return rate of 39.7%.

To test for non-response bias, we administered a shorter version of the survey (29 questions) through a telephone survey. We attempted to contact a random sample of 223 of the 782 non-respondents (28.5%), successfully reaching 176 households. Of these, 135 persons (76.7%) declined to participate and 41 (23.3%) completed the questionnaire. The primary reason given for refusing to participate was disinterest. Comparison of responses of mail and telephone samples yielded few significant differences. Most differences observed were in the intensity of the response rather than the direction (i.e., mean attitude and belief responses of telephone respondents tended to be more neutral).

The response to the telephone survey leads us to believe that the mail survey results reported in this paper represent views of those persons most interested in wildlife issues and most likely to participate in political activities intended to influence wildlife policy (Groves et al. 1992). Still, because of relatively low response rate, we will hereafter refer to our respondents as representing the views of the "interested public" rather than the "general public."

Table 1. Demographics of respondents to a predator management survey conducted by Utah State University, June 1996.

Characteristic	*n*	%
Sex		
Male	328	64.4
Female	181	35.6
Highest level of education		
Did not finish high school	36	7.1
High school diploma	149	29.3
Trade school degree	99	19.4
College degree	150	29.5
Advanced Degree	75	14.7
Region of residence[a]		
Pacific	51	9.9
South	115	22.4
Southwest	48	9.3
North	122	23.7
Central	148	28.8
West	30	5.8
Current residence[b]		
Farm	36	7.1
Rural non-farm	95	18.7
Small town	126	24.8
City	147	28.9
Large metro area	104	20.5
Childhood residence[b]		
Farm	120	23.6
Rural non-farm	86	16.9
Small town	128	25.1
City	109	21.4
Large metro area	66	13.0

[a] Regions follow United States Fish and Wildlife Service designations: Pacific=Calif., Ida., Nev., Oreg., Wash.; Southwest=Ariz., N.M., Okla., Tex.; Central=Ia., Ill., Ind., Mich., Minn., Mo., Oh., Wis.; South=Ala., Ark., Fla., Ga., Ky., La., Miss., N.C., S.C., Tenn.; North=Conn., D.C., Del., Mass., Md., Me., N.H., N.J., N.Y., Pa., R.I., Va., Vt., W. Va.; West=Colo., Kans., Mont., N.D., Nebr., S.D., Ut., Wyo.

[b] Small town was defined as <2,500 people, city 2,500 to 250,000, and metropolitan area >250,000 people.

Results

Characteristics of respondents

Although exact comparisons with census data are not possible because our response categories differed, it appears that the rural-urban split of our survey reflected United States demographics (United States Bureau of the Census 1994). However, we received a disproportionately high number of responses from the Midwest relative to the United States population, and a lower than expected response rate from the Pacific states (Table 1). In addition, a higher percentage of our respondents (64%) had post-high school education than the national average (45%). People may be less likely to respond if they have difficulty reading or understanding the concepts presented (Neuman 1994). More males than females responded. The average age of respondents was 50.3 years, suggesting that the survey may have had a disproportionately high response from retired persons who may have more free time to complete a multi-page questionnaire.

Respondents regularly participated in outdoor activities such as gardening (80%), birdwatching and feeding (74%), fishing (62%), camping (54%), and nature photography (45%). Fewer indicated that they had hunted (28%), and <4% had ever trapped. While most (64%) considered themselves to be "moderately knowledgeable" about wildlife, 23% stated they possessed "slight to no knowledge"

Table 2. Survey respondents' beliefs about predator ecology and predator–human interactions, June 1996.

Statement	Response %[a]					
	SA	A	D	SD	DK	N
Predators are an essential part of nature	76.4	16.9	1.0	1.0	0.8	3.9
Prey species such as mice, rabbits, or deer will overpopulate if predators are removed	55.9	25.5	5.3	4.3	3.4	5.5
The number of prey animals in an area will always increase if predators are reduced	28.7	36.8	9.4	3.5	8.5	13.0
If a predator only eats one type of prey, it greatly affects prey populations	20.9	33.0	12.6	3.0	12.4	17.3
Occasional predators such as rats and squirrels do not affect prey populations very much	16.7	27.0	10.8	4.5	23.8	17.1
When one prey species becomes rare, predators are able to hunt another species	16.2	30.9	10.7	5.02	1.2	16.0
Presence of bears or cougars causes many people to avoid outdoor activities	14.9	24.0	23.2	15.9	10.1	11.9
Predators can cause extinction of prey species	12.3	19.4	20.9	19.4	11.5	16.6
Predators only kill extra prey animals, leaving breeding populations about the same size	11.8	19.3	16.6	15.2	20.2	16.6
All predators living near livestock or poultry will kill domestic animals eventually	11.4	22.1	22.7	14.3	14.7	14.9
The chance of getting rabies or other diseases from predators is very high	8.6	8.8	23.1	30.9	17.3	11.2
The livestock and poultry industries suffer large losses because of predators	7.0	12.9	26.5	21.7	20.1	11.8
Predators commonly kill more than they can eat	6.8	8.4	28.7	37.9	12.0	6.2
Predators only kill sick, injured, or old animals	4.7	16.4	25.2	38.1	4.5	11.0
Decline of North American gamebirds like pheasant or quail is result of too many predators	4.6	7.0	20.1	37.6	23.7	6.8
Many people are killed by predator attacks in North America each year	2.8	5.2	21.7	40.0	23.5	6.8

[a] Columns indicate percentage of respondents expressing the following levels of agreement with each statement: trongly agree; A=agree; D=disagree; SD=strongly disagree; DK=don't know; N=neutral.

about wildlife. One-third of the respondents belonged to some type of wildlife-related organization. Of these, most belonged to hunting (17%) and environmental organizations (12%). Other organizational memberships included agricultural (9%) and animal activist groups (7%).

Nearly 66% of our respondents reported experiencing some kind of negative contact with a wild animal during the past 5 years. Although much of this contact (47%) was of a nuisance variety (e.g., damage caused by rodents, woodpeckers, squirrels, raccoons, skunks, and snakes), several respondents had landscape plants damaged (23.4%), were involved in automobile collisions with wildlife (21.6%), had agricultural crops damaged (13.7%), or had livestock or poultry killed (8.7%). Only 2 respondents (0.4%) indicated they had contracted a disease from wildlife.

Beliefs about predators

We measured general public attitudes toward predators to understand the basis for the specific attitudes toward predator management. A primary influence on attitudes is a person's salient beliefs about the object (Ajzen and Fishbein 1980). In our study, the attitude objects were predators and predator management. We expected attitudes to be strongly influenced by what humans believe about the role of predators in nature and about interactions between predators and humans (Table 2).

Responses revealed a relatively sophisticated but somewhat idealized view of predator ecology. While respondents tended to agree with statements that reflect current scientific understanding and to disagree with those that do not, they expressed their greatest levels of uncertainty about more complex issues of predator ecology (e.g., the role of occasional predators, predator-prey specificity, and stability of breeding populations). They viewed predators as critical elements in a balanced system in which predators keep prey species from overpopulating their environment but do not kill more animals than they can eat or eliminate prey species. Respondents questioned the concept that predators only kill sick, injured, or old animals and tended to discount potential negative impacts of predators on people. More disagreed (54%) than agreed with statements that predators are likely to pass along rabies or other diseases; cause large losses for livestock producers; kill many people; or are responsible for the decline of upland gamebirds. There was

no consensus about whether the presence of predators discourages outdoor recreation or whether predators in livestock-producing areas are highly likely to attack domestic animals.

Attitudes toward predators and their management

Respondents generally appreciated predators (Table 3). They believed in a predator's right to exist, but showed little interest in personal consumptive uses of wildlife. Most respondents believed predator populations should be preserved and reintroduced in areas where they were extirpated. They also supported predator management. There was strong support for predator hunting and opposition to an outright ban on hunting and trapping. Respondents supported the idea that maintaining predator populations is more important than earning a living from the land.

Predator control for avian recruitment

Despite expressing mixed feelings about predator control to reduce interference with human activities, respondents were more supportive of control in wildlife management situations to improve avian recruitment (Table 4). The only scenario that was not supported by a majority of the respondents was control of raptors to benefit populations of introduced gamebirds. More respondents supported predator control to benefit rare ducks than ducks in general (t=-11.5, $P< 0.001$), gulls and crows rather than mammalian predators to protect piping plovers (t=-2.3, $P<0.05$), and mammalian predators rather than raptors to protect non-native upland gamebirds (t=-12.9, $P<0.001$). No difference was found in respondent support for control of mammalian predators to protect native ducks or non-native upland gamebirds (t=0.9, P=0.29). Thus, respondents distinguished between situations based on the immediacy of the threat of losing a prey species, the predator species being controlled, and the prey species benefitting from control (Table 5).

Tests for non-response bias

Non-respondents differed from mail survey respondents in several ways. Two-thirds of the telephone respondents were women. More telephone than survey respondents rated their knowledge of wildlife as "slight" (37% versus 21%). Although telephone respondents participated less in birdwatching and feeding (55%), they reported enjoying camping

Table 3. Survey respondents' attitudes toward predators and predation management, June 1996.

Statement	Response %[a]					
	SA	A	D	SD	DK	N
I enjoy knowing that bears and wolves live in North America	55.4	22.9	2.9	3.3	0.6	14.9
Predators should be maintained in some areas so we can study and understand nature	37.7	34.2	3.8	4.7	2.6	17.0
Hunting is an acceptable way of maintaining predator populations	30.9	30.1	9.8	9.8	4.5	14.8
Seeing tracks of a bear or mountain lion would help me enjoy outdoor recreation more	30.5	23.3	9.2	16.4	2.9	17.6
Trapping is an acceptable way of managing predator populations	19.4	27.3	13.0	14.4	9.0	16.8
Predator control is not necessary for people to fully use and enjoy natural resources	18.7	16.4	22.9	19.1	8.7	14.2
Making a living from the land is more important than maintaining predators	17.2	13.7	19.8	17.6	4.7	27.0
There is no need to reintroduce predators where they are not currently found	15.9	8.8	26.5	24.1	9.8	14.9
Reducing predator numbers is the best way to solve predator problems	12.6	14.0	23.4	20.9	9.6	19.5
Predators should be allowed to exist only where they don't interfere with human activities	11.4	11.4	27.0	33.7	3.1	13.4
I enjoy artwork featuring predators more than most other artwork	10.4	13.7	15.2	16.6	1.8	42.4
All trapping and hunting of predators should be banned	10.3	7.9	25.0	34.9	4.1	17.8
I would enjoy the challenge of trapping a predator	7.3	7.6	10.8	58.6	2.2	13.5
It is wrong to manage predators in any way	6.1	7.7	29.0	31.2	3.9	22.2
My life would not be affected if all predators in North America were eliminated	6.1	8.6	16.2	53.6	5.5	10.0
Recreational hunting makes predators afraid of people and therefore less dangerous	5.3	8.7	20.9	39.3	14.6	11.2
I would enjoy training and using dogs to chase or catch a bear	3.7	4.1	11.3	71.5	1.4	8.0

[a] Columns indicate percentage of respondents expressing the following levels of agreement with each statement: SA=strongly agree; A=agree; D=disagree; SD=strongly disagree; DK=don't know; N=neutral.

Table 4. Survey respondent support for specific predator control scenarios, June 1996.

Statement	Response %[a]					
	SS	S	O	SO	DK	N
Control brown tree snake to protect Guam birds	57.1	24.9	2.2	1.8	5.1	8.9
Control skunks, raccoons, foxes to protect duck species in danger of extinction	45.1	36.2	4.9	1.6	4.3	7.9
Control gulls and crows to protect nesting piping plovers	32.9	38.6	6.1	1.6	4.4	16.4
Control foxes to protect nesting piping plovers	27.3	39.5	6.3	1.6	6.9	18.4
Control skunks, raccoons, foxes to improve duck nesting success	25.0	33.9	8.3	4.6	6.9	21.2
Control skunks, raccoons, foxes to improve pheasant and partridge populations	26.5	30.0	13.8	3.8	4.2	21.7
Control skunks and raccoons to increase songbird populations	24.3	31.0	11.5	5.7	4.3	23.1
Control hawks and owls to improve pheasant and partridge populations	13.5	22.4	21.8	14.9	3.6	24.0

[a] Columns indicate percentage of respondents expressing the following levels of support for each control scenario: SS=strongly support; S=support; O=oppose; SO=strongly oppose; DK=don't know; N=neutral.

(45%), hunting (23%), or gardening (65%) as much as mail survey respondents. There were no statistically significant differences between mail and telephone respondents in their current (X^2 =2.4, 4 df, P=0.66) or childhood residence (X^2=2.1, 4 df, P=0.71), education (X^2=3.2, 4 df, P=0.27), membership in wildlife-related groups (X^2=0.5, 1 df, P=0.46), or experience with wildlife problems (X^2=2.9, 1 df, P=0.08).

Telephone respondents differed from mail respondents only in that their responses to questions regarding basic attitudes or beliefs tended to be more neutral. The sole departure from this trend was that telephone respondents disagreed more with the statement that "making a living from the land is more important than maintaining predators." However, in this case the means were essentially neutral.

Table 5. Comparison of survey respondent attitudes about predator management for specific variables relative to management contexts, June 1996.

Variable	Management Context	$\bar{x}$[a]	t	P
Immediacy of threat	Control raccoons, skunks, foxes			
	... to protect rare ducks in general	1.76		
			-11.50	<0.001
	... to improve duck nesting success	2.28		
Predator species	Protect piping plover nesting areas			
	... by controlling gulls and crows	2.00		
			-2.31	<0.05
	... by controlling foxes	2.08		
Improve upland gamebird populations				
	... by controlling raccoons, skunks, foxes	2.36		
			-12.91	<0.001
	... by controlling hawks and owls	3.01		
Prey Species	Control raccoons, skunks, foxes			
	... to improve pheasant and partridge	2.32		
			0.86	0.39
	... to improve duck nesting success	2.28		

[a] Mean support levels where: 1=strongly support, 2=support, 3=neutral, 4=oppose, and 5=strongly oppose. "Don't know" responses excluded from sample for this analysis.

Discussion

The results of our study suggest that the interested United States public is willing to support predator control as a wildlife management tool under specific circumstances, such as to enhance avian recruitment. A key influence on these attitudes may be their strong conviction that predators play an important role in maintaining "balanced" natural systems (e.g., most respondents believe that predators will not eliminate a prey species population or kill more animals than they can eat). Respondents also believe that predators have a right to exist, and thus support reintroduction of extirpated predators. Further evidence of the strength of this conviction comes from their expressed personal interest in enjoying occasional non-threatening contact with predators, and a widely held belief that predators are important simply because of their ecological role.

Respondents recognized that predators can come into conflict with

humans and acknowledged that predators will sometimes kill livestock as well as desirable wildlife, but they tended to discount the magnitude and frequency of these events. Moreover, they were not convinced that human needs are more important than predators' right to exist. At the same time, we found little support to eliminate predator control entirely from the wildlife manager's tool kit. Respondents opposed a ban on hunting and trapping, and rejected the notion that predator management is unacceptable. Thus, it appears that while the interested public believes that control may sometimes be necessary, they also believe that there usually are better options for solving predation problems than reducing numbers of predators.

The strongest evidence for support of a more "surgical" approach using predator control in wildlife management comes from the responses to our avian-specific scenarios. We found that, given information suggesting that predators are among the threats to a declining bird population, there was increased support among the interested public to use predator control measures, at least when the object of control is medium-sized predators.

Kellert (1984) suggested that attitudes toward wildlife management solutions are likely to vary depending on relevant characteristics of the species involved, including aesthetic value of the species, social and economic costs of protecting the species, phylogenetic similarity of the species to humans, presumed threats to human health and productivity, cultural and historic importance of the species, and potential and actual economic value of the species. Results of our study lend support to some of Kellert's (1984) hypotheses.

For example, support was greatest to control brown tree snakes, the species most phylogenetically distant from humans presented in our scenarios. Similarly, there was greater support to control gulls and crows than to control foxes preying on plover nests. Although respondents supported controlling mammalian predators over raptors to improve upland gamebird recruitment, seemingly in contradiction of the phylogeny hypothesis, these results are consistent with a hypothesis that support for control of raptors would be less because of the favorable cultural and aesthetic status of hawks and owls. Our findings regarding control of mammalian predators to improve duck nesting success are consistent with a prediction that support for intervention would increase if inaction resulted in further population declines.

One decision criterion that Kellert (1984) did not mention, but which enters frequently into wildlife managers' decisions, is whether the species of interest is native or exotic. Although we took care in our scenario to mention that pheasants and partridges are not native to the United States, there was no difference in support for predator control to benefit those species relative to native waterfowl.

In this study we deliberately chose not to focus on the charismatic predators (e.g., large canids) that have been the subject of considerable human dimensions research and media publicity (McCool and Braithwaite 1989, Pate et al. 1996). All of the avian species being protected in our scenarios were relatively attractive due to their economic-recreational importance, aesthetic appeal, or population status (e.g., threatened or endangered). This may explain the greater support for predator control to manage medium-sized predators. One notable exception was the relatively low level of respondent support for controlling skunks and raccoons to increase songbird populations. We believe that this seemingly contradictory result may be a consequence of the non-specific nature of the prey animals in that scenario. Respondent support for predator control as a general management tool was less in situations where threats were not identified. We may have found higher levels of support for control if a particular species had been identified.

Management implications

We believe our respondents are representative of that portion of the United States public whose interest and support are critical to the future success of wildlife management. Our respondents were interested enough in the topic to complete a lengthy questionnaire, but were not aligned with either end of the wildlife-conflict spectrum (i.e., there were few trappers, and relatively low levels of participation in environmental or animal rights groups). Thus, it is imperative for wildlife decision-makers to understand the attitudes of these stakeholders and actively engage them in the decision-making process by providing them with frequent and factual information about the consequences of policy decisions that limit or restrict using direct wildlife management approaches (Hewitt and Messmer 1997).

Wildlife professionals will continue to be faced with the challenge of managing a dynamic landscape in the face of rapidly changing public opinion. When defining management policies, managers

must clearly articulate their goals and the consequences of various approaches to achieving those goals. Our respondents believe that predator management should be considered when examining options for population management. Although predator management may be effective at enhancing prey populations, implementation of such programs must be based on sound scientific evidence.

Managers should not expect to find strong public support for predator control as a broad management strategy. Our results suggest that the interested public's support of predator control may be relatively high in emergency situations when control is recommended to reverse population declines of desirable species or when it is used in conjunction with indirect management strategies, such as habitat restoration, that are likely to have greater long-term benefit. In addition, managers and policy-makers should be cautious when inferring public reactions to specific wildlife management situations based on their understanding of prevailing trends in general public attitudes.

It is worth noting that the preponderance of responses from older Americans may have produced responses that are deceptively positive toward predator control. In general, younger Americans tend to be more skeptical of traditional approaches to natural resource management (Steel et al. 1994). Therefore, it may be useful to repeat this survey in a decade or so to assess whether there is a trend toward negative attitudes concerning predator control.

Social scientists have long argued that general attitudes are not good predictors of specific behaviors (Dollard 1949, Wicker 1969, Heberlein and Black 1975). Our results support this idea in a context important to contemporary wildlife decision-makers. In essence, general public attitudes toward direct wildlife management approaches (e.g., hunting and trapping) appear to be weak predictors of political action in support or opposition to a particular agency response to predator problems.

We chose the scenario approach to present wildlife management decisions in their contemporary context. Our approach addressed criticisms about the shallow nature of attitude studies about natural resource management issues (Shindler and Brunson, In press). Although this approach allowed us to present information about specific problems and consequences so that respondents could more fully evaluate their support or opposition to predator control, we were not fully able to match the real-life situation in one important way: There were no competing sources of information. This is a luxury most wildlife managers do not have. Typically, when a controversial wildlife management decision is being considered or proposed, stakeholder groups are presenting information that emphasizes particular aspects of the issue favorable to their position. Thus, the nature of the public's response depends in part on the relative ability of different stakeholders to convince others that their version of the "truth" is the right one (Gentile 1987, Kirkpatrick and Turner 1997).

However, while "information competition" can certainly influence the strength of support or opposition for predator management options, we do not believe that interest-group information campaigns are likely to cause substantial shifts from support to opposition among wildlife stakeholders like the respondents in our study. We found a moderately knowledgeable, interested public who are able to see shades of gray in the relationship between people and predators. As a result, they may be less susceptible to public information campaigns than less knowledgeable individuals. Consequently, if managers desire to preserve direct management approaches, they should develop, implement, and evaluate proactive public outreach programs that inform this public about the "tradeoffs" or consequences that could result with the loss of traditional management methods, such as hunting and trapping.

Further evidence of the interest of respondents in wildlife issues was provided by their levels of participation in outdoor recreation and resource-related organizations. Previous studies estimate that no more than 10% of Americans hunt (Cordell et al. 1987, Heberlein and Thomson 1996). More than 25% of respondents to our survey said that they hunt at least occasionally. In addition, while only a minority reported membership in environmental, agricultural, animal rights, and hunting or fishing groups, participation rates were above the proportion of members of such groups nationwide.

The percentage of our respondents who indicated they had a problem with a wildlife species in the last 5 years (66%) is comparable to the 61% reported by Conover (1997). Regardless of these conflicts, respondents in both studies expressed deep concerns about conserving wildlife, including many of the same species responsible for the damage (Conover 1997). We believe this situation offers wildlife managers an opportunity to demonstrate to their stakeholders that they are sensitive to their concerns (Conover 1994). Managers can demonstrate their concern by actively engaging stakeholders in the development and implementation of management plans and policies that address public

needs for resolving damage while maintaining desired wildlife populations (Hewitt and Messmer 1997). Increased communication and stakeholder participation in the policy-making process will serve to enhance agency visibility and credibility, thus enabling managers to deal more effectively with complex wildlife issues such as predation management (Brunson 1992, Amend and Gasson 1996).

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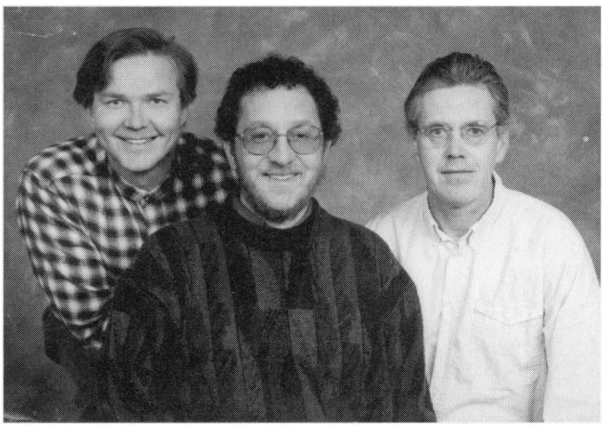

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