

URBAN COYOTES (*Canis latrans* Say, 1823) IN THE LOWER MAINLAND,
BRITISH COLUMBIA: PUBLIC PERCEPTIONS AND EDUCATION

by

KRISTINE WEBBER

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ABSTRACT

Increasing complaints to wildlife agencies and negative media reports about urban coyotes (*Canis latrans*) suggest a negative attitude toward coyotes. I surveyed the public in the Greater Vancouver Regional District (GVRD) for their opinion of urban wildlife and management. Based on these surveys, an educational approach was developed to address public concerns and misconceptions about urban coyotes.

Two public surveys were conducted. The first surveyed attitudes and concerns about urban wildlife through local GVRD community centers. The second focused specifically on urban coyotes, and was directed at 3 sub-populations: the general GVRD population, veterinary clients, and naturalists. The surveys showed that the public has a broad concept of urban wildlife, but has concerns about some urban wildlife including coyotes. Negative attitudes toward coyotes portrayed in the media, were not supported by survey results. The attitude of the general GVRD public toward coyotes was mainly neutral (52%), whereas veterinary clients (51%) and naturalists (62%) felt positively toward coyotes. Non-lethal control methods, such as education, were preferred for addressing problem urban wildlife. Confusion about agencies responsible for dealing with urban wildlife concerns was identified.

Eleven coyotes that I examined from the GVRD were similar in weight, morphology and diet to those in other western coyote populations. GVRD coyotes demonstrated the typically diverse diet of an opportunistic carnivore. Preying (or scavenging) of pets was confirmed by the presence of cat and dog hair in scats. None of the coyotes were infected with either heartworm or

rabies. Distribution of coyote sightings reported by the public showed most were seen during the day (56%), and individual coyotes (77%) were most often seen. Half the sightings were in parks, golf courses or GVRD greenspaces.

Based on survey results, I concluded that the most effective and publicly acceptable approach to addressing concerns about urban coyotes is through public education. Education materials were produced that address misconceptions identified in the surveys, and provide pet owners with strategies to keep their pets safe. Clarification of the responsibilities of the different agencies that deal with urban wildlife would be useful for the public in their search for information or assistance.

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CHAPTER 1 - GENERAL INTRODUCTION

The world's population is estimated to increase to 6.9 billion people by the year 2000, and almost half are expected to be living in urban centers (Sukopp and Werner 1983, Garber 1987). Presently, 80% of the population in Western countries resides in urban areas (Garber 1987) and demographic trends suggest this percentage will increase (Adams 1994). As more people move into cities and their adjacent suburbs, urban sprawl and concomitant fragmentation of the surrounding countryside will continue to increase pressure on existing wildlife areas (Shaefer et al. 1993). In spite of this, human activity and land development have not eliminated wildlife in and around cities (McLoughlin 1978, Garber 1987, Adams 1994). They may, however, have altered wildlife in terms of periods of activity, frequency of use (Vogel 1989), and faunal assemblages (Adams 1994).

Highly adaptable and often habitat-generalist species, such as the raccoon (*Procyon lotor*) and grey squirrel (*Sciurus carolinensis*), survive extremely well in an urban setting. Such species may even have higher population densities, body sizes and reproductive rates in urban habitats (Adams 1994). However, because the home ranges of both humans and urban wildlife inevitably overlap in densely populated urban environments, the opportunity for conflicts between humans and wildlife arises (Shoesmith and Koonz 1977, Gilbert 1982).

The coyote (*Canis latrans*), like the red fox (*Vulpes vulpes*) in Europe (Macdonald and Newdick 1982, Harris and Rayner 1986, Cavallini and Lovari 1991) and parts of North America (Sargeant et al. 1987, Adkins 1991), has adjusted to living within dense urban areas and in proximity to people in North America. Having benefited by the reduction in wolf (*Canis lupus*) numbers and clearing of land for agriculture, coyotes are now distributed widely across the continent

(Nowak 1978). Coyotes are, however, relative newcomers to parts of the Greater Vancouver Regional District (GVRD). In fact, the first reported sighting of a coyote in the City of Vancouver was not until 1987 (Mackintosh, Vancouver Park Board, 1995, *pers. comm.*).

In spite of coyotes being ubiquitous across most of North America and present in many large cities, most research on coyotes has focused on conflicts between livestock producers and coyotes (e.g., Connolly 1978, Sterner and Schumake 1978, Atkinson 1985, Atkinson and Shackleton 1991) in rural areas. The research that has been published on coyotes in suburban (MacCracken 1982, Shargo 1988, Gibeau 1993) and urban (Quinn 1995) environments has focused on coyote ecology (movement and diet) and not the human dimensions of coyotes in an urban setting. Research on human dimensions of coyotes is important because people affect coyotes both directly and indirectly: directly, by providing them with sources of food (e.g., garbage, pets); or indirectly by creating suitable coyote habitat (by clearing forested land for development). In addition, public opinions are increasingly influential to managers. In this study, I survey GVRD public opinion about issues regarding urban wildlife including coyotes. As a result of the public opinion surveys (Chapter 2), an educational approach was implemented to deal with public concerns and misconceptions about urban coyotes. Relevant baseline data on local coyotes were also collected to support the education campaign (Chapter 3).

STUDY AREA

The study was conducted from May 1995 through May 1996 in the GVRD, a 3,292 km² area in the southwestern mainland of British Columbia (Figure 1). The study area is classified as the Georgia Depression Ecoprovince; the Lower Mainland ecoregion; and the Fraser Lowland ecosection (Prov. of BC et al. 1990). This area also corresponds to the Ministry of Environment Lands and Park's (MoELP) Region 2, (Management Units 2-4 and 2-8).

The GVRD is a collection of mainly urban and suburban communities (Appendix A) shifting from densely populated urban areas in the City of Vancouver toward less dense semi-rural and agricultural areas in the Lower Fraser Valley. The GVRD is a political designation encompassing 20 Lower Mainland Electoral Districts (Figure 1). It is considered a Census Metropolitan Area (CMA) by Statistics Canada because it meets the requirements of being a large urban core together with adjacent urban and rural areas that share integrated social and economic destinies (GVRD 1996). It is because of the integrated nature of this area and because wildlife does not recognize political boundaries, that I chose to include the entire GVRD within my study area as opposed to focusing on a single city or municipality (see Appendix A).

Figure 1. The study area was the Greater Vancouver Regional District (GVRD), located in southwestern British Columbia ($49^{\circ} 0' \text{ N}$, $121^{\circ} 30' - 123^{\circ} 15' \text{ W}$).

CHAPTER 2 - PUBLIC OPINION SURVEYS

INTRODUCTION

Since 1987, there has been a general increase in the number of wildlife complaints from the GVRD residents to the Wildlife Branch, BC Ministry of Environment, Lands and Parks (MoELP 1992). Complaints about coyotes comprise a significant proportion of this overall increase. The Wildlife Branch believes that the increase in coyote complaints is a result of nuisance reports from urban and suburban residents, rather than reflective of concerns about depredation of livestock. However, no data on urban complaints or concerns about depredation on pets have been collected.

The increase in complaints coupled with often negative media reports on urban wildlife give the impression of a dubious public attitude toward urban wildlife and suggests increasing concerns about urban wildlife issues. However, the complaints may not necessarily reflect overall opinion of residents of the GVRD, just the opinions of those lodging complaints. Likewise, media reports may not be an accurate gauge of public opinion, often focusing on sensational reports of depredation of domestic pets and concerns for safety of children.

Government wildlife managers have an interest in reflecting public opinion in their policies (Filion 1981, Decker and Purdy 1988, Craven et al. 1992). However, little is known about the real opinion or attitudes of the GVRD public or of their perceptions and concerns about urban wildlife and its management. This is unfortunate because it is essential for wildlife managers to know which methods the public sees as acceptable so that action plans are not met with resistance or

misunderstanding. This is especially true when dealing with highly visible urban wildlife policy matters or controversial species such as the coyote.

The public wants greater input in deciding major wildlife issues (Self 1982, Watson 1983, MoELP 1993) and also wants the needs of wildlife to be considered when land use decisions are made (Self 1982). In addition, the public is also becoming more vocal and increasingly likely to use the political process in demanding its voice be heard (Decker and Gavin 1987). It is recognized that traditional approaches to wildlife management, and their underlying assumptions (Leuschner et al. 1989) may no longer be appropriate especially in urban areas. It is both a responsibility of and a challenge for wildlife managers to seek public input and to develop approaches consistent with public opinion.

Human dimensions research can help managers meet public expectations by identifying public perceptions, attitudes and opinions about wildlife issues. "Human dimensions" research is the acquisition and application of social science data to wildlife and natural resource issues. It can be divided into two parts: acquiring information on human thought and actions through the application of social science methodologies; and the application of that information to developing suitable approaches to wildlife problems or issues (Manfredo 1995).

I applied human dimensions research in an attempt to learn about the public's opinions about urban wildlife which may facilitate greater public involvement in local wildlife policy. This was done in 2 ways: 1) designing and conducting 2 public surveys; and 2) communicating this information to wildlife managers and agencies involved with urban wildlife.

Why Survey?

Surveys are a means of assessing public perceptions, attitudes and concerns. They are a commonly used tool for determining information which infers, describes, or explains some social phenomena, such as voting trends, shopping preferences (Gray and Guppy 1994), or as in my study, public opinion about urban wildlife. Surveys are used for 2 main reasons: 1) they can provide accurate information; and 2) they can be used to determine the opinions of a large number of people relatively inexpensively and quickly. In my case, I chose to design and conduct 2 surveys. The purpose of the first survey was to assess GVRD public attitudes, perceptions and concerns about general urban wildlife and its management. From hereon this will be called the *Wildlife Survey*. The purpose of the second survey was again to determine perceptions and opinion, but this time specifically on urban coyotes and their management. Also, this was a survey not only of the general GVRD public but also of 2 special interest groups. Henceforth this is referred to as the *Coyote Survey*.

METHODS

Survey Design

The accuracy and value of a survey is a function of the representativeness of the sample and the quality of the questions (Gray and Guppy 1994, Dillman 1978). However, there are tradeoffs when considering construction of questions and sampling design. Closed questions and those using Likert scales, although much easier for the researcher to analyze, cannot afford the depth of individual responses provided by open-ended questions. Similarly, respondent and cost differences exist in differing approaches to survey format and delivery.

My survey questions were constructed using a number of resources including manuals and reference material (Dillman 1978, Keppel 1991, Lehman 1991, Gray and Guppy 1994), other wildlife and recreation surveys (Gilbert 1982, Self 1982, Watson 1983, MoELP 1993, Liggins 1995), and input from social survey professionals (Guppy 1996, *pers. comm.*; and Allison 1996, *pers. comm.*) and stakeholders. A combination of both closed, Likert scale (a summative response scale which can be used in questions of attitude where the strength of the respondents attitude is evaluated, i.e., strongly dislike to strongly like), and open-ended questions were included. To test the survey format and reduce ambiguity of questions, a pilot survey was conducted during UBC Open House Exhibition from 13-15 October 1995. This survey was subsequently analyzed (Muir 1996), and I used these results to examine the effectiveness of questions and to refine them for the 2 subsequent public surveys. Some phrasing and format changes were made on the advice of social survey experts and as a result of the pilot study.

1) Design of the Wildlife Survey

The Wildlife Survey was conducted with a sample of the GVRD public to determine opinions about 8 broad topics (Table 1).

Table 1. Broad question topics and rationales used to direct the Wildlife Survey of public opinions about urban wildlife in the Greater Vancouver Regional District.

Question	Rationale
1) What is the overall attitude of the public in the GVRD towards urban wildlife?	To determine if the public considers urban wildlife as having merit or value. If so, any management protocol or educational program promoting coexistence has a greater likelihood of success.
2) Which species do the public consider urban wildlife?	The term “urban wildlife” means different things to different people. I was interested in identifying the species that GVRD residents classed as urban wildlife.
3) Which species do they consider urban pests?	Identification of these species is important because they are likely to be the subject of complaints.
4) Why do these animals cause them concern?	Does the public have concern for personal safety, the safety of children, that of pets, property damage, or do they express a range of concerns?
5) Are coyotes selected as “urban wildlife” and/ or “urban pests” when asked to select from a list containing a number of urban wildlife species?	Determine how coyotes are perceived by the public in an urban environment and if this differs from opinions about other common urban wildlife species. Should coyotes be treated differently in educational materials and management programs?
6) Who does the public think should be responsible for dealing with urban wildlife complaints?	It is useful to know who the public sees as responsible for addressing concerns about urban wildlife, because it is from these organizations that they will seek assistance and expect action.
7) What methods should be used to deal with complaints about urban wildlife?	Success of management approaches are determined partially by public acceptance.
8) How important is wildlife to the public?	Level of public tolerance toward wildlife is partially dependent on the perceived benefit(s)

2) Design of the Coyote Survey

The Coyote Survey was more specific, and its primary objective was to determine the general GVRD population's attitudes, opinions and concerns about coyotes living within the GVRD. By assessing the opinions and identifying misconceptions that the general public held about coyotes, gaps in awareness and educational needs could be determined. This information could then be used by managers to meet these needs for the majority of residents in the GVRD. However, because it is often the voices of a vocal few raised in complaint about wildlife issues that command a disproportionate part of the manager's time, an attempt was made to collect a range of opinions about urban coyotes. To ensure that I included a broad range of viewpoints, I also surveyed 2 special interest groups: *veterinary clients*, and *members of naturalists clubs*, in addition to the general GVRD public. Differences in responses identified among the general GVRD public and special interest groups should prove valuable to managers when they formulate specific approaches to meet the needs of each group.

Atkinson (1985) found that the most effective way of dealing with coyote sheep-predation complaints was through education; working with individual farmers to assess and develop specific management strategies to reduce their individual risk. To assess whether education might be a useful approach for dealing with coyote complaints in urban areas, the Coyote Survey was used to determine: 1) if the public supported an educational approach; 2) what the informational needs of

the general GVRD public were; and 3) if there were differences in the educational needs of the 2 special interest groups.

Sampling Design

Surveys employed today vary from their historical counterparts in that they use a representative sample of the population rather than complete enumeration. Unlike the surveys imposed by past Kings and Emperors, today's respondents are no longer required by law to answer survey questions (Gray and Guppy, 1994). On average, the expected response rates for today's surveys (without follow-ups) are about 50% (Heberlein and Baumgartner 1978, Dillman 1978). Many factors influence a survey's response rate (Heberlein 1978, Dillman 1978, Brown et al. 1989) and where possible I manipulated those factors shown to maximize return rates (e.g., format, length, and question type). Other factors known to contribute to higher response rates were not possible to alter due to cost and time considerations (e.g., personal or written follow-ups). I expected that the current and topical nature of the subject, the surveys' association with UBC, and the format (including larger typeset and relatively short length) to all have a positive effect on the response rate (Heberlein and Baumgartner 1978, Dillman 1978, Brown et al. 1989). In addition, the segment of the GVRD reflected in the non-response group was also expected to be either people disinterested in, or having no strong feelings (positive or negative), about urban wildlife. In general, this segment of the population is not expected to lodge complaints about urban wildlife or to express dissatisfaction about current management approaches, and is therefore of less consequence to managers.

1) Sampling Design of the Wildlife Survey

The local network of community centers was used to distribute the Wildlife Survey. The decision to use community centers as a sampling tool of the GVRD population for the Wildlife Survey was based on several factors: 1) they are accessible to most residents regardless of income bracket, disability or age; 2) they are dispersed throughout the GVRD; 3) community centers could provide a distribution point for future educational materials (e.g., pamphlets); 4) the centers provided supervision and a collection point for returned surveys; and 5) the choice was also fiscal in that community centers were willing to participate at no cost to the researcher. I chose to limit the distribution of Wildlife Surveys to 5 community centers dispersed throughout the City of Vancouver partly to limit costs and also in an attempt to gather a representative sample. Selection of community centers was determined both by their willingness to participate in the project and their location within the City of Vancouver.

Response rates were improved by: survey presentation; placing the surveys in a display box; and making follow-up visits to the community centres to ensure surveys were prominently displayed. Additionally, I encouraged staff, both in writing and verbally (during follow-up visits), to promote the survey by suggesting to patrons that they complete a survey when they approached the reception desk.

2) Sampling Design of the Coyote Survey

For the Coyote Survey, 3 separate groups were surveyed about their awareness of, attitude to, and opinions on the management of urban coyotes. A probability sampling technique (stratified random sampling) was used to select respondents representative of the general GVRD population

for the first group (which I refer to as the *GVRD sample*). These respondents were canvassed by telephone, using a telephone-adapted format of the written questionnaire. Telephone numbers were selected using a random digit table after predetermining the 3 digit telephone prefix that indicates the general geographical location, (and thus represents each *stratum* to be used). In this way, I met the objectives of the selection process for phone survey participation, namely to randomise and distribute the sample of respondents throughout the GVRD. The decision to use a telephone survey was both fiscal and logistical. It allowed a small number of volunteers to quickly and safely survey respondents over a wide geographical area, as opposed to canvassing door to door in person or having a mail questionnaire.

A further 2 groups, representing special interests, were surveyed and included: clients of veterinary clinics (*vet sample*), and members of naturalist clubs or similar interest organisations that requested urban coyote seminars (*naturalist sample*). Veterinary clients were surveyed from January to March 1996. Seventy-five surveys were sent to each of 12 veterinary clinics. Selection of a veterinary clinic was determined both by the willingness of the owner(s) to be involved, and its location within the GVRD (I attempted to select locations throughout the GVRD). Vet sample response rates were improved by presentation of the surveys in a display box, and by follow-up visits to the veterinary clinics to ensure they were prominently displayed. Clinic receptionists were also encouraged to suggest to clients that they complete a survey when checking in for their appointment. Surveys from the naturalist sample were collected from December 1995 to May 1996 at presentations about urban coyotes. Surveys were distributed on demand and completed surveys collected, prior to my presenting a seminar. The sampling of both special interest populations was a

non-probability sampling technique because distribution of the questionnaire was a function of the respondent using a particular veterinary clinic or being present at a seminar.

ANALYSES

Statistics permit the description and interpretation of numerical data. Human dimensions or social survey data are frequently nominal, ordinal or categorical in nature, and as such do not meet the assumptions of parametric statistical tests which require at least interval data (Siegel and Castellan 1988). I used descriptive and nonparametric statistics in my analysis of survey questions. Means were used to describe demographic data such as age.

Responses from completed surveys were incorporated into an Excel 5.0 (Microsoft Corporation) spreadsheet and frequencies calculated for each of the question categories. Responses to open-ended questions were organized into categories during analyses. Each question has a unique sample size due to variation in response rates per question. For questions where the response categories were not mutually exclusive, both a total of respondents (n) and a grand total (N, total number of responses) are provided.

Response rates were calculated for the Wildlife Survey and for the GVRD and vet samples of the Coyote Survey, as a ratio between the number of returned surveys and the number of surveys removed by the public. For the GVRD sample of the Coyote Survey the response rate was calculated as the number of completed surveys as a proportion of respondents contacted by phone (including those who refused or were unable, generally due to language, to participate). A response rate was not calculated for the naturalist sample because the surveys were available on demand at seminars and audience sizes were unknown.

In both the Wildlife Survey and the general GVRD sample of the Coyote Survey, differences between categories within survey questions were analyzed using either Chi-Square Goodness of Fit, or the Fisher Exact Probability test (Zar 1984, Seigel and Castellan 1988). Differences between the responses of the 2 special interest groups were tested using either Chi-Square Contingency Tables or the Fisher Exact Probability test. The null hypothesis for each survey question predicted an equal distribution either between response categories, or a similar “response category profile” between the 2 special interest groups. In the case of the 2 special interest groups, if differences were identified, further analysis using a Z-test on standardized residuals (Lehman 1991) was used to determine the nature of the differences. The standardized residual for any cell in a contingency table is calculated as:

$$\text{the standardized residual} = \frac{\text{residual}}{\text{standard deviation of the residual}}$$

WHERE: $\text{residual} = \frac{(f_o - f_e)^2}{f_e}$ where: $f_e = \frac{R \times C}{N}$, and f_o is the observed frequency

$$\text{standard deviation of the residual (SD}_{\text{resid}}) = \frac{\sqrt{N - R}}{N - C}$$

N = grand total, R = row sum, C = column sum

$$Z_{\text{resid}} = \frac{\text{residual}}{SD_{\text{resid}}}$$

If the residuals are assumed to come from a standardized normal distribution, then a z value of 1.96 or greater is significantly different from the mean. In this manner the cells (i.e., opinions) that differ can be isolated. A significance level of 0.05 was selected *a priori* and used to test all hypotheses.

A “Coyote Awareness Index” was calculated for each of the 3 groups (GVRD sample, vet sample, and naturalist sample) using 11 survey questions that assessed a respondent’s basic knowledge about local coyotes. The index was calculated as the mean number of correct responses per group, and is presented in the respondent information section.

Not all questions included in a survey are meant to elicit information from the respondent about the survey’s topic. Some questions serve to make the respondent feel at ease, or to create trust between the researcher and the respondent so that the respondent can be asked more difficult or personal questions later. Other questions are included to either focus the respondent’s attention on principal questions or to make the questions less obvious or leading (Gray and Guppy 1994). For these reasons not all of the questions included in the surveys (see Appendix B) are presented in the Results section.

RESULTS

1) RESPONDENT PROFILES

All Surveys

The response rate was greatest for the GVRD sample of the Coyote Survey (47%, with 184 valid surveys collected), followed by the vet sample (45%, with 258 valid surveys returned) and lastly, the Wildlife Survey (32%, with 73 valid surveys returned). Twelve percent of non-respondents in the GVRD sample of the Coyote Survey, were unable to participate because of difficulties speaking English. Fifty-one valid surveys were collected at 4 coyote talks given to naturalist clubs.

Substantially more women than men completed the surveys with the exception of the GVRD sample of the Coyote Survey (Table 2). The average age of respondents was similar for each of the surveys (40-42 years old) with the exception of the naturalist sample of the Coyote Survey where the average respondent was older (57 years). Overall, survey respondents were more highly educated than the general GVRD public (Table 2) and the naturalists were the most highly educated with 57% of those surveyed having a university degree.

Table 2. Attributes of GVRD census results¹ and respondent profiles for the 2 surveys.

	GVRD ¹ (1991)(%)	Wildlife Survey (%)	Coyote Survey (%)		
			GVRD	Vet Clients	Naturalists
Valid Surveys	-	n=73	n=184	n=258	n=51
Gender	-	n=68	n=156	n=235	n=50
male	48.8	27.9	47.2	26.4	21.6
female	51.2	72.1	52.6	72.3	78.4
Age	-	n=61	n=162	n=221	n=43
20-39	46.4	31.1	50.0	48.9	15.9
40-60	32.0	42.6	34.6	44.0	31.8
60+	22.0	26.3	15.4	7.1	52.2
mean	-	41	42	40	57
SEM ²	-	1.6	1.3	0.8	2.3
Education	-	n=64	n=158	n=236	n=47
0-some secondary	34.5	7.5	8.2	2.5	2.1
graduated high school	21.0	20.9	24.1	19.1	16.7
some post secondary/ certificate or diploma	32.2	23.0	28.5	25.3	25.0
university degree	12.3	47.7	39.2	53.2	56.2

¹ 1991 Census Data, Statistics Canada in GVRD Key Facts: a Statistical Profile of Greater Vancouver, Canada. 1996 Edition

² Standard error of the mean.

Coyote Survey: Pets, Personal Responsibility and Coyote Awareness

As expected, almost all (96%, n=254) respondents who obtained their surveys from veterinary clinics had pets, whereas, 62% (n=50) of naturalists and only 44% (n=176) of the GVRD sample did. Naturalists were most likely to give their pet access to outdoors (94%, n=31)

followed by veterinary clients (84%, n=247) and then the GVRD sample (70%, n=79). A relatively small percentage of veterinary clients (19%, n=232) and GVRD residents (20%, n=74) fed their pets outdoors at least some of the time, but respondents in the naturalist sample were the least likely to feed their pets outdoors (10%, n=30). About one third of all groups placed their garbage outside the evening before garbage collection. The naturalists were the most likely to have a compost (60%, n=50) and the least likely to have it “open” (20%, n=30) and accessible to wildlife. Forty-six percent of veterinary clients (n=252) and 30% of the GVRD sample (n=41) had composts with 35% (n=115) and 39% (n=41) respectively, having them “open”. The naturalists were the most knowledgeable about local coyotes with a Coyote Awareness Index of 5.7 out of a possible 11 points (SEM=0.5, n=20) followed by veterinary clients at 4.2 (SEM=0.1, n= 214) and lastly the GVRD sample at 3.9 (SEM=0.1, n=184).

2) WILDLIFE SURVEY

The public identified a number of species or species groups as “urban wildlife” (Figure 2). They associated a number of smaller animals, such as squirrels, raccoons, crows, and songbirds, with the urban landscape (Figure 2), more so than they did larger wildlife species such as bears, cougars and wolves. Coyotes were judged by 84% of respondents to be “urban wildlife”.

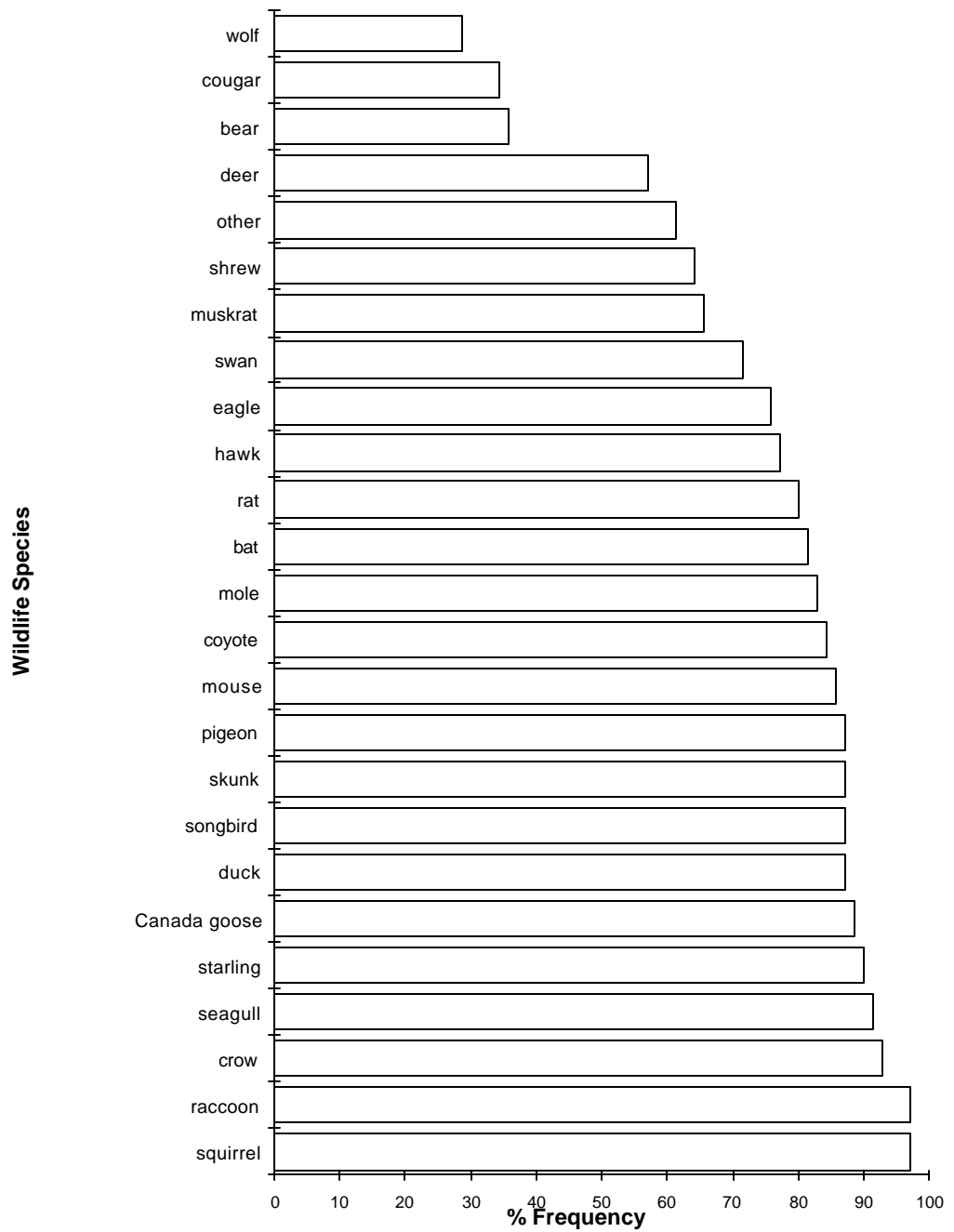


Figure 2. Percentage of respondents that identified particular species as “urban wildlife” (total number of respondents n=70, total number of responses N=1324).

Many species were considered “urban pests” (Figure 3), with rats, raccoons, mice, coyotes and Canada Geese, being identified most often. Rats were identified by the largest number of respondents as being an “urban pest” (70%), while coyotes were identified as pests by 29%. Respondents were asked to clarify why species that they identified as pests caused them concern (Figure 4). Differences among the categories were found ($\chi^2=20$, $df=4$, $N=148$), further analysis showed differences were not discernible among the four categories of property damage, safety of pets, safety of children or personal safety, but a lower than expected frequency of responses was recorded in the “other” category ($\chi^2=4$, $df=3$, $N=138$). The responses in the “other” category included specific concerns about a range of topics such as noise pollution (e.g., crows), aesthetics (e.g., Canada goose droppings), and fear that introduced species upset “the balance of nature” often out-competing indigenous species (e.g., starlings).

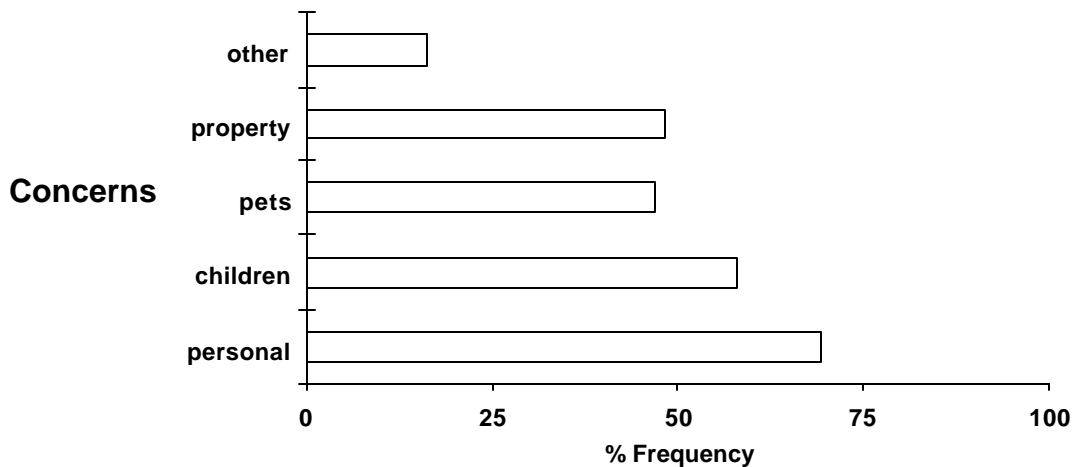


Figure 3. Concerns identified by respondents for considering urban wildlife species as “urban pests” (n=62). (Property- damage to property; pets- safety of pets; children- safety of children; personal- personal safety.)

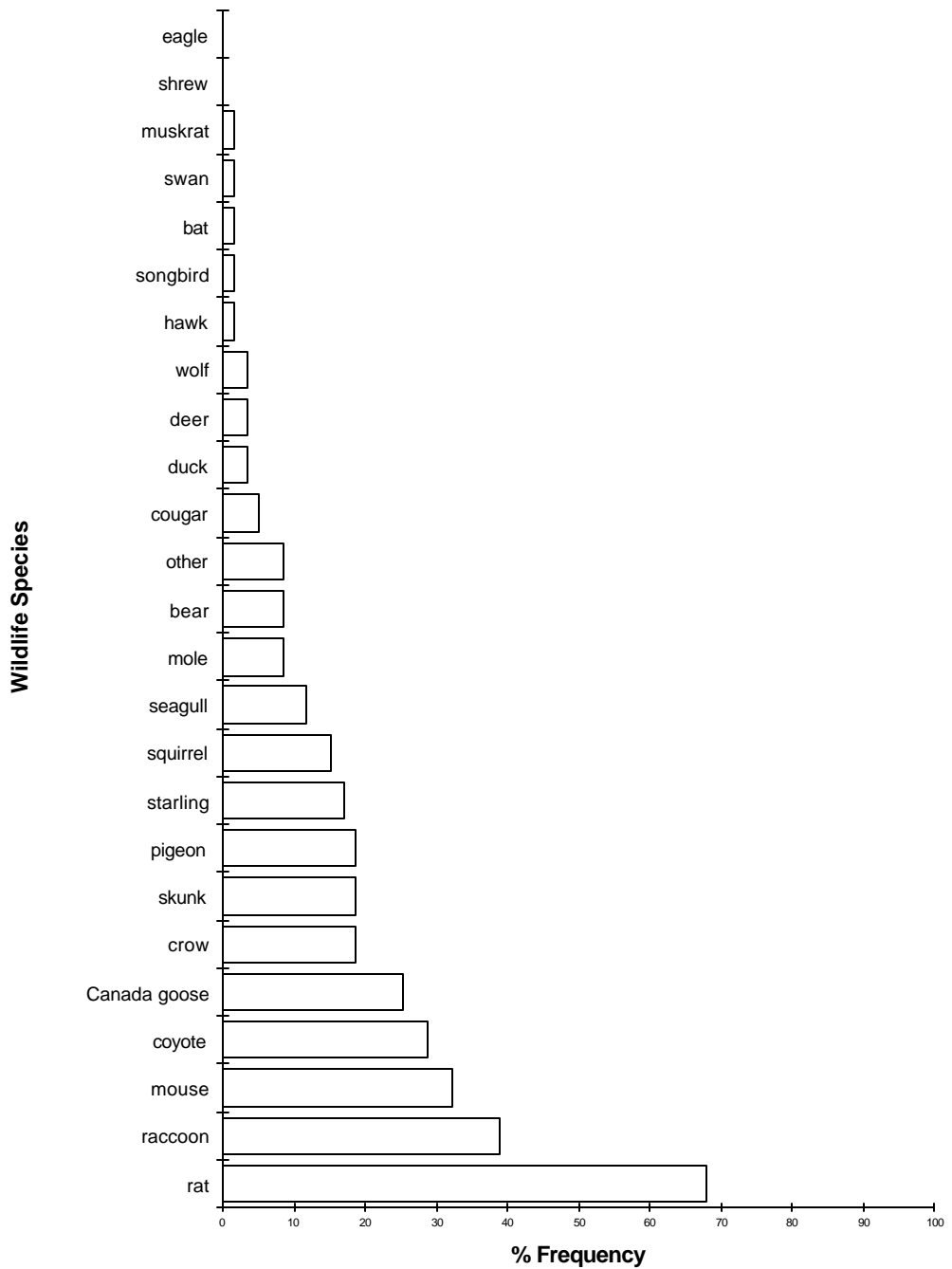


Figure 4. Percentage of respondents that identified particular species as “urban pests” (total number of respondents n=59, total number of responses N=202).

When asked to select from a list of acceptable methods for addressing concerns with “problem wildlife”, public education was the most common suggestion, and humanely destroying

wildlife was the least acceptable method (Figure 5) . The differences among categories were significant ($\chi^2= 30$, $df=4$). Greater than expected responses were in the “public education”, “relocation” and “combination of all” categories, and a lower than expected number in the “destroy/other category” (combined for the analysis).

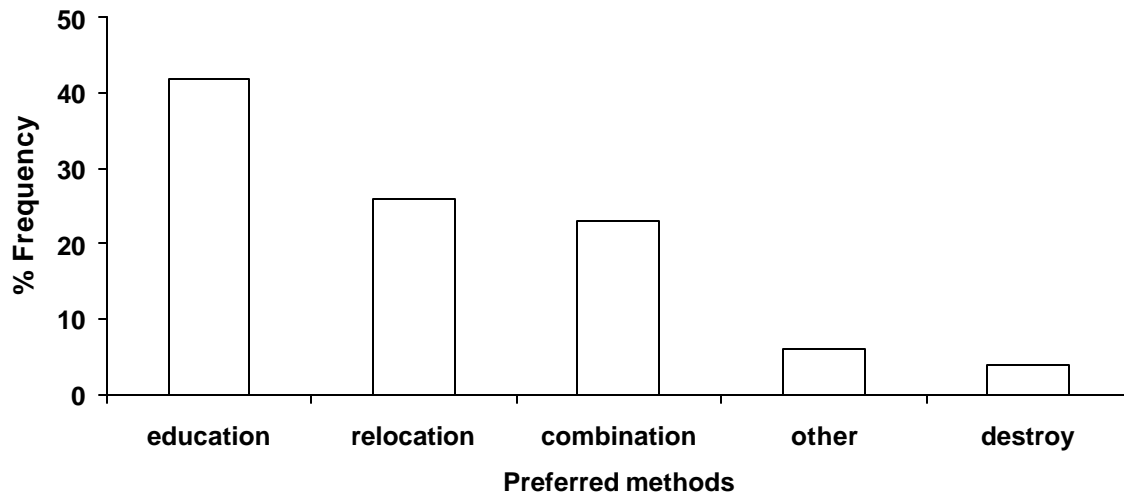


Figure 5. Methods that Wildlife Survey respondents deemed appropriate for dealing with complaints about urban wildlife (N=101).

No significant difference ($\chi^2=1.3$, $df=3$) was found among the primary 4 agencies that respondents thought should be responsible for dealing with complaints about urban wildlife (Figure 6). However, respondents did place significantly less responsibility on veterinarians for dealing with these complaints ($\chi^2=28.20$, $df=5$). Some respondents commented on the need for increased tolerance toward wildlife and that the safety of pets and protection of personal property is the responsibility of the individual.

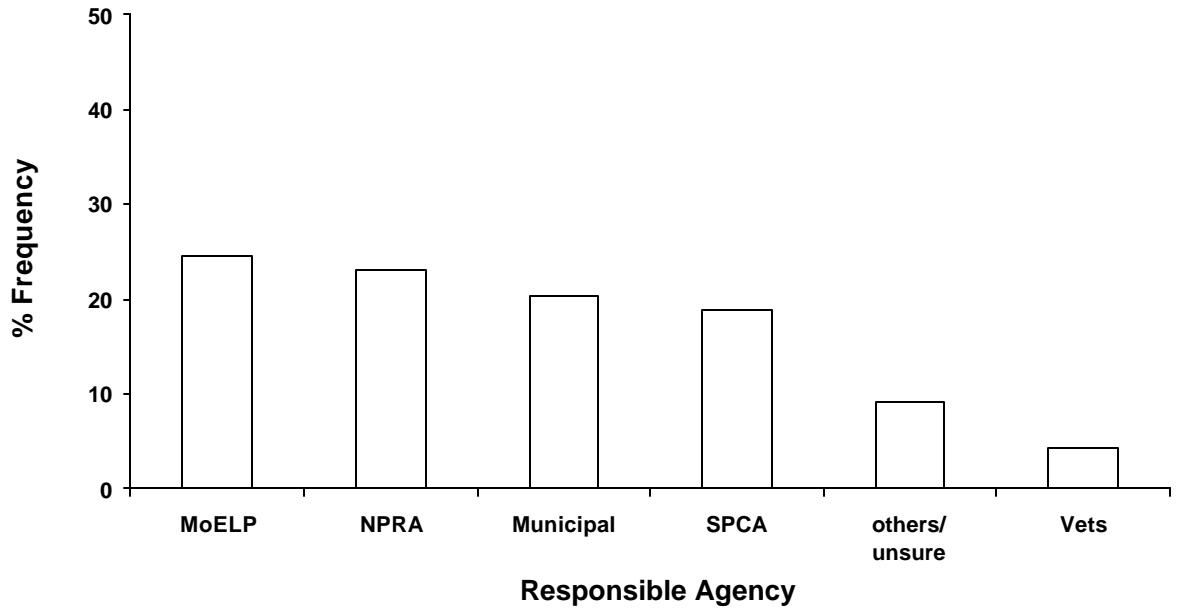


Figure 6. The relative responsibility of particular agencies (MoELP=Ministry of Environment Lands and Parks; NPRA=nonprofit rehabilitation agencies; Municipal=municipal governments; SPCA=Society for the Prevention of Cruelty towards Animals; Vets=veterinarians) for addressing complaints about urban wildlife as perceived by survey respondents (N=143).

The majority of respondents (90%, n=68) in the GVRD Wildlife Survey felt that urban wildlife enhanced their life in the Lower Mainland and they were willing to modify their lifestyle or habits to maintain or enhance wildlife activity in the city. Of the 5.6% that indicated they were unsure if they were willing to modify their lifestyle, some explained that their decision was the result of being uncertain about the cost or extent of the commitment that would be required.

3) GVRD COYOTE SURVEY

i) Awareness

Eighty-two percent (n=184) of the GVRD residents surveyed were aware that coyotes are present in the GVRD. In addition, 42% (n=165) had seen a coyote locally in the past 2 years.

When asked about the population status of local coyotes 27% (n=168) thought coyote numbers were increasing and 49% were unsure. Seventy percent (n=177) believed that coyotes are present in the GVRD because “we have taken over the coyote’s habitat”.

Eighty-two percent (n=177) believed that coyotes would prey on domestic pets. The overwhelming majority of respondents believed that a small portion, 0-20%, of a coyote’s diet is comprised of domestic pets (Figure 7); however, 22% (n=176) believed that coyotes were active, and therefore hunting, only at night.

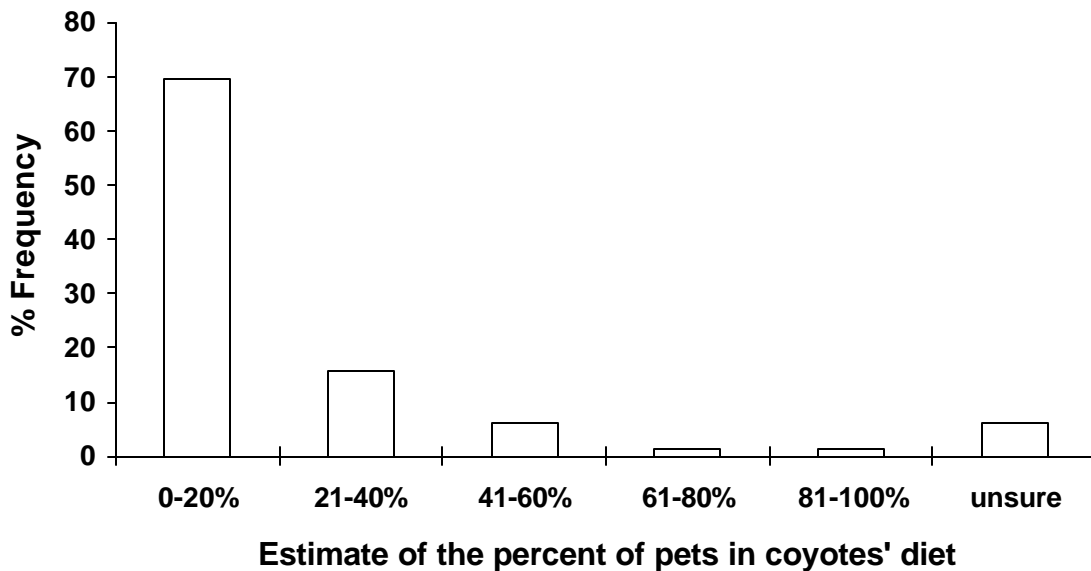


Figure 7. GVRD perception of the percent of domestic pets in the diet of a typical urban coyote (n=148).

Only 25% (n=171) of the GVRD respondents correctly identified the average weight of a coyote (Figure 8). Sixty-six percent over-estimated the weight and 3% were unsure.

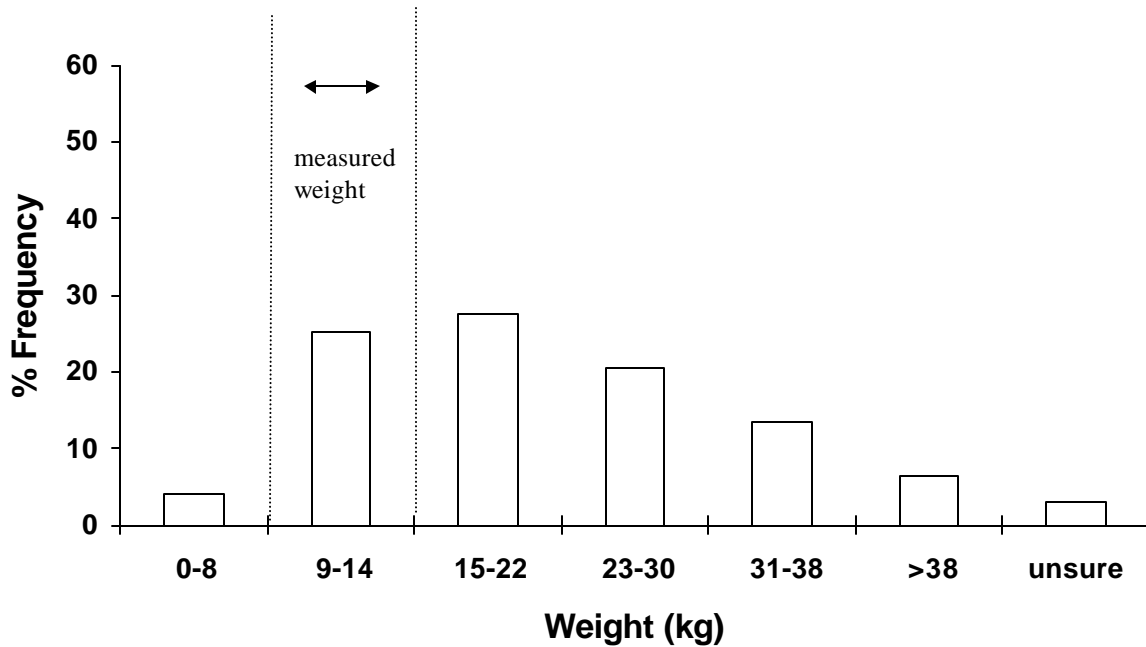


Figure 8. Perceived weight of coyotes as identified by GVRD residents (n=171). The actual weight, calculated from measurements of local coyotes, is indicated by the dashed lines.

GVRD respondents were generally poorly informed about coyote diseases of concern to people and pets. Twenty-nine percent (n=175) thought that local coyotes were carriers of rabies. When asked about 3 other diseases that coyotes can carry and are of concern to domestic dogs (distemper, parvovirus and heartworm disease), the majority of respondents, 64% (n=174), 81% (n=175), 72% (n=175) respectively, were unsure whether coyotes could carry the diseases. Concerns over human safety issues were highlighted in the responses to whether coyotes would

attack humans. Thirty percent (n=177) believed coyotes would attack children, whereas only 9% (n=177) believed coyotes would attack adults.

ii) Attitude

There were significant differences among attitude categories ($\chi^2=127.7$, $df=4$) but the GVRD sample was predominantly neutral in their attitude about coyotes (Figure 9). Only 21% (n=173) felt negatively towards coyotes, whereas 79% were either neutral or felt positive about coyote presence in the GVRD. When asked to expand on their reasons, neutral attitudes were often associated with a lack of knowledge or experience with coyotes; people said they “hadn’t had a problem”, they felt coyotes were too costly to remove, or it was the individual’s own responsibility for their pet’s safety. Positive attitudes were associated with particular perceptions about coyotes such as coyotes: being a natural part of the ecosystem; being important for rodent control; improving the quality of life for GVRD residents; and “deserving” to be in cities because humans have taken over their natural habitat. Those with negative attitudes expressed concerns for pets, concerns about human safety, suspected the loss of a pet, perceived that coyote populations were “out of control”, that coyotes were “savage killers” or that coyotes “don’t belong” in an urban environment.

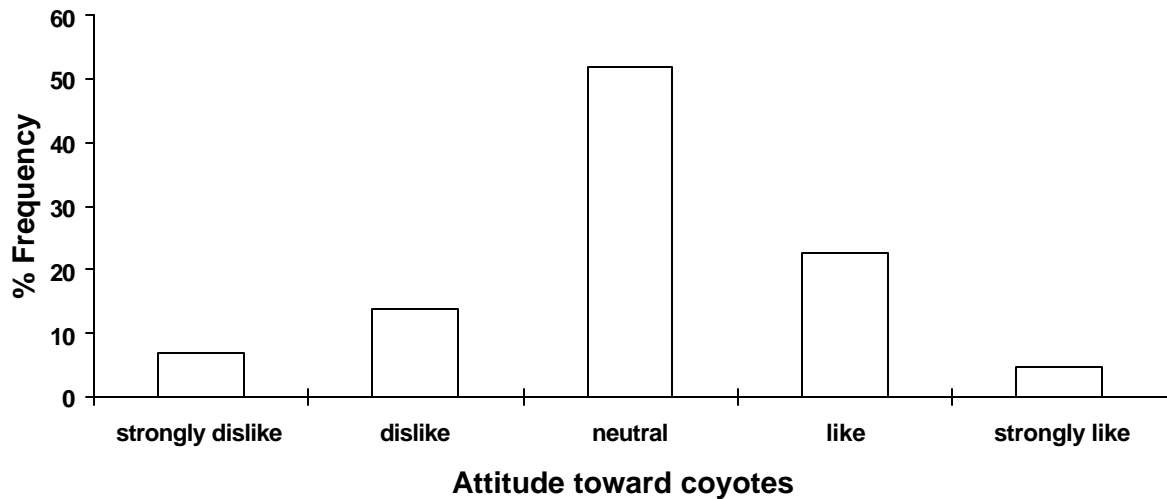


Figure 9. Attitude of the general GVRD population towards coyotes living in the GVRD (n=173).

iii) Management

People were asked to choose from a list, the agency that they thought was responsible for dealing with coyote complaints. Many chose more than one agency, bringing the total number of responses (N) to 252. People indicated no preference for either the Ministry of Environment Lands and Parks (26%), the Society for the Prevention of Cruelty toward Animals (27%), or the Municipal Government (25%) ($\chi^2=0.19$, $df=2$); however responses to the remaining categories were significantly lower ($\chi^2=83.33$, $df=5$). Eight percent identified non-profit rehabilitation agencies and 3% veterinary clinics, as being responsible. Ten percent selected the “other” category offering suggestions such as “personal responsibility”.

When asked how complaints about “problem wildlife” should be approached the frequency of responses (N=209) differed significantly ($\chi^2=160.93$, $df=4$) among the categories. Non-lethal methods such as relocation (44%) and education (39%) were popular solutions, and few advocated

humanely destroying the offending animal (8%). Although many people explained that the appropriate approach should depend on individual circumstances and prior history, only 5% of respondents chose the “combination” category (Figure 10).

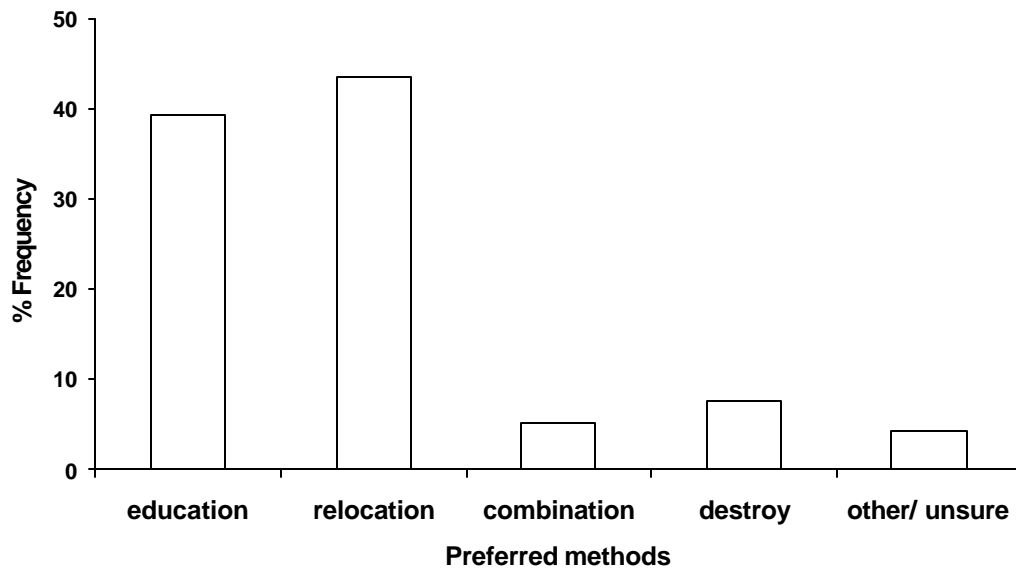


Figure 10. Methods that Coyote Survey respondents deemed appropriate for addressing “problem wildlife” (N=209).

Although some people gave very precise circumstances, most agreed that in some circumstances coyotes should be humanely destroyed (76%, n=176). A *post priori* summary of their reasons is given in Figure 11.

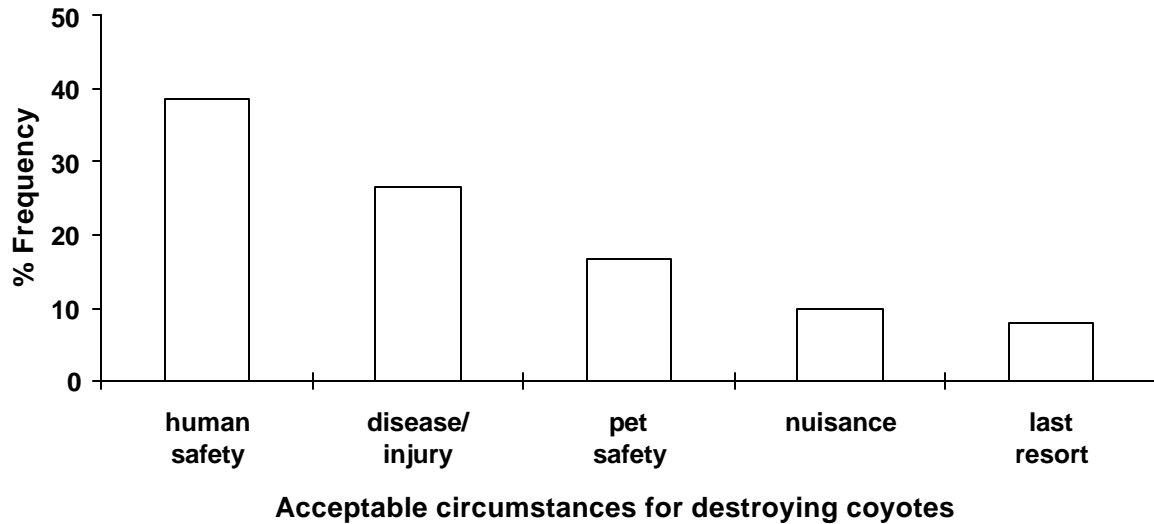


Figure 11. Reasons GVRD residents identified for humanely destroying problem coyotes (N=191).

4) VETERINARY CLIENT AND NATURALIST COYOTE SURVEY

i) Awareness

Ninety-six percent (n=251) of the veterinary clients and 100% (n=51) members of naturalist clubs were aware that coyotes are present in the GVRD. Eighty-three percent (n=201) of veterinary clients and 95% (n=19) of naturalists were aware that coyotes could prey on domestic pets but most respondents in each sample believed that pets were only a small portion of the coyote's diet (Figure 12). Although both groups believed coyotes would prey on domestic pets, only some of the veterinary clients thought coyotes hunted only at night (14%, of veterinary clients n=203, and 0% of naturalists n=20), and others were uncertain (28% of veterinary clients n=203, and 10% of naturalists n=20) when they were active. The naturalists were more accurate in estimating coyote weight than were veterinary clients (Figure 13, $\chi^2=11.30$, df=2; residual analysis $z > 1.96$).

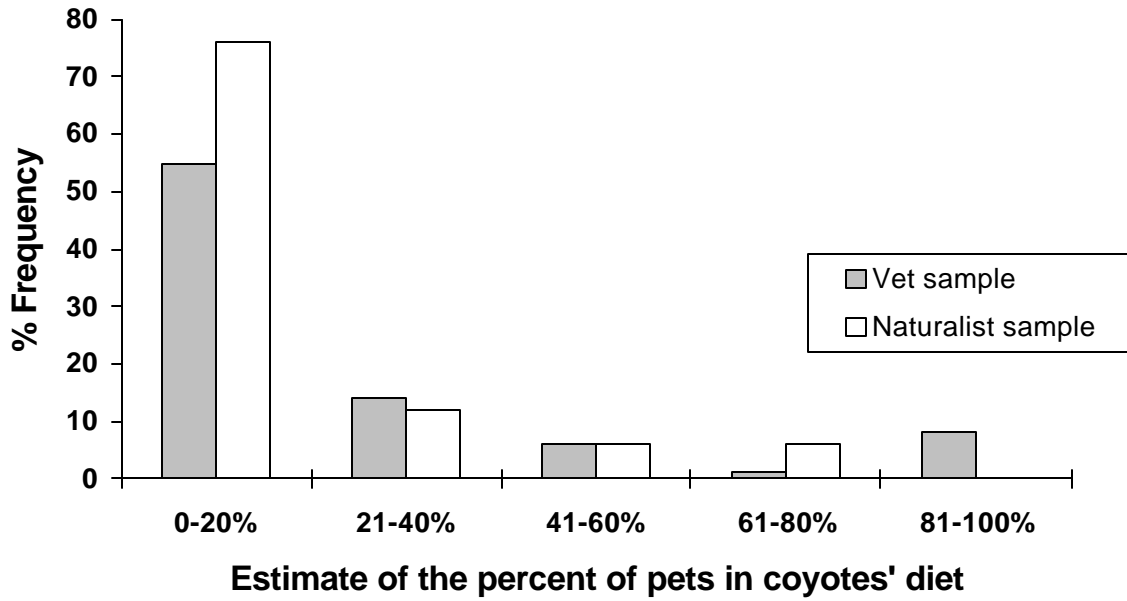


Figure 12. Percentage of domestic pets in the diet of coyotes perceived by veterinary clients (n=164) and naturalists (n=17).

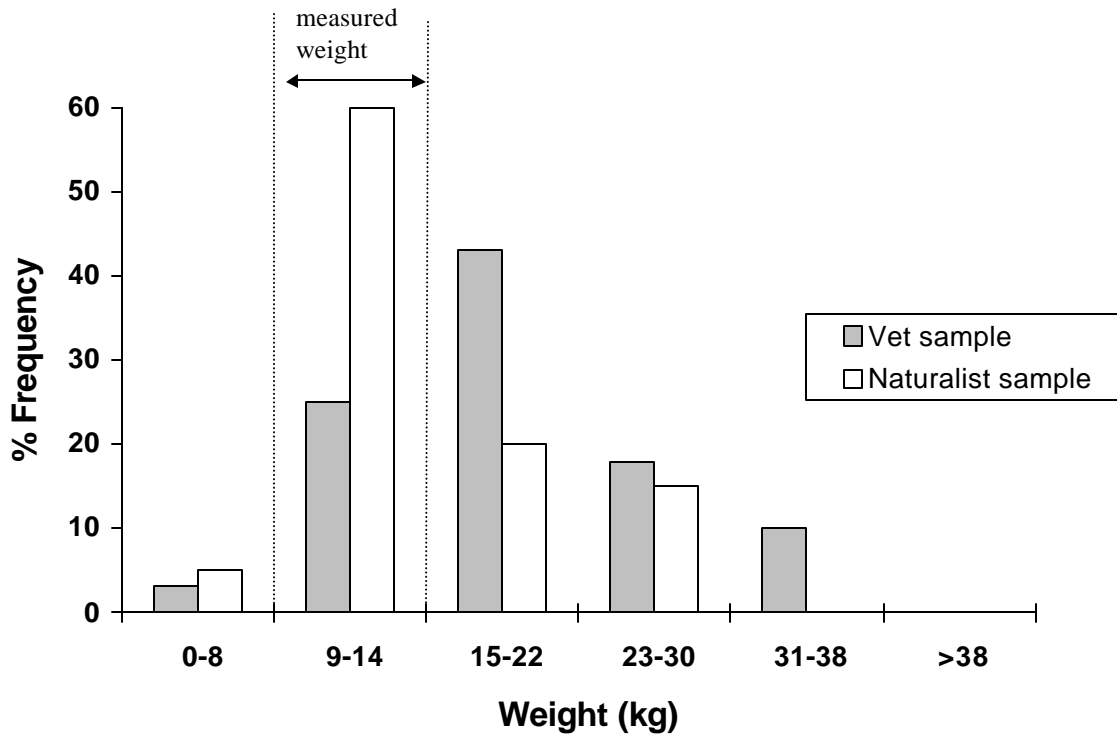


Figure 13. The perceived weight of coyotes as identified by veterinary clients (n=201) and naturalists (n=20).

ii) Attitude

There was no difference between the attitude toward coyotes of veterinary clients and members of naturalist groups ($\chi^2=2.34$, $df=2$). The majority of veterinary clients (51%, $n=243$) and naturalists (62%, $n=51$) liked or strongly liked coyotes; only 21% and 14%, respectively, disliked or strongly disliked them.

iii) Management

Naturalists were significantly less likely to advocate relocation and more likely to recommend educational approaches than were veterinary clients (Figure 14, $\chi^2=7.83$, $df=3$; residual analysis, $z > 1.96$). Also, 45% ($N=65$) of the total responses from naturalists advocated education, compared to 30% ($N=413$) of responses from veterinary clients (Figure 14). Few of either group supported humanely destroying problem animals to deal with complaints, although 75% ($n=244$) of veterinary clients and 86% ($n=49$) of naturalists agreed that it is acceptable to humanely destroy coyotes in some circumstances.

The reasons why humane destruction of problem coyotes was acceptable did not differ between the two groups (Figure 15). Few respondents (5% of veterinary clients, $n=178$ and 6% of naturalists, $n=43$) believed concerns about pets justified destroying coyotes. The two main reasons given to warrant such a control method were human safety or where a coyote was diseased or injured (63% of veterinary clients, $N=250$; 59% of naturalists, $N=53$).

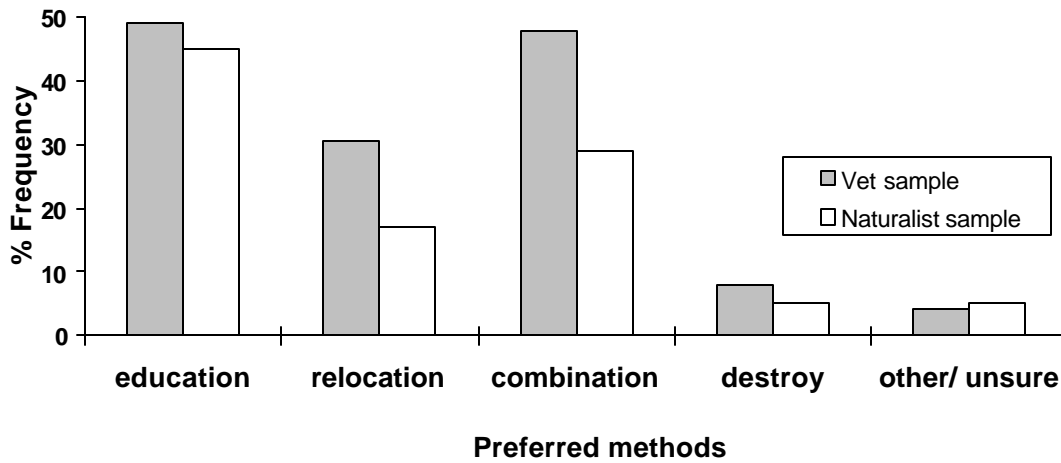


Figure 14. Methods preferred by veterinary clients (N=413) and naturalists (N=65) for dealing with problem animals.

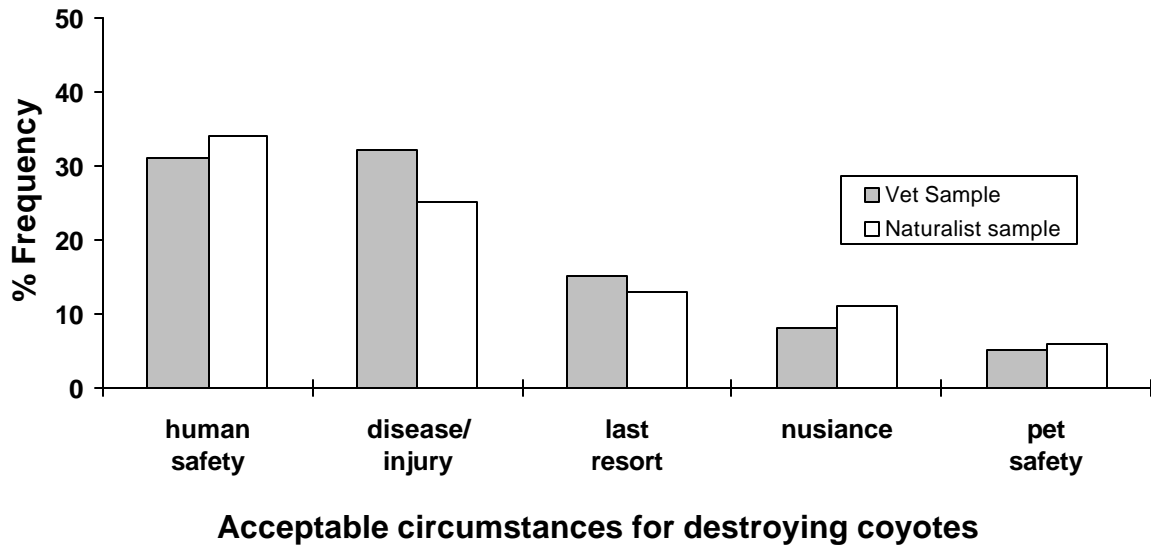


Figure 15. Circumstances for destroying coyotes acceptable to veterinary clients (N=250) and naturalists (N= 53).

DISCUSSION

Survey respondents were not necessarily representative of the GVRD population. The Wildlife Survey respondents and Vet Client and Naturalist sample of the Coyote Survey were more likely female than the GVRD average. In addition, all groups were more highly educated than the GVRD average. By completing the survey the respondents indicated some level of interest or engagement with the subjects of urban wildlife and coyotes. It stands to reason, that those willing to commit the time and effort to participate in this study would also be those people more likely to contact respective wildlife agencies about their urban wildlife concerns, thus making their opinions relevant to this study and the agencies that serve them.

Almost all respondents to the Wildlife Survey believed that wildlife in the Lower Mainland enhanced the quality of their life. Wildlife can also have a strong positive effect on outdoor recreation experiences (Leuschner et al. 1989) and are important to both consumptive and non-consumptive users, for emotive and financial reasons. Also suggesting that the public inherently values urban wildlife, most respondents in my Wildlife Survey stated they were willing to modify their life-style in some way if it would enhance or maintain wildlife activity. Other studies have shown support for wildlife by identifying the public's "willingness to pay" either to participate in wildlife activities (Filion 1987, Filion et al. 1991) or to support conservation or management initiatives (Gilbert 1982, Watson 1983, Leuschner et al. 1989, Schreyer et al. 1989). Rather than ask about willingness to pay, I chose to ask about their willingness to change personal behaviours to maintain or enhance urban wildlife activity. I saw this as a more appropriate indicator of how receptive the public might be to educational materials aimed at effecting behavioural changes. I felt the phrasing of

my question was better because “most wildlife problems start out as biological problems but eventually become people problems” (Teague 1979:59), and it is often more likely (but perhaps not easier) to change human behaviour than the behaviour of wildlife.

Wildlife means different things to different people and often has a broader meaning to the lay person than to wildlife managers (Gilbert 1982). Manager’s terminology, such as “game” and “nongame species”, may have little relevance to the public who relate wildlife to the butterfly in the backyard or the squirrel on the park bench as much as to deer or elk in the hinterland. Given that it is important that managers and the public communicate, both need to “talk the same language”, and managers may find a more receptive public if they were willing to communicate in a more holistic and inclusive manner (Gilbert 1982). As a start, it may be useful for local managers to know the range of species the public considers as urban wildlife and pests. As identified in the Wildlife Survey, the GVRD public had a very broad definition of urban wildlife, with some respondents selecting all of the listed species (including cougars and wolves) as “urban wildlife”. Some people suggested additions to the list such as reptiles, insects and numerous bird species. This inclusion of many species, some clearly not “urban” wildlife (e.g., cougars, wolves), may indicate that respondents focused on the term “wildlife”, rather than on the modifier “urban”, although a definition of “urban wildlife” was included in the instructions accompanying the question. Alternatively, the flurry of media coverage surrounding isolated incidents when cougars or bears travel through residential parts of the GVRD may have conditioned the public to associate these animals with an urban environment.

The GVRD public identified a number of species as urban pests in the Wildlife Survey. More than 20% considered rats, raccoons, mice, coyotes and Canada geese as pests, although they

had previously identified them as urban wildlife. Thus the use of the term “urban wildlife” by the public does not necessarily imply positive attitudes toward species. Other studies (Dagg 1970, Brown et al. 1979) have shown that the public’s preference for wildlife depends on its proximity to one’s home. Some species (virtually all birds and some smaller mammals like squirrels and rabbits) appear acceptable near people’s homes and are valued, but other larger mammalian species (such as fox or raccoon) are not.

Not only is it useful to know which species the public consider as “urban pests”, but knowing *why* they are considered a nuisance or threat can help an agency formulate appropriate response protocols or educational materials to address public concerns. Concerns about personal safety are likely to take a different form and priority to those of an aesthetic or nuisance nature. The GVRD public selected a range of species as urban pests and therefore also identified a range of issues concerning those species that it would be useful to cover in public educational materials. To reflect the concerns identified by the public, education materials on a variety of species should also address safety issues, by providing information on preventing conflict, and giving realistic information on the chance of disease transmission. Information on protecting pets and preventing property damage, are also areas of educational interest identified by the Wildlife Survey.

The majority of respondents in both surveys, supported non-lethal methods to address problem wildlife. This attitude provides a challenge for wildlife managers and eliminates many traditional control methods (e.g., poisoning, trapping and hunting) if they are to gain public support (Decker and Gavin 1987). However, most respondents to the Coyote Survey thought it acceptable to humanely destroy a problem animal if it was a threat to humans or if destroying it ended the animal’s suffering. Some respondents also believed that humanely destroying an individual animal

was appropriate if all other alternatives had been exhausted. The desire to employ non-lethal methods may reflect the increase in non-consumptive wildlife users within the general public (Filion et al. 1991, Boxall and McFarlane 1995), as well as an increasing urbanization of the population (Kellert 1979). Education, both because of its public endorsement and lack of other effective available methods, is becoming a more important tool for wildlife managers, especially those in urban areas. However, simply transplanting education programs from one region to another may prove ineffective because there are substantial differences in attitudes between people from different locations (Gilbert 1982), as well as within populations (Kellert 1976, McIvor and Conover 1994). Increasingly, human dimensions research is being used to develop and support management approaches, but, there are concerns over the lack of wildlife professionals with the necessary training (Manfredo 1989).

“Relocation” was a popular solution chosen by respondents as appropriate for addressing problem wildlife. Kellert (1979) similarly found support from the general public (but not from sheep producers or cattlemen who favoured lethal methods) for relocating coyotes depredating on sheep although it was explained as an expensive option. The public’s support for relocation may reflect the public’s perception that it is a humane alternative whereby people’s needs are met without harming the wild animal. The public may not consider where the offending animal is to be relocated, if the animal is likely to “re-offend” in its new home, or whether the removed animal is likely to be replaced by another. One relocation advocate, Vancouver City Councilor George Puil, has suggested catching Vancouver’s coyotes and shipping them to the “boonies” (Vancouver City Council meeting, December 14, 1995). Attitudes such as this should be seen as educational

opportunities, underscoring the need for “environmental literacy” (VandenHazel 1974, McLaren 1989).

The overall attitude toward coyotes in the GVRD ranged from neutral to positive; very few respondents held negative attitudes. Both the veterinary clients and naturalists felt more positive than the general GVRD public, perhaps reflecting their respective interests in domestic and wild animals, their knowledge of coyotes, or both. Human dimensions researchers divide attitudes into three components: emotional, perceptive (cognitive) and behavioural (actions and intents) (Scalet et al. 1996). Attitudes expressed by respondents about coyotes mainly reflected emotional and perceptive components. Positive attitudes were associated with perceptions about coyotes ranging from coyotes “deserving” to be here, to being an esthetic resource, or improving the quality of life. Those with neutral attitudes expressed a lack of knowledge, experience or concerns about coyotes. The few negative attitudes were associated with strong concerns for person and property, and a perception that coyotes “don’t belong” in an urban environment. Negative attitudes were reinforced by negative experiences such as the suspected loss of a pet to coyotes.

When particular levels of damage are exceeded, tolerance to wildlife declines (Decker and Brown 1982, Craven et al. 1992, Liggins 1995); thus educational materials which reduce the risk (or perceived risk) of conflict, such as the depredation of pets, may improve attitudes toward wildlife and increase residents’ tolerance to wildlife. Decker and Purdy (1988) described a concept called Wildlife Acceptance Capacity (WAC) which is analogous to biological carrying capacity or social carrying capacity, but describes how human preference and beliefs affect management decisions. Wildlife acceptance capacity reflects the acceptance of a given constituency for particular species at a given time and depends on the attitudes and beliefs of people that comprise that

constituency. Changing how people perceive a species and the damage or risk caused by that species, is integral to increasing the WAC. Attitudes are determined by peoples' beliefs (perceived knowledge) about an object and their beliefs about the consequences of their actions toward that object (Morgan and Gramann 1989). Other studies have shown that attitudes (Kellert 1980) and preference (Dagg 1973, Schauman et al. 1987) are related to an individual's knowledge about wildlife and habitats. Thus if someone believes that coyotes are large, dangerous carnivores, they will likely feel fearful and negative toward coyotes. If, on the other hand, the public is well-informed about the size, likelihood of attack, or the chance of contracting rabies, their attitudes will likely reflect this. The naturalist and veterinary client respondents were better informed about coyotes and had a more positive attitude toward them than did the general GVRD population. The general GVRD population scored the lowest Coyote Awareness Index and had a slightly more negative attitude toward coyotes. However, both groups scored less than 50% on the Coyote Awareness Index raising concerns that the questions comprising the index may not have been at an appropriate level to distinguish between relatively high and low levels of public knowledge about coyotes. Regardless, raising public awareness and about coyotes and eliminating common misconceptions, should be an effective way to change underlying beliefs and improve the attitude and increase the WAC of the general public toward the presence of coyotes in the GVRD.

With increasing urbanization, the voting influence lies with an overwhelmingly urban population which traditionally has little access to or knowledge about wildlife. Fortunately, there is a desire on the part of the public for more wildlife education programs that are sponsored by wildlife professionals (Self 1982), especially programs in urban areas (Brown et al. 1979, Boxall and McFarlane 1995). The concentration of people in dense urban centers can also provide wildlife

professionals with easier access to a large public audiences for their educational programs (Boxall and McFarlane 1995), and should make the programs more cost effective. However, although there is increasing interest on the part of urban residents to see wildlife (Filion et al. 1991), there is currently only moderate participation in urban wildlife programs by the general public. Perhaps this is due to ineffective identification and marketing of these wildlife programs to the urban resident (Boxall and McFarlane 1995). Wildlife education is not only necessary to increase awareness and appreciation, but can also be used to prevent and address conflicts between urban residents and wildlife - an approach supported by respondents of the Wildlife and Coyote Surveys.

If education is a preferred approach for dealing with wildlife concerns, the next logical steps are to determine: 1) the most effective educational programs (discussed in Chapter 2); and 2) the best manner of reaching the public with educational messages. Currently, most people obtain their information about wildlife from television and other media (Gilbert 1982, Self 1982), so the media can be a useful tool for reaching the public with information about wildlife. However, this is true only if the information presented is accurate. Often media coverage can be erroneous and misleading (McPherson and Shaw 1994), thus thwarting educational objectives. This is probably because the media often focus on conflict and controversy and rely substantially upon groups and individuals with vested interests for their information, that are generally biased towards one viewpoint. This may have occurred during the summer of 1996 when wildlife managers tried to release information about the presence of coyotes in a GVRD park (BCTV, June 19, 1996). The intent of the press release was to inform the public of the presence of coyotes in the park and to reassure them that coyotes, unless habituated, are rarely a threat to humans. However, the news station covered it as a public warning about dangerous urban coyotes in local parks, and showed dramatic footage of a young

mother standing guard by her child as a coyote sauntered past. Further, the accuracy of “facts” presented in the story was poor. In 3 sequential news broadcasts throughout the evening, reported numbers of potentially hazardous coyotes ranged from 200 to 20,000. This possibly incited fears that the population of coyotes was out of control and a risk to the public, as well as created confusion about true coyote population estimates. When the media are inaccurate in their portrayal of wildlife, misconceptions and fears can be perpetuated. More accurate media coverage will require the active involvement of wildlife professionals (McPherson and Shaw 1994) and a better working relationship between wildlife professionals and the media.

In both the Wildlife and Coyote Surveys, respondents did not distinguish among the various options presented to them in terms of these agencies’ responsibilities to deal with problem wildlife complaints. This may be a result of confusion over who is responsible for urban wildlife or reflect a viewpoint that responsibility is shared among several agencies. In a similar study, Gilbert (1982) found that few people in Guelph, Ontario, knew of the federal or provincial agencies responsible for wildlife, and most reported they would approach the local university when seeking information about wildlife.

The diverse opinions held by the GVRD public about who they consider responsible to address their concerns about urban wildlife, may lead them to seek information and assistance from several agencies. This will likely result in unnecessary duplication and waste of both person-hours and resources. Clearly, clarification of the roles and responsibility of these different agencies is necessary. However, even if the public is aware of the correct agency, if their complaint is not dealt with effectively, they are likely to become frustrated. Individuals who lose confidence in wildlife managers or agencies to deal effectively with their concerns may choose not to report wildlife

problems at all, or go so far as to take matters into their own hands. The MoELP suspects this is currently occurring with sheep producers and their coyote complaints in Region 2 on agricultural land adjacent to the GVRD. According to the MoELP's own report (MoELP 1992), current recorded levels of coyote complaints are probably an underestimation of actual incidents because the agricultural community feels the Wildlife Branch's response is inadequate; farmers are not reporting problems and may be dealing with problem animals on their own. Some GVRD residents, unsatisfied with local agencies' response to concerns about urban coyotes, have threatened den-hunting or poisoning near their properties (Grescoe 1996). Vigilantism, especially in urban areas employing lethal methods, is both a risk to the wildlife causing the problem, as well as to non-target species, domestic animals, and the public. Thus, the public's need to know who to contact, and which agency will deal effectively with their concern, are important from economic, social (public perception), and potentially public safety, perspectives.

SUMMARY

My 2 surveys have shown that the public has a broad concept of urban wildlife, and that it expresses its concern about a number of urban wildlife species including coyotes. At the same time, the public still values the presence of wildlife within the GVRD. It also seems clear that the majority of people are willing to change their behaviour to accommodate present and future wildlife activity. However, confusion exists over which public agencies are responsible for urban wildlife and thus who the public should turn to when they have concerns. The public clearly favours education and non-lethal methods, such as relocation, for addressing urban wildlife problems. Only in extreme

circumstances, either when human safety is at risk or in eliminating animal suffering, do they feel that wild animals should be destroyed.

Both surveys identified that: 1) coyotes are of genuine concern to the public; 2) an educational approach is favoured in dealing with concerns about urban wildlife; 3) the public has specific concerns about coyotes; and 4) there are gaps in the public's knowledge about coyotes.

The following chapter outlines public educational materials about coyotes, based on my survey results, and data that I collected on the ecology of coyotes in the GVRD.

CHAPTER 3 - COYOTE ECOLOGY AND PUBLIC EDUCATION

MATERIALS FOR THE GVRD

INTRODUCTION

Coyotes have substantially expanded their range since the arrival of European colonists in North America (Nowak 1978) and are now found from the west to east coasts, and from the Yukon to Panama. Two main reasons have been put forth to explain their range expansion: 1) the removal of wolves; and 2) the creation of favourable habitat, mainly through cutting down forested areas (Nowak 1991). Coyotes have probably also taken advantage of networks of roads and railways (which could act as travel corridors) linking together parts of cities and regions. They even seem to thrive in the face of an increasing human population, urban expansion and efforts to control them. This is probably because coyotes are generalists in their food habits and thus able to exploit vast urban food sources such as plentiful supplies of small mammals (e.g., rats) and garbage. Their ability to vary their social structure and territoriality with habitat (Nowak 1991) and food supply, has also helped them adapt successfully to a range of habitats.

In light of their adaptive capabilities and with adequate food and suitable habitat, coyotes are likely to remain part of the GVRD's fauna. Unfortunately, there is little published information about urban coyotes that managers can use in formulating approaches for dealing with them or in educating the public. In correspondence with other graduate students, mainly through the internet, it appears that a growing body of research on urban coyotes (Grinder 1997, *pers. comm.* and Hall 1996, *pers. comm.*) and more information in the areas of ecology and human dimensions should soon be available for managers.

There is increased interest in urban wildlife in general, not just coyotes, by the public (Schreyer et al. 1989) as well as, researchers, managers and planners (Wolch et al. 1995). Urban Wildlife is an untapped resource for wildlife education (Milne and Milne 1973, VanDruff 1979), which is one of few management approaches that can be used in the city. Urban wildlife is accessible and can be used to teach the public, the majority of whom live and vote in cities, about ecological principles. By considering urban wildlife in land use plans, planners can avoid conflicts with wildlife and create livable city habitat for more than just human inhabitants (Wolch et al. 1995).

To be worthwhile, wildlife education must effect positive attitudinal and behavioural change (Morgan and Gramann 1989). One way that this can be done is by increasing the public's knowledge and awareness of wildlife (Kellert 1980). Hence in the educational materials that I constructed and during my oral presentations, I tried to present facts about coyotes in a manner that emphasized the interrelationships between people (and their actions) and coyotes. For example, most people do not consider coyotes when they fill their bird-feeders, but in the educational materials I illustrated that feed spill-over could attract small mammals, which in turn could attract coyotes into their yard, which may increase the risk of coyotes preying on their pets. I attempted to communicate that coexisting with coyotes (or other urban wildlife) requires considering the impacts of our actions *before* conflict arises.

Effective educational programs also have a well defined nature and scope (Roth 1973), so that the goals of the program are understood by educators (and managers), and can be both assessed and revised. The intent of my educational materials about urban coyotes was not to teach the public everything known about coyotes, but to provide them with specific information based on areas of need.

Because little information is available on the ecology of urban coyotes -- or how to coexist with them, I felt an obvious first step in developing an educational approach was to collect baseline biological data on coyotes inhabiting the GVRD. This local information would allow me to respond meaningfully and effectively to concerns and misconceptions identified in the public surveys, and create educational materials from local information and tailored to meet local needs. Four aspects of urban coyote ecology and biology were studied: morphology (weight, body size), diet, disease (heartworm and rabies), and distribution.

Morphological data of GVRD coyotes were collected to accurately describe our local coyotes, because misconceptions about the size and weight (and therefore perceived threat) of coyotes were identified in the surveys. Some people felt urban coyotes might be “better fed” and thus, larger than their rural counterparts.

Diet was considered important because it relates directly to predation of domestic pets by coyotes. Coyotes are opportunistic carnivores feeding on a variety of prey from white-tailed deer to rabbits, but mainly consuming smaller mammals depending on availability (Nowak 1991), as well as pets, vegetation, fruit, carrion and garbage (Atkinson 1985, Shargo 1988, Quinn 1992). Most information available on coyote diet has been obtained from wild or rural coyotes, so there has been no accurate information on the percentage of diet composed of domestic pets.

Respondents in the surveys were worried about wildlife diseases that could impact them or their pets. Rabies was identified although there have been no reported cases of rabid coyotes in BC (Pemble *pers. comm.*). Another disease of concern to local dog owners is heartworm (*Dirofilaria immitis*), an internal parasite up to 300 mm in length that matures in the right ventricle and pulmonary arteries of coyotes, dogs and other canids (Gier et al. 1978). Often fatal, heartworm can

be transmitted among animals by mosquitoes which act as the intermediate vector. The infection rate in coyotes is variable (Gier et al. 1978) but because they can potentially act as a reservoir for heartworm, even a low incidence is important to dog owners.

In my discussions with the public, people were usually aware that coyotes were present in the GVRD, but were often insistent that coyotes were not present in their respective neighbourhoods. Another common misconception was that coyotes were only active at night. I used public sightings to determine the distribution and movements of coyotes throughout the GVRD. Traditional wildlife techniques for determining movement, such as telemetry, are not always feasible in an urban setting. Technical aspects (overwhelming radio interference), problems associated with trapping wildlife in an urban area (mainly concern for pets safety) and cost, are limiting factors. By using public sightings, I avoided these problems and immediately increased public participation and awareness in the study, thereby increasing my opportunity to answer the public's questions when they reported sightings. Public sightings have been used in other studies for determining broad-scale habitat use by coyotes (Quinn 1992), and it may be an effective tool for collecting distribution data on other conspicuous wildlife species in urban areas.

The effectiveness of an educational program is partially determined by the form and accessibility of the materials or presentations. I used a number of formats and presentation styles to: A) accommodate different learning styles (some people are visual, others experiential); B) serve a range of purposes (from providing "fast facts" to more in-depth information); C) be suitable for different education levels; D) reduce costs of production and distribution; and E) increase accessibility. The internet is a relatively new educational tool for the general public and I hoped that by posting a coyote web page the novelty of this medium would help increase the number of people

that I reached. Pamphlets on the other hand, did not require computer access and could be included in municipal mail-outs (for example with dog license renewal notices), or could be made available in various locations (e.g., MoELP, veterinary clinics). Thus, I tried try to maximize distribution of basic materials (i.e., pamphlet, internet web page) and to provide easier access to more in-depth materials (video, presentation) to reach as many people as possible. Educational products included: 1) pamphlet, 2) video, 3) Coyote Kit, 4) internet web page, and 5) slide show presentations and public displays.

METHODS AND ANALYSES

Coyote cadavers were collected at motor vehicle accidents (MVAs), donated by private citizens, and provided by conservation officers (COs). Measurements of total body length (including tail), hind foot length, and chest girth, were made prior to skinning, and measurements of males and females were compared using an F-test and a 1-tailed t-test. Stomachs, skulls, and hearts were removed for future analysis, rabies testing and heartworm testing, respectively.

The percent occurrence of food items was estimated in both scats (previously autoclaved and rinsed) and stomach contents, using a compound microscope. For hair samples, wax impressions were made and a compound microscope used to identify prey species (Adorjan and Kolenosky 1969, Brunner and Coman 1974, Kennedy and Carbyn 1981). In the case of difficult samples, the hairs were examined under a scanning electron microscope. It was difficult to distinguish between domestic dog and coyote faeces, so not all of the samples collected were analysed. Scat was collected only in the vicinity of known den sites and along frequently used coyote travel routes.

Brain tissue was sent for rabies testing to the Center for Coastal Health. The centre is currently studying the incidence of endemic rabies as part of their BC Wildlife Disease Survey. The occurrence of heartworm was assessed by Dr.T. Khan (Burnaby New Westminster Central Animal Hospital) by examining coyote hearts for the presence of mature worms.

To determine the distribution and movement of coyotes, sightings reported by the public were collected from January 1995 through March 1997 by several means: A) calls to the “*coyote hotline*”, B) responses to the Coyote Survey, C) e-mails to the coyote homepage, and D) in person at educational seminars. Date, time, nearest street intersection, number of coyotes, activity of the coyote(s), as well as, a contact name and telephone number, were all requested. All sightings were recorded in an Excel 5.0 spreadsheet (Microsoft Corporation). Sightings were compared by time, number of coyotes, biological season, and location, using a Chi Square Goodness of Fit test with a significance level of 0.05 determined *a priori*. Each comparison had a unique sample size based on the number of sightings that had complete information for the variable in question (i.e., time or location). Comparisons of time were made using 4 time categories: dawn, day, dusk and night. Monthly averages of daily sunrise and sunset data (Environment Canada 1997) were used to designate the categories. The time between 1 hour pre-sunrise and 1 hour post-sunrise or 1 hour pre-sunset and 1 hour post-sunset, were considered dawn and dusk respectively. Comparisons of the number of coyotes in the sighting were made after sorting the sightings into 3 categories: singles, pairs, or groups of 3 or more. Sightings were also compared by dividing the year into 3 biological seasons (Smith et al. 1981, Laundre and Keller 1984, Nowak 1991, Harrison 1992): *denning* from January 1 through April 30; *rearing* from May 1 through August 31; and *dispersal* from September 1 through December 31. Lastly, I examined where the coyotes were seen. I used 3

categories based on the description of the sighting: 1) parks, golf courses and greenspaces; 2) freeways, roadsides, or residential cross streets; and 3) lanes, private backyards, or school yards.

RESULTS

Eleven coyotes (6 males and 5 females) were collected, but I could obtain measurements only from 9 of them (Table 3). There were no significant differences between the means of the sexes (weight, $t=0.34$; total body length, $t=0.73$; hind foot length, $t=0.89$; and chest girth, $t=1.35$).

Table 3. Body measurements of 4 male and 5 female coyotes sampled in the GVRD.

VARIABLE	MALE	FEMALE
Weight (kg)	12.6 (SEM=1.4)	12.0 (SEM=0.7)
Nose to Tip of Tail (mm)	1197.5 (SEM=21.7)	1186.0 (SEM=30.8)
Hind foot (mm)	186.3 (SEM=6.9)	180.0 (SEM=3.2)
Chest girth (mm)	532.5 (SEM=11.1)	505.0 (SEM=15.8)

Scat and stomach contents analyses revealed that small mammals, plant material and coyote hair were the most frequent items in the coyote diet (Figure 16). Domestic pets, both cats and dogs, were also eaten, but occurred only in the scats.

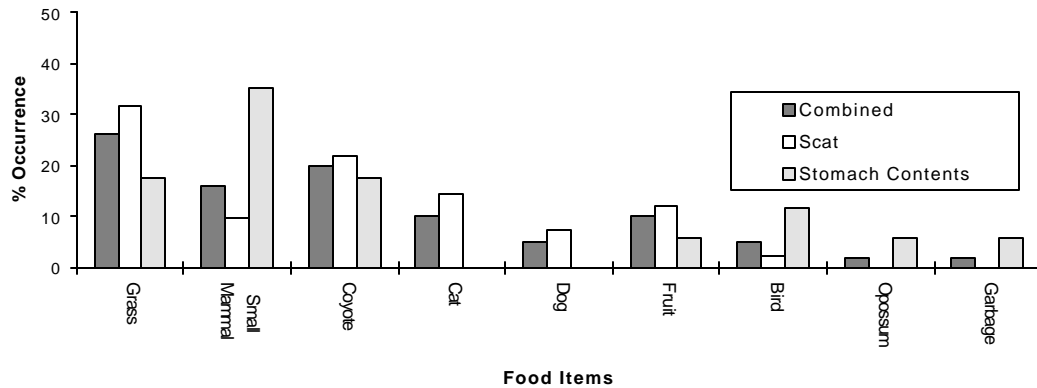


Figure 15. Percent occurrence of food items in scat (n=22) and stomach contents (n=11) of GVRD coyotes.

With the exception of one coyote that was shot, all other coyotes collected for analyses, were killed in collisions with vehicles. One coyote had mange. No positive cases of heartworm (n=11) or rabies (Schwantje 1997, *pers. comm.*; n=4) were found.

The public reported 613 coyote sightings. Although coyotes were seen at any time of the day or night (Figure 17), there were significantly more daytime and fewer night-time sightings ($\chi^2 = 36.63$, $df=3$) using weighted analyses (to account for the disproportionate time in each category). Single coyotes were the most often sighted (77%, n=505), however, pairs (12%), and groups (11%) containing as many as 9 individuals, were also reported. Coyotes were significantly ($\chi^2 = 25.33$, $df=2$) more likely to be seen in the denning season (January to April) and less likely to be seen in the dispersal season (September to December). Fifty percent of all sightings were in parks, golf courses or GVRD greenspaces. Only 3% of sightings were in people’s yards, lanes or in school yards.

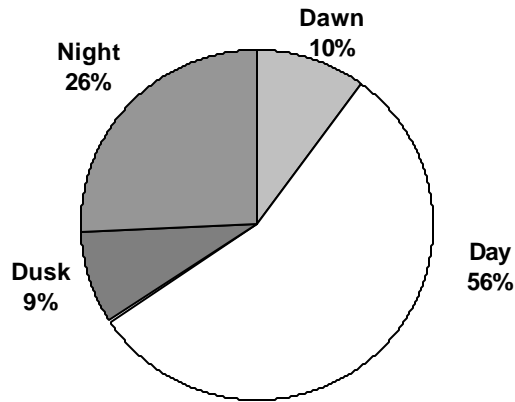


Figure 16. Distribution of sightings according to time of day (n=327).

EDUCATION PRODUCTS

Four types of educational products (Appendix C) were produced about urban coyotes for distribution in the GVRD: 1) a pamphlet, 2) a video, 3) an internet web page, and 4) the Coyote Education Kit. In addition, I gave approximately 40 presentations or interviews about coyotes. The pamphlet and internet web page contained easily accessible “quick facts” about urban coyotes and coexistence. Although the internet web page mirrored the information in the pamphlet, it also provided viewers with a direct e-mail connection if they wanted to report sightings or ask questions.

The 30-minute video, divided into 3 parts (concerns, characteristics, coexistence), was aimed at a general audience who require more information than could be delivered in a pamphlet. The video allowed me to develop some issues that the public identified in the surveys (e.g., concern about pets and personal safety), in greater detail than in the pamphlet or internet web page. It was produced in collaboration with Delta Cable during May and June 1996 and it features questions from school children (William Bridge Elementary in Richmond), interviews with local experts, and comments from the public.

The video is also included as part of the Coyote Kit, an intermediate school level environmental education kit featuring ecology of the urban coyote, and including 7 “be-a-scientist” activities based on my graduate research. I developed the kit in collaboration with the BC Humane Education Society, and it is suitable for both public schools and community-based environmental education programs.

DISCUSSION

Although often overestimated by the public, the weights of GVRD coyotes fell within the expected range for weights and measurements and were consistent with values reported in other studies in western North America (Nowak 1991). Displaying pelts and presenting local measurements at presentations and in educational materials, seemed to help the public develop a realistic view of the size and weight of coyotes. This, in turn, allowed them to put into perspective the minimal threat that coyotes pose to people.

GVRD coyotes have the typically diverse diet of an opportunistic carnivore (Nowak 1991). Predation (or scavenging) of pets was confirmed by the presence of domestic cat and dog hair in scats, however, domestic pets were not a primary food item. Consistent with other studies (Andrews and Bogess 1978, Berg and Chesness 1978, Atkinson 1985, Shargo 1988, Quinn 1992), many of the samples contained vegetation. Garbage found in the stomach of one of the coyotes underscores the need to make garbage inaccessible to coyotes and thus discourage them from using private yards. In addition, *making access* to pets more difficult (by fencing yards, leashing and supervising pets), *removing enticements* mainly in the form of alternative food sources (such as pet food, compost, and garbage), and *actively deterring* them from around one’s

property (by throwing objects, yelling, chasing), should encourage coyotes to find easier alternative sources of food.

No positive cases of rabies or heartworm were found in my sample of GVRD coyotes. This could reflect a low incidence these diseases or be an artifact of small sample size. Although there has never been a case of rabies in coyotes reported in BC, even in areas of the province where heartworm is more prevalent (e.g., the Okanagan) the number of detected coyote heartworm cases can be low (Falkenberg 1995, *pers. comm*). Thus, further work should be done by other researchers to determine the incidents of these diseases in local coyote populations.

Coyotes were most often seen singly, refuting claims of packs roaming city streets. People were more likely to see coyotes during the denning season and rearing season. Increased hunting activity during the denning season (January to the end of April) to meet the demands of reproduction, likely explains the abundance of sightings at this time. Sightings during the rearing season are probably explained by the public's movements - people, and their pets, are more likely to be outside enjoying spring and summer activities during the months of May through August when coyotes are raising their young. Awareness programs targeted to these periods would probably be effective at reducing conflict.

Using public sightings to determine distributions and movements of a wildlife species may not always be desirable, but it can supplement or provide an alternative to telemetry in urban areas (Quinn 1992). Because the purpose of collecting these data was to raise awareness about coyotes distributions and movements, I felt the benefits of this approach outweighed any biases that might be present. Although coyotes would be reported only in areas and at times when people were present,

the opportunity for sightings was never totally eliminated because a portion of the public will always be active (e.g., shift workers, taxi drivers).

The public provided me formally with information (sightings and surveys) but also contacted me with observations, stories and with requests to “remove” their coyote problems. In most instances, I found that validating people’s concerns and providing them with information, was a successful approach, and as a result some of the most adamant and angry callers became active supporters in distributing information about coyotes.

From my conversations with the public, coyotes appeared more bold if people were walking with their dogs, which the coyote probably viewed as prey. However, in all reported instances, the coyote(s) retreated when challenged by the owner. Tales of coyotes snatching small dogs off the ends of leashes remain unconfirmed and likely fall into the realm of urban mythology. Unfortunately, instances of coyotes injuring children, although rare, have been documented (Carbyn 1989) and range in severity. Two such incidents happened in the GVRD (July 11, 1995; May 8, 1997) during this study. In both cases young children (aged 7 and 3 respectively) in the presence of an adult were approached by the coyote. Neither child was seriously injured and health professionals did not feel it was necessary to commence rabies treatment. Both events occurred in the same Burnaby park, but it is not known if the same coyote was involved in each case; a single coyote was removed from the area after the second attack. Although food was not directly a factor in either of the two attacks, it is possible that feeding by a local resident has habituated coyotes in this park, which may have resulted in the unusually bold behaviour of the particular coyote and its subsequent destruction.

The level of interest in my study, and urban wildlife in general, was quite astonishing. In addition to coyotes, I found myself fielding questions about a range of wildlife species, from raccoons to “predatory carp”. Interest was further highlighted by public receptivity to education materials, and an overwhelming number of requests for presentations. Informal reporting from local agencies (Liz Thunstrom, Wildlife Rescue Association; Mike Mackintosh, Stanley Park Wildlife Manager; and Stephen Huddart, BCSPCA) indicates that complaints about coyotes within the GVRD have decreased since the start of my educational campaign; a response also found by Atkinson (1985) in rural areas.

There is a recognized need for environmental literacy (VandenHazel 1974, McLaren 1989) and urban wildlife programs (VanDruff 1979, Boxall and McFarlane 1995). The coyote, and the challenges for its coexistence with people, may make it an ideal “flagship” species for urban wildlife programs. The urban coyote is bold, curious, and wild. This “wild dog” is a reminder of the wilderness and has a captivating urban personality. The coyote provides an educational opportunity challenging us to value and learn to live with, the untamed creatures that share our cities.

RECOMMENDATIONS

1. Incorporate human dimensions information (public opinion) when formulating management approaches for coyotes and other urban wildlife. Also, use it as a means of assessing the progress and acceptance of such programs.
2. Use public education and other non-lethal methods for addressing urban wildlife problems.

Public education is an important tool for the management of urban coyotes because traditional wildlife management techniques are not feasible or publicly acceptable in cities.
3. Target educational materials to particular segments of the GVRD population such as parents with young children and pet owners. It may be practical to target pet owners at veterinary clinics and local branches of the SPCA, for example.
4. Expand current “do not feed the wildlife” initiatives because this should also help reduce conflicts between coyotes and people.
5. Enforce municipal bylaws that discourage the public from feeding wildlife.
6. Different agencies that deal with urban wildlife should collaborate promoting a co-ordinated approach and consistent message in addressing coyotes and other urban wildlife. This would reduce duplication and make information more accessible and consistent for the public.
7. Clarification of the roles of different agencies that directly and indirectly deal with coyotes and other urban wildlife would be useful for the public.
8. Agencies should become more actively involved in working with the media to distribute valid information about coyotes because the vast majority of people get their information about wildlife from television.

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APPENDIX A

GVRD Municipalities and their Participation

Municipality	Survey	Sighting	Collection of cadavers for necropsy
Village of Anmore		√	
Village of Belcarra		√	
City of Burnaby	√	√	√
City of Coquitlam		√	
District of Delta		√	
Electoral Area A (University Endowment Lands)	√	√	
Electoral Area C (Bowen Island / Barnston Island)		√	
City of Langley		√	
Township of Langley		√	√
Village of Lions Bay		√	
City of NewWestminster	√	√	
City of North Vancouver	√	√	
City of Port Coquitlam		√	
City of Port Moody		√	
City of Richmond		√	√
City of Surrey		√	√
City of Vancouver	√	√	√
District of West Vancouver	√	√	
City of White Rock		√	
District of Maple Ridge		√	
District of Pitt Meadows		√	

APPENDIX B

SURVEY QUESTIONS

WILDLIFE SURVEY

For the purposes of this survey, **Urban Wildlife** is defined as *any non-domestic animal or bird that lives within an urban setting.*

1) Please **place an X** beside the animals or birds that you consider to be urban wildlife.

squirrel	_____	seagull	_____	songbird	_____	cougar	_____
shrew	_____	eagle	_____	bat	_____	wolf	_____
rat	_____	hawk	_____	bear	_____	skunk	_____
mouse	_____	crow	_____	coyote	_____	muskrat	_____
mole	_____	starling	_____	deer	_____	pigeon	_____
raccoon	_____	duck	_____	swan	_____	Canada Goose	_____

other: _____

- 2) Please **circle** any of the above marked species you have **seen** in the Lower Mainland in the past year.
- 3) Please **list** any of the above urban wildlife species that you consider to be “**pests**” or that cause you concern.
-

4) **Identify** why these animals cause you concern from the reasons provided below.

- personal safety / health pets' safety / health
 children's safety / health property damage
 other, please list

5) Are you aware that coyotes are present in Lower Mainland? **yes** **no**

If yes, **circle** the response which best represents your attitude about coyotes in Lower Mainland?

1	2	3	4	5
strongly dislike	dislike	neutral	like	strongly like

6) May we contact you at a later date with questions about coyotes in the Lower Mainland?

yes **no** **contact number:** _____

7) Do you place your garbage out the night before your garbage collection? **yes** **no**

8) Do you have an outdoor compost? **yes** **no**

If yes, is it open? **yes** **no**

9) Do you have pets? **yes** **no**

If yes, do they go outdoors? **yes** **no**

If yes, are they ever fed outdoors, or on the porch? **yes** **no**

10) Have you ever tried to **dissuade** wildlife from your property/place of residence?

yes **no**

If yes, **identify** the method(s) used

- body language (loud threatening display)
 use of objects (throwing rocks, etc.)
 fencing

other, please **describe** _____
Were you successful? **yes** **no**

- 11) When there is a problem with an urban wildlife species, who should take the appropriate action to deal with the complaint?
 SPCA Ministry of Environment, Lands & Parks
 Veterinarians Non-profit wildlife Rehabilitation Centers
 City/Municipal Gov't other, please **list**:
- 12) Have you ever asked for assistance or information from any of the above agencies with wildlife concerns?
yes **no**

If yes, please **list** which agencies and indicate whether you were **satisfied** with their response.

- 13) Are there adequate agencies/individuals within the city to address any wildlife concerns you might have now or in the future? **yes** **no** **unsure**
If unsure, explain why
- 14) Is there a need to make information about urban wildlife more readily available to the public?
yes **no** **unsure**
- 15) **Check** the method you feel most appropriately addresses “problem wildlife” (i.e., those animals causing concern)?
 relocate animals
 humanely destroy
 public education
 all of the above but depends on circumstances
 other, please **describe** below:
- 16) Are there circumstances under which it is acceptable to humanely destroy problem wildlife species?
yes **no**
If yes, which:
- 17) Does urban wildlife enhance your life in the Lower Mainland? **yes** **no**
- 18) Are you willing to modify your lifestyle or habits in order to maintain or enhance wildlife activity within the city? **yes** **no** **unsure**
If unsure, please explain

Name: _____ Sex: Male Female Age: _____
Birth Country _____
Occupation: _____
Level of Education : Gr.10 ; Gr. 12 ; diploma ; bachelors ; masters ; Ph D
Phone **OR** if you prefer the first three digits of your phone number: _____
Address **OR**, if you prefer, your postal code : _____

COYOTE SURVEY - GVRD Sample

Interviewer: _____

Date: _____

Phone # _____

Are you aware that coyotes are present in Vancouver? yes/no	
Which response which best represents your attitude about coyotes in Vancouver? 1)strongly dislike 2)dislike 3)neutral 4)like 5)strongly like	
Do you feel their numbers are increasing? decreasing? Staying the same ? Unsure?	
Do you feel that the coyote population in the Lower Mainland is “ a problem”? yes <input type="checkbox"/> no <input type="checkbox"/>	
Have you seen a coyote(s) in the Lower Mainland in the past 12 months? <i>(If yes, ask : date, time of day, # of coyotes, location including cross street)</i>	
What is <i>your best estimate</i> of the average body weight of an adult coyote 0 - 8 kg (0-17 lbs) 8 - 14 kg (17-31 lbs) 15 - 22 kg (33-48 lbs) 23 - 30 kg (50-66 lbs) 31 - 38 kg (68-84 lbs) more than 38 kg (84 lbs)	

*I'm going to read you some statements about coyotes, please answer **true, false or unsure** to each:*

Coyotes in the Lower Mainland are known carriers of the following diseases: Rabies virus true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Canine Heartworm disease true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Canine Distemper virus true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Canine Parvo virus true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Lyme's Disease true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Coyotes rarely attack children. true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Coyotes live in urban areas because humans have “ taken over the coyote's habitat”. true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Coyotes are a threat to adults. true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Coyotes only hunt at night. true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Coyotes have been in the Lower Mainland for more than 100 years. true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
Coyotes prey on domestic animals true <input type="checkbox"/> false <input type="checkbox"/> unsure <input type="checkbox"/>	
if true, what proportion of the coyote's diet do you think consists of domestic animals? 0 - 20% 21-40% 41 - 60% 61 - 80% 81 - 100%	
Do you think there needs to be more information /education made available to the public about coyotes?	
Who (which agency or agencies) do you think should be responsible for dealing with complaints about coyotes [possibilities include 1) SPCA 2) vets 3) gov't/city council 4) MOELP 5) Non-profit animal rehab centers 6) other]	
What method(s) do you think are appropriate for dealing with urban coyote complaints/concerns? [some possibilities = 1) relocate 2) humanely destroy 3) public education campaign 4) all 5) other	
Are there circumstances under which it is acceptable to humanely destroy problem	

coyotes? If yes, which	
---------------------------	--

Now I'm going to ask you some general questions

Do you place your garbage out the night before your garbage collection?	
Do you have an outdoor compost ?	
If yes , is it open?	
Do you have pets ?	
If yes , do they go outdoors?	
If yes , are they ever fed outdoors, or on the porch?	
Do you ever feed strays or wildlife ?	
Name	
Age	
Sex (don't ask unless you have to)	
Occupation	
Education gr 10; gr 12; Diploma; Bach; Masters; PhD	
Address (postal code ok)	

COYOTE SURVEY- vet and naturalist sample

Part A: General

For the purposes of this survey, **Urban Wildlife** is defined as *any non-domestic mammal or bird that lives within an urban setting.*

1) Please **place an X** beside the animals or birds that you consider to be urban wildlife.

squirrel	_____	seagull	_____	songbird	_____	cougar	_____
shrew	_____	eagle	_____	bat	_____	wolf	_____
rat	_____	hawk	_____	bear	_____	skunk	_____
mouse	_____	crow	_____	coyote	_____	muskrat	_____
mole	_____	starling	_____	deer	_____	pigeon	_____
raccoon	_____	duck	_____	swan	_____	Canada Goose	_____

other: _____

- Please **circle** any of the above marked species you have **seen** in the Lower Mainland in the past year.
- Please **list** any of the above urban wildlife species that you consider to be "**pests**" or that cause you concern.
- Identify in general terms** why these animals cause you concern from the reasons provided below.
 - personal safety / health pets' safety / health
 - children's safety / health property damage
 - other, please list
- Do you place your garbage out the night before your garbage collection? **yes** **no**
- Do you have an outdoor compost? **yes** **no**
 - If yes**, is it open? **yes** **no**
- Do you have pets? **yes** **no**
 - If yes**, do they go outdoors? **yes** **no**
 - If yes**, are they ever fed outdoors, or on the porch? **yes** **no**
- Have you ever tried to **dissuade** wildlife from your property/place of residence? **yes** **no**
 - If yes, **identify** the method(s) used
 - body language (loud threatening display)
 - use of objects (throwing rocks, etc.)
 - fencing

- other, please **describe** _____
- Were you successful? **yes** **no**
- 9) When there is a complaint about a urban wildlife animal, who should take the appropriate action to deal with the problem?
- SPCA Ministry of Environment, Lands & Parks
 Veterinarians Non-profit wildlife Rehabilitation Centres
 City/Municipal Gov't other, please **list**:
- 10) Have you ever asked for assistance or information from any of the above agencies with wildlife concerns?
yes **no**
- If yes, please **list** which agencies and indicate whether you were **satisfied** with their response.

- 11) Are there adequate agencies/individuals within the city to address any wildlife concerns you might have now or in the future? **yes** **no** **unsure**
- If unsure**, explain why
- 12) Is there a need to make information about urban wildlife more readily available to the public?
yes **no** **unsure**
- 13) Are there circumstances under which it is acceptable to humanely destroy problem wildlife? **yes** **no**
- If yes**, which:
- 14) **Check** the method you feel most appropriately addresses “problem wildlife” (i.e., those animals causing concern) ?
- relocate animals
 humanely destroy
 public education
 all of the above but depends on circumstances
 other, please **describe** below:
- 15) Does urban wildlife enhance your life in the Lower Mainland? **yes** **no**
- 16) Are you willing to modify your lifestyle or habits in order to maintain or enhance wildlife activity within the city? **yes** **no** **unsure**
- If unsure, please explain

Part B. Coyotes

- 17) Are you aware that coyotes are present in Lower Mainland? **yes** **no**
- If **yes**, please answer the following questions, if **no**, please go to Part “C”.
- Circle** the response which best represents your attitude about coyotes in Lower Mainland?
- | | | | | |
|-------------------------|----------------|----------------|-------------|----------------------|
| 1 | 2 | 3 | 4 | 5 |
| strongly dislike | dislike | neutral | like | strongly like |
- 18) Explain why you feel this way about coyotes in the Lower Mainland: _____
- 19) Have you seen a coyote(s) in the Lower Mainland in the past 12 months? **yes** **no**
- If **yes**, Date: _____ Time of day : _____ Number of coyotes: _____
- Location of Sighting (include cross-street): _____
- 20) Please **check** the response which best answers this statement: *I feel the population of coyotes in the Lower Mainland is* **increasing** **decreasing** **staying the same** **unsure**
- 21) Please **circle** your best estimate of the average body weight of an adult coyote
- | | | |
|------------------------|------------------------|--------------------------|
| 0 - 8 kg (0-17 lbs) | 9 - 14 kg (17-31 lbs) | 15 - 22 kg (33-48 lbs) |
| 23 - 30 kg (50-66 lbs) | 31 - 38 kg (68-84 lbs) | more than 38 kg (84 lbs) |
- 22) Please answer the following true or false questions *carefully*.
Please, mark **unsure** if you don't know the correct response:
Coyotes in the Lower Mainland are known carriers of the following diseases:
- Rabies virus **true** **false** **unsure**

- Canine Heartworm disease **true** **false** **unsure**
- Canine Distemper virus **true** **false** **unsure**
- Canine Parvo virus **true** **false** **unsure**
- Lyme's Disease **true** **false** **unsure**
- Coyotes rarely attack children. **true** **false** **unsure**
- Coyotes live in urban areas because humans have
 " taken over the coyote's habitat". **true** **false** **unsure**
- Coyotes are a threat to adults. **true** **false** **unsure**
- Coyotes only hunt at night. **true** **false** **unsure**
- Coyotes have been in the Lower Mainland
 for more than 100 years. **true** **false** **unsure**
- Coyotes prey on domestic animals **true** **false** **unsure**
- if true, **circle** the proportion of the coyote's diet that you think consists of domestic
 animals **0 - 20%** **21-40%** **41 - 60%** **61 - 80%** **81 - 100%**
- 23) Do you have any specific concerns about/for coyotes in the Lower Mainland? **yes** **no**
 If yes, Please identify those concerns: _____
- 24) Do you feel that the coyote population in the Lower Mainland is " a problem"? **yes** **no**
 Please explain your answer above: _____
- 25) May we contact you at a later date with questions about coyotes in the Lower Mainland?
yes **no** **contact number:** _____

Part C: About You

Name: _____ Sex: Male Female Age: _____

Birth Country : _____

Occupation: _____

Level of Education : Gr.10 ; Gr. 12 ; diploma ; bachelors ; masters ; PhD

Phone number **OR** if you prefer the first three digits of your number: _____

Address **OR**, if you prefer, your postal code : _____

APPENDIX C

EDUCATIONAL MATERIALS

- 1) Pamphlet
- 2) *Urban Coyote* Video
- 3) Internet web page
accessed by : www.interchange.ubc.ca/kwebber or search for “urban coyotes”
- 4) *Coyote Kit* - intermediate level education program