UNDERSTANDING THE ROLE ATTITUDES COULD PLAY IN CONSERVATION PLANNING FOR WOLVES AND BROWN BEARS IN ABRUZZO, LAZIO AND MOLISE NATIONAL PARK, ITALY

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Understanding the role attitudes could play in conservation planning for wolves and brown bears in Abruzzo, Lazio and Molise National Park, Italy

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Abstract

Wolf and brown bear populations are expanding throughout Europe, in a human dominated landscape. Conservation of these two species will be determined by the attitudes of those who live close to them. Unlike in North America, human dimensions (HD) regarding human-wildlife issues remains a relatively new field of research in Europe, and even more so in Italy. This is the first study of HD in wolf and bear management in Italy.

This dissertation has focused on understanding how the attitudes of those living in close proximity to both wolves and bears can play a role in achieving conservation planning.

Attitudes are positive or negative evaluations of an object - in this case wolves or bears - and are a mental state composed by affective (feelings), cognitive (beliefs) and behavioural intention components. Each component of attitude plays a role in the conservation of wolves and brown bears. The objectives of this study were to look in detail at these three components, how they can be linked, and how they contribute to conservation. Quantitative face-to-face (n= 1611) interviews were carried out to determine attitudes of residents toward wolves and bears in the Abruzzo, Lazio, and Molise National Park (PNALM) and the surrounding buffer zone.

This dissertation demonstrated that the majority of residents in the PNALM are willing to coexist with these large carnivores. Participants expressed

positive feelings toward wolves and bears, they tolerated the perceived damages caused, and they support the maintenance and protection of both species- but especially of brown bears. This dissertation showed that residents have a higher level of knowledge about bears, which results in stronger positive feelings.

These are important messages to communicate to managers responsible for the conservation of wolves and brown bears. Emphasizing these positive findings can be the starting point for constructive dialogue on conservation. This study, therefore, sets the direction for future public involvement processes. The next HD step would be to organize workshops with all interest groups (e.g. shepherds, hunters, non-locals), to bring them together and to work with them on their commonalities to create a management plan for wolves and bears.

Keywords: Apennine brown bear conservation, attitudes, beliefs, human dimensions, Italy, knowledge, national park, public involvement, wildlife management, wolf conservation.

Dedication

To my Husband that I met in this remote island and to my future son who gave me the focus to finish this dissertation on time

Acknowledgements

Writing a PhD involves four years of our lives, and many people around us that pass by, go or stay. It is hard to include all of them.

There are many people to acknowledge during the whole process of a PhD, and in general during our length of life.

When I think about acknowledgements, immediately I think about my parents, who gave me life. They encourage me every day to pursue my dreams, and their support helps make them happen.

I am lucky because I have already accomplished one dream of my life: to find the perfect companion with whom to make all the other dreams come true. I would also like to thank him in helping me in the G.I.S. map design in this dissertation.

Special thanks to an anonymous donor that made this whole project possible. In the professional academic realm, I am very thankful to Luigi Boitani and Paolo Ciucci who allowed me to embark on the project of human dimensions, and my supervisor Alistair Bath who taught me what human dimensions is and how to do it. I am grateful to Jerry Vaske, who kindly and patiently taught me new statistical analyses. I greatly appreciated the insights and comments of my PhD committee (Ratana Chuenpagdee and Arn Keeling) that made this dissertation more complete.

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List of Abbreviations and symbols

PNALM- Abruzzo, Lazio and Molise National Park

CGM- Common Ground Matrix

HD- Human Dimensions

HDW- Human Dimensions of Wildlife

LCIE- Large Carnivore Initiative for Europe

TRA- Theory of Reason Action

WWF- World Wide Fund for Nature

Glossary of main concepts

Affective component of attitude consists of feelings, moods, emotions, and sympathetic nervous system activity that people experience in relation to an object (e.g. wolf/bear) (Eagly and Chaiken, 1993; Bright and Manfredo,1996).

Attitudes are positive or negative evaluations of an object, such as wolves or bears, and are a mental state reflected by affective (feelings), cognitive (beliefs) and behavioural intention components (Eagly and Chaiken, 1993; Verplanken et al., 1998; Cooke and Sheeran, 2004).

Behavioural intention is a person's belief about how he/she will behave in a specific situation (Manfredo, 2008). For example: "I belief I would support the completely protection of wolf/bear".

Cognitive component of attitude refers to beliefs and thoughts people hold about an object (e.g., wolf/bear), and represents the information an individual possesses about an object which may or may not be true (Ostrom, 1969; Eagly and Chaicken, 1993).

Mediator is a variable that accounts for the relationship between the predictor (or independent variable) and the criterion (or dependent variable) (Baron and Kenny, 1986).

Moderator is a variable that affects the direction and/or strength of the relation between the predictor (e.g. perceive damage belief) and a criterion variable (e.g. support protection toward wolf/bear) (Baron and Kenny, 1986).

Normative beliefs are defined as personal judgments about what is appropriate in specific situations (Vaske and Whittaker, 2004). For example: "Wolf/bear should remain completely protected (i.e. it should be illegal to kill them)".

Values are defined as enduring beliefs or mental constructs that reflect our evaluation of our fundamental desires of specific modes of conduct or the end states that define what is important for us, such as family, fairness (Rokeach, 1973; Fulton et al., 1996; Decker et al., 2001).

List of Appendices

Co-authorship statement

From this dissertation, two papers have been written in collaboration with other people. In both of these papers, the candidate was the first and corresponding author and the identifier of the research proposal. The candidate performed the analysis on all samples, interpreted the data and wrote the manuscript. The co-authors contributed to the planning of the articles, and helped in data interpretation and manuscript evaluation.

The first manuscript, "Human dimensions of wildlife in Europe: The Italian way," was a collaborative effort with Beatrice F. Frank. This article has been accepted to be published in the Human Dimension of Wildlife Journal vol. 16 (5) 2011.

The other collaborative manuscript, "Segmenting normative beliefs regarding wolf management in Central Italy," was based on the paper presented in this dissertation. This article was a collaborative effort with Dr. Alistair Bath and Dr. Jerry Vaske. This manuscript has been published in Human Dimension of Wildlife Journal vol. 15 (5) 2010: 347-358.

Part I: Background of the Research

1. Overview of the dissertation

This dissertation is the result of a collaborative research effort between La Sapienza University of Rome, Memorial University, and the Abruzzo Lazio and Molise National Park (PNALM). The overarching goal of the project is to achieve conservation of wolves and brown bears inside the park and in the surrounding buffer zone. Within this project, both human needs and biophysical aspects are investigated as they relate to the conservation of brown bears and wolves. Understanding the social science or human dimensions (HD) component of conservation is the theme for this dissertation research. Specifically, the scope of this dissertation is to comprehend the role of attitudes in the conservation of wolves and brown bears.

HD research focuses on understanding attitudes, perception and beliefs, and identifying types of conflict and steps toward conflict resolution (Decker et al., 2001). Indeed, a HD project is built through partnerships with a variety of interest groups, developed by working toward understanding the issues. Moreover, HD research can help managers identify areas of support for different management options and target specific weaknesses in the knowledge that affects attitudes. This will result in more effective educational materials.

An essential aspect of research like this is the sharing of results with the academic community, and particularly with those who directly participated in producing the results (Stronen et al., 2007). This dissertation is organized in a manuscript-based format as one means to facilitate the dissemination of the outcomes of this study.

To help the reader link the papers, several common sections are included in the dissertation: an introduction; research questions and objectives; study area characteristics; methods used; and a general conclusion. The reader will discover throughout the thesis the underlying connection between four inter-related fields: geography, folklore, conservation biology, and human dimensions. These disciplines cover complementary aspects regarding wolves and bears. For example, it was analyzed how attitudes are influenced by myths and legends, but also how attitudes are driven by specific biological aspects of the species themselves (e.g. wolves killing more sheep than they consume), and how the management of wolves and bears changes spatially. Furthermore, some of the topics of these disciplines and the methods applied overlap. Literature from these four inter-related fields has been incorporated to contribute to communication between these disciplines in wildlife management issues.

The overarching goal of this dissertation is to understand the role attitudes play in achieving conservation planning of wolves and brown bears. Three scientific papers were produced to answer this research question, with

each of them highlighting different aspects of the issues (e.g. perceived damage, protection of predators) regarding wolves and brown bears in the PNALM. The leitmotif of each of these articles is the understanding of specific characteristics of attitudes toward these two species. Attitudes are made up of three components: affective (i.e., liking or disliking of the species), cognitive (i.e., beliefs about the species), behavioural intention (i.e., what people say they will support/oppose or do under a given situation) (Ostrom, 1969; Kothandapani, 1971; Fishbein and Ajzen, 1975; Ajzen, 2001). Relatively few studies have compared wolves and brown bears simultaneously (Kellert et al., 1996; Breitenmoser, 1998; Teel et al., 2002; Kleiven et al., 2004; Bath et al., 2008), and none have examined the three components of attitudes in the same document. The components of attitude have been investigated in this dissertation research, and findings are presented using statistical analyses that are relatively new for the field of HD.

HD research is relatively new in Europe and even more so in Italy. The need to understand development of this field (including how many studies have been completed to date, and on what topics) is investigated in the first paper of this dissertation. *"Human dimensions of wildlife in Europe: The Italian way"* provides an overview of HD in Europe and uses the case study of Italy to highlight the difficulties of conducting a review in this field. The paper summarizes through a bibliometric analysis (Tague-Sutcliffe, 1992; Schneider and Borlund, 2004) all the works that have been retrieved in Italy until 2009, and evaluates the

implementation of the field of HD in Europe. The format of this paper meets the requirements of the *Human Dimensions of Wildlife Journal*, the leading journal of HD research in wildlife management.

The second paper focuses on the affective component of attitudes. The strength of the affective component, whether positive or negative, suggests not only persistency, but also tends to be a strong predictor of the third attitude component, behavioural intention (Prislin, 1996; Verplanken et al., 1998). In addition, the differences between the two species for the other two components of attitudes (cognitive and behavioural intention) were investigated. Direct comparison between wolves and bears, in regard to residents' level of fear, as well as consent with respect to management options, is discussed. In the article, *"The influence of folklore and cultural practices in understanding rural attitudes toward Apennine wolves (Canis lupus) and Apennine brown bears (Ursus arcots marsicanous),"* differences in the attitudes toward the two large carnivores are linked to the literature from other disciplinary areas (i.e., folklore). This discussion helps to expand the understanding of attitudes. This paper has been written in a format compatible with the requirements of the journal *Society and Animals*.

The third paper focuses on the second component of attitudes: cognitive beliefs. The role of knowledge as moderator between perceived impact belief of damage (the other cognitive belief) and the feelings toward these two species (affective component) is investigated. In addition, the connection between the

three components of attitudes is explored by examining whether the perceived impact belief of damage (cognitive component) and by the feelings toward these two species (affective component) predicts the intention to support various management options toward wolves and bears (normative beliefs). Two models, using path analysis based on multiple regression analyses, are constructed with the overarching objective being to examine whether the same model applies to brown bears and wolves. This paper is titled "*The Moderating Influence of Knowledge on Feelings, Beliefs and Normative Beliefs about Wolves and Bears.*" This paper has been written in a format compatible with the requirements for *European Journal of Wildlife Research.*

The third component of attitude is investigated in the fourth and final article. Traditionally, managers have focused attention on understanding the differences between group membership (e.g. hunters and non-hunters), but as these interest groups need to work together for conservation purposes, it is important to focus on possible similarities. For the purposes of this paper, the general public was segmented by their normative beliefs to support or oppose wolf and brown bear management options, and then the characteristics of the respondents were examined. This offers wildlife managers more specific information about the size of the segments and the degree of controversy that could be expected. This paper is titled, "*Segmenting normative beliefs regarding wolf*

and bear management in central Italy." This paper has been written in a format compatible with the requirements of *Human Dimensions of Wildlife Journal.*

2. Introduction

This chapter briefly describes the background context of the current research. First, the history of human dimensions (HD) and the connections of this field with geography and conservation are explored. Next, the nature of attitudes within the HD discipline and the process of public involvement are discussed. The purpose of this chapter is to familiarize the reader with theories and issues surrounding HD of wildlife.

2.1. Human dimensions and its history

Aldo Leopold, considered the founder of wildlife management in North America, stated in 1943 that the management of deer was more about managing people than animals (Flader, 1973). In the late 1940s, Frank H. King recognized the need for research into the HD of wildlife management, in particular the importance of understanding the knowledge of the public, in order to develop a comprehensive conservation program (King, 1948). The earliest attempts of HD research focused on public relationships and provided education to the citizens.

In 1955, the U.S. Fish and Wildlife Service implemented one of the first national surveys, which is still conducted every five years. The purpose of this study was to track Americans' wildlife-associated recreation participation and economic expenditures (Manfredo et al., 2009). The investigations primarily focused on measuring attitudes and socio-demographic characteristics of hunters

and anglers (Gigliotti and Decker, 1992; Decker et al., 1996a; Manfredo, 2008), and were carried out under labels other than HD (Bath, 1996; Bath, 1998). At that time, standard methods were not recognized. Only in the mid-1960s did HD in wildlife research really begin (Manfredo, 1989).

The term "human dimensions" of wildlife was first introduced by Hendee and Schoenfeld at a session of the North American Wildlife and Natural Resources Conference (Hendee and Schoenfeld, 1973; Manfredo, 2008). The field of HD in wildlife management focuses on understanding how people value wildlife, on understanding public support or opposition to management actions, and on working with people who are affected by, or can affect, wildlife decisions (Decker et al., 2001). Professional managers may have a different set of priorities and ideas than the general public about how to manage wildlife (Kellert, 2000), thus, learning about the attitudes and opinions of the general public is important for effective wildlife management (Blanchard, 2000; Ericsson et al., 2004). The goal of HD research is to assist managers in understanding and evaluating public interest in wildlife, to produce information to help in conflict resolution, and to design and implement programs for public participation (Manfredo et al., 1996).

During the 1970s the field of HD evolved and expanded to look at attitudes, perceptions, and environmental values (Kellert, 1976, Dunlap and Van Liere, 1978). The main actors of investigations were the direct users of natural resources such as hunters and anglers, their level of satisfaction and their

willingness to pay for accessing a resource, and the economic impacts (Manfredo, 1989; Bath, 1998; Manfredo et al., 1998; Decker et al., 2001; Manfredo, 2008; Manfredo et al., 2009). In decision-making, input from direct users (e.g. hunters) was the first to be sought out, not only because the direct users showed greatest concern for the resource, but also because of the philosophy of "wise use" management that was driving conservation and management at that time (Decker et al., 1996a).

The establishment of the environmental movement brought a shift in values. There was a decrease in utilitarian values and recognition of the intrinsic value of wildlife by non-consumptive users (Decker et al., 1996b). This further complicated the situation for wildlife agencies that had to deal with a greater diversity of interest groups, some of which had conflicting values and ideas about how to manage natural resources. With this challenge, HD was pushed to grow into a more formal organization. In the early 1970s, the first academic recognition of the field arrived with the establishment of a Human Dimension Research Unit at Cornell University (Decker et al., 2001). During the same period, the first published survey assessing attitudes toward wolves was conducted at the Minnesota State Fair (Johnson, 1974 as reported in Williams et al., 2002).

During the late 1980s, the emphasis of the majority of HD research was on large carnivores, particularly wolves and grizzly bears. The interest in large carnivores, particularly wolves, emerged due to controversy over wolf

restoration within Yellowstone National Park and the Rocky Mountain ecosystems of the western United States (Bath, 1989; Bath and Buchanan, 1989; Tucker and Pletscher, 1989). The concept of nature has been reshaped by U.S. society. Wolves were once a symbol of a wilderness that was perceived negatively; as wilderness started to be viewed positively, wolves also became a more positive symbol.

In the 1990s, a large amount of HD research continued to focus on attitudes toward grizzly bears, confrontations between humans and bears (Bath, 1994), and attitudes toward wolves and wolf restoration (Bath, 1991; Bright and Manfredo, 1996; Pate et al., 1996; Bath, 1998; Williams et al., 2002). In 1996, the *Human Dimensions of Wildlife Journal* was established to communicate advances in HD theory, methods and case studies. This journal was a clear sign that HD had become not only an applied science but also an academically recognized discipline worldwide.

From this brief introduction, it is possible to identify the main goals of HD. These include identifying baseline data to understand public attitudes and beliefs toward wildlife species, identifying areas of support and disagreement over management options, and understanding types of conflict over management issues. HD research can identify the key beliefs most related to attitudes, thus helping in the design of targeted specific educational programs. This dissertation focuses on key beliefs (e.g., perceived damage) affecting

attitudes toward brown bears and wolves. Understanding these attitudes can help identify messages that will produce more effective educational materials, as well as improving conservation and management of these species.

2.2. Human dimensions and geography

In this subsection, the similarities between HD and geography in the field of natural resource management are explored. It is shown how HD fits within geography, and how geographers could expand their research to incorporate certain aspects of HD.

Historically, decisions regarding how to best manage natural resources were centred on information coming from the biophysical sciences (Bright and Manfredo, 1995; Blanchard, 2000). George Perkins Marsh (1864) in his book *Man and Nature* addressed the need to discuss careful management of resources with all interest groups. An understanding of resource management issues, including wildlife management, incorporates diverse perspectives (Mitchell, 1989). Indeed, resource management should combine human and biophysical components (Decker et al., 1996b; Manfredo et al., 1996; Bath, 1998; Musiani et al., 2009).

Geographers have the integrated skills needed to play a key role in understanding both physical and human processes (Gauthier, 1991). Resource geographers have explored topics dealing with human impact, environmental perception, values, and public involvement in an array of resource management

decision-making conditions (Saarinen et al., 1984; Tuan, 1990). Indeed, given the four traditions in geography (i.e., spatial, area studies, man-land, and earth science) (Pattison, 1964), and the long tradition of studying perceptions toward natural hazards such as impacts of humans on their environment (Marsh, 1864; Leighly, 1963; White, 1966; Giordano, 2003), extending this concept to wildlife is a natural progression. The role of geographers in studying HD of wildlife falls within the human-environment interaction, formerly known as the man-land tradition.

The relationship between society and nature, and their complex interplay, has received a great deal of interest from human geographers lately (Milbourne, 2003; Power, 2008; Panelli, 2010). Human geographers have generated vast amounts of literature about the history and cultural construction of human and non-human animal relations (Lulka, 2000; Emel et al., 2002; Buller, 2008; Johnson, 2008). However, much of this work has focused on definitions of nature and wilderness from the anthropocentric and anthropomorphic view point (Philo and Wolch, 1998; Wolch and Emel, 1998; Philo and Wilbert, 2000; Vining et al., 2008). Most of the articles in animal geography tend to focus on domestication, the domination of humans over nature and the role of zoos in society (Ritvo, 1992; Ingold, 1994; Anderson, 1995; Anderson, 1997; Wolch, 2002; Dombrowski, 2002). Moreover, the authors undertake these studies to endeavour to solve the dualism of the social construction of nature (Emel et al., 2002). Perhaps more than any

other natural resource, wildlife challenges us to better understand the bridge between nature and society; HD investigates this connection by asking the opinion, and understanding the attitudes, of humans toward animals. The difference lays on the focus of the subject. While animal geography looks at human society in relation to animals, HD looks at individual humans in relation to animals. Animal geographers' projects attempt to make non-human animals visible, in light of human responsibility of sharing the world with non-human animals (Johnston, 2008). HD research projects aim specifically at incorporating attitudes of humans in management plans for animals (Blanchard, 2000).

HD and geography have common characteristics in terms of natural resource management approaches, as they both involve people in the decision-making process. At the same time, these two disciplines have complementary views on the connection between humans and the environment, specifically with respect to animals. Connecting the literature coming from geography and HD draws on the strengths of these separate disciplines, and creates a more comprehensive articulation of the subject of this dissertation. For example, geography and conservation biology have a long tradition of collecting data at different scales. In addition, these two disciplines have an understanding of the importance of identifying the appropriate spatial scale for gathering meaningful data that fits into decision-making processes (Openshaw, 1984; Wiens and Bachelet, 2010). HD literature, on the other hand, seems to have a naïve approach

to scale (Gibson et al., 2000): there is a mismatch between the spatial resolution of attitude data collection and the management scale for conservation issues. Management decisions are often political, existing at a larger scale (e.g., national endangered species legislation) than the scale on which impacts may be felt. HD researchers have either chosen to have data representative of a political unit, arguing that politicians need an understanding of their entire resource constituency, or of key interest groups.

2.3. Human dimensions in conservation program context

Conservation is the preservation, protection, or restoration of wildlife and its environment. Conservation biology is an applied, cross-disciplinary science aimed at maintaining biodiversity and the natural processes that create and sustain it (Groom et al., 2006). Parks and protected areas have been the traditional tools used to achieve conservation of ecosystems. Since park managers may have a different set of priorities and ideas than the general public about how to manage wildlife (Kellert, 2000; Mech, 2001), learning about the attitudes and opinions held by the general public is increasingly important for effective wildlife conservation and protected areas management (Bath, 1996; Decker et al., 2001; Ericsson et al., 2004). Conservation failures have sometimes resulted from focusing only on biological and ecological considerations without taking into account social factors (Wilson, 2008). The importance of human

aspects in the conservation of wildlife is becoming increasingly recognized among wildlife managers, especially those who deal with "problem wildlife" (Knight, 2000; Redpath et al., 2004). One of the most controversial recent wildlife issues has become the management of large carnivores (Karlsson and Sjöström, 2007; Bostedt et al., 2008; Majić and Bath, 2010). For example, Bisi et al. (2007) illustrated the conflict between how the citizens of Finland would like to manage that country's population of wolves and what European Union policy states.

Residents who live closest to large carnivores can be, potentially, the strongest allies for their conservation or the strongest opponents to that conservation (Fritts et al., 2003; Bath and Majić, 2000). It is vital to understand not only residential attitudes *per se* but also their behavioural intentions and actual behaviour (verbal and overt) (Mitchell, 1989; Bath and Enck, 2003). The HD of wildlife resource management is particularly important when managing large carnivores, which often arouse conflicting emotions among various sectors of society. By understanding public attitudes, managers no longer have to "guess" at public opinions or make decisions based on "gut feelings" of how the public may react. HD research, through standardized methods, can provide data based on a scientific approach (Chase et al., 2000).

Within the project for conservation of wolves and brown bears in the PNALM, researchers at the University of Rome La Sapienza (in collaboration with personnel of the park) are studying biophysical aspects through radio

collaring and telemetry of wolves and bears, genetic sampling, and studies on the diets of several species. While necessary, such biological research may not be sufficient to understand and address the key issues facing wolf and brown bear conservation in the area (e.g. illegal killing). In addition to biological and ecological principles, it is necessary to consider the attitudes and opinions of interest groups when dealing with wildlife (König, 2008). In the territory of the PNALM, wolves may be generating conflict and bears are entering villages more frequently, possibly leading to lower tolerance of these species by local residents. Bears and wolves, killed by poison, have been found in the park area suggesting that the issue, like many wildlife management issues involving large carnivores, tends to be more socio-political in nature than biological (Bath, 1989; Bath and Buchanan, 1989; Promberger and Schröder, 1992; Musiani et al., 2009). While it is not known for certain if the poison baits are specifically intended for wolves and brown bears, it is known that such baits do result in the death of these animals. Thus there is a need to understand whether residents believe such setting of baits can affect brown bears and wolves, and whether they feel it is important to address the issue of poison baits. Given that the human component of the wildlife management equation is so important, the focus has been on understanding the public who are affected, or can affect, the wolf and brown bear populations with whom they strive to coexist.

2.4. Human dimensions and participation in decision-making

In the 1960s, long after the dust of World War II had settled, a socio-cultural shift occurred in the United States. The term and concepts associated with "environmentally friendly" were in their nascent years. Rachel Carson wrote *Silent Spring* in 1962, which immediately became a bestseller. Her book made the general public realize how, more often than not, individuals tend to be kept in the dark especially regarding the health risks they may have been exposed to in their daily lives (Blanchard, 2000). Garret Hardin's 1968 *The tragedy of the Commons* and Paul Ehrlich's 1968 *The Population Bomb: Population control or race to oblivion?*, forced the issue of overpopulation into the public consciousness. These books demonstrated not only a growing interest in the environment, but also an increased awareness of environmental issues in civil society. In the 1960s people started to be interested in the environment, and environmentalism was becoming a mass social movement (Wilson, 1997; Halvorsen, 2006). The following year, Sherry Arnstein wrote the article *A ladder of Citizen Participation*, which still remains fundamental to the discussion of different levels of public involvement. She described a spectrum of public involvement from non-participation to full citizen power (Arnstein, 1969). Ctizens were increasingly becoming involved with environmental politics. On April 22, 1970, the first Earth Day was organized, demonstrating the public's support for protecting the earth and focussing attention on threats to the environment.

Public involvement in its basic form has been defined as any action taken by an interested public to influence a decision (Praxis, 1988). While the present study did not pull groups together in a higher format of involvement such as joint planning, the act of interviewing individuals in order to understand their attitudes, values and support/opposition to management options, and the additional step of providing that information to managers, is a lower level of public involvement known as information feedback.

The main pre-requisite for public involvement is that government, institutions, organizations, managers, and whoever finds themselves in the role of "the boss" can exercise their capacity, but is favourably inclined to delegate and to share some of their managerial power. There are three other requirements that must be met to ensure successful public involvement (Fleming, 1997): time and money; fairness: and inclusion. If met, they can lead to a healthy society and balance of power and resource management.

Public involvement is based on two-way communication. Participants should trust each other; differences can be overcome when discussion is based on principles and not on stubbornness. Positions can so often change when one discovers more (Reed, 2008) about a given issue. Communication is also of utmost importance, both internally within specific groups of participants and externally between the groups. Participants should take into consideration that circumstances can vary over time, and must be willing to adapt to that.

Public participation is important in conservation programs, and generally in wildlife management, because it helps reduce conflict between users and increase ownership of the process. Increasing ownership leads the public to be more supportive of final decisions. Implementation of resolutions will be more durable and free from challenge as members of the public are the main actors in establishing the decision (Reed, 2008). In addition, participatory involvement is very effective in encouraging environmentally responsible behaviour (Dalton, 2005; Wilson, 2008). Aldo Leopold believed and promoted that conservation can be achieved by how we live on the land, by being involved, and through frequent contact with nature (Blanchard, 2000; Miller and Hobbs, 2002).

HD is both a theoretical and applied discipline. While the emphasis on public participation is not original, the focus on the application to wildlife issues is new. Indeed, the process of public participation and decision making follows the same steps as community planning: identifying what people think regarding wildlife; understanding why; and incorporating those insights into policy and management decision-making processes and programs (Decker and Chase, 1997; Bryson, 2004; Innes and Booher, 2004; Sheedy, 2008; Prell et al., 2009). This dissertation focuses on the first step of public involvement by identifying key beliefs of the residents of PNALM and informing the managers how they can use those insights to create plans that better represent the attitudes of those that can affect and can be affected by large carnivores.

2.5. Human dimensions and the nature of attitudes

Human Dimensions research focuses on understanding the attitudes, beliefs and behaviour of key interest groups and local residents towards wildlife species (Decker et al., 2001). Such research draws upon theories and methods from social science disciplines, namely from social psychology (Manfredo, 1989; Patterson et al., 2000). In the specialized study of attitudes and behaviour, HD researchers use two approaches: one cognitive and the other motivational. The former examines concepts such as attitudes, norms and values; the latter seeks to explain why we do what we do (Decker et al., 2001). Can these be linked? To better understand the attitude-behaviour relationship, it is important to better understand the nature of attitudes.

There are several definitions of attitude. There appears to be widespread agreement (Fishbein and Ajzen, 1975; Eagly and Chaiken, 1993; Ajzen, 2001; Bohner and Wänke, 2002; Manfredo, 2008) that the term attitude refers to a general feeling about something. For example, Schiff (1971: 8-9) defines attitude as "...an organized set of feelings and beliefs which will influence an individual's behaviour." From this definition, one can get a sense of the attitude-behaviour relationship.

Attitudes are conceptualized into three major components: affective, cognitive and behavioural (Mitchell, 1989). The affective component is the feeling of liking or disliking something. The cognitive component is the belief a person

has about something, which may or may not be true. For example, many people in PNALM believe brown bears enter villages because there is not enough food in the surrounding abandoned fields. The third component is the behavioural component, or the statement of how a person will behave towards something; for example, showing support for the planting of apple trees for the benefit of brown bears (Ostrom, 1969; Eagly and Chaiken, 1993; Bright and Manfredo, 1996; Verplanken et al., 1998).

To predict behaviour, it is important to investigate both the affective and cognitive components. As early as 1934, researchers such as LaPiere (1934) began to question whether the relationship was this straightforward. He demonstrated in a study about hosting Chinese couples in hotels that there were discrepancies between what people say they will do (verbal behaviour) and what people actually do (overt behaviour) (LaPiere 1934 as reported in Petty and Cacioppo, 1981). Hence, the need occurred to separate actual behaviour from behavioural intention. For example, behavioural intention could simply be a person stating that he/she will donate money for planting trees associated with the conservation of brown bears - but not actually doing it. Such concepts become formalized later in the theory of reasoned action (Fishbein and Ajzen, 1975).

The Theory of Reasoned Action (TRA) is a model where the immediate cause of behaviour is the behavioural intention, which is determined by the attitude towards the behaviour and subjective norm (Fishbein and Ajzen, 1975;

Ajzen and Fishbein, 1980). In other words, instead of asking a person if he or she likes hunting, the person can be asked directly if he or she likes to go hunting. If that person likes hunting, and his or her social surroundings are accepting of hunters, then that person is predicted to go hunting (Fishbein and Manfredo, 1992). However, weak predictions of specific behaviours have been produced from general attitudes. For example, in Weigel and Newman (1976) attitudes toward the environment did not predict participation in several specific environmental activities. Because of this, Ajzen and Fishbein (1980) noted that closer relations can be expected only if both measures agree in the degree of specification (Ajzen and Fishbein, 1980; Sheppard et al., 1988). When the question has been more specific, e.g. asking whether a person likes hunting black bears in New York in September with friends, the prediction of behavioural outcomes in the TRA has been more successful (Bohner and Wänke, 2002). TRA has been used to help identify value orientations and attitudes influencing the decision to hunt and/or fish in Colorado (Fulton et al., 1996). This model has also been implemented to understand support for a trapping ban (Fulton et al., 1995; Rossi and Armstrong, 1999) and to assess attitudes toward the reintroduction of wolves in Colorado (Pate et al., 1996).

The cognitive hierarchy (Fulton et al., 1996; Vaske and Donnelly, 1999) or value-attitude-behaviour framework (Homer and Kahle, 1988; Manfredo, 2008) based on the TRA (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) can be

used to understand people-wildlife relationships and management by looking at the values, attitudes, norms, and behaviour of the public with respect to wildlife conservation. According to this framework, each of these elements builds upon one another in what has been described as an inverted pyramid. Relatively few values form the foundation and numerous behaviours are found at the top (Figure 2.5) (Fulton et al., 1996; Vaske and Donnelly 1999).

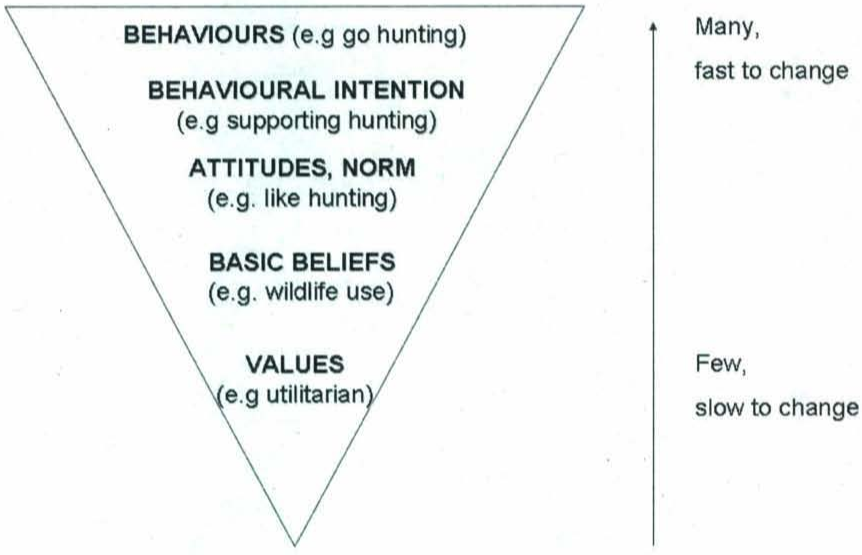

Figure 2.5. The cognitive hierarchy model of human behaviour. Adapted from Fulton et al. (1996)

People develop wildlife values from a young age and these values tend to be resistant to change. Such values are precursors of (and therefore influence) basic beliefs, which are relatively abstract concepts (Fishbein and Ajzen, 1975). These bases of beliefs form attitudes and social norms, which in turn are the close antecedents of behavioural intention (Carroll and Bright, 2009; Kretser et al.,

2009). Thus, intentions to engage in a specific behaviour are the best predictors of actual behaviour (Ajzen and Fishbein, 1980; Sorice and Conner, 2010).

Within this framework it is theorized that there are connections between the various levels in the hierarchy (Kaltenborn and Bjerke, 2002). This dissertation focuses on the relationship between attitudes, basic beliefs and behavioural intentions.

3. **Research goal and objectives**

In Italy, various aspects of wolf and brown bear biology have been examined in detail, but the human component has largely been neglected. Indeed, this dissertation is the first detailed, quantitative HD study carried out on large carnivores in the country. In Italy, HD as a discipline still strives to be recognized academically and by wildlife management agencies as a decision-making tool. An overview of European research and a detailed review of all the studies carried out in Italy on HD are examined in the first paper. This is the first attempt to present this research in context to understand the progress and the direction of HD as a field in Europe and specifically in Italy.

This dissertation highlights the need for including the human component in the conservation and management of large carnivores. Understanding public attitudes toward wolves and brown bears is imperative to successful conservation of these species. The research itself, from the interviews performed to the sharing of the results, is an act of public involvement in the management decision-making process about the large carnivores. The residents may become aware and may get interested in participating in future steps of the project. The key findings from this first HD study are focused on a specific national park in Italy, but they also have implications at the national and international level for the conservation of large carnivores. Moreover, the inputs derived from

analyzing the three components of attitudes in a unique study have theoretical implications such as the importance of looking at each component separately and the relationship between them.

Manfredo, Teel and Bright (2004) reported that attitude studies are the most prevalent type of investigation in HD of natural resources; probably because some components of attitudes, such as the affective and cognitive ones, are easily measured with close-ended questionnaires. They can be summarized with univariate statistics and offer good insights into the perception of the respondents that can be used by managers for better decision-making (Manfredo, 2008). Moreover, attitudes influence value systems, which in turn predict behavioural intention and ultimately behaviour (Fulton et al., 1996; Vaske, 2008). Therefore, understanding the relationship between attitudes, beliefs and behaviour can be one of the most important uses of HD conservation projects. This study provides baseline data on the attitudes of the general public, which is the first step for a more participatory approach toward the conservation of wolves and brown bears.

Despite the frequent use of the attitude concept to date, there is a lack of studies exploring the three components of attitude in relation to the same research theme. Furthermore, few studies simultaneously compare attitudes toward two different species of large carnivores, such as wolves and brown bears

(Kellert et al., 1996; Breitenmoser, 1998; Teel et al., 2002; Kleiven et al., 2004; Bath et al., 2008).

This dissertation addresses these weaknesses by examining the three attitude components (affective, cognitive and behavioural intention) concurrently focusing on wolves and brown bears, the two large carnivores present in Italy. A questionnaire that integrated items addressing each component of attitude was designed. In addition, there was a separate section of questions for each species, thus allowing a comparison about these two species at the same time by the same participants. Such a comparison is rare within HD research studies (Kellert et al., 1996; Breitenmoser, 1998; Teel et al., 2002; Kleiven et al., 2004; Bath et al., 2008). Large carnivores are controversial species and a simultaneous exploration can help managers understand whether residents perceive them equally, whether these predators should be managed separately or together, and whether to focus educational campaigns on different aspects of each species.

To achieve the overarching goal of this thesis - to understand the nature of attitudes and to understand the role each component has in conservation issues for wolves and brown bears - each component of attitude became a separate paper. Starting with the first of the three components of attitudes, the feelings of the residents living within and around the PNALM national park were investigated. The question of whether residents hold different attitudes for

bears and wolves was specifically examined. Sequentially, these data were connected to the cognitive component by examining whether knowledge about large carnivores moderates the relationship between perceived damage belief (another cognitive component) and feelings (affective component) to predict influences and predict support for management options (normative beliefs). The third component of attitudes was investigated by understanding which residents, and how many of them, would like to maintain the protection of these two large carnivore species. Understanding the relationships between the affective component of attitudes and the cognitive component was also important (perceived damage beliefs).

The objectives and null hypotheses tested in this research were:

1) To understand whether there are differences between feelings (affective component of attitudes) toward wolves and brown bears.

Ho1: There is no significant difference in feelings of the residents toward brown bears and wolves.

2) To understand the strength of the relationships between knowledge, perceived damage beliefs (cognitive component) and feelings (affective component) to predict intentions to support various management options (normative beliefs) toward wolves and bears.

Ho2: The relationship between knowledge, perceived damage beliefs and feelings is weak and they do not predict normative beliefs.

3) To examine the relationships between those who support protection of wolves and bears (normative beliefs) with damage beliefs (cognitive component), feelings (affective component) toward large carnivores and general demographic/experiential variables.

Ho3: There is no relationship between normative beliefs and the affective-cognitive component of attitudes. There is no relationship between those who would like to maintain the protection of wolves and bears and the feelings and/or damage beliefs toward these large carnivores.

These predictive statements are tested: I) the affective component of attitudes (liking/disliking) will vary among species; II) the cognitive component of attitudes (knowledge and perceived damage belief) is a predictor of the affective component of attitudes; and III) the normative beliefs of attitudes (support/opposition for management options) is predicted by the cognitive component of attitudes (perceived damage beliefs and knowledge) and moderated by the affective component of attitudes.

4. Study area

The Abruzzo Lazio and Molise National Park (PNALM) is located in the central Apennine Mountains (Figure 4), and comprises the highest mountains in central Italy with several peaks exceeding 2000 metres (Letardi and Migliaccio, 2002).

Figure 4. Location of PNALM in Italy (© LeBlanc Philippe)

This protected area lies approximately 150 km east of Rome and encompasses three regions (Abruzzo, Lazio and Molise), of which the Abruzzo region contains the majority of the protected territory. Although it is predominantly mountainous, the PNALM is an integrated complex of natural habitats, wildlife and people. Twenty-five towns and villages, located mainly at low altitudes and along valley bottoms, cover 2% of the territory (Posillico et al., 2004). These communities maintain strong cultural roots and traditions. An example is the yearly procession of a specific Saint within each town with traditional costumes and traditional food. The county borough of L'Aquila (within the Abruzzo Region) has nine towns located within the boundaries and three towns in the buffer zone of the national park. The county borough of Frosinone (within Lazio region) has eight towns located in the buffer zone of the national park. Finally, the county borough of Isernia (within Molise region) has five towns located in the buffer zone of the national park. The buffer zone is an area created around the park boundaries to enhance the protection of the protected area by mitigating margin effect and other negative impacts of the matrix (Battisti, 2004). At the same time, within the buffer zone certain activities deemed a sustainable use of natural resources, such as hunting, collecting fallen timber, harvesting fruits or mild development, are allowed (Wells and Brandon, 1993).

4.1. Flora and fauna

The flora in the park is rich and varied, with extensive areas covered with deciduous forests. The predominant tree of the park (56%) is beech (*Fagus sylvatica*). At high altitudes (900-1800 m) it is possible to find Downy oak (e.g. *Quercus pubescens*), while at lower altitudes the European Turkey oak (*Quercus cerris*) is found (Posillico et al., 2004). At high elevations open habitats (grasslands, bare rocks) cover 30% of the area (Ciucci and Boitani, 2008). Within the park there is an exclusive diversity of plants (more than 2,000 species excluding mosses and lichens) including endemism such as *Iris marsica* and rare species such as lady's slipper (*Cypripedium calceolus*), one of several orchids in the park.

Only one paved road crosses the entire park, and this runs through valley bottoms and mid-elevation plateaux (14% of the total area). These plateaux are characterized by a mixture of agricultural landscapes, settlements, fragmented woodlands, and pastures. The bottom valleys, once dedicated to agricultural activities, are today partially re-colonized by forests, bushes and occasionally used for grazing (Latini et al., 2005).

Livestock breeding, while consisting mainly of small flocks of sheep and goats, is common in 58% of the park. From the census of 1998 done by the park, 27,216 livestock animals have been estimated in the area, of which 82% are sheep and goats. There are also several small farms of horses and cattle. For centuries,

local shepherds have practised the custom of "transhumance," moving their flocks down to the warmer pastures of Apulia in fall and back in spring, following the same age-old *tratturi* (trails) (Figure 4.1).

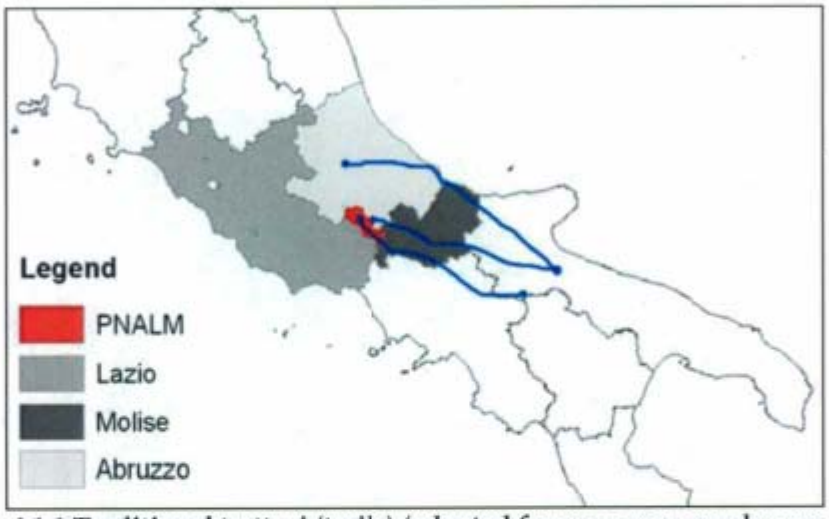

Figure 4.1.1 Traditional tratturi (trails) (adapted from www.parcoabruzzo.it)

The Apennine brown bear (*Ursus arctos marsicanus*) (Figure 4.1.2) is an endemic subspecies considered critically endangered by the International Union for Conservation of Nature (IUCN, 2007). Around 40 to 50 individuals inhabit the national park and surrounding areas (Falcucci et al., 2008; Gervasi et al., 2008). The other large carnivore present in the area is the Apennine wolf (*Canis lupus italicus*) (Figure 4.1.3), also included in the IUCN list and considered to be vulnerable (IUCN, 2007). Currently, there are at least seven or eight packs of wolves, with an estimated total of about 40 individuals living in the PNALM (Latini et al., 2005). Both species are included in Appendix II (potentially

endangered species) in the Convention on International Trade in Endangered Species of Fauna and Flora (CITES, 1973), in Appendix II (needs habitat conservation) of the Habitat Directive (Council Directive 92/43/EEC, 1992), and in the Bern Convention (Council Decision 82/72/EEC, 1979) as strictly protected species (Trouwborst, 2010). Wolves and bears have always existed in the park area and are evenly distributed (Latini et al., 2005).

http://www.leggimi.eu/quotidiano/cronaca/laquila/6689-orso-confidenziale-paura-a-scanno.html

Figure 4.1.2 Apennine brown bear

Figure 4.1.3 Apennine wolf

Apart from the large carnivores, there are several other species of mammals in the park. These include river otters *(Lutra lutra),* wild cats *(Felis sylvestris),* Abruzzo chamois (Rupicapra pyrenaica ornata), stone marten *(Mattes foina),* badgers *(Meles meles)* (Zunino and Herrrero, 1972), wild boar (*Sus scrofa*), red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*) (Ciucci and Boitani, 2008). The park also holds several endemic and rare species of insects (e.g., Rosalia longicorn *Rosalia alpina*), bats (e.g., Barbastelle bat *Barbastella barbastellus*), reptiles (e.g., Italian meadow viper, *Vipera u. ursinii*), amphibians (e.g., Spectacled Salamander *Salamandrina terdigitata*) and birds (e.g., Lilford woodpecker *Picoides leocotus lilfordi*).

4.2. Kings and bears: the origin of the national park

In 1872, the year the first national park in the world was created (Yellowstone in the United States); a royal hunting reserve was established in the central part of the Apennines (Italy). In the Camosciara (today the heart of the park) this reserve was created to protect rare species, such as the chamois of Abruzzo (*Rupicapra pyrenaica ornata*) and the Apennine brown bear (*Ursus arctos marsicanus*). The bear was seen as docile, shy and worthy of protection (Sievert, 1999).

After the First World War, the *comune* of Opi granted the use of nearly 500 hectares of the territory to the Pro Montibus federation to establish a protected area. The first nucleus of the national park in the Abruzzo region was born. After these first successes of the Park Board, other *comuni* granted part of their territories to the park. The park soon grew to 12,000 hectares in size. On September 9, 1922, the park was officially inaugurated at Pescasseroli. In January 1923, the State issued a decree (Royal decree n. 257 January 2, 1923, and made law July 12, 1923) to establish the Abruzzo National Park with a territory of 18,000 hectares. At that time, the population of these rare species were estimated to be 70 bears and 50 chamois.

By contrast, wolves were seen as vermin species, damaging livestock and reducing the population of chamois (Sievert, 1999). The President of the park, Erminio Sipari, set up a bounty system to kill wolves (150 Italian-lire for an adult

male, 50 for a pup and 250 for an adult female), in the belief that it would help the population of bears and chamois to recover. In addition, bounties were offered on eagles (50 L) and foxes (25 L). To better succeed in the extermination of these species, Sipari sought the help of citizens from France who trained forest rangers to fix poison baits.

In 1933 the park lost its working status as a protected area due to the Second World War. Although the park was re-established in the late 1940s, the economic boom of that period exposed the area to property speculation, paving of roads, and the building of villas, hotels, and ski resorts.

In 1954, hunting of game species within the park was banned. In 1968, Italia Nostra and Club Alpino Italiano (two Italian NGOs) together with the World Wide Fund for Nature (WWF) prepared the first master plan for the park. A buffer zone of 60,000 hectares was created around the park in 1970, and six years later the park increased its territory again, to a size of 40,000 hectares.

In 1984, the Park Board decided that the "zoning" of the protected area would include both the conservation of the nature and the social-economic development of people and their towns.

In 1990, the park expanded a fourth time, when a number of *comuni* of Molise decided to become part of the park. In 1999 the town of Valle del Giovenco joined, and the park expanded once again to a total size of 50,000 hectares. In the 60,000 hectares of the outer buffer area of the PNALM, year-

round hunting, mainly of wild boar, is allowed (Zunino and Herrero, 1972; Ciucci and Boitani, 2008), and development and natural resources exploitation are less rigorously regulated and monitored (Ciucci and Boitani, 2008) than within the park itself.

In 2001 the park changed its name from the previous Abruzzo National Park to Abruzzo Lazio and Molise National Park (law n° 93 of 23 March 2001) to better reflect the region and the people who are very much part of the park.

4.3. Zoning of the Park

There are four zones within the boundaries of the national park, which are similar in the level of protection to those of the IUCN Protected Areas categories (Synge, 2004) (Figure 4.3.1). The buffer zone is found all around the territory of the protected area.

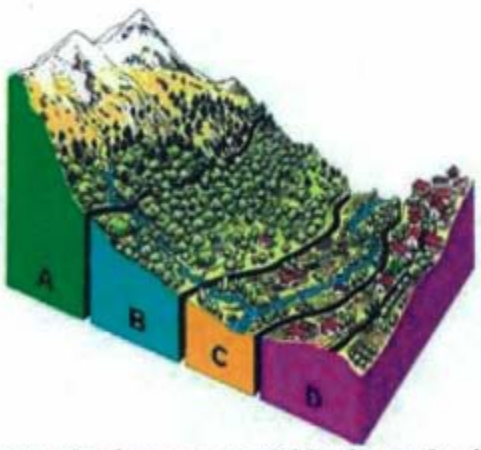

Figure 4.3.1 The four zones within the park offer different levels of protection (adapted from www.parcoabruzzo.it)

Zone A. Integral (meaning strict) Reserve represents 6.9% of the territory and is owned or leased by the park. Access is only allowed with a permit, and mainly for scientific research purposes. Tourists can only access this area with a guide, are confined to trails, and numbers are limited.

Zone B. General Reserve covers the majority of the protected area (83. 8%). This consists mostly of forests, in which the park permits the continuation of traditional activities, such as collecting wood, truffles and other fungi. However, the park managers specify where and how much collecting may be done.

Zone C. Protected Landscape embraces 8.5% of the park. This is where agro-pastoral activities are managed in traditional ways.

Zone D. Development Zone (0.8%) is the area of historical towns; several museums of endangered species are located in the park (Di Benedetto, 2005; Synge, 2004) (Figure 4.3.2).

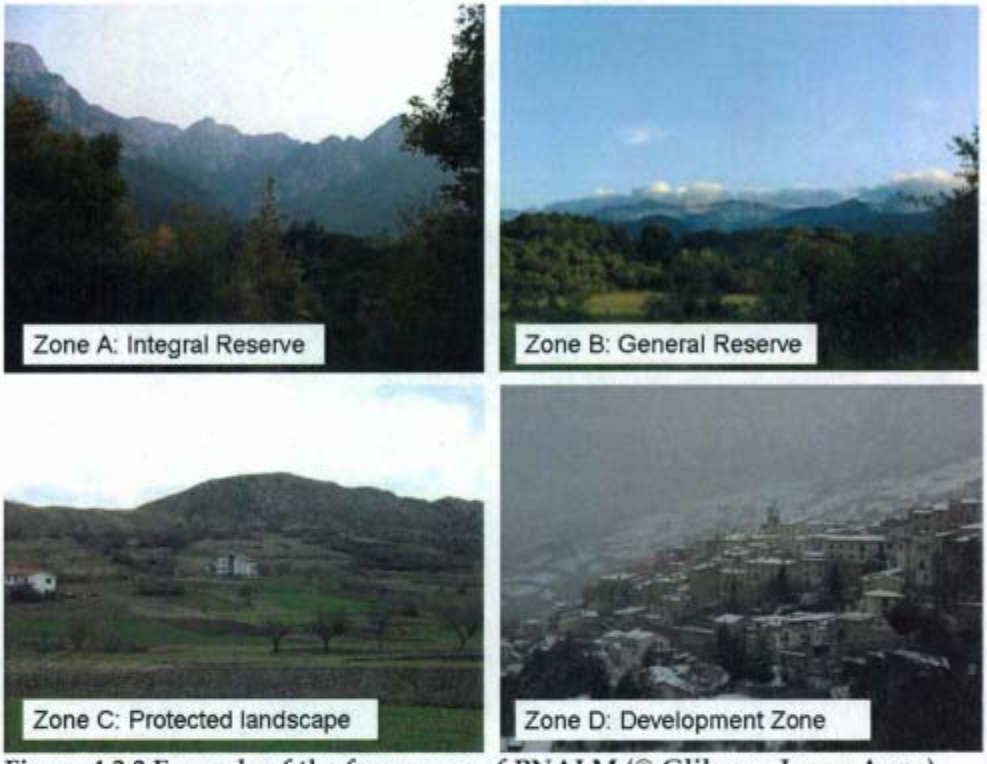

Figure 4.3.2 Example of the four zones of PNALM (© Glikman Jenny Anne)

4.4. Human activities

The PNALM is famous in Italy and in the rest of the world for being a model of the balance that can be achieved between the conservation of nature and the sustainable development of human activities (Synge, 2004). Indeed, the PNALM demonstrates that Italian parks are a testimony to the long relationship between human beings and nature. More than 2 million people visit the park per year. Within the park there are 77 hotels, eight camping areas, five bed and breakfasts, and four official park residences.

The park offers many outdoor activities, including treks on horseback or by mule, bicycle trips, hiking, cross-country skiing, and wildlife watching (bird watching and bear watching during the summer). There are over 250 kilometres of trails. The local agency in charge of trekking and natural excursions is ECOTOUR. This agency also organizes observations of bear, deer, and wolf howling. The park also organizes special voluntary programmes, ecological and orientation camps, seminars and training courses to encourage a healthy relationship between young people and nature.

In Abruzzo Marsica there are two ski resorts, one in Pescasseroli and the other in Scanno. Next to the administrative centre of the park are a museum and a zoo filled with rescued animals native to the park.

Almost every town in the park has been provided with a Tour Information Centre and Zone Office. These centres generally feature museums, botanical gardens or "Aree faunistiche" (fenced territories where animals such as bears, wolves or deer live in semi-captive environment).

4.5. Study zones of the HD research

The study area of this HD research included the PNALM itself and its outer buffer zone, representing a total of about 1,200 km^2. The area was divided into four study zones: Abruzzo Marsica (AM); Abruzzo Fucino (AF); Lazio (LA); and

Molise (MO). It was recognized that managers may need to be sensitive in their policy decisions across administrative regions (Figure 4.5).

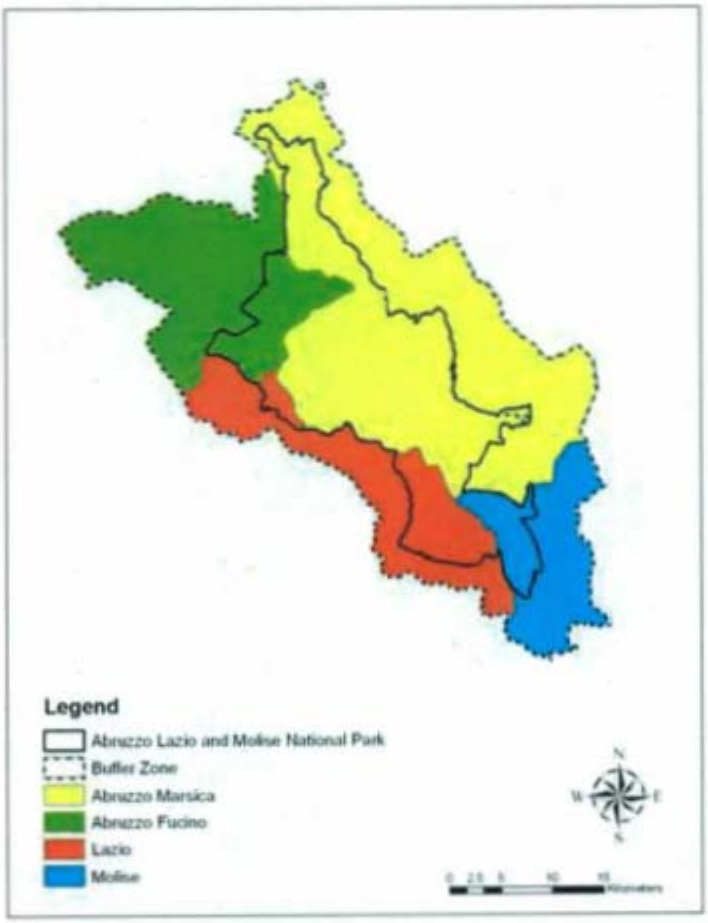

Figure 4.5 Study zones of the PNALM (© LeBlanc Philippe)

In determining how to identify the HD study zones, several biophysical and human factors were used, however, each zone is in a rural landscape. The territory was first divided according to geographical political boundaries, therefore separating Abruzzo, Lazio and Molise. In Italy, legislation regarding

natural resources, and specifically wildlife, is implemented at a regional level. Moreover, both Lazio and Molise officially joined the Park only recently and therefore certain benefits of the park, such as tourism and other infrastructure, are less developed.

Abruzzo was further divided into two study zones, Abruzzo Marsica and Abruzzo Fucino, to reflect the distinct topography and history of each. Abruzzo Fucino is in the plain area, where agriculture, mines and wind farms contribute to significant, often intense, economic development. On the other hand, Abruzzo Marsica is the historical heart of the park, and includes the park administrative centre in Pescasseroli. In Abruzzo Marsica, tourism activities are more developed, in part because people associate this zone with Abruzzo National Park (its previous name), but also due to the presence of popular ski resorts. This study zone is the only one that contains villages within the actual territory of the park – in the rest of the study zones, towns exist only within the buffer area.

The four study zones include a total of 28 communities of the park and buffer zone. Twenty-five of these towns are directly related to the park. Two more, Collelongo and Anversa negli Abruzzi, were included because residents were divided about whether to be part of the park. Finally, the town Ortucchio was included because poisoned bears and wolves have been found there.

As the impediments to conservation often come from the towns and their residents (e.g., those who use poison baits), my data collection has been focused

at the town level. In this way, the collected data should lead to an understanding of, and ability to address, these conservation challenges. Finer scale conservation must occur because poison baits and poaching occur at a local scale. Data collection must, therefore, also be at this scale.

5. Method

5.1. Data collection

Data were collected using a mixed methodology (Fowler, 2002; Ercikan and Roth, 2006). An initial qualitative approach was used to identify the key issues, their nature, and their importance from the perspective of various interest groups (Hay, 2005). In August 2006, preliminary qualitative interviews were completed over a one-week period with 44 individuals including park rangers, hunters, shepherds, biologists, truffle collectors and park managers. From this initial research, key issues were identified and a Common Ground Matrix (CGM) produced. This is a matrix that visually illustrates the main concerns from the perspective of each group. The result allows for an assessment of the common topics across various interest groups, i.e., the common ground (Bath, 2000). Following identification of the key issues, specific close-ended questions were designed to obtain the quantitative measurement of attitudes and beliefs toward wolves and brown bears.

The most recent national census (completed in 2001) was used to determine the appropriate strata and sample size for each community within each study zone, thus ensuring that sampling was completed in proportion to the target population (Sheskin, 1985; Hall and Hall, 1996; Vaske, 2008; Warner, 2008). While collecting data in the field, a lower rural population was found than was

expected from the 2001 census. Thus, in a few cases, slightly more or slightly less people were interviewed per town than would be indicated by the census results (see tables 5.1.1, 5.1.2, 5.1.3, 5.1.4).

Tables 5.1.1, 5.1.2, 5.1.3 and 5.1.4 are based on census tracts (ISTAT, 2001) for each region (Abruzzo, Lazio and Molise) that were used to determine the number and characteristics of participants needed from each village within each study zone. The residency, age and sex of individuals were taken into account to ensure the proportional representation of the target population (Sheskin, 1985; Hall and Hall, 1996; Vaske, 2008; Warner, 2008). Based on the census categories, three major age groups were defined: younger (from 20 to 39), middle-aged (from 40 to 64) and senior (65 and over). From the census data, it appeared that the population within each community was approximately 50% female and 50% male.

Based on these criteria, a total of 1611 people were interviewed, consisting of 402 residents from AM, 400 residents from MO, 410 residents from LA and 399 residents from AF.

Table 5.1.1 Sampling frame for Abruzzo Marsica

Communities	Residents ISTAT 2001	Expected	Interviewed
Alfedena	578	32	32
Anversa degli Abruzzi	373	21	22
Barrea	657	36	32
Bisegna	307	17	17
Civitella Alfedena	229	13	13
Opi	376	21	21

Ortona dei Marsi	726	40	40
Pescasseroli	1711	95	97
Scanno	1766	98	101
Villetta Barrea	482	27	27
Total	6723	400	402

Table 5.1.2 Sampling frame for Molise

Communities	Residents ISTAT 2001	Expected	Interviewed
Castel San Vincenzo	577	62	64
Filignano	756	82	82
Pizzone	328	36	36
Rocchetta a Volturno	1083	117	117
Scapoli	949	103	101
Total	3693	400	400

Table 5.1.3 Sampling frame for Lazio

Communities	Residents ISTAT 2001	Expected	Interviewed
Alvito	2480	96	97
Campoli Appennino	1394	54	54
Pescosolido	1223	47	47
Picinisco	934	36	37
San Biagio Saracinisco	300	12	12
San Donato Val di Comino	1806	70	83
Settefrati	684	26	26
Vallerotonda	1564	60	54
Total	10385	400	410

Table 5.1.4 Sampling frame for Abruzzo Fucino

Communities	Residents ISTAT 2001	Expected	Interviewed
Collelongo	1270	73	73
Gioia dei Marsi	1880	109	109
Lecce nei Marsi	1387	82	82
Ortucchio	1558	91	90
Villavallelonga	785	45	45
Total	6880	400	399

Respondents were selected using a stratified random sampling approach to ensure that the representation of groups in the sample was proportional to the population of each study zone (Sheskin, 1985; Hall and Hall, 1996; Vaske, 2008; Warner, 2008). A sample size of 400 per zone is standard and gives results considered accurate 19 times out of 20, plus or minus five percentage points (Sheskin, 1985). Such a sample size provides a 95% confidence level and ± 5% margin of error, a generally accepted standard in social science research (Vaske, 2008).

Only residents were interviewed. Most participants were selected simply by conducting the interview with the first adult contacted in the household. In order to collect responses from the required demographics, the interviewer would, at times, schedule interviews to ensure that males were at home after working hours. Other participants were interviewed using a street intercept method (Miller et al., 1997); a few individuals were interviewed in local cafés (typically, less than five people are in a café in rural Italy at one time). Indeed, adult males were more likely to be encountered at cafés or in the main squares of the towns than in their households; these individuals were still randomly selected using the "next to pass" rule.

The quantitative questionnaire was modelled after similar research instruments administered in other parts of Europe including France (Bath, 2000),

Croatia (Majić and Bath, 2010), Spain (Blanco and Cortés, 2002), and Portugal (Espirito-Santo, 2007).

The questionnaire consisted of 71 close-ended items (Appendix I). The close-ended items were designed by taking into consideration diverse literature (Krosnick, 1999; Kaczensky et al., 2004; Flowerdew and Martin, 2005). The questionnaire was designed to explore the various components of attitudes toward wolves and brown bears. A third section regarding compensation issues for both species was also included.

The questionnaire was tested before being implemented. After reviewing the wording of some questions, it was administered as a personal structured interview at the respondent's place of residence, or using the street intercept method. All of the items were close-ended, reducing the chances of interviewer bias. The principal researcher completed most of the interviews (n=1,200), occasionally accompanied by an assistant. A total of two assistants were trained and informed about the nature of the study, the importance of being objective, and the importance of reading the questions exactly as worded.

A face-to-face interview was identified as the most appropriate tool to implement the quantitative questionnaire. The literature demonstrates that a face-to-face method, despite the cost associated with conducting in-person interviews, tends to achieve a higher response rates than all other methods (Holbrook et al., 2003; Link et al., 2008). In Italy's rural areas, where there is still a

notable illiterate population, as well as an elderly population that might have difficulties in reading, a mailed survey would have resulted in a low response rate. Face-to-face interviews also allow the interviewer to observe non-verbal cues exhibited by respondents, and to react to those cues in constructive ways, reducing the task difficulty and keeping the respondent motivated (Holbrook et al., 2003). Indeed, Drolet and Morris (2000) showed that face-to-face contact led participants to feel more "in sync" with the interviewer, which led to improved collaborative task performance (Drolet and Morris, 2000). Moreover, interviewers during face-to-face sessions, in comparison to telephone or mail surveys, are more likely to be aware of distractions or multi-tasking (such as cooking), and can adapt to the situation (Holbrook et al., 2003).

By doing face-to-face interviews, it is possible to collect information to help understand the unique geographical-social context of each small town that could not otherwise be perceived. Italians like to talk, tell stories and give explanations with their responses, thus illustrating the broader context in which they have responded. Qualitative data were also collected during the study and reported as personal comments from participants regarding specific topics. Such qualitative information aids in the interpretation of the data gathered through the quantitative approach.

While interview lengths varied among respondents, usually due to their different levels of interest, most interviews were completed within 30 minutes.

Data entry occurred simultaneously as data collection. Quality control and checking procedures were used during coding, data entry and data preparation for analysis (Tabachnick and Fidell, 2001). Each entry was re-controlled and compared with the corresponding questionnaire to ensure that coding was done correctly. Quality control and checking procedures did not reveal any significant problems with the data.

Interviewer bias was checked through testing whether any differences occurred in the attitudes of respondents across the three interviewers; no significant differences were found. In other words, the data gathered by the assistants was compared with that of the principal researcher and no significant difference was found.

5.2. Data analysis

The current study includes a total of four articles. In this subsection, all methods used to conduct this dissertation are presented. Specifically, the statistical analyses used to address each objective in this research are explained.

First, a review of the existing literature of HD studies done in Italy was conducted. These findings can suggest opportunities for future research in Italy and contribute to the theoretical field of HD in general. In developing the subsequent three papers, it was intended to answer the research goal of understanding attitudes toward wolves and brown bears by focusing on specific

components of attitudes and the relationships between each of them. A probability level of .05 was used in evaluating the statistical significance of the results. All the statistical analyses were undertaken using the software SPSS version 17 (SPSS, 2008).

In the first paper, gray literature and peer-reviewed articles regarding HD in Italy were retrieved by searching several databases within different disciplines. Different combinations of keywords in English and in Italian were used to search for documents. A bibliometric analysis (Tague-Sutcliffe, 1992; Schneider and Borlund, 2004; Vaske et al., 2006) was then performed on the 32 manuscripts obtained. The year 2010 was not included as this research was conducted before that year had finished; the number of documents for 2010 would have been an underestimation of the total.

In the second paper, descriptive analyses were used to visually examine the strength and the direction of the affective and cognitive components of attitudes (Verplanken et al., 1998) held by the residents of the PNALM regarding wolves and brown bears. A comparison between wolves and bears on the affective (i.e. liking/disliking), cognitive (i.e. fear) and behavioural intention (i.e. support protection) components of attitudes were achieved using a paired t-test. An extensive literature review of folklore and cultural practices was used to help understand the differences in attitudes toward wolves and bears by the residents of the PNALM.

In the third paper, two separate path analyses based on multiple regression analysis were carried out to examine if the same model applies to both brown bears and wolves. The intention to support various management options toward wolves and bears (normative beliefs) was the criterion variable, the perceived damage beliefs (cognitive component) was the predictor and the feelings toward these two species (affective component) was the mediator. Cronbach's alpha was used to test for internal consistency in each set of variables.

The final paper focused on exploring the third component of attitudes and understanding the relationship with the other two components. Respondents were segmented into groups based on their responses to four management options for wolves and two management options for brown bears. Separate K-means cluster analyses were used to identify homogenous groups of respondents based on their normative beliefs. Chi-square was used to examine the relationships between the independent and dependent variables. Cramér's V served as the effect size measure. Values of V at .1 were considered as "minimal" relationships; .30 was labelled as "typical," and V = .50 or higher were categorized as "substantial" relationships (Vaske, 2008). This analytical approach was used by Vaske and Needham (2007) to examine public beliefs about conflict with coyotes and it seemed appropriate to apply the same techniques to the present data.

6. **References Part I**

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Part II: Papers

7. Paper 1: Human dimensions of wildlife in Europe: the Italian way

Abstract

In comparison to North America, human dimensions of wildlife (HDW) remains a relatively new field in Europe, especially in Italy. This article provides a European overview of HDW using Italy as a case study. Overall, 299 European HDW documents were retrieved, out of which 32 were found for Italy. Multiple languages and unpublished documents limited the findings at a European level. The case study highlights the constraints of conducting a review at a larger scale. A bibliometric analysis was used to investigate the trends, the main themes and actors playing a role in the Italian HDW up to and including 2009. The majority of Italian documents were gray literature, about general public attitudes toward large carnivores. Most of the results of the case study can be generalized to Europe. Although HDW is growing, the discipline still strives to be recognized academically and as a decision-making tool.

Keywords: academic discipline; bibliometric analysis; herbivores; Italy; large carnivores

Introduction

Historically, decisions regarding how to best manage wildlife were centered on information coming only from biophysical sciences (Blanchard, 2000; Musiani, Boitani & Paquet, 2009). Starting in the early 1940s in the United States, wildlife managers and conservationists began to realize that humans were the main factor influencing wildlife management. The changing role of people, however, from external elements to components of wildlife management, started only in the mid-1960s (Manfredo, 1989), when hunters and fishers became the main actors of recreational studies (Decker, Krueger, Bear, Knuth & Richmond, 1996).

The term "human dimensions of wildlife" (HDW) was introduced by Hendee and Schoenfeld (1973) during the North American Wildlife and Natural Resources Conference (Manfredo, Decker & Duda, 1998; Manfredo, 2008) and was defined as the way "people value wildlife, how they want wildlife to be managed, and how [they] affect or are affected by wildlife and wildlife management decisions" (Decker, Brown & Siemer, 2001, p. 3). In less than 50 years, the field of human dimensions in North America has emerged, evolved and become an academically accredited discipline (Manfredo, Vaske, Brown, Decker& Dike, 2009).

Overview of Human Dimensions in Europe

Unlike the North American continent, defining Europe as a unit is a challenging task. It is composed of 50 countries, with 33 languages and three different alphabets (Latin, Greek, Cyrillic). The unification of the countries to form the current Europe is relatively new (e.g., all the former communist countries). The European Union was founded to bring together the economic powers of different countries. Within the European Union (27 member states), there is a bond in the geo-political organization, but not in the socio-cultural aspects of each member. Each country holds its own identity, language and culture. These features complicated a review of HDW in Europe.

We started with a search of HDW published documents, reports and cross-references. Only studies on wildlife and related issues were selected, without taking into consideration documents on environmental issues (e.g., landscape, wilderness, agriculture). This process highlighted several limitations, including the ability to understand languages and alphabets, and the ability to retrieve documents. From this first glimpse on HDW documents, 299 studies were obtained in 11 different languages and for 26 countries (Albania, Austria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom).

Increasing large carnivore populations in Europe and the connected signs of human-wildlife conflicts resulted in the spread of attitudinal studies throughout Europe. The first attitudinal studies in Europe on wolves were done by Åsgård (1976) in Norway and Andersson, Bjärvall and Blomberg (1977) in Sweden. Systematic and structured HDW studies followed in 1980s in Scandinavia (Norling, Jägnert & Lundahl, 1981 in Swedish; Bjärvall, 1983; Gjertz, & Persen, 1987; Dahle, 1987 in Norwegian; Dahle, Solberg & Sodal, 1987 in Norwegian; Frafjord, 1988 in Norwegian). In the same decade a HDW study was carried out in Western Carpathian Mountains toward the coexistence of humans with brown bears (Hell, & Bevilaqua, 1988 in German). These early HDW studies were mostly unpublished documents, often written in the authors' native language. Since the beginning of the 1990s, reports started to be translated and published as peer-reviewed articles in Scandinavia (Dahle, Solberg, & Sådahl, 1990; Bjerke, 1993; Kuitunen, & Törmälä, 1994; Bjerke, & Reitan, 1994; Arbeiderblad, 1994) as well as in the rest of Europe (Huber, Mitevski, & Kuhar, 1992; Kellert, 1993; Radišić, Novosel, Huber, & Frković, 1994; Davey, 1994 a,b). Important HDW articles for Europe were published by authors like Bath, Bjerke, Hunziker, Kaczensky, Kaltenborn, Linnell, Skogen among others.

A landmark for HDW studies is the foundation of the Large Carnivore Initiative for Europe (LCIE). This European initiative aims to foster coexistence between people and large carnivores, while maintaining and restoring viable

populations of carnivore species across Europe (Schröder, 1998). Sponsored by LCIE and connected organizations (e.g., KORA in Switzerland, NINA in Norway), studies have bloomed in European countries on wolf, brown bear, lynx and wolverine since 1995 (e.g., Strahm, 1998).

Of the 299 documents obtained, the majority (n=272) were dated after 1994. Of the 26 European countries explored, Norway, with 54 studies, was the most productive (Figure 7.1). Italy was the second with 32 documents, however this is probably an overestimation given the authors' increased ability to retrieve and understand documents in their native language. Studies focused on attitudes of general public and different interest groups (farmers, hunters, anglers) toward wildlife species (large carnivores, herbivores, nuisance species).

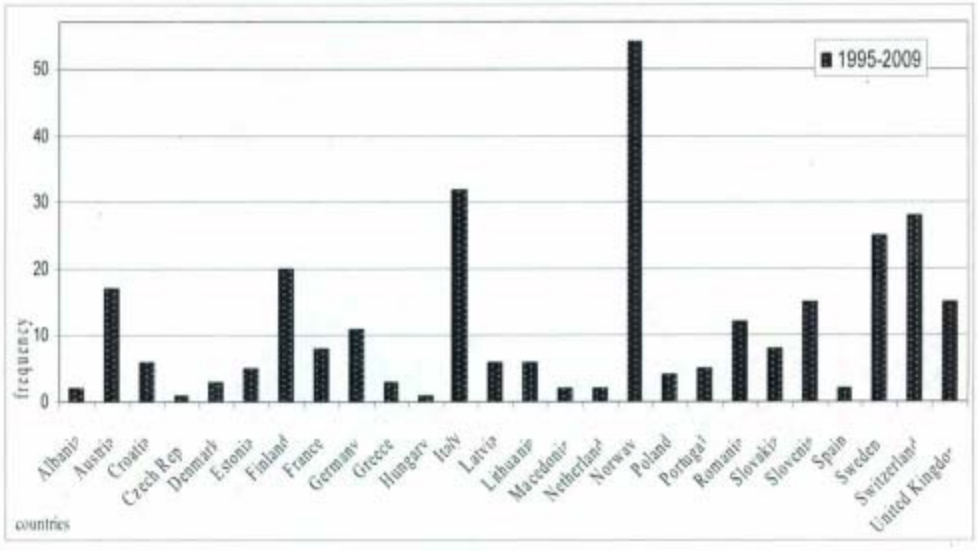

Figure 7.1. Number of HDW studies in Europe between 1995 and 2009.

To share the results of HDW studies with the local public, most documents (n=91, 30%) were published in the native language of the country in which the research was conducted. In limited cases an English abstract was provided as an overview of the study. Different languages and alphabets represented the main constraints in trying to characterize HDW in Europe. Numerous studies did not result in peer-reviewed articles, which constrained the ability of the authors to create a complete picture of HDW in Europe. Because of the difficulties encountered in collecting and reviewing HDW studies throughout Europe, Italy was selected as a case study, due to the authors' knowledge of the language and cultural context. This article analyzed HDW documents from Italy in an attempt to generalize lessons learned and to highlight future research priorities in Europe.

Human Dimensions: An Italian Case Study

Attitudes toward wolves were initially examined in 1975-76 in Abruzzo as part of a dissertation in psychology (Serracchiani, 1976). In the same period, Boitani and Zimen (1979) made a presentation at a conference in North Carolina (United States) about the role people played in wolf management. Influenced by his North American experience and academic colleagues, Boitani understood the importance of integrating humans in wildlife management and became a HDW promoter in Italy.

Despite diverse of studies encompassing human and wildlife issues have been conducted in Italy, there has not been an attempt to present this research in a context to understand the progress and direction of HDW as a field.

This article analyzed the HDW literature to understand how it is applied in wildlife research in Italy. Specifically, we address the following objectives:

(1) Explore HDW trends over time;

(2) Investigate the main themes researched;

(3) Understand the main actors and sample size of the studies.

An overview of Italian HDW research was conducted using a bibliometric analysis to highlight past practices and to identify future research priorities. A bibliometric study is a quantitative analysis of the production, distribution and use of information from a specific field (Tague-Sutcliffe, 1992; Schneider & Borlund, 2004). It measures different aspects and topics such as types of articles, frequency of articles, main themes and analytical procedures (Vaske, Shelby & Manfredo, 2006). A comprehensive review of HDW studies in Italy was created based on peer- reviewed articles and gray literature found by the authors until 2009.

Methods

Several methods were used to generate the sample of the case study: (a) computerized searches were conducted of online databases (Google scholar, Web of Science, Taylor & Francis, Science Direct, BioOne Online Journals, Wiley

Online library, Emerald, Blackwell Synergy Website, DART-Europe E-theses Portal); (b) references in each article identified were evaluated for inclusion; (c) the correspondent authors of conference presentations and/or abstracts were contacted and requests were made for unpublished studies; (d) an Italian group composed of wildlife conservationists called the "*lista dei vertebrati*" (vertebrate list) was contacted to broaden the search for unpublished studies in the native language; (e) different disciplines such as sociology, geography and tourism were considered. Different combinations of keywords in English and Italian were used while searching the online databases (e.g., human dimensions, wildlife, wolf, bear, deer, wild boar, hunting, management, perception, attitude, opinion, public participation, conflict, coexistence, tolerance, questionnaire, and Doxa; the latter is a marketing agency that designs questionnaires).

All documents that had been published or distributed on wildlife were considered for bibliometric analysis. The year 2010 was not included, as this research was conducted before that year had finished, thus the number of documents obtained in 2010 would be an underestimation. Gray literature was considered as unpublished documents, including reports and dissertations. To avoid double-counting, the first appearance in time of a document has been taken into account for data analysis.

Results

A total of 32 studies were obtained, excluding the two documents written in the 1970s, which were not available (Table 7.1). Of these documents, two (6%) were peer reviewed articles, 19 (59%) were technical reports and 11 (35%) were dissertations. Gray literature represented 94% of the information available for HDW studies in Italy.

No peer reviewed articles or gray literature were found from the late 1970s to the beginning of the 2000s. The first HDW research dates back to 2003, with three conservation biology master theses (Table 7.1). The highest number of HD studies was reached in 2007 with nine documents.

Table 7.1 Frequencies of types of HD documents for Italy

Document	# of Total	Documents Type		
Year	Documents per year	Report	Dissertation	Article
2003	3		3	
2004	2	2		
2005	6	4	2	
2006	1		1	
2007	9	6	2	1
2008	5	4		1

2009	6	3	3	
Total #	32	19	11	2

The majority of studies, 18 (56%), had large carnivores as subjects (Table 7.2). Within this category, some focused on more than one species; specifically, eight documents (42%) were on both wolves and bears. The second biggest category consisted of 10 (31%) studies on herbivores; seven (70%) were on wild boar (*Sus scrofa*), two (20%) on deer (*Cervus elaphus*), and one (10%) on mouflon (*Ovis musimon*) (Table 2). The last category labelled "wildlife," was composed of three (75%) other wildlife species (bird, sea turtle and coypu), and even one (25%) on mosquitoes (*Aedes sp.*). We found the highest number of peer reviewed articles (67%) within the "wildlife" category.

Table 7.2 Frequencies of themes in HD documents for Italy

Document Year	# of Total Documents per year	Theme-Species		
		Large Carnivores	Herbivores	Wildlife
2003	3	2	1	
2004	2	1	1	
2005	6	5	1	
2006	1	1		
2007	9	6	1	2
2008	5	1	3	1
2009	6	2	3	1
Total #	32	18	10	4

The majority of data used in the studies was gathered from the general public (Figure 7.2). Papers that focused specifically on large carnivores drew from a more diverse audience, likely due to the controversial nature of the species. Interest groups (e.g., farmers, hunters) were often examined separately in studies referencing large carnivores. In the other two categories, mixed groups, composed of the general public and some interest groups, were more commonly

used (Figure 7.2). The category "others-professions" refers to veterinarians and anglers

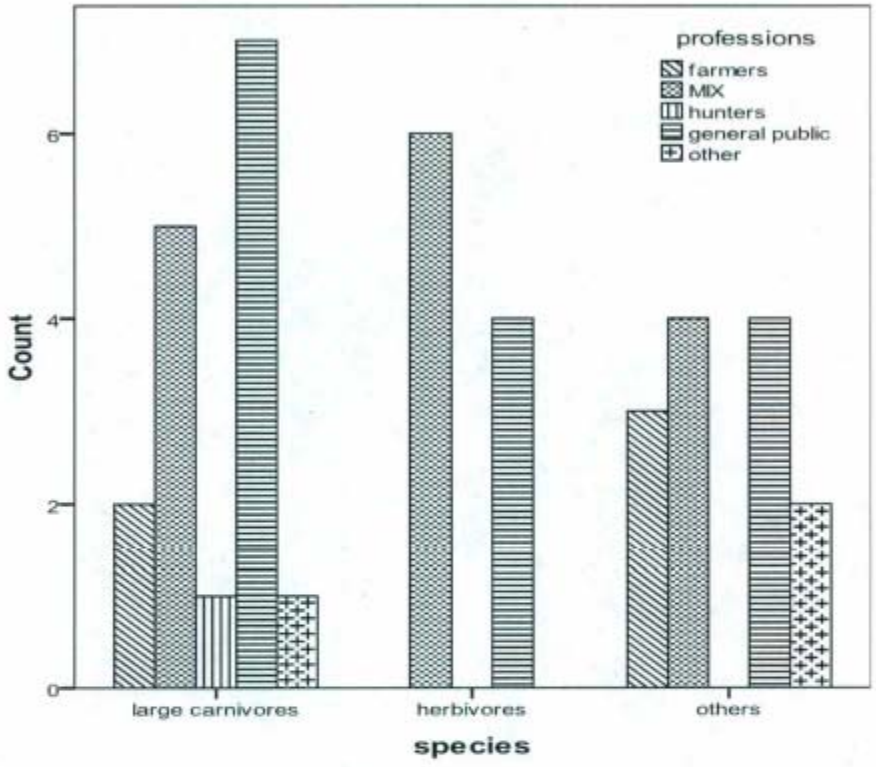

Figure 7.2. Interest groups involved per species studied

Studies that focused on large carnivores were more likely to include data from a large sample group than those dealing with herbivores or other wildlife. In the first group, studies generally included 400 or more interviews, with some exceeding 1,000 participants. In the other two categories, sample sizes ranged from 100-200 for herbivores and 200-400 for "others". Despite the methods applied, studies involving different interest groups drew from relatively small

sample sizes; when a study focused on the attitudes of the general public, larger sample sizes were obtained.

Discussion

Only 32 HDW documents were obtained by searching within several disciplines and different search engines and keywords for Italy; only two of them were peer-reviewed articles regarding wildlife (Panzacchi, Bertolino, Cocchi, & Genovesi 2007; Carrieri, Bellini, Maccaferri, Gallo, Maini & Celli, 2008). Compared to other countries in Europe, where HDW research has been conducted since the 1990s, the discipline in Italy began in 2003 and has continued to increase since. This trend may be due to the establishment of the Master in Conservation Biology program at La Sapienza University (Rome), organized by Professor Luigi Boitani. Currently, La Sapienza University is the only institution in Italy where a module of HDW is taught within a Masters level program; however, the module has been led for several years by Dr. Alistair Bath, an overseas professor.

In Europe, only two other Master programs - one in Germany, one in Croatia - contain HDW as a short course module within their programs on Conservation Biology or Sustainable Resource Management. Students attending the HDW module in Italy have recognized the importance of including HDW into Conservation Biology research by carrying out dissertations as part of their Master degree. Thus, most of our gray literature is represented by unpublished

Master theses. It might be possible that a similar phenomenon is occurring in other European countries; these studies are unpublished and most of them written in their native language thus constraining the ability to gather them.

In Italy, as in the rest of Europe, a comparatively large number of HDW studies focused on large carnivores. Several reasons may explain this. First, the HDW module of the Master program taught in Italy (as in Croatia and Germany) was based on examples focused on large carnivores. Second, large carnivores are charismatic mega fauna, and fully protected by European laws (Trouwborst, 2010). Third, large carnivores (i.e., wolf, bear, wolverine, lynx) are expanding their territory throughout Europe, thus occupying areas of previous extinction (Boitani 2000; Swenson, Gerstl, Dahle, & Zedrosser, 2000; Ericsson and Heberlein 2003; Enserink & Vogel, 2006; Trouwborst, 2010). This has resulted in increased interactions between humans and large carnivores, fostering the need to integrate HDW in wildlife management across Europe. Finally, the growing wolf population in Europe is reviving old conflicts due to the lack of exposure today's residents have to this species (Schröder, 1998; Valière et al., 2003; Ciucci, Reggioni, Maiorano & Boitani, 2009). For all of these reasons, attitudes toward wolves, followed by bears, were the main themes of HDW studies carried out in Italy and Europe until now.

In Italy, the general public was the main actor in HDW research and sample sizes ranged between 400 and 600 interviews. The lack of attitudinal

baseline data is probably the principal reason why studies have focused mainly on the general public. The sample size is based on the accepted statistical standard that at least 400 individuals are needed to generalize results to a large population (Vaske, 2008). It was not possible to compare these findings with the rest of Europe. Many European studies did not include an English abstract, and of those that did, did not report the sample size and/or the specific actors.

It appears that in Italy, wildlife experts and managers, despite being exposed to HDW tools, do not believe in the effectiveness of this discipline, nor do they trust that HDW can improve wildlife management and conservation in Italy. They are reluctant to delegate power to the general public and unwilling to let them decide how to manage wildlife (e.g., establishing the number of wildlife tolerated in an area). Those wildlife agencies who do believe in HDW are constrained by policy and the lack of political stability; they are not able to integrate the results of the HDW investigations into their mandates. The frequent political turnover of higher power positions (i.e., park managers and directors) does not allow long-term planning and decision-making, thus making HDW, as well as other management tools, inefficient. To ensure a given political position or project funding, Italians may agree to use new management tools; in reality, they will usually wait to see what is best to do to survive the next political change.

Apparently, the Italian way is to embrace changes in policy and society without actually modifying anything - and, therefore, nothing will change. HDW has been carried out in accordance with the current European conservation mandates (e.g., LCIE), without having the time and continuity to develop the proper background necessary to implement this discipline. This approach to HDW does not reflect the whole of Europe; every single country is culturally different and has embraced this discipline in its own way. For example, in Croatia (Bath & Majić, 2001; Majić & Bath, 2010) HDW research application resulted in the implementation of a wolf and bear management plan.

Conclusions

Similar to the impediments highlighted by Decker, Brown and Mattfeld (1987), HDW in Italy and in Europe is struggling due to a lack of: biological studies that incorporate humans; recognition as a field; and acceptance by managers of social science studies. Ten years ago, Boitani (2000) expressed his concern that local attitudes were considered to be known more from an "expert" viewpoint than from appropriate scientific research. While advances have been made, with sporadic inclusion of humans in biophysical projects, HDW is still not a recognized discipline in Europe. This may be due to a lack of agreement about HDW vocabulary and to the lack of publications about HDW in many parts of Europe. Ironically, in some European countries (e.g., Portugal, Denmark), even though HDW is not yet recognized as a scholarly enterprise, studies are

considered as academic exercises and not as management tools. After the completion of interviews in a report or in a dissertation there is generally no follow up, and research therefore remains a one-shot case study (e.g., Panchetti, 2003; Espirito-Santo, 2007). The lack of implementation of HDW findings frustrates participants who have been consulted about wildlife issues and yet are unable to influence the decision-making process. Until managers recognize and have the political will to engage with the public, understand the public's perceptions toward wildlife and involve them in decision-making processes, HDW will never result in a complete process of public participation.

It is encouraging that HDW has reached Europe. Since HDW is still a young field, there are plenty of research possibilities and capacity for the discipline to take root in Europe if properly planned. The establishment of HDW in academia can provide a unique opportunity to integrate social science in wildlife management and to open up these possibilities to research.

The Italian case study highlighted the difficulties in conducting bibliometric analysis for the whole of Europe. Constraints encountered included gray literature, a lack of common HDW terminology, and studies written in a variety of languages. The lack of a common European language and the usage of multiple alphabets hinder the authors' ability to generalize the findings of the Italian case study to Europe. A European review could be possible only with the collaboration of HDW authors across the continent.

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8. Paper 2: The influence of folklore and cultural practices in understanding rural attitudes toward Apennine wolves *(Canis lupus italicus)* and Apennine brown bears *(Ursus arctos marsicanus)*

Abstract

Wolves and bears are expanding throughout Europe despite an increasingly human-dominated landscape. Conservation of these two species depends on the attitudes of those who live close to them. Quantitative face-to-face (n= 1611) interviews were carried out to determine the attitudes held by residents of a national park in central Italy toward wolves and bears. Descriptive and paired t-test analyses were carried out to identify residents' attitudes toward the large carnivores, and to examine any differences in attitudes toward wolves and bears. Attitudes were positive toward both carnivores; however, residents tended to favour bears to wolves. Wolves and bears are surrounded by many myths and legends, which influence the public's general attitudes toward these large carnivores. Folklore literature, comparing northern and southern European countries, was used to help understand residents' attitudes, and to suggest possible explanations for why there were differences in attitudes toward wolves and bears. Managers could use this information to improve conservation strategies for these two large carnivores.

Key words: Europe, feelings, Italy, large carnivores, legends, myths

Introduction

Between the end of 2006 and the summer of 2007, I personally interviewed more than 1,600 people living in and around the Abruzzo, Lazio and Molise (PNALM) national park located in central Italy. During that period, I lived briefly in several towns in PNALM while I carried out face-to-face interviews using a close-ended questionnaire. I asked residents for their opinions about the wolves and brown bears with whom they coexist. Italians like to talk, tell stories and offer lengthy explanations, thus qualitative data were also collected during the same interviews. Several residents told me stories and legends about wolves and bears, which led to my interest in the possible influence of folklore on their attitudes.

With this article I attempt to suggest possible interpretations of ethnographic discourses and cultural practices in light of the information I collected during the interviews. I endeavour to draw parallels between how large carnivores, like wolves and bears, are viewed in northern and southern Europe and how folklore literature and cultural practices in these two geographical areas helps to understand attitudes toward these two predators.

During my review of the available literature, I found that more articles, chapters and books refer to wolves than bears. Certain notable patterns emerged: wolves were predominately portrayed as negative figures, especially in northern

European literature; bears were portrayed in legends and stories in a more mixed/positive way.

I am not trying to propose that attitudes are created by folklore; I do endeavour to point out how attitudes, as measured through quantitative survey methods, may have been influenced by stories and legends. Examining folklore surrounding wolves and brown bears can help create a better understanding of what is behind the attitudes people hold, and how these attitudes are influenced by cultural situations, events and mythology.

In this article, I first explore the attitudes toward wolves and bears, and how they vary geographically in Europe. Subsequently, I focus on the analysis from the quantitative data collected through interviews. I will illustrate my analyses with examples of stories narrated during those interviews. Finally, I explore folklore and cultural practices across Europe and use this literature as a means of interpretation of the results of the quantitative interviews.

Wolves and bears in European landscape

Europe is a densely populated continent of many different languages and cultures. There is no wilderness; all natural vegetation has been transformed into human landscapes, where humans roam together with wildlife (Schröder, 1998). As cities expand into contiguous forests, the importance of rural areas for the conservation of wolves and brown bears increase. The responsibility for local management of wildlife varies greatly from country to country (Enserink &

Vogel, 2006), even though there are overarching European directives that control the conservation status of species and habitats (Trouwborst, 2010).

Wolves and bears have been protected across Europe since the end of the 1970s. Following decades of legal protection, the recovery of forest cover and, subsequently, recovery of the carnivores' natural prey have meant that wolves and bears are increasing in number and expanding their territories. The animals are returning to their native range throughout Europe (Trouwborst, 2010; Enserink & Vogel, 2006; Ericsson & Heberlein, 2003; Skogen & Krange, 2003; Boitani, 2000; Swenson, Gerstl, Dahle, & Zedrosser, 2000). Both positive and negative human attitudes have been associated with the expansion and recovery of the range of large carnivore (Morzillo, Mertig, Garner, & Liu, 2007; Bowman, Leopold, Vilella, & Gill, 2004; Enck & Brown, 2002; Schoenecker & Shaw, 1997). Negative attitudes and conflicts with large carnivores have been documented mainly in rural areas (e.g., Skogen, Mauz, & Krange, 2008; Ericsson & Heberlein 2003; Bjerke, Reitan, & Kellert, 1998; Kellert, Black, Rush, & Bath, 1996). Public attitudes toward large carnivores are believed to be most positive when the animals are absent (Karlsson & Sjöström, 2007; Zimmermann, Wabakken, & Dötterer, 2001; Kellert et al., 1996) or in areas where human always coexisted with them (Kaczensky, Blazic, & Gossow, 2004; Bath & Majić, 2000; Boitani, 1995). Italy has seen thousands of years of intensive human presence, leading to a mix of natural ecosystems and human landscapes (Maiorano, Falcucci, & Boitani,

2006). Italians have learned to live with large carnivores (Boitani, 1995); in turn, wolves have adapted to live in a human landscape and have expanded throughout the Apennine Mountains (Ciucci, Reggioni, Maiorano, & Boitani, 2009; Valière et al., 2003; Schröder, 1998). Likewise, brown bears are expanding in central areas of the Italian peninsula (Ciucci & Boitani, 2008; Enserink & Vogel, 2006).

Nature conservation is generally accepted as important by modern western societies today (Musiani, Boitani & Paquet, 2009; Van Den Born, Lenders, De Groot, & Huijsman, 2001), and this includes the protection of large carnivores (Soliva & Hunziker, 2009; Breitenmoser, 1998). Nevertheless, the management of large carnivores is one of the most controversial environmental policy issues in this human landscape (Musiani et al., 2009; Bostedt, Ericsson, & Kinderberg, 2008; Karlsson & Sjöström, 2007). Large charismatic carnivores often evoke considerable emotion, are often surrounded by myth, and have considerable cultural symbolism (Bruskotter, Vaske, & Schmidt, 2009; Skogen & Thrane, 2008; Bruskotter, Schmidt, & Teel, 2007; Kellert et al., 1996).

In Europe, where the folklore of large carnivores is significant, studying the myths and legends surrounding the wolf and brown bear will better help understand attitudes toward these species, and could assist in their conservation (Bieder, 2007; Boitani, 1995). Indeed, the symbolic status of wolves and brown bears is so significant that biologists have suggested that beliefs about these large

carnivores can be more important than the objective truth (Fritts, Stephensn, Hayes, & Boitani, 2003).

Attitudes toward wolves and bears

To understand the different views held toward wolves and bears, it is important to appreciate and integrate legends, myths, science and attitudes surrounding these large carnivores (Lynn, 2010). Several authors have pointed out the importance of understanding the attitudes of the people who are most directly affected by large carnivores. It is the rural people who live with these predators, and experience regular contact with them, that ultimately decide the destiny of these species (Majić & Bath, 2010; Morzillo et al., 2007; Ericsson & Heberlein, 2003; Merrill, Mattson, Wright, & Quigley, 1999). For example, although certain areas may be able to support viable populations of predators from a biological perspective, public attitudes and behaviours may mean the difference between the successful and unsuccessful implementation of a conservation project (Bath, Olszanska, & Okarma, 2008; Woodroffe, 2000; Lohr, Ballard, & Bath, 1996).

Attitudes toward large carnivores have been conceptualized and polarized as positive and negative (Meadow, Reading, Philipps, Mehringer, & Miller, 2005; Bath, 1991; Bath & Buchanan, 1989; Kellert, 1985). For example, positive attitudes include a favourable assessment of a species' right to exist, and that a species is a symbol of the greatness of nature (McFarlane, Craig, Stumpf-

Allen, & Watson, 2007; Kaczensky et al., 2004; Bright & Manfredo, 1996; Pate, Manfredo, Bright, & Tischbein, 1996). In contrast, negative attitudes toward large predators are linked to beliefs about livestock losses and the danger presented by predators coming into close contact with humans in developed areas (Enck & Brown, 2002; Schoenecker & Shaw, 1997). These attitudes can be affected by direct and indirect experience with the predators, cultural values, whether the respondents live in a rural or urban setting and the respondent's spatial distance from the large carnivores (McFarlane et al., 2007; Karlsson & Sjöström, 2007; Morzillo et al., 2007; Meadow et al., 2005; Williams, Ericsson & Heberlein, 2002; Kellert, 1985).

Scope and objectives

The overarching goal of this paper is to link qualitative and quantitative data to offer a meaningful perspective. On the one hand, I attempt to illustrate the importance of collecting qualitative data at the same time as quantitative data to help in the contextualization of the information gathered. I also examine the value of using folklore literature to help understand the attitudes of residents living inside and surrounding the PNALM. On the other hand, the objective of the quantitative study was to identify and compare attitudes toward wolves and brown bears among residents living inside and surrounding the PNALM.

In carrying out this research, I used an accepted definition of attitude, and its three components: attitudes are positive or negative evaluations of an object,

such as wolves or bears, and are a mental state composed by affective (feelings), cognitive (beliefs) and behavioural intention components (Manfredo, 2008; Cooke & Sheeran 2004; Bohner & Wanke, 2002; Eagly & Chaiken 1993).

Methods

Study Area

The PNALM is the core area of the endangered endemic subspecies of brown bear, the Apennine brown bear (*Ursus arctos marsicanus*) (Altobello, 1921) and the most important wolf (*Canis lupus italicus)* source population for Italy (Boitani & Ciucci, 1993; Boitani, 1992). Neither wolves nor bears have ever been extirpated from the PNALM (Carpaneto & Boitani, 2003; Zunino & Herrero, 1972). In and around the national park there are approximately half a million people who coexist with these large carnivores. The territory of the park and buffer zone covers 1,200 km^2, and is considered to be a rural area, of which more than 56% is forested and 58% is used for livestock breeding land use (Ciucci & Boitani, 2008). Within the boundaries of the national park there are 25 towns and villages, which cover 2% of the territory and are located mainly at low altitudes and along valley bottoms (Posillico, Meriggi, Pagnin, Lovari, & Russo, 2004).

Data Collection and Analysis

Stratified random sampling proportional to each township's population was used to ensure representative samples from the communities. Data on community populations were obtained from the official 2001 census (Istituto

Nazionale di Statistica [ISTAT], www.istat.it, 2001). A close-ended questionnaire was administered through face-to-face interviews with 1611 residents of PNALM (response rate = 80%). Respondents were the first adult contacted in a household and most interviews were completed within 30 minutes. Data were collected between the end of November 2006 and June 2007. All items included in the questionnaire were identified through initial qualitative interviews with different interest groups (e.g., hunters, shepherds, park rangers) and pre-tested before implementation.

Respondents rated their general feelings toward wolves/bears. Questions were coded on a 5-point scale ranging from strongly dislike (-2) to strongly like (2). Respondents also indicated their level of agreement with: (a) It is important to maintain wolf/bear populations in your region so that future generations can enjoy them; (b) Having wolves/bears in your region increases tourism; (c) Wolves/bears should remain completely protected (i.e., it should be illegal to kill them); (d) In areas where there are continuous attacks on livestock, it should be possible to selectively kill wolves/bears. Responses were measured on a 5-point scale ranging from strongly disagree (-2) to strongly agree (2).

Descriptive analyses as well as paired sample t-tests were carried out to identify whether there were differences in attitudes toward wolves and bears. In addition, ethnographical data were used to offer context for the quantitative data collected. The correlation coefficient r is used as a measurement of the effect size

measure. Values of r at .10 were considered "minimal" relationships; .30 was labelled as "typical," and r = .50 or higher were categorized as "substantial" relationships (Vaske, 2008).

Results

Attitudes toward brown bears from a quantitative perspective

Residents in and around the PNALM held positive attitudes (strongly liking and liking) toward brown bears and wolves. Feelings toward brown bears (83%) were more positive than toward wolves (69%) (Figure 8.1). This was also confirmed statistically by the paired t-test (Table 8.1).

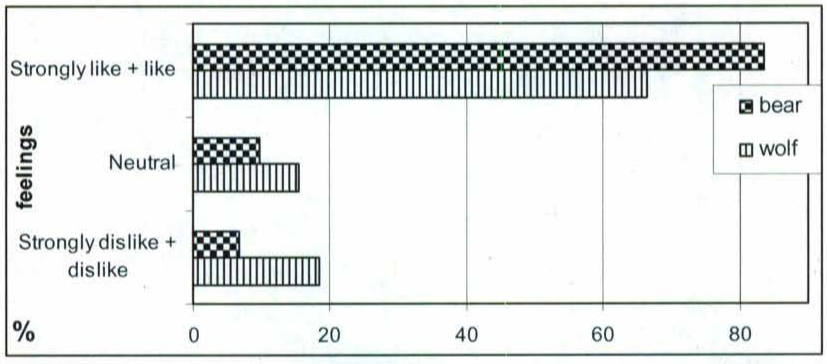

Figure 8.1. Percentage of positive, neutral and negative attitudes toward wolves and brown bears

Wolves and bears were also rated differently on the value of their continued existence. More than 87% of residents believed it was important to maintain wolves for future generations; 94% held this view for bears. When asked whether wolves should remain completely protected, residents' agreement reached 80% for wolves and 88% for bears. When asked if wolves should be

selectively killed in the case of continuous livestock depredation, a strong majority of residents disagreed (70%); there was an even stronger disagreement toward killing bears (88%). Residents were evenly split about whether they would be afraid to hike in the woods if wolves/bears were present. Nearly half agreed or strongly agreed (45% for wolves and bears) they would be afraid, but most all of the rest of the participants disagreed or strongly disagreed with the statement (53% for wolves and 54% for bears). Paired t-tests illustrated that statistically significant differences existed between attitudes toward bears and wolves for all the above items except for fear, and the effect size was substantial for all the items (Table 8.1).

Table 8.1. Paired sample t-test results on attitudinal items[1]

	Mean	Standard deviation	t-value	Effect size *r*
Feelings toward wolves-bears	-.45	.95	-18.87	.510
Future generation value	-.19	.70	-10.66	.567
Fear toward wolves-bears	.03	1.08	.324 (ns)	.649
Protection wolves-bears	-.19	.87	-8.89	.489
Select killing wolves-bears	.46	1.07	17.31	.456

[1]All are significant at $p<0.001$ except fear which is not statistically significant.

Attitudes toward brown bears from a qualitative perspective

The majority of respondents expressed pride that they were living in the PNALM where bears were still present. Most participants felt that bears are still

living in the area because of them; that they were the ones protecting the animals. Regarding wolves, the comments were less enthusiastic. However, respondents were happy to know that there were wolves in their region and expressed high value for their existence: "wolves have always been here, why should they not be in the future?" Residents felt that while both animals were justified in killing livestock to satisfy their hunger, bears are "fair" with the shepherds because: "the bear jumps the fence and takes only one sheep under his arm and leaves the rest undisturbed, whereas the wolf kills all the sheep and he does not even eat them all."

Legends of big black wolves with red eyes roaming in the forest are common across the PNALM, as are stories about people disappearing and only one shoe being found. This led to the belief that there have been attacks by wolves on humans in the past. Nowadays, residents tend to believe that wolves are "tame" because they are smaller and look similar to dogs. Some residents expressed fear of meeting bears with cubs because of possible attacks. However, a high number of residents organize expeditions to see bears, displaying a fascination with these large carnivores. Many have succeeded in encountering bears at least once in their lives.

Discussion

Given that rural areas are increasingly important for large carnivore habitat, support for the conservation of these species depends highly on tolerant

rural residents (Trouwborst, 2010; Ciucci & Boitani, 2008; Petram, Knauer, & Kaczensky, 2004). In this study, rural attitudes toward brown bears and wolves emerged as positive. My results contribute to the ongoing debate on the nature of rural resident attitudes toward large carnivores.

According to one interpretation, rural residents with more direct experience with large carnivores should hold negative attitudes (Bostedt et al., 2008; Heberlein & Ericsson, 2005; Williams et al., 2002), because they are more likely to perceive carnivores as a threat to rural economic activities and leisure pursuits (Skogen & Thrane, 2008; Milbourne, 2003; Bjerke et al., 1998). Røskaft, Händer, Bjerke & Kaltenborn (2007) state that in Norway the conflict is greatest in rural areas between humans and large carnivores. This may, however, not be the case in Italy either historically or currently.

The question becomes: why are rural residents' attitudes different from those of rural populations in other areas of Europe? In Latin cultures like Italy, rural residents tend to live in closed towns; in Germanic societies, like in Norway, residents generally live in more open settlements and solitary farms; Breitenmoser (1998) believes these characteristics lead to increased tolerance amongst southern European residents. Since Roman times, in Italy shepherds have been sedentary and have had housing to protect their livestock during the night. As well, there is a tradition of owning dogs to guard the livestock (Schwartz, Swenson, & Miller, 2003; Boitani, 1995). In northern Europe, such

traditions were lacking, partially due to the temporary extermination of wolves and brown bears (Swenson et al., 2000). Conflicts tend to be stronger in areas where large carnivores have recently come back (Musiani et al., 2009; Ciucci & Boitani, 1998). Where there has been a constant carnivore presence and residents have traditionally always co-existed with them, wildlife tolerance tends to be higher (Campbell & Lancaster, 2010; Morzillo et al., 2007). Given that wolves and brown bears were never completely exterminated from Italy (Boitani & Ciucci, 1993), herders have maintained a continuous respect for these large carnivores.

Residents in the PNALM support the maintenance and protection of both wolves and bears and do not agree with the killing of these large carnivores. Contrary to northern Europe, where wolves and bears were exterminated in the Middle Ages (Schwartz et al., 2003; Swenson et al., 2000), there has never been an extensive campaign to destroy wolves or bears in eastern and southern Europe, leaving few relict populations (Boitani, 1995). In Italy, shepherds rarely killed wolves, preferring to defend their sheep with guard dogs and fences (Nobili, 2002). Bears were hunted mainly as trophies, rarely to control livestock depredation and never to exterminate them (Siever, 1999).

In 1872, a royal hunting reserve was established in Abruzzo to protect the Apennine brown bear as well as the chamois of Abruzzo (*Rupicapra pyrenaica ornata*) (Zunino & Herrero, 1972). At the same time, the wolf was persecuted in

effort to reduce livestock depredation and to decrease predation pressure on chamois and other wildlife species (Siever, 1999). Italian wolf hunters had neither the organization nor the persistence of their northern European counterparts (Boitani, 1992). However, each time a wolf was caught, it was reason to celebrate, and those who persecuted the wolves were seen as heroes (Gandolfi, 2007). In Italy today, although legally protected, it is still possible to find wolves hanging from streetlights of the squares in Lazio (Nobili, 2002) and not so long ago in Abruzzo (Gandolfi, 2007). While public hangings of wolves are rare, there may be remnant feelings that cause residents to be less positive toward wolves than brown bears.

In PNALM, there have never been any documented attacks by bears or wolves on humans. Residents who participated in this study expressed the same level of fear toward both large carnivores. Slightly more than half of the participants stated that they are not afraid of hiking, even knowing that wolves and/or bears could be present along the way.

In general, in southern and eastern Europe, where large carnivores have never been exterminated, people are not notably concerned about potential attacks on humans (Musiani et al., 2009). In contrast, in rural landscapes in northern Europe, large carnivores are still perceived as affecting human safety (Bisi, Kurki, Svensberg, & Liukkonen, 2007; Kleiven, Bjerke, & Kaltenborn, 2004;

Bjerke et al., 1998), even though there are very few reports of wolves and bears attacking humans (Linnell et al., 2003; Olson, 2001).

Wolves and bears in folklore

Face-to-face interviews not only contributed to the successful gathering of quantitative data, but also provided an opportunity for respondents to share stories and legends about wolves and bears. For example, a common legend across the PNALM is that the reintroduction of wolves is accomplished with the use of helicopters. Some believe biologists repopulate wolves in an area by throwing parachute-wearing wolves from helicopters; the wolves are believed to be able to remove the parachutes by themselves and roam the new territory.

Listening to stories and legends like this one made me consider the role that cultural practices and folklore could play in influencing attitudes and beliefs, and that folklore could provide important background and context for understanding quantitative results. I therefore revisited how large carnivores, like wolves and bears, were viewed in the folklore literature of northern and southern Europe. I organized the myths and legends chronologically, from ancient Greece and Roman times through the Middle Ages to modern society.

Wolves and bears play an important role in classical Greek and Roman mythology. In classical Greece, Zeus fell in love with the nymph Callisto. Hera, Zeus' wife, discovering that Callisto had an affair with her husband and was the mother of his child, transformed Callisto into a bear, separating the mother from

her child. Years later, the child (now grown up) was going to kill a bear, not knowing it was his mother Callisto. To save her, Zeus transported Callisto and their son to the heavens, becoming the constellations known as the Great and Little Bear (Ursa major and minor) (Bieder, 2007).

Apollo, god of light, son of Zeus and Leto, was characterized by the wolf. When Leto was pregnant, a wolf appeared to her and passed to her child, Apollo, the vital essence of the solar wolf. Apollo was given the surname of *Lukogenes* (born of the wolf) (Werness, 2004).

For the Romans, the wolf was a major figure. A legend recounts that Rome was founded by the twins Romulus and Remus, who were nursed by a she-wolf (Boitani, 1995). At the same time, Romans were using bears as entertainment to fight lions or gladiators in the Coliseum (Bieder, 2007).

In northern Europe, early legends exist about beings that were half-bear/half-human, symbolizing strength and demonstrating how people had great respect for carnivores that could stand upright and enjoy a diverse diet like humans (Werness, 2004; Schwartz et al., 2003). The Vikings believed that wearing bear fur during battle guaranteed protection. Some Norwegian warriors, the *berserker* (*ber*, bear and *serkr*, coat), were feared because it was believed that they could transform themselves into bears during battle (Bieder, 2007).

Many family names have their roots in the word "bear" or related terms (e.g., King Arthur from the Celtic word for bear *artos*). A number of villages and cities are named after the carnivore (such as Berlin or Bern) (Swenson et al., 2000).

Wolf symbolism, however, tends to be more ambiguous: mainly associated with darkness and aggression in the north of Europe, but linked with the sun and spirit in southern countries. Barbarian populations were nomad warriors, living by hunting and nomadic farming; the wolf was their primary enemy because it competed for prey species and killed their livestock (Nobili, 2002).

With the increased influence of the church across Europe, non-human animals were used in painting and sculpture, mainly to provide moral lessons. For example, the bear was strong - but also lazy, clumsy and lustful. The wolf was often a symbol of human avarice and dishonesty (Nobili, 2002). In northern Europe, the legend of the half-human and half-bear changed in meaning, as the bear-man became a symbol of male sexuality (in tales of bears kidnapping and raping women, for example) (Rowland, 1973). In southern Europe, Dante portrayed Count Ugolino and his sons as the wolf and his whelps. Count Ugolino was a traitor from Pisa imprisoned by Archbishop Ruggieri, who was another betrayed of his country. Both were condemned to the Second Rig of the Ninth Circle of Hell (Rowland, 1973).

Several modern fables feature wolves; most of them come from northern Europe. These include *Peter and the wolf, The boy who cried wolf, The three little pigs* and *Red Riding Hood* (Dingwall, 2001; Boitani, 1995). These childhood tales all have negative connotations associated with this large carnivore, which likely contributes to the negative attitudes toward wolves (Ratamäki, 2008). Fewer European tales are known with bears as protagonists, the most famous being *Goldilocks and the three bears* (Bieder, 2007). During the 20th century there has been a transformation in children's stories, with predators and wilderness becoming sublime and reversing the ethos of the hunters (Varga, 2009). Nonetheless, the oral tradition of northern European countries contains many stories of people being attacked by large carnivores, but only a few have any form of supporting documentation (Ratamäki, 2008; Linnell et al., 2003).

These legends and myths suggest an influence on contemporary attitudes toward, and knowledge of, the animals. The differences that exist between the northern and southern European countries in terms of myths are reflected as well in the people's attitudes. General attitudes toward wolves and bears have improved over the past few decades, especially in urban areas (Fritts et al., 2003). Nevertheless, in rural landscapes in northern Europe, large carnivores are still perceived as threats to livestock and human safety (Bisi et al., 2007; Kleiven et al., 2004; Bjerke et al., 1998). Attitudes in southern Europe are notably different from those in the rest of Europe (Boitani, 2003). Historical, geographic, and, above all,

cultural practices have fostered relative tolerance toward wolves (Boitani, 1995) and bears.

Conclusions

Overall, the positive attitudes in the PNALM toward wolves and brown bears should be encouraging for managers. Such positive attitudes can be attributed to a long period of coexistence, during which these large carnivores have played an important cultural role in society through positive myths and stories. This study contributes to the debate about the effects of the presence or absence of large carnivores on rural attitudes by suggesting that as long as animals are present, the attitudes of residents remain positive. When the animal populations disappear or are exterminated, more negative attitudes tend to develop (Bath et al., 2008; Kaczensky et al., 2004; Bath and Majić, 2000; Boitani, 1995). Gaining a more comprehensive understanding of public attitudes toward wolves and bears will help managers integrate useful social science research into wildlife management (Bath & Enck, 2003).

The most common representations of non-human animals in literature are found in fables, legends and myths. In most cases, when writing about non-human animals, humans use their imaginations and cultural stereotypes (Harel, 2009). Non-human animals are generally anthropomorphized (Foltz, 2010); wolves and bears are used as metaphors for human traits, behaviours or abstract values. Different cultures conceptualize non-human animals in a variety of ways.

Understanding the local culture and myths may help managers recognize the basis of people's reactions and act accordingly.

Those involved in the human dimensions (HD) research field may find it useful to adopt a broader scholarly approach and include input from other disciplinary areas in order to expand the understanding of attitudes. Managers as well as those within the HD discipline should realize the importance of collecting data through face-to-face interviews when speaking about symbolic charismatic species such as wolves and bears.

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9. Paper 3: The moderating influence of knowledge on feelings, beliefs and normative beliefs about wolves and bears

Abstract

Using the cognitive hierarchy as a theoretical foundation, this article examines the predictive influence of beliefs and feelings on normative beliefs about wolves and brown bears. Knowledge is hypothesized to moderate these relationships. Data were obtained from stratified random face-to-face interviews conducted within an Italian National Park (n = 1611). Two separate path analyses based on multiple regression analysis were carried out. Both models supported the role of feelings in mediating perceived impact beliefs and support for the protection of large carnivores. Knowledge was found to moderate these relationships in the case of wolves. The same was not found regarding brown bears.

These findings support the idea of affect being more important than cognition in predicting normative beliefs. Residents of the national park held a higher level of knowledge about bears than wolves, suggesting the importance of educational programs for conservation.

Keywords affect, knowledge, Italy, large carnivores, path analysis

Introduction

Large charismatic carnivores have considerable cultural symbolism (Kellert et al. 1996; Mech and Boitani 2003; Bruskotter et al. 2007; Bruskotter et al. 2009), and are often used as flagship species for broader conservation initiatives (Simberloff 1998). In Europe, wolves and bears are legally protected by two main conservation regimes: the "Bern Convention on the Conservation of European Wildlife and Natural Habitats" and the "EU Habitats Directive" (for review see Trouwborst 2010). Wildlife management, however, exhibits great differences across Europe. The management of large carnivores is controversial (Karlsson and Sjöström 2007; Bisi et al. 2007; Bostedt et al. 2008; Trouwborst 2010). Carnivores are re-colonizing areas where they have long been absent, and which are currently inhabited by humans (Boitani 2000; Swenson et al. 2000; Ericsson and Heberlein 2003; Trouwborst 2010); their presence raises the potential for conflict (Messmer 2000; Kretser et al. 2008; Bisi et al. 2010). In highly populated areas such as southern Europe, predators and humans always had frequent interactions (Boitani 1995; Messmer 2000; Treves et al. 2004; Kretser et al. 2008; Kretser et al. 2009). Because of these links between the animals and people – including the sharing of the same geographic areas – understanding public attitudes, beliefs and behaviours toward these large carnivores is important. Indeed, it can make the difference between a successful or unsuccessful implementation of a conservation project (Wilson 2008; Meuser et al. 2009).

Wolves and bears are fully protected in Italy by national legislation (Boitani and Ciucci 1993; Ciucci and Boitani 2008). Italian wolves (*Canis lupus italicus*), also called Apennine wolves, have been officially protected since 1976 (Boitani and Ciucci 1993). Elderly residents still remember the "lupari", people who were paid to kill wolves (Nobili 2002; Bonini 2006; Gandolfi 2007). The Apennine brown bear (*Ursus arctos marsicanus*) is an endemic subspecies protected in Italy since 1992 (Ciucci and Boitani 2008). Bears have been protected in Abruzzo since 1939 (Zunino and Herrero 1972). In spite of this, between five and 10 wolves and bears are illegally killed (poisoned or shot) per year in the territory of the Abruzzo, Lazio and Molise National Park (PNALM) (Ciucci and Boitani 2010).

In Italy, the enforcement of protection laws is challenging. Often, rural law enforcement personnel fail to prosecute those who illegally kill large carnivores because they sympathize with the reasons for the poaching (the economic hardship suffered by shepherds due to livestock damage, for example) (Fritts et al. 2003). For conservation purposes, it is important to understand whether residents of this national park are supportive of the protection of wolves and brown bears, and whether their personal norms for acceptable management actions are consistent with their feelings and beliefs.

In this article, I investigate whether the intention to support various management options toward wolves and bears (normative beliefs) is predicted

by the perceived impact belief of damage (cognitive component) and by the feelings toward these two species (affective component). Based on the cognitive hierarchy (Fulton et al. 1996), attitudes were hypothesized to mediate the relationship between perceived impact beliefs and norms. I also hypothesized that knowledge of each species would moderate the relationships. Two models are constructed to explore the hypotheses: one for wolves and one for bears.

Theoretical Approach

Attitudes are positive or negative evaluations of an object, in this case wolves or bears, and are composed of affective (feelings) and cognitive (beliefs) components (Eagly and Chaiken 1993; Verplanken et al.1998; Cooke and Sheeran 2004). The affective component of attitudes itself consists of the feelings, moods, emotions, and sympathetic nervous system activity experienced in relation to an object or behaviour (Eagly and Chaiken 1993; Bright and Manfredo1996). The cognitive component of attitudes refers to beliefs and thoughts held about an object (e.g., wolf/bear), and represent the information an individual possesses about that object, which may or may not be accurate (Ostrom 1969; Eagly and Chaicken 1993).

Norm variables examine acceptability evaluations (what a person, group or institution should do) (Zinn et al. 1998; Bruskotter et al. 2009; Glikman et al. 2010), while attitude measures focus on positive or negative evaluations. Following Vaske and Whittaker (2004), I define normative beliefs as personal

judgements about what is appropriate in different situations. In this study, normative beliefs are used to judge the acceptability of wolf/bear management practices in the PNALM.

It is suggested that attitudes, beliefs and norms mediate the relationship between values and behaviour (Whittaker et al. 2006) in a hierarchical structure from general to specific (Fulton et al. 1996). Specific belief, attitudinal, or normative variables are more likely to predict behaviours than more general measures like values (Ajzen and Fishbein 1980; Glikman et al. 2010). Following the cognitive hierarchy structure approach, attitudes are theorized to influence norms, which in turn predict behavioural intention and ultimately behaviour (Fulton et al. 1996; Vaske and Donnelly 1999; Vaske 2008). Understanding the relationship between attitudes, beliefs and behaviour can be one of the most important theoretical and applied issues of human dimensions conservation projects.

The proposed model consists of three parts. First, the affective component of attitudes (i.e., feelings toward wolves/bears) is posited to directly predict the normative beliefs that would see respondents supporting or opposing the protection of large carnivores. Second, the cognitive component (i.e., perceived impact belief of damage) is posited to serve as direct antecedent to the affective component. Third, knowledge about wolves/bears is posited to moderate the model.

A moderator (i.e., knowledge) is a variable that affects the direction and/or strength of the relationship between the predictor (i.e., perceived impact belief) and a criterion variable (i.e., support protection toward wolves/bears); whereas a mediator (i.e., feelings) is a variable that accounts for the relationship between the predictor and the criterion (Baron and Kenny 1986) (Figure 9.1).

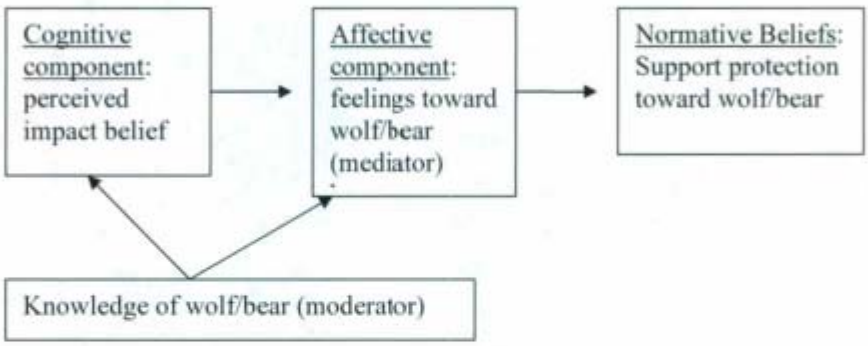

Figure 9.1. Theoretical framework of the effect of moderation and mediation for the attitudinal models based on the cognitive hierarchy

The Affective and Cognitive Components of Attitudes

The affective component of attitudes can produce reactions that may contribute to the evaluations of attitude objects and to behaviours separate and distinct from cognitions (Ostrom 1969; van der Pligt et al. 1997; Verplanken et al.1998). Evaluations of affect are straightforward and instantaneous (Wilson 2008); as they are an instinctive feeling towards something they do not need to be tested for truth like other cognitions (Verplanken et al. 1998). On the other hand, beliefs are information learned through formal education or from other

individuals and may or may not be true; these cognitions can be proven. Feelings may produce positive or negative evaluation without impacting one's beliefs about the attitude object or the behaviour.

The cognitive component of attitudes involves two factors: (a) perceived impact belief of damage caused by wolves/bears (e.g., wolves killing livestock); (b) objective knowledge about these large carnivores (e.g., pack size of wolves).

Perceived impact belief of damage represents the extent to which individuals believe that wolves/bears damage human activities such as livestock farming and beekeeping. Kellert (1985) suggested that the dislike of wolves was due to perceptions that wolves are dangerous to humans and that they damage human property. Gazzola et al. (2008) reported that actual damage is generally much lower than perceived damage, particularly in the case of the wolf.

Objective knowledge represents the extent to which individuals know the facts about wolf/bear biology. Several studies indicate that a high level of knowledge about a species leads to more positive attitudes toward that species (Kellert 1985; Bath and Buchanan 1989; Ericsson and Heberlein 2003; Mustoni et al. 2003; Kaczensky et al. 2004; McFarlane et al. 2007; Balčiauskas et al. 2010). Many studies have found a negative relationship between knowledge and support for wolves/bears (Bath 1994; Ericsson and Heberlein 2003); acquiring new information regarding wolves/bears could result in an attitude change for those individuals with low levels of knowledge. At the same time, other studies

(Petty and Carcioppo 1986; Prislin 1996; Berninger et al. 2009) have demonstrated that a high level of knowledge leads to more resistance to attitude change and tends to reinforce and rationalize already formed attitudes (Kellert 1994; Kellert et al. 1996; Bright and Manfredo 1995).

It can be expected that attitudes held by a person towards an object result from the interaction between that individual's beliefs and feelings. In this study, it was explored how cognition (knowledge about wolves/bears) relates to a person's attitude toward wolves/bears and that species' management. Using the cognitive hierarchy as the theoretical foundation, it was hypothesized that:

H_1: Feelings toward wolves/bears (affective component of attitude) and the support of management options (normative beliefs) will show a positive relationship (i.e., those holding positive feelings toward wolves/bears will be more willing to support protection)

H_2: Perceived damage beliefs (cognitive component of attitude) will have a negative relationship with the affective component and normative beliefs (i.e., those who believe that wolves/bears cause significant damage will hold more negative attitudes toward, and will be less supportive of, protection of these carnivores)

H_3: Knowledge of wolves/bears will show a positive relationship with the affective component of attitude (i.e., those who have higher levels of knowledge will have more positive feelings toward wolves/bears)

H_4: Knowledge will moderate the relationship between attitudes (affective and cognitive component) and normative beliefs (i.e., the strength or directions of the relationship between the two variables will be affected by the moderator)

H_5: Feelings toward wolves/bears (affective component of attitude) will mediate the relationship between the cognitive components of attitude (perceived damage beliefs and knowledge) and the intention to support management options (normative beliefs) (i.e., the strength of the relationship between the variables will be affected by the mediator)

Methods

Study Area

There are currently seven to eight wild wolf packs in Italy's PNALM, with a total estimated population of 40 wolves (Latini et al. 2005). About 40-50 brown bears inhabit the national park and surrounding buffer zone (Gervasi et al. 2008). There are approximately half a million people within the national park and in the surrounding buffer zone.

Survey design and questionnaire

A close-ended questionnaire was administrated through face-to-face interviews with 1,611 residents of the PNALM (response rate = 80%). Stratified random sampling proportional to each township's population was used to ensure representative samples from the 28 communities in the park and buffer zone. Data on community populations were obtained from the official 2001 census (Istituto Nazionale di Statistica [ISTAT], www.istat.it, 2001). Interviews were conducted between November 2006 and June 2007. All questionnaire items were identified through initial qualitative interviews with different interest groups (e.g., hunters, shepherds) and pre-tested before implementation.

Variables in the Model

Predictor: Perceived damage beliefs. Separate general belief indexes regarding the impacts of wolves and bears were computed, each based on three variables. Respondents were asked to indicate their level of agreement with a number of statements, including: wolves cause significant damage to livestock; wolves limit the population of small or big game species (Table 9.1); bears cause significant damage to livestock, beehives and orchards (Table 9.2). Responses were measured on a five-point scale, ranging from strongly disagree (-2) to strongly agree (2).

Mediator: the affective component of attitude toward wolves/bears. Separate average scores were computed to gauge general attitudes toward

wolves and bears. Respondents rated their (a) general feelings toward wolves/bears and (b) the importance of wolves/bears in their region (Table 9.1 and Table 9.2). Responses were coded on a five-point scale ranging from strongly dislike (-2) to strongly like (2).

Criterion variables: Normative beliefs as management options. Each respondent's normative beliefs were constructed using four variables for wolves and two variables for bears. This allows the measuring of support or opposition toward management of wolves/bears (Table 9.1 and Table 9.2). Responses were coded on a five-point scale, ranging from strongly disagree (-2) to strongly agree (2).

Moderator: Knowledge of wolves/bears. Knowledge of wolves/bears was measured using five wolf and five bear-related statements. All questions in this category were given in multiple-choice format, and included a "do not know" option. Responses were coded as "correct" (1), "incorrect" and "do not know" (0). A composite knowledge score was achieved by adding the number of correct responses given by each individual.

Analysis

Descriptive analyses were performed to calculate the mean and percentage of residents who displayed specific attitudes, beliefs, normative beliefs and level of knowledge about wolves/bears. The internal consistency of the beliefs, feelings and management options were examined using Cronbach's

alpha reliability coefficients. Separate path analyses were used to assess the mediation role of attitudes towards wolves and bears, and the moderator effect of knowledge.

Mediation was tested by verifying the following three conditions: (1) the significant relationship between the predictor (i.e., perceived damage beliefs) and the mediator (i.e., attitudes toward wolves/bears); (2) the significant relationship between the criterion (i.e., normative beliefs) and the mediator; and (3) when the effect of mediator is controlled, the effects of the predictor should not be significant (and theoretically equal to zero) (Baron and Kenny 1986).

Moderation was examined by including the interaction between knowledge and beliefs in the model. A significant coefficient value for this variable suggests moderation (Barron and Kenny 1986). Path analysis is useful to test causality based on a theoretical framework because it allows testing of specific, hypothesized causal relationships (Ericsson and Heberlein 2003). Path coefficients are calculated to estimate the strength of the relationships between variables in a model. The path coefficients are calculated from a series of multiple regression analyses, based on the assumed relationship (Alwin and Hauser 1975). SPSS for Windows (version 17) was used for all the analyses.

Results

All respondents held positive attitudes toward both wolves and bears; they tended to disagree with that statement that the two large carnivores cause

significant damage to human property. Participants supported the protection of both species (Table 9.1 and 9.2). Reliability analysis of attitudinal items toward wolves (Cronbach's alpha =0.82) and toward bears (Cronbach's alpha= 0.85) supported the creation of these two computed variables. Values of overall Cronbach's alpha for the computed perceived impact beliefs of wolves (Cronbach's alpha 0.72) and bears (Cronbach's alpha =0.65) were lower, but still considered acceptable (Cronbach, 1951; Murphy and Davidshofer 1991). Finally, reliability analysis of normative belief items toward wolves (Cronbach's alpha =0.70) and toward bears (Cronbach's alpha =0.75) supported the creation of these two computed variables.

Table 9.1 Descriptive statistics and reliability analyses for attitudes, beliefs and normative beliefs toward wolves

Question	Mean	Standard deviation	Cronbach's Alpha
Attitudes toward wolves	.62	.48	.82 [3]
Which of the following best describes your feelings toward wolves? [1]	.55	1.05	
To have wolves in your region is for you: [2]	.70	.91	
Beliefs about the impact of wolves	-.11	.85	.72
Wolves have a significant impact on big game (example roe deer) [4]	-.19	1.04	
Wolves eating have a significant impact on small game (hare). [4]	-.32	.98	
Wolves cause significant damages to livestock [4]	.16	1.16	
Normative beliefs about wolves	1.02	.60	.70

Wolf should remain completely protected (i.e. it should be illegal to kill them) [4]	1.11	.42
In the area where there are continuous attacks to livestock, it should be possible to kill selective wolves. [4-5]	.56	1.13
It should be authorized the hunting of wolves [4-5]	1.10	.89
It should be authorized the use of poison baits to control wolves [4-5]	1.32	.67

[1]Variables coded on a 5-point scale from completely negative (-2) to completely positive (+2).
[2]Variable coded on a 5-point scale from completely dislike (-2) to completely like (+2).
[3]Cronbach's alpha based on 2 variables.
[4]Variable coded on a 5-point scale from strongly disagree (-2) to strongly agree (+2).
[5] Reverse code

Table 9.2 Descriptive statistics and reliability analyses for attitudes, beliefs and normative beliefs toward bears

Question	Mean	Standard deviation	Alpha
Attitudes toward bears	1.01	.75	.85 [3]
Which of the following best describes your feelings toward bears? [1]	1.00	.83	
To have bears in your region is for you: [2]	1.02	.77	
Beliefs about the impact of bears	-.10	.80	.65
Bears cause significant damages to livestock [4]	-.40	1.03	
Bears cause significant damages to beehives [4]	.03	1.03	
Bears cause significant damages to orchards and agriculture crops [4]	.08	1.06	
Normative beliefs about bears	.99	.75	.75[3]
Bear should remain completely protected (i.e. it should be illegal to kill them) [4]	.95	.79	
In the area where there are continuous attacks to livestock, it should be possible to kill selective bears. [4-5]	1.02	.87	

[1]Variables coded on a 5-point scale from completely negative (-2) to completely positive (+2).
[2]Variable coded on a 5-point scale from completely dislike (-2) to completely like (+2).

[3]Cronbach's alpha based on 2 variables.
[4]Variable coded on a 5-point scale from strongly disagree (-2) to strongly agree (+2).
[5] Reverse code

Respondents displayed more knowledge about bears than wolves (Table 9.3). Eleven per cent of respondents answered all five of the bear questions correctly; only four per cent answered all of the wolf questions correctly. The mean score for bears was 3.18 (out of 5) for bears and 2.30 for wolves.

Table 9.3 Descriptive statistics for knowledge

	Mean	Standard deviation	Incorrect[1]	Correct [1]
Wolves				
Are wolves completely protected in Italy? (Yes -No -Don't know)	.78	.41	22	78
How much does the average adult male wolf weight (kg) in Italy? (1-25/26-50/51-75/ More than 75/ Don't know)	.55	.50	45	55
What is the average pack size of wolves in Italy? (1-5/ 6-9 / 10-15 / More than 15 / Don't know)	.43	.49	58	42
It is generally true that only two members (one pair) of a wolf pack breed in any one year? (Yes -No -Don't know)	.22	.41	78	22
How many times a wolf reproduce per year? (Once /Twice/ Three times/ More than three/ Don't know)	.33	.47	67	33
Bears				
Are bears completely protected in Italy? (Yes -No -Don't know)	.92	.27	8	92
How many times a bear reproduce per year? (Once /Twice/ Three times/ Neither one (it reproduces every other year) / Don't	.81	.40	20	80

know)				
In the park which is the average litter size of bears? (1-3 / 4-6 / 7-9 / More than 9 / Don't know)	.40	.49	60	40
Is it true that the bear goes into hibernation during winter time in your region? (Yes, but not continuous/ Yes, all the winter time / No/ Don't know)	.80	.40	20	80
The bear is generally: (A solitary animal/Lives in couples /Lives in groups/ Don't know)	.25	.43	75	25

1Variable in percentages

Mediation and Moderation Models

The direct influences of the affective and cognitive components of attitudes on normative beliefs, and the effect of knowledge on the criterion were examined through a series of multiple regression analyses for each species. The two path analyses showed similarities in their direct path coefficients and in the explanation of their variation.

Supporting the first hypothesis (H_1), feelings toward wolves and bears (the affective component of attitudes) showed a positive relationship with normative beliefs ($\beta = .50$ $p < 0.001$; and $\beta = .49$ $p < 0.001$, respectively) (Fig. 9.2 and 9.3). Consistent with the second hypothesis (H_2), perceived impact belief (cognitive component of attitude) showed a negative relationship with both feelings ($\beta = -.54$, $p < 0.001$; and $\beta = -.36$, $p < 0.001$) and normative beliefs ($\beta = -.14$, $p < 0.001$; and $\beta = -.12$, $p < 0.001$) toward wolves and bears. Together, the two components of attitude explained 33% of variance for wolves and 29% for

bears (R^2 = .33, df = 2, F = 389.59, p < 0.001 and R^2 = .29, df = 2, F = 332.54, p < 0.001).

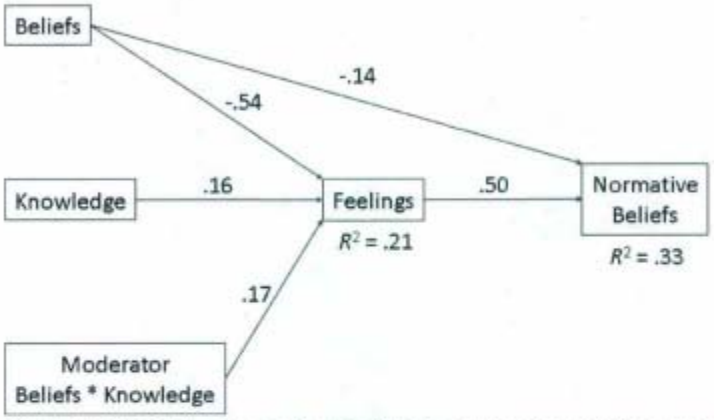

Figure 9.2 Path analysis model based on multiple regression analyses for wolves

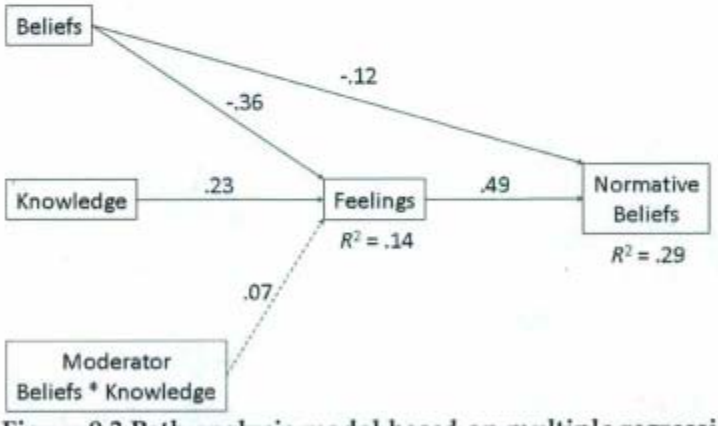

Figure 9.3 Path analysis model based on multiple regression analyses for bears. Dotted line stands for non-significance path between moderator and feelings

Level of knowledge was positively related to the affective component of attitude for both wolves and bears (β = .16 p < 0.001; and β = .23 p < 0.001, respectively). The positive coefficient implies that individuals with higher levels of knowledge were more likely to have positive feelings toward wolves and bears; they were also more likely to perceive that the impact of the animals was not significant. These findings support Hypothesis 3 (Fig. 9.2 and 9.3).

In the wolf model, the interaction of the perceived impact belief (cognitive component of attitudes) and knowledge (the moderator) was statistically significant (β = .17, p < .001, Fig. 9.2); this was not the case in the bear model (β = .07, p= .34 ns). These findings only partially support Hypothesis 4 and the moderating role of knowledge. Both models demonstrate that the affective component of attitude (feelings toward wolves and bears) mediated cognitive variables (perceived impact belief and knowledge) and normative beliefs (R^2 = .21, df = 3, F = 138.72, p < 0.001 for wolves and R^2 = .14, df = 3, F = 88.98, p < 0.001 for bears) (H_5). Following Baron and Kenny (1986) three conditions, the mediation resulted to be a partial mediation. Both wolf and bear models, indeed, did have a significant relationship between the predictor and the mediator (β = -0.35 p < 0.001; β = -0.27 p < 0.001 respectively) and a significant relationship between the criterion and the mediator (β = -0.42 p < 0.001 for wolves; β =-0.30 p < 0.001 for bears) and finally, the effects of the predictor was still significant (β =

0.14 $p < 0.001$; β=-0.12$p < 0.001$) even when the effect of mediator was controlled ($\beta = 0.50$ $p < 0.001$; $\beta = 0.49p < 0.001$).

Discussion

To increase awareness about the endangered brown bears in the PNALM, the logo of the park has been an image of a brown bear since 2001. This may have helped generate positive feelings towards the animal among residents. While there are limited educational materials (e.g., leaflets, brochures, etc.) about the large carnivores found in the national park, information campaigns have focused more on brown bears than wolves. Residents in the PNALM had a higher level of knowledge of bears than wolves, and this may explain why knowledge did moderate the model for wolves but not for bears. At the same time, the effect of knowledge on the affective component of attitude was stronger for bears than for wolves.

Education has been recognized as forming and modifying attitudes through the process of cognitive learning about an object (Eagly and Chaiken 1993, Kellert et al. 1996, Lucherini and Merino 2008). Consistent with many other studies (Kellert 1985; Bath and Buchanan 1989; Ericsson and Heberlein 2003; Mustoni et al. 2003; Kaczensky et al. 2004; McFarlane et al. 2007; Balčiauskas et al. 2010), higher levels of knowledge resulted in stronger positive attitudes toward the species, especially bears. Strong attitudes, whether positive or negative, suggest persistency and tend to be better predictors of behavioural intention

(Prislin1996; Verplanken et al. 1998). This suggests that stronger attitudes toward bears and, to a certain extent, wolves, are more resistant to change (Petty and Carcioppo 1986; Prislin 1996; Berninger et al. 2009). Although the direct influence of education cannot be proven to change or reinforce the attitudes of some residents, from a conservation point of view it is encouraging to see a positive significant relationship between knowledge and positive attitudes of residents toward bears and wolves.

Perceived impact belief had a stronger effect on feelings than on normative belief, supporting the duality of the attitude component (Ostrum 1969; Eagly and Chaiken 1993; Verplanken et al.1998; Cooke and Sheeran 2004). As expected, the relationship was negative, demonstrating consistency within an individual's attitude: those who believed wolves/bears cause significant damage held more negative feelings toward the species.

Supporting the findings of previous studies (Pate et al. 1996; Zinn et al. 1998; Decker et al. 2006; Bruskotter et al 2009), perceived impacts are negatively associated with support of protectionism. Also consistent with previous studies (Kellert 1985; Kellert et al 1996; Breitenmoser, 1998; Vittersø et al. 1999; Teel et al., 2002; Kleiven et al., 2004; Bath et al., 2008), wolves are blamed for more damage than bears, which explains the stronger relationship between perceived impact beliefs and feelings toward wolves. Overall, residents of the PNALM did not

perceive that either of these large carnivores caused significant damage; an important note for managers involved in their conservation.

The affective component of attitude (feelings toward both species) had more influence on normative beliefs than either of the cognitive components (perceived impact beliefs and knowledge). This finding reinforces what has been referred to as the evolutionary perspective (Johnston 1999), suggesting that affect is more important than cognition for predicting norms and behaviours (Bright and Manfredo 1996; Trafimow et al. 2004). Affect plays an important role in decision-making as well as in conflict resolution (Forgas 1998; Wilson 2008). Contrary to findings from Scandinavian countries (Ericsson and Heberlein 2003; Skogen and Krane 2003; Bisi et al 2007; Bisi et al 2010), feelings toward wolves and bears were positive in the PNALM and there is a high level of support for protecting these two species. The positive feelings found, and their strong relationship with normative beliefs, is very encouraging for the future conservation of these two species.

Supporting the cognitive hierarchy, attitudes did predict normative beliefs about acceptable management actions (Fulton et al 1996; Zinn et al. 1998; Vaske and Donnelly 1999). Norms are predictors of intention to behave, which in turn is a predictor of actual behaviour. The findings of this study are important in terms of the conservation of these large carnivores. The majority of residents in the PNALM support maintaining wolves and bears as protected species and did not

support the idea of killing them, even in areas where the animals cause significant damage. This could be explained by the role of these two large carnivores as flagship species (Simberloff 1998). Knowing that wolves, and especially bears, are endangered and protected in the territory, people tend to support their conservation (Bowen-Jones and Entwistle 2002; Smith and Sutton 2008).

The low values of the variance in the models suggest that other variables should be explored in the future to fully understand the relationship between feeling, belief and normative beliefs.

Overall, this study demonstrates a positive attitude toward wolves and bears among residents of the PNALM. The residents seem to be consistent in what they think, feel and what they should do in terms of the conservation of these large carnivores. That said, illegal killings still happen in the national park (Ciucci and Boitani 2008). Such actions are not supported by the majority of rural residents and appear to be the result of actions taken by a few individuals. To address this conservation challenge, a next HD step might be to focus on specific interest groups to help identify those groups that may take such action (e.g., among shepherds, hunters, non-locals).

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10. **Paper 4:** Segmenting normative beliefs regarding wolf and brown bear management options in Central Italy

Abstract

We segmented a sample of the Italian public based on their normative beliefs supporting or opposing wolf and bear management options. Based on the specificity principle and the notion of predictive potential, we hypothesized "minimal" differences among the segments for demographic and past experience variables, and substantive differences among the segments for belief and attitude measures. Data were collected through personal interviews (n = 1,611) in the Abruzzo, Lazio, and Molise National Park and its buffer zone. Using separate K-means cluster analyses, three clusters of respondents were identified on the topic of wolves, and two on the topic of bears. Regarding wolves, we identified a group of residents who favoured their protection, a group who opposed protection, and a third group of residents indicating mixed views. For bears, we identified a group of residents who favoured their protection, and a group of those who opposed it. Consistent with the hypotheses, demographics (i.e., age, sex) and prior experience (i.e., hunting, seeing wolves/bears) did not substantively differ among the clusters. The segments, however, did differ in their beliefs about the perceived impacts of and attitudes toward wolves/bears. Findings reinforce the predictive potential of psychological variables when attempting to understand support or opposition for wildlife management issues.

Key words: attitudes, bears, beliefs, national park, norms, segmentation, wolves

Introduction

There is an overall shift in the general public's social values in North America and in Europe, toward the recognition of the intrinsic value of wildlife, including bears and wolves (Duda, Bissell, & Young, 1998; Kellert, 1985; Schwartz, Swenson, & Miller, 2003). This accompanies a decrease of utilitarian values in Western cultures (Decker, Brown, & Siemer, 2001; Manfredo, Decker, & Duda, 1998; Manfredo, Teel, & Bright, 2003). With an increase in environmental awareness, and an increased willingness among the general public to participate in natural resource decision-making, wildlife professionals now recognize that gathering information from both ecological and human dimensions points of view will help achieve better wildlife management outcomes (Bath, 1996; Decker & Chase, 1997; Decker et al., 1996).

Wildlife managers and agencies typically consider hunters, shepherds or environmentalists independently in terms of public consultation, educational messages and working groups, assuming that attitudes and basic values are less variable within each group (Kaltenborn, Bjerke, & Strumse, 1998; Lischka, Riley, & Rudolph, 2008).

Recognizing the diversity of opinions about wildlife, researchers have emphasized segmenting the public into homogeneous meaningful groups in

order to understand potential responses to wildlife management strategies. Much of this research has focused on differences among known interest groups (e.g., hunters), or people with different demographic characteristics such as sex and age (Agee & Miller, 2009; Daigle, Hrubes, & Ajzen, 2002; Lohr, Ballard, & Bath, 1996). Other research has segmented the public using psychological indicators such as motivations (Beh & Bruyere, 2007), attitudes (Vaske, Howe, & Manfredo, 2009), and normative beliefs (Vaske & Needham, 2007).

These segmentation studies have enhanced our understanding of the differences between interest groups with different demographics, past experiences and psychological profiles. However, such a-priori research thinking can lead to an automatic search for differences, and conclusions that reinforce these differences (Dougherty, Fulton, & Anderson, 2003; Krange & Skogen, 2007; McFarlane, Watson, & Boxall, 2003). For example, the stated objective of Daigle et al. (2002) was to highlight the differences among hunters, wildlife viewers, and other outdoor recreationists. However, diversity in attitudes does not necessarily imply differences at higher levels of the cognitive hierarchy such as basic beliefs or general values, which tend to be widely shared by the public (Bright, Manfredo, & Fulton, 2000; Fulton, Manfredo, & Lipscomb, 1996; Kaltenborn & Bjerke, 2002; Vaske & Donnelly, 1999; Zinn, Manfredo, Vaske & Wittmann, 1998).

When speaking about endangered species, it is possible that groups such as hunters, shepherds and environmentalists actually share more views about

conservation than they do not. From a conservation perspective, it is equally important to examine the magnitude of such differences (or lack thereof) and to identify situations where there may be more similarities than differences. An emphasis on similarities among different segments of the public could help facilitate collaborative efforts to find solutions to contentious wildlife management issues (Fisher, Ury, & Patton, 1991; Innes & Booher, 2004; Margerum, 2002). Finding common ground among various segments of the interested public is thus argued as a necessary first step toward the effective conservation of large carnivores.

In this article, we: (a) segmented the residents living in and around the Abruzzo, Lazio and Molise National Park (PNALM) (Italy), based on their normative beliefs about wolf and bear management and (b) examined differences/similarities among these segments in terms of demographics, past experiences, and beliefs/attitudes. By understanding the characteristics of those who support or oppose a policy or management action, managers can better target educational messages based on commonalities and not, as traditionally has been the case, upon group membership.

Specificity Principle and Predictive Potential

Social psychologists differentiate concepts (e.g., attitudes, norms) based on the specificity of objects being measured. An *object* can be any entity that is being evaluated (e.g., a person, situation, wildlife, management action or policy).

Specificity refers to the level of correspondence among the measured variables. Ajzen and Fishbein (1980) identify four specificity variables across which measurement should correspond in order to maximize the relationship between psychological and behavioural variables: target (e.g., wolves); context (e.g., wolves killing cattle); action (e.g., conduct a special hunt); and time (e.g., next month).

Predictive potential refers to the likelihood that one survey question can explain variation in a second variable (see Vaske, 2008 for a general discussion). When the two questions are measured at the same level of specificity (in terms of target, action, context, and time) the predictive potential increases (Ajzen & Fishbein, 1980). When there is less measurement correspondence between the variables, the predictive potential decreases (Vaske & Manfredo, in press; Whittaker, Vaske, & Manfredo, 2006).

Predictive Potential of Attitudes and Norms

Attitudes are positive or negative evaluations of an object, and can be measured at both general and specific levels (Eagly & Chaiken, 1993). If the object is "overall feelings toward bears," the evaluation is a general attitude. If the object is "selective killing of bears in Italy in 2009," the evaluation reflects a narrower context and time frame, and thus represents a more specific attitude. While much of the literature focuses on more general attitudes, specific variables are often better predictors of specific behaviours (Ajzen & Fishbein, 1980). To

determine the extent to which people will support a specific lethal bear management action, we should examine their specific attitudes toward destroying (the action) a bear (the target) in an Italian park (the context) during 2009 (time); not just their attitudes toward bears in general. *General* beliefs/attitudes, however, should be strongly related to *general* acceptability of management actions.

While attitudes focus on positive or negative evaluations, norms examine acceptability evaluations (i.e., what an individual, group or agency should do) (Vaske & Whittaker, 2004). *Social norms*, for example, refer to acceptability standards (evaluations) shared by the members of a social group. *Personal norms* are defined as an individual's own expectations, learned from experience, and modified through interaction. Following Vaske and Whittaker (2004), we define normative beliefs as personal judgements about what is appropriate in different situations. As with attitudes, norms can vary in their measurement specificity. Some norms are more global than others, but the specificity is critical for determining whether the norm will accurately predict behaviour. Global or general norms should be related to general management actions, not specific ones.

Differences in situational contexts in human-wildlife interactions influence norms for management actions (Bruskotter, Vaske, & Schmidt, 2009; Decker, Jacobson, & Brown, 2006; Wittmann, Vaske, Manfredo, & Zinn, 1998;

Zinn et al., 1998). The Wildlife Acceptance Capacity (WAC) advanced by Decker and Purdy (1988), for example, is essentially a normative concept that proposes there is a maximum wildlife population level in an area that is acceptable to people. The WAC concept suggests that a person's acceptance threshold is dependent on the severity of the human-wildlife interaction (Decker et al., 2006). The more severe the problem, the more likely residents will accept a severe response (e.g., lethal control). Suburbanites in New York, for example, were shown to be more willing to accept aesthetic or economic wildlife impacts (e.g., damage to ornamental plantings) than health risks (e.g., disease) (Connelly, Decker, & Wear, 1987).

Predictive Potential of Demographics

Demographic variables (e.g., age, sex) are useful for describing the characteristics of different individuals that support/oppose management actions, but they may not have strong predictive potential. Issues related to general versus specific variables also apply to demographic variables. A survey response to a question asking a person's age can be a specific number (e.g., 22, 43, or 56); an individual's sex is always specific (i.e., male or female).

In the context here, however, demographic measures are considered to be general variables (Vaske, 2008). "General" is used in the sense that a person who is 43 years old is 43 regardless of other questions on the survey. Research has consistently shown that general demographic variables are relatively weak

predictors of specific wildlife actions (e.g., Miller & Vaske, 2003; Whittaker et al., 2006). Similarly, general prior experience variables (e.g., hunter vs. non-hunter) have been shown to have less predictive potential than psychological measures (e.g., Donnelly & Vaske, 1995).

Segmenting the Public

Segmentation of the public is recognized as an important tool in both academic research and applied marketing (Haley, 1984; Punj & Stewart, 1983). Market segmentation, "consists of dividing a heterogeneous market into a number of smaller, more homogeneous submarkets" (Zikmund & D'Amico, 1996, Cole & Scott, 1999). Market segmentation has long been a standard practice among tourism and outdoor recreational organizations because it helps park agencies and managers recognize the differences between groups in terms of motivations, needs and demands (Andereck & Calwell, 1994).

By understanding the different motivations of recreational hunters (Boulanger, Hubbard, Jenks, & Gigliotti, 2006; Schroeder, Fulton and Lawrence, 2006; Vaske, Timmons, Beaman, & Petchenik, 2004), anglers (Fisher, 1997; Kyle et al., 2007; Nain Chi, 2006), hikers (Kyle, Graefe, & Manning, 2004; Légaré & Haider, 2008; Schuster, Hammitt, Moore, & Schneider, 2006) and wildlife-watchers (Applegate, Otto, & Buttitta, 1982; Beh & Bruyere, 2007; Cole & Scott, 1999; Hvenegaard, 2002; Manfredo & Larson, 1993; McFarlane, 1994; Needham, Rollins, & Wood, 2004; Scott, Ditton, Stoll, & Eubanks, 2005; Scott & Thigpen,

2003), park agencies and managers can provide facilities and services to maximize the satisfaction of different groups, and minimize conflict between each segment.

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

From a social psychological perspective, research has segmented the public based on motivations, attitudes, and normative beliefs. Visitors to three

Kenyan national reserves, for example, were segmented based on their motivations for visiting (Beh & Bruyere, 2007). Vaske et al. (2009) identified individuals with positive, negative and neutral attitudes toward mountain lions and examined differences in these three segments relative to acceptability norms for alternative management actions. Results indicated that, as the severity of human-mountain lion interaction increased, respondents were less in favour of simply monitoring the lions and were more inclined towards destroying them. The pattern of these findings, however, varied by respondent attitudes toward lions.

Vaske and Needham (2007) segmented the public based on their normative beliefs about the lethal control of coyotes in an urban recreation setting. Three groups of individuals were identified – those who believed that lethal control was (a) acceptable, (b) unacceptable except when coyotes injure or kill pets, and (c) unacceptable. The respondents who felt that lethal management was unacceptable were most likely to have positive general attitudes toward coyotes, negative specific attitudes toward lethal coyote management, and were less likely to support a vote in favour of killing coyotes.

Study Area and Hypotheses

The Abruzzo National Park is one of the oldest parks in Italy. In 2001, the Park changed its name to Abruzzo, Lazio and Molise National Park (PNALM). This protected area currently has seven to eight wolf packs in the wild with an

estimated population of 40 wolves (Latini, Sulli, Gentile, & Di Benedetto, 2005). Italian wolves (*Canis lupus italicus*), also called Apennine wolves, have been officially protected in Italy since 1976 (Boitani & Ciucci, 1993).

The Apennine brown bear (*Ursus arctos marsicanus*) is an endemic subspecies protected in Italy since 1992 (Ciucci & Boitani, 2008). Bears have been protected locally in Abruzzo since 1939 (Zunino & Herrero, 1972). There are about 40-50 individual bears inhabiting the national park and buffer zone (Gervasi et al., 2008). Approximately half a million people live in and around the national park.

Following Vaske and Needham (2007), we segmented a sample of the Italian public based on their normative beliefs regarding the support or opposition of wolf and bear management options. Based on the "specificity principle" (Fishbein & Ajzen, 1975; Whittaker et al., 2006) and the notion of "predictive potential" (Vaske, 2008), we hypothesized that the general norm-based segments would be more strongly related to general beliefs/attitudes than the general demographic/experiential variables. In other words:

H_1 General demographic indicators will account for minimal variation among the norm-based segments.

H_2 General prior experience variables will account for minimal variation among the norm-based segments.

H_3 General attitudinal variables will account for substantial variation among the norm-based segments.

In taking this approach, the goal is to highlight the magnitude of differences and similarities among different segments of the public. The greater the similarities, the more likely consensus can be achieved and effective conservation of wolves and bears implemented.

Method

Stratified random sampling proportional to each township's population was used to ensure representative samples from the 28 communities in the park and buffer zone. Data on community populations were obtained from the official 2001 census (Istituto Nazionale di Statistica [ISTAT], www.istat.it, 2001). A total of 1,611 people were personally interviewed (response rate = 80%). Data were collected between November 2006 and June 2007.

The questionnaire was modelled after similar instruments administered in other parts of Europe (Bath, Olszanska, & Okarma, 2008; Majić & Bath, 2010). All items were identified through initial qualitative interviews with different interest groups (e.g., hunters, shepherds, park rangers) and pre-tested before implementation.

Independent Variables

Respondents were segmented into groups based on their responses to two general normative belief statements regarding management of wolves and bears.

Respondents were asked the extent to which they disagreed or agreed with: (a) wolves/bears should remain completely protected and (b) it should be possible to kill selected wolves/bears in areas where there have been continuous wolf/bear attacks on livestock. Responses were coded on a five-point scale ranging from strongly disagree (-2) to strongly agree (2).

Dependent Variables

Respondents were asked two demographic variables (age and sex). For analysis purposes, age was recorded into one of three categories (i.e., 18-39, 40-64, 65+ years old); sex was coded as male (1) or female (0). Prior experience was measured by two variables: (a) has the respondent done any hunting in his/her life and (b) had the respondent ever seen a wolf/bear in the wild. Both variables were coded as yes (1) or no (0).

A general beliefs index regarding the impacts of wolves/bears was computed from three variables. Respondents indicated their level of agreement with: (a) wolves cause significant damage to livestock, (b) wolves have a significant impact on small game (e.g., hare), and (c) wolves have a significant impact on big game (e.g., roe deer). Participants then indicated their level of agreement with: (d) bears cause significant damage to livestock, (e) bears cause significant damage to beehives, (f) bears cause significant damage to orchards and agriculture crops. Responses were measured on a five-point scale ranging from strongly disagree (-2) to strongly agree (2).

Two separate "general attitude" indices toward wolves/bears were computed as the average of two items. Respondents rated their (a) general feelings toward wolves/bears and (b) the importance of wolves/bears in their region. Questions were coded on a five-point scale ranging from strongly dislike (-2) to strongly like (2).

Data Analysis

Cluster analysis is a common tool for classification in the social and biological sciences (Schroeder et al., 2006) and allows empirical groupings of persons, products, or occasions with similar characteristics to be generated (Punj & Stewart, 1983). Unlike other statistical methods for classification, cluster analysis makes no prior assumptions, and needs no prior knowledge on the composition of a sample population (Davis, Allen & Cosenza, 1988). The K-mean procedure is preferred when sample sizes exceed 200 cases (Kyle et al., 2004).

K-means cluster analysis was used to identify homogenous groups of respondents based on their normative beliefs. Chi-square was used to examine the relationships between the independent and dependent variables. Cramér's V served as the effect size measure. Values of V at .1 were considered as "minimal" relationships; .30 were labelled as "typical," and V = .50 or higher were categorized as "substantial" relationships (Vaske, 2008).

Results

Sample Characteristics

Demographics

Overall, there were slightly more males (57%) than females (43%) in the sample (n = 1,611). Approximately 40% of the respondents were between 40 and 64 years of age; 34% were 39 or younger, and 26% were older than 65 years old. More than half of the respondents (57%) reported that they had seen wolves, and less than half of participants had seen a bear (47%) in the wild at least once. Only 12% of respondents had hunted at least once in their life.

Psychological

Most residents expressed positive attitudes toward wolves (53% "like" and 13% "strongly like"). Even more positive attitudes were expressed toward bears (59% "like" and 25 % "strongly like"). When asked to consider the presence of wolves in their region, 62% were "positive" and 12% were "strongly positive"; less than 15% were negative. When participants were asked to consider bears in their region, they were even more positive, with 64 % "positive" and 22% "strongly positive"; less than 5% were negative. A majority disagreed with the statement that wolves cause significant impact on big game (51%) or small game species (54%; Table 10.1). Residents also disagreed with the statement that bears cause significant impact on livestock (65%) (Table 10.2). However, less

disagreement was found regarding bears causing impact on beehives (41%) or agriculture (42%).

Table 10.1. Descriptive statistics and reliability analyses for beliefs and attitudes toward wolves

	Mean	Standard Deviation	Cronbach alpha
Beliefs about the impact of wolves [1]	.23	.42	.72
Wolves cause abundant damages to livestock	.16	1.16	
Wolves eating have a significant impact on small game (hare)	-.32	.98	
Wolves have a significant impact on big game (e.g., roe deer)	-.19	1.04	
Attitude toward wolves	.62	.48	.82 [4]
Describe your feelings toward wolves [2] (completely dislike [-2] to completely like [2])	.55	1.05	
Having wolves in may region is: [3] (completely negative [-2] to completely positive [2])	.70	.91	

[1]Variables coded on a 5-point scale from -2 "strongly disagree" to +2 "strongly agree."
[2]Variable coded on a 5-point scale from completely dislike (-2) to completely like (+2).
[3]Variable coded on a 5-point scale from completely negative (-2) to completely positive (+2).
[4]Cronbach's alpha based on 2 variables.

Table 10.2. Descriptive statistics and reliability analyses for beliefs and attitudes toward bears

	Mean	Standard Deviation	Cronbach alpha
Beliefs about the impact of bears [1]	-.10	.80	.65
Bears cause abundant damages to livestock	-.40	1.03	
Bears eating have a significant impact on beehives	.03	1.03	
Bears have a significant impact on agriculture	.76	1.07	
Attitude toward bears	1.01	.75	.85 [4]
Describe your feelings toward bears [2] (completely dislike [-2] to completely like [2])	1.00	.83	
Having bears in may region is: [3] (completely negative [-2] to completely positive [2])	1.02	.77	

[1]Variables coded on a 5-point scale from -2 "strongly disagree" to +2 "strongly agree."
[2]Variable coded on a 5-point scale from completely dislike (-2) to completely like (+2).
[3]Variable coded on a 5-point scale from completely negative (-2) to completely positive (+2).
[4]Cronbach's alpha based on 2 variables.

Segmenting the Public

Separate cluster analyses of the normative beliefs were performed for two, three, four, and five group solutions. The three-group solution provided the best fit for data regarding wolves, whereas the two-group solution proved the best fit

for bears. To validate this solution, data were randomly sorted and a cluster analysis was conducted after each of three/two random sorts. All of these additional cluster analyses supported the initial three/two-group solution (Table 10.3 and Table 10.4).

Regarding wolves, respondents in the first cluster agreed with protecting the wolf and disagreed with killing wolves (n = 1,092, 68%). Individuals in cluster 2 (n = 237, 15%) held norms for wolf management beliefs that were situation-sensitive. These individuals supported the selective killing of wolves that attack cattle, but supported the protection of wolves in general. People in the third cluster (n = 282, 17%) supported the selective killing of wolves and disagreed with protecting wolves.

Regarding bears, respondents in the first cluster agreed with protecting the bear and disagreed with killing bears (n =1406, 87%). Individuals in cluster 2 (n =204, 12%) held contrary norms: they supported selective killing of bears and disagreed with protecting bears.

The majority of the sample supported protection of wolves and bears and disagreed with selective killings of both species (both cluster 1). In other words, there were more similarities than differences in these normative beliefs.

Table 10.3. Acceptability of wolf management actions for three clusters

	Normative beliefs toward wolf management					
	Cluster 1: Positive toward wolf protection	Cluster 2: Situation Influenced	Cluster 3: Negative toward wolf protection	*F*-value	*p*-value	Eta
Cluster						
Sample size (n)	1092	237	282			
Percent	68%	15%	17%			
Normative belief						
Wolf should remain totally protected	1.16	1.03	-1.01	61.15	< .001	.364
In areas where there are continuous attacks on livestock, it should be possible to kill selective wolves	-1.25	0.96	0.83	203.39	< .001	.914

[1]Means of variables coded on a 5-point scale from –2 "strongly disagree" to +2 "strongly agree."

Table 10.4. Acceptability of bear management actions for two clusters

	Normative beliefs toward bear management				
	Cluster 1: Positive toward bear protection	Cluster 2: Negative toward bear protection	*F*-value	*p*-value	Eta
Cluster					
Sample size (n)	1406	204			
Percent	87%	12%			
Normative belief					

Bear should remain totally protected	1.17	-0.53	786.52	P<0.001	.814
In areas where there are continuous attacks on livestock, it should be possible to kill selective bears	-1.27	0.70	1160.13	P<0.001	.862

Similarities/Differences among the Clusters

Hypothesis 1 predicted that the general demographic indicators will account for minimal variation among the segments (Table 10.5 and Table 10.6). Both females and males were found in similar proportions in cluster 1 (65% males and 71% females in respect to wolves, and 67% males and 76% females in respect to bears). There was no statistical difference between females and males for bears ($\chi 2$ =1.48, df = 1, p = 0.223). Although for wolves the difference between sex ($\chi 2$ = 20.32, df = 2, p < .001) was statistically significant; the minimal relationship (V = .112) suggests that this difference is likely due to the large sample size (see Vaske, 2008).

For both large carnivores, age varied by cluster membership ($\chi 2$ = 73.61, df = 4, p < .001 for wolves and $\chi 2$ =56.96, df = 2, p<0.001 for bears). Younger individuals were more protection-oriented, while those in the 65+ age category were more likely to favour selective killings. The strength of this relationship, however, was minimal (V = .15) to moderate (V = .18).

For wolves, a statistical significance was found between prior hunting experiences and the clusters ($\chi 2 = 25.34$, $df = 2$, $p < .001$), but the effect size was a minimal relationship ($V = .125$). This was not the case for bears, where no significant difference was found ($\chi 2 = 1.69$, $df = 1$, $p = 0.193$).

The difference among clusters for having seen wolves ($\chi 2 = 2.78$, $df = 2$, $p = .249$) or bears ($\chi 2 = 0.12$, $df = 1$, $p = 0.912$) in the wild was not statistically significant.

Table 10.5. Relationship between cluster membership, and demographics, prior experiences, beliefs and attitudes for wolves

	Normative beliefs toward wolf management [1]					
	Cluster 1: Positive toward protection	Cluster 2: Situation Influenced	Cluster 3: Negative toward protection	χ^2	*p*-value	Cramer's *V*
Demographics						
Sex				20.32	< .001	.112
Male	65	14	21			
Female	71	16	13			
Age				73.61	< .001	.151
18 - 39	77	11	12			
40 - 64	40	36	41			
65+	20	28	52			
Prior Experience						

Ever hunted				25.34	< .001	.125
No	69	15	16			
Yes	54	16	30			
Ever seen wolf in wild				2.78	.249	.042
No	68	16	16			
Yes	68	14	18			
Psychological [2]						
Beliefs about wolf impacts				112.61	< .001	.264
Disagree	84	73	55			
Agree	16	27	45			
Attitudes toward wolves				269.15	< .001	.405
Positive	75	43	27			
Negative	24	57	74			

[1]Cell entries are percents.

[2]The belief and attitude indices were collapsed into dichotomous variables to maintain consistency with effect size indicators reported for the demographics and prior experience variables.

Table 10.6. Relationship between cluster membership, and demographics, prior experiences, beliefs and attitudes for bears

	Normative beliefs toward bear management [1]				
	Cluster 1: Positive toward protection	Cluster 2: Negative toward protection	χ^2	*p*-value	Cramer's *V*
Demographics					
Sex			1.48	.223	0.30
Male	67	33			
Female	76	24			
Age			56.96	<0.001	0.188
18 - 39	36	19			
40 - 64	41	35			
65+	22	46			
Prior-Experience					
Ever hunted			1.69	.193	0.32
Yes	84	16			
No	88	12			
Ever seen bear			.12	.912	0.003
Yes	47	47			
No	53	53			
Psychological [2]					
Beliefs about bear			59.36	<0.001	.192
Disagree	86	64			
Agree	14	36			
Attitudes			235.24	<0.001	.382
Positive	86	41			
Negative	14	59			

[1]Cell entries are percents.

[2]The belief and attitude indices were collapsed into dichotomous variables to maintain consistency with effect size indicators reported for the demographics and prior experience variables.

Regarding wolves, both of the psychological variables were statistically related to cluster membership ($\chi 2 > 112.61$, $df = 2$, $p < .001$), and the effect sizes were in the typical ($V = .264$ for beliefs) to substantial relationship range ($V = .405$ for attitude, Table 10.5) (Vaske, 2008). Regarding bears, both psychological variables were statistically related to cluster membership ($\chi 2 = 235.24$, $df = 1$, $p < 0.001$, Table 10.6) and the effect size was substantial for the attitudes (V=.382) and nearly in a typical relationship range for beliefs (V=.192). Those that disagreed with the negative impacts belief statements were more likely to be in the protection-oriented cluster 1 (84%) than respondents who agreed with the belief statements (16%). Similarly, individuals who held positive attitudes were in cluster 1 (75% for wolves and 86% for bears) and those with negative attitudes were in the "kill selectively" cluster 3 for wolves (74%) or in cluster 2 for bears (59%).

Taken together, the effect sizes in Table 10.5 and Table 10.6 support the three hypotheses, and are consistent with the specificity principle and the notion of predictive potential. The measures of association for the demographics and prior experience variables were minimal, while the Cramer's *V*s for belief and attitude indices were in the typical to substantial relationship range.

Discussion

Consistent with other segmentation research, the findings reported here suggest the PNALM public is not a homogeneous group and meaningful

differences in their normative beliefs can be identified. At the same time, there were more similarities than differences among the groups. The respondents' sex, age, and prior experience did not substantively differentiate the segments (V < .18 in all cases). Consistent with social psychological theory, the major differences between the norm-based clusters were in terms of the respondents' beliefs about negative impacts caused by wolves and their general attitude toward wolves. These findings have an applied, theoretical and methodological implication.

Applied Implications and Future Research

Demographic variables are useful for understanding the characteristics of a sample population and/or when designing targeted educational messages. The differences among our segments, however, did not substantively vary by traditional demographic indicators or prior experience measures. From a conservation perspective, focusing on this common ground may facilitate finding solutions. In our sample, most respondents held protection-oriented normative beliefs (cluster 1). Over 80% of the individuals in this cluster believed that wolves do not have a negative impact. Seventy-five per cent held positive general attitudes toward wolves and 86% held positive general attitudes toward bears. By emphasizing these similarities, wildlife managers can work with various interest groups to resolve wolf/bear-related impacts.

Given that three-quarters of the youngest age group were in the norm-based cluster 1, the PNALM public may be shifting toward a protectionist orientation. Although these findings are consistent with those from the United States (Deruiter & Donnelly, 2002; Fulton et al., 1996; Manfredo, 2008; Manfredo & Zinn, 1996; Williams, Ericsson & Heberlein, 2002), future applied research should examine the relationship between these normative beliefs and the belief/attitudinal indicators. Longitudinal research (e.g., Majić & Bath, 2010) is also necessary to monitor the extent of shifts in norms, beliefs, and attitudes.

The majority of residents have seen wolves in the wild; almost half have seen bears in the wild. This could be expected from residents living within a national park or in its buffer zone, where the likelihood of encountering wolves or bears is relatively high. Research into wildlife viewing has shown that peoples' positive experiences (Beh & Bruyere, 2007; Fulton, Whittaker & Manfredo, 2002) observing wildlife can decrease risk perception (Gore, Knuth, Curtis & Shanahan, 2006) and can lead to stronger positive attitudes (Ericsson & Heberlein, 2003). Direct experience, in this case the viewing of large carnivores, increases attitude accessibility, defined as the strength to recall the attitude from memory and its evaluation (Glasman & Albarracín, 2006). In turn, attitude accessibility increases the connection between attitude and behaviour (McCLeery, Ditton, Seel & Lopez, 2006).

Attitudes between clusters were different. The majority of the respondents tended to have positive attitudes toward both wolves and bears. Recent research (Forgas, 1998; Wilson, 2008) has demonstrated that affect plays an important role in decision-making as well as in conflict resolution. Positive affect helps facilitate agreement between parties, encouraging co-operation and positive attitudes toward negotiating partners (Forgas, 1998). Participation dissolves group boundaries, and increases ownership of the outcome. This encourages commitment to and action toward wildlife conservation goals (Messmer, 2000; Cvetkovich & Winter, 2003; Wilson, 2008). The positive attitudes found in this study bode well for the future conservation of these two large carnivores.

Segmenting the public helps identify different groups of people who may or may not become involved in decision-making regarding wildlife (Bright et al., 2000; Decker et al., 2001). Wildlife and park agencies can use information about different norm-based segments to help estimate the proportion of the public who are likely to support, oppose, or be indifferent toward wildlife management actions. For example, the proportion of the public that may set poison baits within the protected area clearly demonstrates opposition to wolf presence. Research has suggested that different segments of the population seek out or pay attention to different sources of information (Bright et al., 2000). Although beyond the focus of this article, future research should consider the information sources monitored by each segment of the public. Understanding how to reach

different segments of the public would allow wildlife agencies to more effectively and efficiently target groups and design effective informational materials.

Theoretical/Methodological Implications

Social scientists are interested in answering three basic questions when examining the relationships among variables (Vaske, 2008). First, is an observed effect real or should it be attributed to chance (i.e., statistical significance)? Second, if the effect is real, how large is it (i.e., effect size)? Third, is the effect large enough to be useful (i.e., practical significance or importance)? In this article we have illustrated the necessity of addressing all three questions when conducting research. Had we simply focused on statistical differences, the limited predictive potential of the demographic and prior experience variables could have easily been overlooked.

Thirty-five years ago, Fishbein and Ajzen (1975) identified four specificity variables across which measurement should correspond (i.e., target, context, action, time) and encouraged researchers to construct surveys that incorporated all four elements. When measurement correspondence between variables is similar (e.g., general to general, or specific to specific), measures of association (e.g., effect sizes) are predicted to be larger.

General "wildlife normative beliefs," for example, should predict the general level of acceptance of killing wolves better than responses to specific

conflict situations (e.g., killing [the action] a wolf [the target] in a national park [the context] during the fall of 2010 [time]). In this article, respondents' general attitude toward wolves accounted for the variation in the general norm-based protection orientation more than any of the other independent variables. While correlation does not prove causality, the relative strength of relationships can help assess the merits of including variables, or tests for mediation, in larger models.

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Part III: Discussion and Conclusions

11. Discussion and Conclusions

For successful conservation, there is a need to go beyond biological research. The conservation of wolves and brown bears depends on human as well as the biological aspects (Musiani et al., 2009). This dissertation has focused on the attitudes of the residents who live in close proximity to both wolves and bears. Coexistence can occur in this geographic space, as residents control how they affect and are affected by these large carnivores. Understanding how attitudes can play a role in achieving conservation planning was the overarching goal of this dissertation.

Attitudes are positive or negative evaluations of an object, such as wolves or bears, and are a mental state reflected by affective (feelings), cognitive (beliefs) and behavioural intention components (Eagly and Chaiken, 1993; Verplanken et al., 1998; Cooke and Sheeran, 2004). Each component of attitude plays a role in the conservation of wolves and brown bears. Attitudes influence value systems, which in turn predict behavioural intention and ultimately behaviour (Fulton et al., 1996; Vaske, 2008). Anticipating behaviour is the ultimate goal; doing so will help predict the impacts and reactions of residents toward various conservation alternatives (Manfredo, 2008). Understanding the relationship between feelings, beliefs and behaviour can be one of the most important uses of HD conservation

projects. The objectives of this study were to look in detail at these three components, to examine how they can be linked and how they contribute to conservation. For conservation, it is important to understand what the attitudes toward wolves and bears are, and to ask why people hold those attitudes. Attitudes are expressed daily through behaviour, and attitudes help explain the behaviours and the purpose of those behaviours to others (Manfredo, 2008).

The first component of attitude, affect, is the instantaneous reaction (or feeling) one has to an object, such as like or dislike (Ostrom, 1969; Ajzen, 2001; Manfredo, 2008). In this dissertation it was illustrated that the majority of residents in the PNALM held positive feelings toward wolves and bears. Similar to findings from other countries (Kleiven et al., 2004), residents in the PNALM demonstrated a preference for bears over wolves. Differences among participants with respect to bears and wolves were in the strength of feelings and not in the direction (i.e., residents were more positive toward bears than toward wolves, but still they held positive feelings toward wolves). Strong attitudes, whether positive or negative, suggest persistency and tend to be better predictors of behavioural intention (Prislin, 1996; Verplanken et al., 1998). This leads to the conclusion that residents in the park and buffer zone are slightly more supportive toward bear conservation than they are toward conservation for wolves.

Affect has been demonstrated in the literature as playing an important role in decision-making (Forgas, 1998; Wilson, 2008). In this dissertation it was demonstrated that normative beliefs (i.e., support in maintaining protection toward the species) was predicted by feelings toward that species. The positive feelings recorded are reassuring for the conservation of large carnivores in Italy. This does not appear to be so in other countries in Europe and around the world. For example, northern Europeans (e.g., residents of Finland, Norway and Sweden) generally hold negative attitudes toward wolves and bears (Ericsson and Heberlein, 2003; Skogen and Krane, 2003; Bisi et al., 2007; Bisi et al., 2010), and the majority of rural residents in these regions would like to have these large carnivores removed.

Affect was connected as a mediator with the second component of attitude, cognitive beliefs, to predict support of management options (normative beliefs). The cognitive beliefs represent the extent to which people believe and think about an object (e.g., wolves/bears), and denote the information an individual possesses about an object which may or may not be true (Ostrom, 1969; Eagly and Chaicken, 1993; Haddock and Zanna, 1999). Two cognitive beliefs were explored: the objective level of knowledge, and the more subjective belief of perceived damage. "If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow" (Carson, 1965). While Carson (1965) was focused

on childhood development, her ideas illustrate the connection between cognitive and affective components of attitude. In this dissertation it was shown that residents of the PNALM have higher levels of knowledge about bears, which result in a stronger relationship to positive feelings. Consistent with many studies (Kellert, 1985; Bath and Buchanan, 1989; Ericsson and Heberlein, 2003; Mustoni et al., 2003; Kaczensky et al., 2004; McFarlane et al., 2007; Balčiauskas et al., 2010), higher knowledge did result in stronger feelings toward the species. This connection between feelings and knowledge is important for conservation, especially in this case where positive feelings were found for both species, but particularly for bears.

Generally, the most critical aspect of the management and conservation of large carnivores is their perceived damage to livestock. However, people in the PNALM appeared willing to coexist with wolves and bears, perceiving any damage the carnivores may cause as natural - and not extensive. This explained why feelings were a stronger predictor of supporting protection of the species than cognitive belief. A stronger relationship between perceived damage beliefs and feelings was seen for wolves than for bears, suggesting that the cognitive component of attitudes plays a stronger role in attitudes toward wolves. Perceived damage beliefs were shown to have a greater influence on feelings toward wolves than those toward bears. This was confirmed also in Gandolfi (2007), who reported that wolves are believed to kill more animals than they

need for food; the feelings toward this predator are less positive than for bears, which are believed to kill or take only the food needed for survival.

The third component of attitudes was investigated by understanding which residents, and what percentage of them, would like to maintain protection of wolves and bears. The majority of the residents of the PNALM clustered together to support the protection of both large carnivores. Furthermore, it was explained how residents of the park can be segmented in a more meaningful way by psychological variables (i.e., feelings, beliefs) rather than demographic characteristics or prior experience measures. From a conservation perspective, focusing on the commonalities of the residents' characteristics may facilitate finding solutions to conflicts (Fisher et al., 1991; Margerum, 2002; Innes and Booher, 2004). Wildlife managers can work together with various interest groups to resolve wolf/bear related impacts. Wildlife managers could hire a facilitator to organize workshops with representatives of the various interest groups. Beginning such a process could build trust amongst the diverse groups and help all parties better understand and address the key issues facing wolves and brown bears in the area.

In trying to understand why residents of the PNALM display positive attitudes toward wolves and bears, folklore literature was used in the second paper of this dissertation. A study of relevant folklore showed that attitudes are

influenced by myths and legends, and that southern and northern European countries diverge in their level of adaptation to livestock damage.

In the third paper, perceived damage and knowledge were explored, showing that perceived lower impact and higher knowledge about large carnivores result in positive feelings. Finally, in the fourth paper, the influences of demographic characteristics and prior experience with large carnivores were examined. Interestingly, gender, age and location of residence were not important variables in differentiating attitudes. The majority of residents had the opportunity to view the predators at least once in their life; from qualitative data, residents affirmed that these encounters resulted in a positive experience. Research studying wildlife viewing demonstrates that a positive experience (Fulton et al., 2002; Beh and Bruyere, 2007) can decrease risk perception (Gore et al., 2006) and lead to stronger positive attitudes (Ericsson and Heberlein, 2003). It would seem this may be the case in the PNALM.

Theoretical and applied contribution of the dissertation

HD is an applied and research-oriented field. From a research perspective, HD studies people's attitudes, values and behaviour toward the environment. This provides insights on the nature of conflicts and level of support or opposition toward management options. HD offers managers, researchers, and policymakers a better understanding of people's perceptions and concerns. From

an applied perspective, HD uses public involvement techniques to engage people and identify a spectrum of possible solutions to achieve conservation.

Exploring the literature around HD of wildlife, it appears there is a lack of studies that explore the three components of attitude in detail, and on the same theme of the research. Furthermore, few studies (Kellert et al., 1996; Breitenmoser, 1998; Teel et al., 2002; Kleiven et al., 2004; Bath et al., 2008) simultaneously compare wolves and bears, and none of the studies that do exist have examined the three components of attitudes in the same document. By exploring both species, it is possible to highlight the perceived differences by the residents between the two large carnivores and to communicate concrete steps to managers for the conservation of each of these species.

This dissertation, therefore, contributes to the field of HD by filling the gaps and exploring the three components of attitudes in detail and comparing findings for wolves and bears. In addition, this dissertation helps highlight the need for including the human component in wildlife conservation and management in Italy. The bibliometric analysis that was carried out in this dissertation pointed out that little research has been conducted in the field of HD of wildlife in Italy, and even fewer studies have been incorporated in management plans. HD is a valuable tool in the management planning process as it can increase ownership of the final plan amongst diverse interest groups. This

involvement increases commitment and action to achieve wildlife conservation goals (Messmer, 2000; Cvetkovich and Winter, 2003; Wilson, 2008).

From a theoretical point of view, this dissertation strengthens the multiple-component model of attitudes (Kothandapani, 1971; Eagly and Chaiken, 1993; Haddock and Zanna, 1999) and the importance of exploring each component of attitude separately (Verplanken et al., 1998; Trafimow et al., 2004). By investigating each component on its own, it is possible to understand which one plays a more important role in understanding support or opposition to proposed management actions. Having such knowledge allows wildlife managers to better target their messages and strategically plan their resources. It is important to distinguish each component of attitudes and identify it with its own name to avoid confusion, especially between attitudes and the affective component of attitudes (Piderit, 2000; Wilson, 2008), which is a typical generalization found in the literature.

This dissertation reinforces the cognitive hierarchy model (Fulton et al., 1996; Zinn et al., 1998; Vaske and Donnelly, 1999; Vaske, 2008); beliefs did influence attitudes, which in turn predicted normative beliefs about acceptable management actions. HD is in its infancy in Italy, therefore there are plenty of research possibilities and capacity for the discipline to take root. Italian researchers can learn from their North American counterparts, both from the

theoretical and applied points of view, and can adapt approaches to the Italian culture.

As a contribution to methods of HD research, this dissertation supports the use of face-to-face interviews for controversial wildlife issues. Face-to-face contact not only resulted in a high response rate (80%), but also allowed the researcher to collect information in order to understand the geographical-social context of each small town that could not otherwise be perceived. Qualitative data was able to be collected at the same time as quantitative data: Italians like to talk, tell stories and give explanations of their responses, thus contributing to the understanding of the broader context in which they responded. Such qualitative information aids in the interpretation of data gathered through the quantitative approach. This dissertation supports the suggestion of Ercikan and Roth (2006) that qualitative and quantitative data can be integrated into a unique approach of research.

From an applied point of view, this dissertation is part of a collaborative project for the conservation of wolves and brown bears. Conservation also means working with people, gaining public support and building tolerance. Linnell et al. (2001) provide evidence that large carnivore conservation is possible at high human densities, if management and public opinions are in favour of co-existence. This dissertation demonstrated that the majority of residents in the PNALM are willing to coexist with these large carnivores. Participants expressed

positive overall attitudes toward wolves and bears, they tolerated the perceived damage caused, and they supported the maintenance of protection of both species. These are important messages to communicate to managers responsible for the conservation of wolves and brown bears. Emphasizing these positive findings can be the starting point for constructive dialogue on conservation (Blanchard, 2000). HD provides basic information for managers to help them better understand views about an issue, but it does not identify the "right" thing to do. The responsibility for such determination remains the purview of the natural resource manager (Decker et al., 1996). However, park managers could use the findings in this dissertation, together with biological information collected by other researchers at La Sapienza University of Rome, to formulate meaningful policy that integrates biological and human factors.

The key findings in this dissertation are focused on a specific national park in Italy, but they also have implications at a national and international level for the conservation of large carnivores. The PNALM is the core area of the endangered endemic subspecies of the Apennine brown bear and it is also the most important wolf source population area for Italy (Boitani and Ciucci, 1993). Effective management of this park can play a role in larger national-scale conservation. It is fundamental to protect the population of the PNALM in order to permit the species to expand to the surrounding areas. Wolves are now expanding throughout the Apennines, and reaching border countries such as

France, Switzerland and Austria, as well as Germany and Spain (Schröder, 1998; Valière et al., 2003; Ciucci et al., 2009). Bears are expanding in central areas of the Italian peninsula (Enserink and Vogel, 2006; Ciucci, and Boitani, 2008). Brown bears are more endangered than wolves. The findings of this dissertation, that residents in PNALM hold positive attitudes toward this predator, are reassuring for its conservation. This endemic small brown bear population living in PNALM is not only extremely important to understand from a biological perspective (Potena et al., 2005; Ciucci and Boitani, 2008), but from a social perspective. This dissertation supports the idea that as long as animals persist on the landscape, attitudes will remain more positive than if such populations disappear (Boitani, 1995; Kaczensky et al., 2004; Bath et al., 2008).

At an international level, this dissertation contributes to the debate about the proximity of place of residence to large carnivore areas and how it relates to people's attitudes (Kellert, 1985). Some authors propose that attitudes toward large carnivores are more positive in areas where predators are absent, or where people live further away from, and do not interact with, them (Kleiven et al., 2004; Karlsson and Sjöström, 2007; Kellert et al., 1996). In contrast, this dissertation supports previous research (Boitani, 1995; Kaczensky et al., 2004; Bath et al., 2008; Majić and Bath, 2010) that reveals more positive attitudes toward large carnivores from those residents who have lived where carnivores have always been present.

Limitations

Normative beliefs were considered as the third component of attitudes investigated. Normative beliefs are defined as personal judgements about what is appropriate in specific situations (Vaske and Whittaker, 2004). Behavioural intention is a person's belief about how he/she will behave in a specific situation (Manfredo, 2008). My questionnaire was modelled after similar instruments administered in other parts of Europe (Bath et al., 2008; Majić & Bath, 2010). The wording I used in my questionnaire was: "Wolves/bears should remain completely protected (i.e., it should be illegal to kill them)" instead of "I believe I would support the complete protection of wolves/bears". The latter way of wording was argued to be too direct; people tend to be less honest in face-to-face interviews of this nature because of social desirability bias (Holbrook et al., 2003).

Social desirably bias describes the tendency of respondents to reply in a manner that will be viewed favourably by others (Presser and Stinson, 1998). Indirect questioning has been employed to reduce social desirably (Fisher, 1993). The difference between normative beliefs and behavioural intention is therefore understood as a difference in wording; in the paper "Segmenting normative beliefs regarding wolf management options in Central Italy", the reviewers suggested labelling such statements normative beliefs (instead of behavioural intention) in order to avoid any theoretical controversy.

From an applied point of view, the lack of value given to HD research was the driving force behind the first paper, "Human dimensions of wildlife in Europe: the Italian way". It was frustrating to recognize that managers do not put the findings and recommendations of HD research into practice. After the completion of interviews for a report or dissertation, there is no obvious follow up. The political will to consider the results of HD investigations is missing. This practice of not implementing HD by park managers stems from a lack of understanding and acceptance of the value of HD, as well as a lack of trust that HD can improve wildlife management and conservation.

Recommendations

This dissertation provided baseline data on the attitudes of the general public, which is the first step toward a more participatory approach to wolf and brown bear conservation. The research itself, through the interview method, was an act of public involvement, and made residents aware and interested in the large carnivore management decision-making process. Many residents have expressed interest in learning about the results of this research; a first recommendation is to organize public consultation sessions to share the results with the communities involved. This is an integral part of research and it is the role of university scientists to report back to their research subjects. For HD researchers, such knowledge mobilization is part of the process of working with people toward conservation objectives.

The next step in the participatory process could be to create a management plan for wolves and bears with the involvement of the residents. The positive attitudes toward wolves and bears reported in this dissertation can help in the process of facilitation. Through increased co-operation among negotiating partners and the recognition of a shared interest in conservation, an optimal agreement between the parties, could be reached (Forgas, 1998). In organizing workshops, it is important to invite all interest groups, to put them together around a common table and to work from the views they share. Participation dissolves group boundaries and increases ownership in the outcome, which in turn encourages commitment to, and enaction of, wildlife conservation goals (Messmer, 2000; Cvetkovich and Winter, 2003; Wilson, 2008). It is important to acknowledge that a minority of the general public disagrees with the protection of wolves and bears. By organizing facilitated workshops it is possible to tackle the reasons for the discontent of these residents and to work together for possible solutions.

Conservation managers communicate and interact with communities most often through education campaigns associated with carnivore conservation programs (Sillero-Zubiri and Laurenson, 2001). This dissertation provides information that will help in the designing of successful communication programs. The difference in the level of knowledge held for bears and wolves, and the level of positive attitude towards these carnivores connected with the

knowledge, suggest the need for an educational program for wolves to increase the tolerance toward this predator.

Future research

This dissertation highlights key issues, but does not provide a full understanding of the reasons behind some of the issues. During the face-to-face interviews, qualitative data were collected in a non-systematic way, challenging data analysis. Future research could focus on organizing this qualitative data to help understand and refine the interpretation of the results in order to better answer the question of why people held positive attitudes toward the carnivores.

It is suggested to extend the present research to the surrounding areas where brown bears are expanding and wolves are starting to create conflicts (e.g., attacking livestock). A first step in this direction has been taken. Between April 2008 and August 2008, an additional 1,000 face-to-face interviews were completed in two adjacent areas: the Monti Simbruini (n=400) and Sirente-Velino Provincial Parks (n=600). The results of these two studies could help managers compare the attitudes toward wolves and bears and develop, if necessary, different strategies for managing these large carnivores.

Another area of interest would be to focus on specific interest groups (e.g., shepherds, hunters, non-locals) often considered the most affected by large carnivore management. In this regard, an initial phase has begun in PNALM. In

2009, approximately 200 individuals were interviewed, including shepherds, hunters, park personnel, forestry workers and hotel owners.

Finally, this study could be the start of a longitudinal data collection process. HD research can analyze changes over time, providing updated information to managers and the public. The development of HD research to become an integral tool in resource management decision-making will be fundamental to meeting future societal needs for natural resources.

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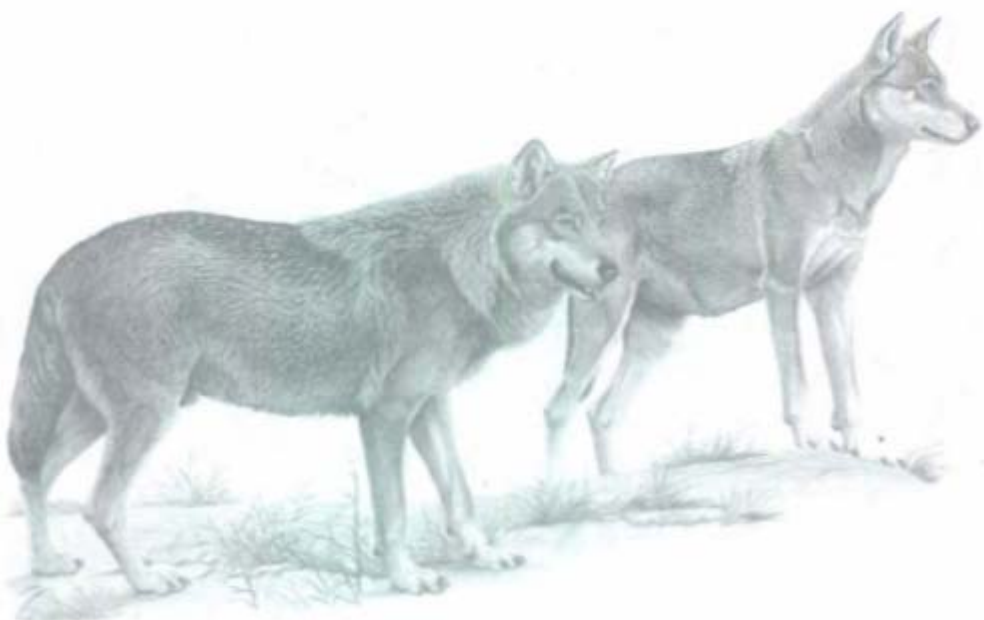
13. **Appendix I: The questionnaire**

The wolf

The first part of the questionnaire is regarding the wolf.

The respondent has just to cross a box in correspondence to the choice



Section A: The first few questions ask about your feelings toward wolves. Please cross the response that best describes your opinion.

1. Which of the following best describes your feelings toward wolves?

a) Strongly dislike ❑ b) Dislike ❑ c) Neither ❑

d) Like ❑ e) strongly like ❑

2. To have wolves in your region is for you:

a) Strongly negative ❑ b) Negative ❑ c) Neither ❑

d) Positive ❑ e) Strongly postive ❑

To continue, we are going to list a series of statements. Please choose the response that best describes your opinion according to the following scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
3. It is important to maintain wolf populations in your region so that future generations can enjoy them.					
4. Having wolves in your region increase tourism					
5. Wolves have a significant impact on big game (example roe deer.).					
6. Wolves have a significant impact on small game (hare).					
7. Wolves cause abundant damages to livestock					
8. I would be afraid to hike in the woods if wolves were present.					
9. In your region wolf should remain completely protected					
10. In the area where there are continuous attacks to livestock, it should be possible to kill selective wolves.					

11. In your region it should be authorized the hunting of wolves for a numerical control.					
12. In your region it should be authorized the use of poison baits for a numerical control of wolves.					

Section B: The next few questions ask about your general knowledge of the wolf. Please circle the response that you feel best answers the question.

1. How many wolves do you believe currently exist in your region? N°_____ wolves.

2. Do you believe wolf numbers in your region are:

a) Decreasing ❑ b) Stable ❑ c) Increasing ❑ d) Don't know ❑

3. Wolves are completely protected in Italy?

a) Yes ❑ b) No ❑ c) Don't know ❑

4. How much does the average adult male wolf weight in Italy?

a) 1-25 Kg ❑ b) 26-50 Kg ❑ c) 51-75 Kg ❑ d) More than 75 Kg ❑ e) Don't know ❑

5. What is the average pack size of wolves in Italy?

a) 1-5 wolves❑ b) 6-9 wolves ❑;
c)10-15 wolves ❑; d) More than 15 wolves ❑; e) Don't know ❑

6. It is generally true that only two members (one pair) of a wolf pack breed in any one year?

a) Yes ❑ b) No ❑ c) Don't know ❑

7. **How many times a wolf reproduce per year?**

a) One time ❑ b) Twice ❑ c) Three times ❑
d) More than three ❑ e) Don't know ❑

8. Why, in your opinion, wolves attack sheep?

a) Not enough prey in the wild ❑ b) easier ❑ c) is part of their diet ❑
d) are more tasty❑; e) Don't know ❑

9. Which are the livestock that are most damaged by wolves?

a) Calves ❑ b) goats❑; c) sheep❑; c) foals❑;
d) Chicken❑; e) all the same❑; f) other____❑

10. In your opinion, which is the <u>main</u> mortality cause of wolves?

a) Natural cause ❑ b) car accidents ❑ c) poaching with arms❑;
d) poaching with poison baits ❑ e) other____❑

11. Are poison baits used in the park?

a) Yes ❑ b) no, ❑ c) don't know ❑

12. How many sheep and goats do you think were killed by wolves last year in your region?

a) From 0 to 50❑; b) From 51 to 100❑; c) From 101 to 150❑; d) More than 150❑;

13. Do you think that wolf damages to livestock in your region are?

a) Decreasing ❑ b) Stable ❑ c) Increasing ❑ d) Don't know ❑

14. Do you know if, <u>in the last 5 years</u>, someone has been attacked by wolves in your region?

a) Yes ❑ b) no, ❑ c) don't know ❑

Section C: Your experience, if any, with wolves:

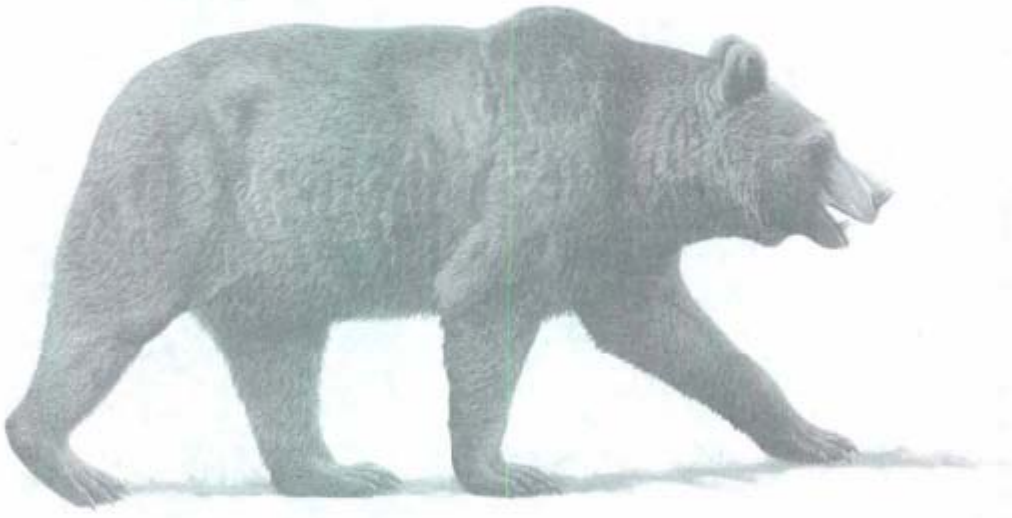
1. Have you ever seen a live wolf in the wild?

a) Yes ❑ b) no, ❑

2. Have you ever seen a wolf in captivity?
a) Yes b) no, ❑

The bear

The second part of the questionnaire regards the bear.
Also in this case to answer is enough to cross a box corresponding to your choice.



Section D: The first few questions ask about your feelings toward bears. Please cross the response that best describes your opinion.

1. **Which of the following best describes your feelings toward bears?**

a) Strongly dislike ❑ b) Dislike ❑ c) Neither ❑

d) Like ❑ e) strongly like ❑

2. **To have bears in your region is for you:**

a) Strongly negative ❑ b) Negative ❑ c) Neither ❑

d) Positive ❑ e) strongly positive ❑

To continue, we are going to list a series of statements. Please choose the response that best describes your opinion according to the following scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
3. It is important to maintain bear populations in your region so that future generations can enjoy them.					
4. Having bears in your region increase tourism					
5. I would be afraid to hike in the woods if wolves were present.					
6. Bears cause abundant damages to livestock					
7. Bears cause abundant damages to beehives					
8. Bears cause abundant damages to agriculture					
9. In your region bear should remain completely protected					
10. In the area where there are continuous attacks to livestock, it should be possible to kill selective bears.					

Section E: The next few questions ask about your general knowledge of the bear. Please circle the response that you feel best answers the question.

1. How many bears do you believe currently exist in your region? N°_____ bears.

2. Do you believe bear numbers in your region are:

a) Decreasing ❑ b) Stable c) Increasing ❑ d) Don't know ❑

3. Bears are completely protected in Italy?

a) Yes ❑ b) No ❑ c) Don't know ❑

4. How many times do bears reproduce per year?

a) Once ❑ b) Twice ❑ c) Three times ❑
d) Neither one (it reproduce every other year) ❑ e) Don't know ❑

5. In the park which is the average litter size of bears?

a) 1-3 cubs❑ b) 4-6 cubs ❑ c) 7-9 cubs ❑
d) More than 9 cubs ❑ e) Don't know ❑

6. In the area of the park, the main diet of the bear is:

a) meat❑; b) vegetables ❑
c) Both vegetable and carnivore food in the same quantity ❑ d) don't know ❑

7. It is true that in your region the bear goes into hibernation during winter time?

a) Yes, but not continuous ❑ b) yes all the time❑ c) No❑ d) Don't know ❑

8. The bear is generally:

a) a solitary animal ❑ (males and females are solitary and meet only to reproduce)
b) lives in couples ❑ (males and females form stable couples)
c) lives in groups ❑ (males and females live together and form groups of 4 or more)
d) Don't know ❑

9. In your opinion, which is the <u>main</u> mortality cause of bears?

a) Natural cause ❑ b) car accidents ❑ c) poaching with arms❑;
d) poaching with poison baits ❑ e) other____❑

10. In your opinion, are many bears that die eating poison baits?

a) Yes ❑ b) No ❑ c) Don't know ❑

11. Is it common that bears go into towns?

a) Yes ❑ b) No ❑ c) No, anymore❑ d) Don't know ❑

12. In your opinion, the number of bears going into towns are:

a) Decreasing ❑ b) Stable ❑ c) Increasing ❑ d) Don't know ❑

13. Evaluate from 1 to 5 (from no important to extremely important) what are the factors of why bears go into town?

a) there aren't enough natural preys (animals to eat in the forest) 1.....2.....3.....4.....5
b) easier to find food 1.....2.....3.....4.....5
c) abandon of agriculture in mountain 1.....2.....3.....4.....5
d) no more livestock in mountain 1.....2.....3.....4.....5
e) no native animals 1.....2.....3.....4.....5
f) other (specificy)_____ 1.....2.....3.....4.....5

14. In your opinion, ski development have a negative impact brown bears in the winter

a) Yes ❑ b) No ❑ c) Don't know ❑

15. In your opinion, too many tourists have a negative impact brown bears

a) Yes ❑ b) No ❑ c) Don't know ❑

16. Do you know if, <u>in the last 5 years</u>, someone has been attacked by bears in your region?

a) Yes ❑ b) No ❑ c) Don't know ❑

Section F: Your experience, if any, with bears:

1. Have you ever seen a live bear in the wild?

a) Yes ❑ b) no, ❑

2. Have you ever seen a bear in captivity?

a) Yes b) no, ❑

Wolf and Bear

Section G: The next few questions ask about your feelings toward various management options in respect of the damages done from wolf and bear. Please circle the response that you

1. **In your opinion, which animal is most dangerous to humans?**

a) wolf ❑ b) bear ❑ c) wild boar ❑
d) all the them e)None of them ❑ f) don't know ❑

2. **In your opinion, in economic terms, which animal cause greater damages?**

a) wolf ❑ b) bear ❑ c) wild boar ❑ d) roe deer ❑
e) all the same ❑ f) don't know ❑ g) none of them ❑

3. **Do you think the damages done by wolf should receive more money that those done by bears?**

a) yes❑ b)no❑ c)don't know ❑

To continue, we are going to list a series of statements. Please choose the response that best describes your opinion according to the following scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
4.It is more important to build a new ski development inside the park area than protect brown bears and wolves in the park					
5.the livestock owners that lives in places where wolf and bears are present, should receive a fix amount of money of subsidy instead of receive the reimbursement for the lost					
6/7.All livestock owners that lose livestock due to wolf and/or bear attacks should be compensated.					
8. The reimbursement for the lost of livestock should be paid only to those owners that have used preventive methods to avoid attacks (i.e. e-fences, LGD ecc.)					

9. The time of reimbursement for the damages caused by wolf/bear is too long					
10. livestock people receive a fair amount of money for reimbursement for damages caused by wolf/bear					
11. I would agree in giving back animals rather than money to reimburse the damages caused to livestock by wolves					
12. I would be willing to contribute money toward a compensation program for farmers for losses due to wolves and/or bears.					
13. Livestock owners should be required to buy insurance for protection against wolf and bear attacks.					

Of the following groups that could give you information about bears and wolves, what would you believe? *Please choose the response that best describes your opinion according to the following scale: 1 = nothing; 2= a little; 3= half; 4= almost all; 5= all*

	Nothing (0%)	**Few** (25%)	**Half** (50%)	**Most** (75%)	**All** (100)
a. Local and regional institutions	1	2	3	4	5
b. Personnel of the park.	1	2	3	4	5
c. Forestry.	1	2	3	4	5
d. Park rangers.	1	2	3	4	5
e. Academic biologists.	1	2	3	4	5
f. Hunter organizations.	1	2	3	4	5
g. Agriculture/shepherds organizations	1	2	3	4	5
h. Other	1	2	3	4	5

2. **On a scale from 1 to 10, how important is to you that you keep up to date with issue of wolf and bear in your region?**

Not important at all 1 2 3 4 5 6 7 8 9 10 Extremely important

3. **Which is your main information source about bears and wolves? (please indicate only one answer)**

a) Newspapers/Magazines/Books ❑ b) Television ❑ c) Radio ❑
d)Famiglia/Amici ❑ e) Otherf ❑_____(specificy)

Section I: With respect of you:*

I a) Female ❑ **b) Male** ❑

II Age: _____ **years**

III Place of residence: _____

IV Did you ever hunt?

a) Yes ❑ _____ (specific the last year you went) b) No ❑

V Have you ever been part of an environmentalist association?

a) Yes ❑ _____ (specific the last year of inscription) b) No ❑

VI If you are a livestock owner, what type of livestock do you have?

a) Sheep ❑ b) Goats ❑ c) Cows ❑ d) Horses ❑
e) Bees ❑ f) Other ❑ _____ (specificy)

VII If you are a farmer, what type of vegetables or fruits do you have?

Cultivation of:
_____

Fruit trees:
_____

Thank you for your cooperation. If you have other comments on this subject or with respect of the questionnaire, please write them here.

* The questionnaire is completely anonymous and the results are elaborate in a complex way, in a way that it is not possible to interfere with the singular cases

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