

SOCIAL SCIENCE ANNOTATED BIBLIOGRAPHY
on
HUMAN-CARNIVORE INTERACTIONS

Presented to
PARKS CANADA
by

Cécile Lacombe
Cecile.lacombe@telus.net

for
Optimal Environments, Inc.

27 March 2005

Background

Over the past several years Pacific Rim National Park Reserve has recorded a marked increase in the number of encounters between people and large carnivores (wolves and cougars). Conflicts between humans and one or both of these carnivore species have occurred within the Pacific Rim National Park Reserve in all three of the park's components (Long Beach, the Broken Group Islands, and the West Coast Trail). Some cougars and wolves have become less fearful of humans and have learned to forage in areas of human activity. Some wolves have become food-conditioned as a result of direct feeding by people. The park has made considerable efforts to educate visitors and residents about the need to frighten off carnivores when they are encountered and of the importance of not feeding carnivores directly or indirectly. Despite these educational initiatives, many close encounters and the destruction of a wolf conditioned by human feeding occurred in the summer of 2004. There is a heightened level of concern by park management toward finding an optimal balance between public safety and the conservation dimensions of the park's social ecological system.

Introduction

This annotated bibliography provides a summary of international and North American research and other literature deemed relevant to wolf and cougar management in Pacific Rim National Park Reserve, with particular reference to the human side of human-wolf and human-cougar interactions. Where pertinent, examples from research concerned with other wild animals were included. This annotated bibliography has the objective of acquiring a good knowledge of human-carnivore encounters, understanding factors that lead to negative encounters, and identifying management communication strategies that might be useful for addressing the problem.

Extensive searches were conducted in several online databases that cover conservation biology, conservation or environmental psychology, human ecology, general social science, and tourism management (JSTOR, PsychInfo, Web of Science, ERIC, Academic Search Elite, Environmental Issues and Policy Index, PsychArticle, PubMed, and ScienceDirect), and from the reference lists of many of the documents found in those searches. We have obtained all the documents listed below through different means such as online documents, the University of Victoria library, interlibrary loans, and copies sent by researchers.

The following paragraphs summarize the findings, which were organized in three main sections:

- **Encounters**, which describes the factual context of human-wolf and human-cougar encounters as well as some theoretical work about human-carnivore encounters. This section addresses the "What" questions.
- **Human factors associated with encounters**, which describes research about inappropriate behaviours in parks, social ecotourism trends, and individual attitudes toward, beliefs about, and knowledge of carnivores. This section addresses the "Why" questions.
- **Management**, which gives examples of wolf and cougar management plans in North America, showing how human-carnivore conflicts are understood. This section also describes some tested management strategies undertaken to change inappropriate behaviours, and includes the theoretical background used to implement these strategies. This section addresses the "How" questions.

Encounters

Sources detailing attacks on humans by the carnivores in question often are fragmented because there is no universal system to collect that information and make it available (Loe & Roskaft, 2004). However, literature on the topic does exist and we were able to collect factual information ("What" questions) about negative encounters that have been described and

superficially analyzed (descriptive statistics, patterns of attacks, patterns of victims) in the literature.

This literature demonstrates that numerous encounters with wolves have occurred over the last century. However, their number has decreased regularly and fatal attacks by non-rabid wolves are now less frequent (Linnell *et al.*, 2002). Two primary reports (Linnell *et al.*, 2002; McNay, 2002a) cover this topic, as do several shorter articles. In general, the authors note that the vast majority of attacks were caused by rabies, and that there was an increased risk of attacks when wolves had lost their fear of humans. Attacks also increased in highly modified environments with low prey abundance and high human density. Victims of rabid attacks mainly are adult men working in the wilderness, whereas victims of predatory attacks mostly are children under 10 years of age or, sometimes, women. Pets (dogs) may also attract wolves and lead to negative encounters (Kojola & Kuittinen, 2002).

The literature on encounters with cougars is less extensive than the literature on encounters with wolves. However, it was possible to find material providing many descriptions of cougar attacks over the last 100 years (Beier, 1991; Lewis, 2005). Analyses show that most cougar attacks are predatory attacks on children under 12 whether or not they were accompanied by adults. Fatal cases mostly occurred when no adults were present to defend the children. One article suggests appropriate human behaviours in response to different cougar behaviours (Fitzhugh, 1997).

Human Factors Associated with Negative Encounters

Human factors associated with wolf and cougar encounters are numerous. However, the literature on these encounters does not address them systematically or deeply. Of course, reductions in animal habitat due to human activity and increasing human populations close to carnivore territories are important factors, but these factors are difficult for park managers to control. Among other factors suggested in the encounter literature, inappropriate human behaviour was often cited, especially carnivore feeding, which is likely to lead to habituation and loss of human fear by the carnivores. Wildlife-feeding behaviour is a relatively recent topic in the scientific literature and is mostly considered in tourism management journals. Few recent

studies about people feeding large wild animals in parks were found. One (Orams, 2002) points out the problems of ecotourism as well as the necessity to educate people. This topic is a growing concern for parks (e.g., Arizona park staff face a similar problem with human-mountain lion encounters and they also are trying to find solutions). Taking photos and approaching wildlife are also part of National Park visitors' behaviour, but this is not often considered to be a problem in the encounter literature. However, it could become one. For example, entering a carnivore's territory, approaching cubs, or walking with a dog may be dangerous and inappropriate human behaviours to be addressed by park managers.

Social pressure, cultural tendencies and touristic trends are important in the way people behave because they shape visitors' expectations toward wildlife experience. Few scientific studies were found on the topic, but some recent documents, mostly about whale watching, show how tourism discourse may influence wildlife tourists' behaviour (Muhlhausler & Peace, 2001). The literature shows also how animal-human interactions are sometimes promoted in ecotourism material, and some ecosystem managers adopt aggressive campaigns to attract tourists promoting "wildlife experience" (Carpatian Wildlife Foundation *et al.*, 2002).

Attitudes, knowledge and beliefs may affect visitors' behaviours once they visit a natural area with wolves and cougars. Attitudes, knowledge and beliefs may also affect the way visitors, residents, accommodation providers or even tour guides will receive and react to educational campaigns from ecosystem managers. Attitudes, knowledge and beliefs about wolves and cougars have been extensively studied during re-introduction programs (e.g., the re-introduction of wolves in Yellowstone National Park). These numerous studies mainly focus on the general public, local inhabitants and farmers. Most attitude studies also propose management implications aimed at compensating farmers and residents for wolf or cougar depredation (mostly on livestock). A few articles were found that studied wildlife viewers (Smith, 1996) or backpackers (McCool & Braithwaite, 1989; Molitor, 1995). Only one scientific study was found that examined behaviour and individual characteristics of wildlife-feeders in advertised dangerous-animal wild areas (Ballantyne & Hughes, 2005).

Part of the literature is devoted to the ways that people develop their attitudes, beliefs and values. In this annotated bibliography, we decided to include some relevant scientific studies

that analyze fears and risk taking attitudes toward dangerous animals (Bjerke & Kaltenborn, 1999; Bjerke *et al.*, 2000; Davey *et al.*, 2003; Kellert, 1983; Muris *et al.*, 2003) even though they apparently never study actual encounters. Attention to these articles should be helpful for better understanding cognitions, emotions, and expectations about these animals.

Management

Few wolf or cougar management plans that we could find deal with the problem of human-carnivore encounters. Much effort has been made in the past to change negative attitudes toward carnivores into positive attitudes, to support the reintroduction of these animals into parks. In most of the plans, human-carnivore conflicts are discussed in terms of livestock depredation and compensation to farmers. Recently, however, an Oregon wolf management plan addressed human-wolf encounters in a substantial chapter (Oregon Department of Fish and Wildlife, 2004), and the Arizona Game and Fish Department proposed a draft action plan for minimizing and responding to human/mountain lion interactions (Arizona Game & Fish Department, 2004). These plans acknowledge the human-carnivore encounter problem and propose some "lines of action" or goals. However, none really describes how they will accomplish this.

Implemented and tested management strategies (e.g., educational campaigns and enforcement) to change inappropriate human behaviours in natural settings are not very common in the literature. It was not possible to find any that addressed wolf or cougar management. However, we could find some tested management campaigns for other kinds of animals, and these are included in the annotated bibliography (Ballantyne & Hughes, 2005; Beckmann *et al.*, 2003; Molitor, 1995). Most of these management strategies rely on scientific theories about changing human behaviour, or at least about human behavioural intentions. We decided to include the most relevant of them at the end of this literature review, such as the theory of reasoned action (Fishbein & Ajzen, 1980), the theory of planned behaviour (Ajzen, 1991), the elaboration likelihood model and persuasive communication models (Ajzen, 1992). These theories are known to help in predicting human behaviour. The theory of reasoned action (TRA) asserts that a person's behaviour is determined by his or her attitude toward the outcome of that behaviour and by the opinions of the person's social circle. It predicts better when the decision is a high-

involvement one, that is, when the person actively thinks about and cares about the decision (e.g., choice about a big hiking trip). The theory of planned behaviour (TPB) is an extension of the TRA that includes the addition of perceived behavioural control, which refers to a person's belief about whether he or she is able to engage in the behaviour. The elaboration likelihood model is more concerned with the prediction of low-involvement behaviours, that is, the outcome of that behaviour is not very important for the person (e.g., feeding wildlife may be in this category). This model assumes that decisions are affected more by emotion-based messages than by a person's active reasoning. Persuasive communication is based on these theories and models. It involves the use of verbal (or written) messages to influence attitudes and behaviours. Applications of these theories and models to tourism and natural resource management are collected in an edited book (Manfredo, 1992), which is included in this annotated bibliography.

Remaining questions

The literature reviewed here certainly helps in understanding various aspects of the human-carnivore encounter problem. Some findings are generalisable (e.g., cougars usually attack children) or concern general beliefs and attitudes (e.g., farmers have less positive attitudes toward wolves than the general public), but most authors agree that management strategies should be based on the specific context of each wilderness or park. Thus, gathering and analyzing additional data about human-carnivore encounters in the Pacific Rim National Park Reserve is a necessary step toward quality management. These new studies should be informed by the methods and results of studies in other parks and wilderness areas, but they should be locally situated for maximum validity. New studies should include answers to the "what" questions in PRNPR, as well as pertinent visitor and resident attitudes, behaviours, expectations, beliefs, and intentions. The existing literature on attitudes and beliefs mainly considers those of the general public, rather than focusing on residents and visitors who are actually in or near to the park and wilderness context. Clearly, the appropriate study populations, as the University of Victoria Honours thesis projects have begun to recognize, are local residents and visitors. But, according to the literature, local accommodation providers, backpacker service providers, and tour leaders also should be included, because they also influence visitor behaviour. Finally, studies in this literature have suggested some useful management strategies, but they have done

so in other contexts and usually with other animal species. These studies provide the basis for implementing efficient management strategies (e.g., communication, education, and enforcement), but they cannot replace local research. Further research will greatly help in the development, application, and evaluation of management strategies in the Pacific Rim National Park Reserve that will reduce the frequency and severity of negative encounters between humans and carnivores.

Annotated bibliography

The list of references below includes scientific studies, reports, books and pertinent documents that have been found about the above topics.

1 Encounters

The documents collected under this section report factual information about negative encounters.

("What" questions)

Who encountered wolves/cougars (age, sex, tourist/worker/hunter/resident, etc.) ?

At what time of the day/year did the encounter occur ?

In what place did the encounter occur (country, urban/rural area, parks, etc.) ?

What was the physical environment of the encounter ?

Which activities were the people engaged in ?

What were their reactions and the reactions of the people around them ?

What was the reaction of the animal ?

What was known about this particular animal ?

What was the outcome of the encounter ?

Wolf/cougar attack statistics (e.g., number of attacks per year/country, fatalities)

1.1 Encounters with wolves

Kojola, I., & Kuittinen, J. (2002). Wolf attacks on dogs in Finland. *Wildlife Society Bulletin*, 30(2), 498-501.

This paper analyzes 65 reports (1996-1999) of wolf attacks on dogs in Finland. Most of the attacks (usually by a single wolf) occurred in house yards, and dogs were often killed (82%). Spitz dogs were attacked more frequently than others. During hunting season, hunting dogs are often attacked in the forest by two or more wolves. Attacks in residential yards had a strong seasonal pattern and were concentrated in winter. The author found a correlation between number of attacks and density of moose, but this association was not necessarily a causal relationship. Attacks on dogs may be considered as one factor in wolf-human conflicts and in wolf-human encounters.

Linnell, J. D. C., Andersen, R., Anderson, Z., Balciauskas, L., Blanco, J. C., Boitani, L., et al. (2002). The fear of wolves: A review of wolf attacks on humans. *Nina Oppdragsmelding 731*, 1-65.

This report is a very complete document that analyzes wolf attacks on humans. The authors collected data from about 18 European countries, Russia, Eurasia and North America (US and Canada). This report summarizes wolf attacks, compares them with the other types of carnivore attacks (dingoes, coyotes, cougars, bears, tigers, lions, and leopards). The report then analyzes the patterns and process of the attacks: factors associated with wolf attacks (rabies, habituation, provocation, extreme socio-environmental situations), patterns (age and sex of the victims; temporal changes in number of attacks). The authors found that a vast majority of attacks were attributed to rabies, and that there was an increased risk of attacks when wolves had lost their fear of humans. Attacks were also increased in highly modified environments with low prey abundance and high human density.

McNay, M. E. (2002a). *A case history of wolf-human encounters in Alaska and Canada* (No. 13 Wildlife Technical Bulletin). Juneau, AK: Department of Fish and Game, Division of wildlife conservation.

This well-documented report collects 80 cases of human-wolf encounters in Alaska and Canada. Each case is described with as many details as possible. Data come from investigative reports, interviews with witnesses or officials, newspapers, and newsletter articles. Wolf-human encounters are organized into 5 behavioural categories that describe aggressive behaviour (agonism, predation, prey testing or agonistic charges, self

defense, rabies) and 2 categories that are nonaggressive (investigative search behaviour, investigative approaches). The report does not analyzes patterns of victims as the Linnell report does. However, it represents a very complete and detailed database which could be very useful for further studies.

McNay, M. E. (2002b). Wolf-human interactions in Alaska and Canada: A review of the case history. *Wildlife Society Bulletin*, 30(3), 831-843.

In this paper, the author analyses the 80 cases described in the McNay report (McNay, 2002a). The analyses compare wolf behaviours, categorizes the types of aggressions and focuses on 19 unprovoked wolf aggressions (the other aggressions were mostly the consequence of rabies or self-defense). 11 of the unprovoked aggressions were perpetrated by habituated wolves. The author discuss non-habituated and habituated wolf behaviours. He suggests that, where wolves are protected and frequently encounter people, some level of negative conditioning should be applied to prevent habituated and food-conditioned behaviour in wolves.

Munthe, K., & Hutchison, J. H. (1978). Wolf-human encounter on Ellesmere Island, Canada. *Journal of Mammalogy*, 59(4), 876-878.

This note reports a wolf-human encounter in which wolves were aggressors. It describes the encounter.

Scott, P. A., Bentley, C. V., & Warren, J. J. (1985). Aggressive-behavior by wolves toward humans. *Journal of Mammalogy*, 66(4), 807-809.

This short article describes an aggressive encounter between a pack of wolves and the authors. Physical environment, behaviours of both wolves and humans are presented as well as the weather conditions. A figure shows the setting and behaviour mapping of the attack.

1.2 Encounters with cougars

Beier, P. (1991). Cougar attacks on humans in the United States and Canada. *Wildlife Society Bulletin*, 19(4), 403-412.

This paper summarizes and discuss 100 hundred years of reports about cougar attacks on humans (1890-1990) in the US and Canada. The author analyses trends in the history and circumstances of cougar attacks, and traits that typify the human victims and their attackers. He notes that attacks on humans increased after 1970, with humans' increasing use of cougar habitat. Most victims are children (64%) under 10. There are not more attacks when children are alone (as opposed to being with parents or friends), but most

of the adults that were attacked were alone. Yearling and underweight cougars were most likely to attack. Aggressive response of intended victims could repel an attack in progress.

Fitzhugh, L. E. (1997, 27 February - 1 March 1996). *Puma behaviors during encounters with humans and appropriate human responses*. Paper presented at the 5th Mountain Lion Workshop, San Diego, California.

Examining historical accounts of puma attacks on humans, the author draws the conclusion that unprovoked attacks are predatory in nature. This publication presents a description of 7 different puma activities that a hiker may encounter. For each of these 7 behaviours, the author suggests the meaning in terms of animal behaviour, the risk for humans, and the appropriate human responses to insure security. The paper is short but provides interesting insights to understand puma-human encounters and to categorize these encounters according to the risk they represent.

Kadesky, K. M., Manarey, C., Blair, G. K., Murphy, J. J., Verchere, C., & Atkinson, K. (1998). Cougar attacks on children: Injury patterns and treatment. *Journal of Pediatric Surgery*, 33(6), 863-865.

This medical paper describe the case of 2 cougar attacks in BC. Encounters, wounds and treatments are described (and one photo). The paper also presents a short review of 83 documented cases of cougar attacks that occurred between 1898 and 1998 (see Beier,1991). 70% of these attacks occurred in BC. 59% of all attacks and 70% of all fatal attacks were on children (average age: 8). 92% of the children attacked were not alone. Fatalities occurred when children were with other children and no adults. Beside the description of the encounters and the statistics, the paper presents some interesting data useful to prepare educational material for the public.

Lewis, L. (2005). Mountain lion attacks. Retrieved February 01, 2005, from http://tchester.org/sgm/lists/lion_attacks.html

This important web source collects short and well-documented descriptions of a very large amount of mountain lion-cougar/human encounters and attacks since 1880 in the US and Canada. Sources are magazines, newspapers and other reports. Some sources come from Beier's research (1890-1990), others come from Chester's research (1991-

2000; available on another webpage: http://tchester.org/sgm/lists/lion_encounters_ca.html). Descriptions report what people were doing during the encounter, their reactions and those of the animal. They also report the outcomes (death, wounded, simple encounter). Not all the descriptions are detailed, but sources are indicated which would allow researchers to find more complete descriptions. This document is the most important database of mountain lion attacks on human found for this annotated bibliography.

McKee, D. (2003). Cougar attacks on humans: A case report. *Wilderness & Environmental Medicine*, 14(3), 169-173.

This medical paper describes the case of a cougar attack on an 8-year old girl in British Columbia. The author then discusses wound management. Also reviewed are recommendations on actions that may be helpful in preventing an attack following a sudden encounter with a cougar (e.g., shouting, swinging sticks).

Sweanor, L., Logan, K., Bauer, J., & Boyce, W. (2004). Southern California puma project. Davis, Ca: California State Park and UC Davis Wildlife Health Center.

This report provides results and recommendations based on the first 3 years of an ongoing research project examining the relationships between pumas, people, and the environment they share in eastern San Diego County in southern California. The results show that pumas are rarely found in close proximity to buildings or campgrounds. Pumas and people tend to have opposite activity periods. Pumas move very little during daylight hours when people are most active. The authors suggest that the greatest opportunity for a puma-human encounter is probably during crepuscular periods (times within 1.5 hours either side of sunrise or sunset), when puma activity is increasing and human activity is waning.

1.3 Scientific knowledge

This section contains scientific knowledge and discussions about human-carnivore encounters.

Kerr, W. A., & Wilman, E. A. (1988). A proposed formal-structure for assessing bear-human encounters. *Environmental Management*, 12(2), 173-179.

This article develops a formal theoretical model to assess interactions between bears and the hiker population in national parks. Although this paper addresses encounters with bears, the model may be interesting to adapt to the study of encounters with wolves and cougars. It provides a theoretical basis for further studies. A number of alternative interactive scenarios are identified, and some specific cases are explored in detail. Some examples of the insights to be gained by the use of such a formal structure by park managers charged with the dual mandate to preserve fauna and to provide safe recreational opportunities are presented.

Kruuk, H. (2003). *Hunter and hunted: Relationships between carnivores and people*. Cambridge: Cambridge University Press.

This book is founded on the author's lifetime experience studying carnivores and their complex dealings with humans in many countries and situations. The chapters deal with the standard aspects of carnivore biology, their societies, their quarries, antipredator behaviour, attacks on humans, competitors and disease, carnivores in culture, and a personal insight on the future of carnivore-human relationships. This book is a useful document as a contextual background.

Loe, J., & Roskaft, E. (2004). Large carnivores and human safety: A review. *Ambio*, 33(6), 283-288.

This article analyzes statements about the frequency and causes of carnivore attacks on humans. It also reviews the literature on the topic. The author notes that sources detailing the number of attacks on humans are often fragmented and difficult to obtain. According to the author, one reason is because information is often not properly collected by wildlife managers. The author suggests that information systems, including databases on attacks and encounters, should be established for large carnivore conservation efforts, to supply information and to answer future requests for this information.

2 Human factors associated with encounters

The documents collected under this section address the social/individual factors that may have contributed to people encountering carnivores ("Why" questions).

2.1 Inappropriate behaviours

Green, R. (2003). *Wildlife feeding*. Paper presented at the Sustainable Wildlife Tourism Workshop, Warrawong Earth Sanctuary and Cleland Wildlife Park Adelaide Hills, South Australia.

This paper addresses the problem of wildlife feeding. The author discusses the controversial points of view about this topic. She also proposes some relevant points about different outcomes of these issues. Should feeding be permitted in some situations - What are some of the criteria for deciding whether, when, what, how and where feeding of wildlife should be allowed - Is there a need for national guidelines.

Montana Wildlife Society. (1999). Effect of recreation on Rocky Mountain wildlife, a review for Montana. Retrieved March, 2005, from <http://www.montanatws.org/pages/page4a.html>

Based on the literature, chapter 7 of this report reviews the impacts of recreational activities on carnivores in the Rocky Mountains, comprising wolves and mountain lions. Behavioural habits, habitat and effects of recreational activities that disturb these are examined for each species. For wolves, disturbing human activities include trapping/snaring, hunting with hounds, big game hunting; coyote hunting, non-hunting recreation with dogs, snowmobiles; den disturbance, rendezvous site disturbance, wildlife photographers and tourism, recreational howling, anthropogenic linear features (i.e., roads, seismic lines, and ORV trails). For mountain lions, the authors analyse habitat fragmentation, influence on home range, behavioural changes, influence of roads, hunting, and habituation to humans. The authors offer a few management recommendations, mainly in terms of providing intensive education to visitors and the local population. One example is to require real estate brokers to provide "living with lions" literature to all prospective home buyers within the mountain lion habitat.

Orams, M. B. (2002). Feeding wildlife as a tourism attraction: A review of issues and impacts. *Tourism Management*, 23(3), 281.

This paper discusses the problem of feeding wildlife as a tourism trend. It also discusses the difficulties encountered by wildlife managers as they try to stop park visitors from doing this. The author mentions that the issue of feeding wildlife for tourism is a controversial one, with little consensus about how it should be managed. Approaches range from complete prohibition, to active promotion and management, to simply ignoring the practices. This paper addresses an important question because wildlife habituation may be a significant factor in human-carnivore encounters in Canadian National Parks.

2.2 Social-cultural pressure

Muhlhausler, P., & Peace, A. (2001). Discourses of ecotourism: The case of Fraser Island, Queensland. *Language & Communication*, 21(4), 359-380.

This paper concentrates on the discourse of ecotours and whale watching. The author compares ecowalks and ecotours (in boats). He notes that the objectives of ecotourism, such as teaching, interpreting and changing attitudes toward nature are seldom met. Ecotourism material (promotional and educational material) and discourse (messages during a tour) comprise a "green product" detached from the visitor. Ecotourism experience is highly mixed with mass consumption and ecotourism companies sell not only tours, but other products such as T-shirts and post cards. Ecotourism articles are rare and this one opens an avenue to understand the influence of media and discourse on wildlife visitors' attitudes and behaviours.

Reynolds, P. C., & Braithwaite, D. (2001). Towards a conceptual framework for wildlife tourism. *Tourism Management*, 22(1), 31-42.

This is a theoretical paper that presents a conceptual framework which begins to classify the major components of wildlife tourism/recreation and indicates the roles of, and the relationship between, these components.

2.3 Individual attitudes, knowledge and beliefs toward carnivores and wildlife experience

This section collects articles on attitudes, knowledge, beliefs, values and risk perception toward carnivores among several important groups of people:

- The public in the context of re-introduction of carnivores in a specific region
- Residents/farmers
- Public in general
- First Nations
- Tourists
- Hunters

Ballantyne, R., & Hughes, K. (in press). Using front-end and formative evaluation to design and test persuasive bird feeding warning signs. *Tourism Management*.

This article examines the effectiveness of warning signs in Brisbane Forest Park after serious bird attacks on visitors were reported (some even required hospital treatment). The first part of the document examines visitors' beliefs, attitudes and bird feeding behaviour. The results show significant differences between feeders and non-feeders. This document is the only one that was found about attitudes and beliefs of park visitors feeding wildlife.

Bjerke, T., Reitan, O., & Kellert, S. R. (1998). Attitudes toward wolves in southeastern Norway. *Society & Natural Resources*, 11(2), 169-178.

This study examines preferred size of the wolf population, attitudes and knowledge about wolves, and experience with animal-related activities in southeastern Norway. The proportion who want wolves extirpated or reduced increased as the perceived size of the wolf population increased, age increased, and educational level decreased. The attitude profiles showed that older persons, pensioners, and those with only basic education expressed high dominionistic, high negativistic, high utilitarian, and low naturalistic scores, whereas younger persons with higher education showed the reverse pattern. The study provides data to help ameliorate current conflicts between sheep farmers and wildlife managers.

Bjerke, T., & Kaltenborn, B. P. (1999). The relationship of ecocentric and anthropocentric motives to attitudes toward large carnivores. *Journal of Environmental Psychology, 19*(4), 415-421.

This paper addresses the question of values and attitude toward carnivores among 853 sheep farmers, 551 wildlife managers, and 379 research biologists in Norway. The results show that greater anthropocentrism is related to more negative attitudes toward carnivores, and that greater ecocentrism is related to positive attitudes toward carnivores for all three groups. Farmers, relative to the other groups, scored lowest on the ecocentric and highest on the anthropocentric subscales. The author points that economic considerations are important in the farmer attitudes, and proposes that authorities take measures to reduce economic insecurity due to carnivore proximity.

Bjerke, T., Vitterso, J., & Kaltenborn, B. P. (2000). Locus of control and attitudes toward large carnivores. *Psychological Reports, 86*(1), 37-46.

This article investigates whether attitudes toward wolves also reflect a protest against increased control of land use by central political authorities. The study is based on the same data as Bjerke (1999). Sheep farmers expressed an *external locus of control*, indicating a belief that external forces control events, relative to the two other groups (in contrast, *internal locus of control* means that people feel that they control events). The authors show that among sheep farmers and research biologists, a positive association was found between an external locus of control and negative attitudes toward large carnivores.

Brooks, J. J., Warren, R. J., Nelms, M. G., & Tarrant, M. A. (1999). Visitor attitudes toward and knowledge of restored bobcats on Cumberland island national seashore, Georgia. *Wildlife Society Bulletin, 27*(4), 1089-1097.

This article examines knowledge and attitudes toward bobcats in 4 different groups: deer hunters, day visitors, developed-site campers, and back-country campers. The survey took place in Cumberland Island National Seashore and included 1138 participants. Deer hunters had a less positive attitude toward bobcats. Their knowledge was greater than in the 3 other groups but, overall, the level of knowledge of the four groups was rather low. Visitor attitudes toward and knowledge of bobcats differed among the 4 visitor user-

groups. The authors suggest that wildlife interpretive and education programs should be specifically targeted to address the differences in attitudes and knowledge between visitor user-groups.

Ericsson, G., & Heberlein, T. A. (2003). Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation*, *111*(2), 149.

This study investigated the relation between Swedes' experience, knowledge, and attitude toward wolves in four groups of people (non-hunter public, non-hunter public living in wolf areas, hunter public, and hunters living in wolf areas). Swedes who live in areas where wolves have been restored have more negative attitudes than the general public. Experience with wolf predation leads to more negative attitudes. Hunters in areas with wolves have the most accurate knowledge but the most negative attitudes. Within all groups, as knowledge increases attitudes become more positive. Nevertheless, the most knowledgeable local hunters have less favorable attitudes than the least knowledgeable members of the general public. The authors suggest that most people are very neutral toward wolves, and thus they are not very receptive to traditional education (e.g., pamphlets). However, these weak attitudes make them receptive to widely publicized events.

Kaltenborn, B. P., & Bjerke, T. (2002). The relationship of general life values to attitudes toward large carnivores. *Research in Human Ecology*, *9*(1), 55-61.

This article examines fundamental values and attitudes toward predators among sheep farmers, wildlife biologists and research biologists in Norway (see Bjerke, 1991). The authors evaluated the assertion that the negative attitude of farmer compared to the two other groups is related to differences in values. "Nature" was the most important value dimension among wildlife managers and biologists, whereas "Security" was most important for sheep farmers. Negative attitudes toward carnivores were positively associated with items related to "Security" and "Tradition." Positive attitudes toward carnivores were positively correlated with "Openness to change" and "Nature" dimensions.

Kellert, S. R. (1985). Public perceptions of predators, particularly the wolf and coyote. *Biological Conservation*, 31(2), 167-189.

This paper explores US attitudes toward, and knowledge of wolf and coyote. Data were derived from a national study of animal-related attitudes, knowledge, and behaviours among 3107 randomly selected Americans residing in the 48 states and Alaska. Comparisons were made among a variety of demographic groups distinguished by age, sex, region of residence, urban-rural residence, education, and occupation. The views of livestock producers were also explored. Farmers have the most negative attitudes toward wolves and coyote. Positive attitudes toward wolves and coyotes was correlated with general affection for animals and a desire to protect wildlife and natural habitats. Details of the study give more information about attitudes, knowledge and values of each group.

Kellert, S. R. (1993). Attitudes, knowledge, and behavior toward wildlife among the industrial superpowers: United States, Japan, and Germany. *Journal of Social Issues*, 49(1), 53-69.

This paper is an extension of the preceding one. The author examines attitudes, knowledge, and behaviour toward wildlife in the US, Japan, and Germany. A conceptual and methodological approach was used to survey 3,107 adults throughout the US; 450 persons in Tokyo and in 3 rural areas, and 50 Japanese experts on nature and wildlife; and 1,484 persons throughout West Germany over a 10-year period. The results show that knowledge about animals is greater in Germany and less in Japan. Young adults and educated people express more affection and concern for animals. US respondents own more domestic animals and are more favorable to hunting than those in the two other countries. The author interprets the differences in terms of the biogeographical, cultural, and historical characteristics of each country. He points out a paradox in US respondents: they have a high level of concern for individual animals (e.g., their pets) but are indifferent to most other animals.

Kellert, S. R., Black, M., Rush, C. R., & Bath, A. J. (1996). Human culture and large carnivore conservation in North America. *Conservation Biology*, 10(4), 977-990.

The authors examine and compare human attitudes toward wolves, grizzly bears, and mountain lions in North America (Rocky Mountains of the United States and Canada). The authors include primary research, literature reviews, and secondary data, as well as

Native American material (e.g., art, legends) in their analysis. An historical overview of the material shows that contemporary attitudes toward wolves have evolved from very negative to partly positive or neutral. However, people living close to wolf areas still have more negative attitudes. Attitudes toward mountain lions have been highly ambivalent, never assuming the prominence or clarity of views on wolves. Today, perceptions of grizzly bears range from positive to negative. The authors discuss policy and management implications. Their recommendations include targeting key groups with education programs, building support through the use of spokespersons within the target groups, integrating human and ecological concerns, and designing species-specific education initiatives in some cases.

Koval, J. H., & Mertig, A. G. (2004). Attitudes of Michigan public and wildlife agency personnel toward lethal wildlife management. *Wildlife Society Bulletin*, 32(1), 232-243.

This paper identifies attitudes of the public (n = 952) and wildlife agency personnel (n = 142), who are important in the implementation of management policies, particularly in controversial situations. A survey addressed support for lethal wildlife management in Michigan. The authors identified 7 situations in which lethal wildlife management can be used: to control wildlife diseases, ensure species survival, preserve the ecological health of an area, control wildlife damage, ensure public safety, manage population levels of wild animals, and provide opportunities for people to gather food. Support for lethal management was strong in general, and even stronger among agency personnel. Lethal management to control disease was the highest in both the public and agency personnel. Support for lethal management to protect public safety was lower than expected. The authors discuss wildlife management implications and suggest that managers need to consider public attitudes in specific lethal management situations.

McCool, S. F., & Braithwaite, A. M. (1989). Social influences and backcountry visitor behavior in occupied grizzly bear habitat. *Society and Natural Resources*, 2(4), 273-283.

This article examines the strength of others' influences on an individual's behaviour, with the objective of enhancing the development and effectiveness of programs designed to communicate appropriate behaviour in grizzly bear country. Although this study is not oriented toward wolves or cougars, it is relevant because it examined the attitudes and

behaviours of backcountry visitors in the north of the US. The authors examine the behaviours (e.g., store food in trees, make noise on trail) of nine groups of people (in nine areas with various human-bear encounters opportunities) when they go backcountry camping. They also examine whether these behaviours were related to social pressure (from their group, park rangers, backcountry magazines, etc.). The authors found that 1) backpacking in grizzly country is mainly an individual (or duo) activity. Thus the individual's attitude (as opposed to group influence) may be a better predictor of backcountry behaviours.

Molitor, A. B. (1995). The effects of persuasive communication messages on backcountry visitor behavior in occupied grizzly bear habitat. *Dissertation Abstracts International: Section B: The Sciences & Engineering*, 56(6), 2969.

This dissertation reviews various backcountry information programs designed to persuade individuals to engage in appropriate behaviours necessary for relatively safe hiking and camping in occupied grizzly bear habitat. The first part of the dissertation has useful information for understanding visitors' characteristics and their behaviours when they backpack. The 1991 field experiment involved 760 visitors to the Jewel Basin Hiking Area.

Musiani, M., & Paquet, P. C. (2004). The practices of wolf persecution, protection, and restoration in Canada and the United States. *Bioscience*, 54(1), 50-60.

This paper describes the evolution of public attitudes toward wolves in the US and Canada. During the early 20th century, wolves were considered undesirable. They were subject to persecution and were extirpated from large areas of their original range. With increased environmental awareness in the 1970s, attitudes toward wolves began to change. Wolf conservation became a focus of public interest, providing conditions that favored regional wolf recovery.

Naughton-Treves, L., Grossberg, R., & Treves, A. (2003). Paying for tolerance: Rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology*, 17(6), 1500-1511.

In this article, the authors examine the attitudes of rural citizens in Wisconsin (landowner complainants, random landowners, hunter complainants, random hunters)

toward wolves and wolf management. Responses to a mail-back survey (n=535) suggested that people who had lost a domestic animal were less tolerant of wolves. Perceived risk is as important as actual experience with depredation in shaping rural attitudes. The authors show that an individual's cohort (i.e., hunter, livestock owner, general resident) and education level are strongly significant predictors of tolerance for wolves, whereas losses to wolves are less powerful but also significant. Compensation for losses did not affect levels of tolerance toward wolves, but was approved as a management strategy. In conclusion, the authors suggest that deep-rooted social identity and occupation are stronger predictors of tolerance for wolves than individual encounters with large carnivores.

Pate, J., Manfredo, M. J., Bright, A. D., & Tischbein, G. (1996). Coloradans' attitudes toward reintroducing the gray wolf into Colorado. *Wildlife Society Bulletin*, 24(3), 421-428.

In this article, the authors examine attitudes toward wolves. Their results show that those with negative attitudes considered that wolf reintroduction would result in wolf attacks on livestock, financial loss to ranchers, wolves wandering into residential areas, and large losses in deer and elk. Positive attitudes were based on belief that wolf reintroduction was part of environment preservation.

Ratti, J. T., Weinstein, M., Scott, J. M., Wiseman, P. A., Gillesberg, A. M., Miller, C. A., et al. (2004). Feasibility of wolf reintroduction to the Olympic Peninsula, Washington. *Northwest Science*, 78, 1-76.

This special issue presents various perspectives on the restoration of wolves. Among them are cultural and spiritual considerations such as stories and myths or ceremonies and rituals, which give some clues about the status of the wolves in Native American societies. The issue also presents the human-wolf conflict with depredation on livestock and domestic dogs. The authors also present the socio-economic factors associated with wolf restoration (public opinion, human population growth, recreation and tourism, changes in road density, legal aspects of wolf management).

Riley, S. J., & Decker, D. J. (2000). Wildlife stakeholder acceptance capacity for cougars in Montana. *Wildlife Society Bulletin*, 28(4), 931-939.

This paper examines the public acceptance of cougars through 805 mail-back questionnaires and 34 interviews. Demographic variables such as location and tenure of residency, gender, and level of education did not affect the level of acceptance. People who desire a decrease in cougar numbers perceive the population of cougars as increasing, have negative attitudes toward cougars, and believe that cougars are a threat.

Smith, K. C. (1996). *Tourism product development: A case study of wildlife viewing in the Squamish Valley*. MA thesis, Resource Management, Simon Fraser University, Burnaby, British Columbia, Canada.

This thesis contains an analysis of wildlife areas tourist characteristics in BC. Although the focus is only on wildlife viewers and adopts a tourism point of view, the information contained in this document could be useful because the population studied is close to that of Pacific Rim National Park Reserve visitors.

Williams, C. K., Ericsson, G., & Heberlein, T. A. (2002). A quantitative summary of attitudes toward wolves and their reintroduction (1972-2000). *Wildlife Society Bulletin*, 30(2), 575-584.

This paper reports a meta-analysis on support for wolves (*Canis* spp.) from 38 quantitative surveys conducted between 1972 and 2000. The authors show that ranchers and farmers have less positive attitudes than the rest of the population.

Zinn, H. C., & Pierce, C. L. (2002). Values, gender, and concern about potentially dangerous wildlife. *Environment & Behavior*, 34(2), 239-256.

The authors investigated wildlife value orientations, gender, and concern about risks posed by mountain lions. A survey of a sample of 2,469 adult residents in Colorado was conducted. Results show that women expressed greater concern than men, and participants with children living at home expressed greater concern than participants without children at home. Participants with utilitarian values were more likely than those with protectionist ones to accept destroying a lion in a residential area, and men were more likely than women to accept destroying it. This study provides data that could be useful for adapting management and communication strategies in parks.

2.4 Scientific knowledge about attitudes, knowledge and beliefs

This section addresses scientific knowledge about the way people develop their attitudes, knowledge and beliefs toward animals and wildlife experience

Coble, T. G., Selin, S. W., & Erickson, B. B. (2003). Hiking alone: Understanding fear, negotiation strategies and leisure experience. *Journal of Leisure Research*, 35(1), 1-22.

This study examines fears that solo hikers experience, the strategies they employ to negotiate these fears, and how the leisure experience is influenced by this process. Semi-structured interviews were conducted with 20 men and women (aged 20-50 yrs). Fear of wild animals and dogs was expressed as one of the 5 main types of fear solo hikers encounter. Solo hikers mentioned that fear of wild animals was less important during group hiking. To negotiate their fears, solo hikers use strategies (avoiding perceived threats, modifying participation in solo hiking, using aids or protective devices, expanding knowledge or skills, and employing a psychological approach). Park managers may take in account these fear-negotiation strategies for adjusting education aimed at dealing with human-carnivore interactions.

Davey, G. C. L., Cavanagh, K., & Lamb, A. (2003). Differential aversive outcome expectancies for high- and low-predation fear-relevant animals. *Journal of Behavior Therapy & Experimental Psychiatry*, 34(2), 117-128.

This paper addresses the question of fear of dangerous (e.g., tiger, shark) versus non-dangerous phobic animals (e.g., spiders, slugs). It shows that fear of dangerous animals is associated with pain conditioning and fear of non-dangerous phobic animals is associated with disgust conditioning. The author mentions that fear toward each category of animal is reinforced by showing violent (for dangerous animals) or disgusting (for non-dangerous phobic animals) material. The author suggests that disgust conditioning may be related to the fear of spread of disease. Understanding the mechanism of fear of dangerous animals may be very relevant to wildlife managers for adjusting their communication strategies.

Kellert, S. R. (1983). Affective, cognitive, and evaluative perceptions of animals. *Human Behavior & Environment: Advances in Theory & Research*, 6, 241-267.

This chapter discusses scientific understanding of human perceptions of animals, using 1) affective (feelings and emotions), 2) cognitive (knowledge and factual understanding), and 3) evaluative (beliefs and values) components to classify human perceptions of animals. These 3 aspects of human perception of animals are related to 4 basic areas of concern: basic attitudes toward animals; attitudes toward specific animal-related issues; knowledge and awareness of animals; and symbolic perceptions of animals. The author suggests that understanding human perceptions of animals has implications for policy and management issues in 5 contexts of wildlife management: constituency identification, multiple-satisfactions management, resource allocation, social impact and trade-off analysis, and public awareness and environmental education

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2), 267-286.

This paper proposes a theoretical view of risk-taking as based on feelings. Risk-taking may be a factor in human-carnivore encounters. Virtually all current theories of choice under risk or uncertainty are cognitive and consequentialist. They assume that people assess the desirability and likelihood of possible outcomes of choice alternatives and integrate this information through some type of expectation-based calculus to arrive at a decision. The authors propose an alternative theoretical perspective, the risk-as-feelings hypothesis, that highlights the role of affect experienced at the moment of decision making. Drawing on research from clinical, physiological, and other subfields of psychology, they show that emotional reactions to risky situations often diverge from cognitive assessments of those risks. When such divergence occurs, emotional reactions often drive behaviour. The risk-as-feelings hypothesis is shown to explain a wide range of phenomena that have resisted interpretation in cognitive-consequentialist terms.

Muris, P., Bodden, D., Merckelbach, H., Ollendick, T. H., & King, N. (2003). Fear of the beast: A prospective study on the effects of negative information on childhood fear. *Behaviour Research & Therapy*, *41*(2), 195-208.

The authors examine the effects of negative information on the enhancement of childhood fear. 285 children (4-12 yrs) received either negative or positive information about an unknown, doglike animal called "the beast." Results "showed that children's fear of "the beast" increased with negative information. The fear was still greater after one week follow-up. Furthermore, fear of "the beast" appeared to generalize, that is, children who became more fearful after receiving negative information, also became more apprehensive of other dogs and predators. Although negative information may be more powerful with children than with adults, it should be considered by park managers as a possible tool.

Roskaft, E., Bjerke, T., Kaltenborn, B., Linnell, J. D. C., & Andersen, R. (2003). Patterns of self-reported fear towards large carnivores among the Norwegian public. *Evolution and Human Behavior*, *24*(3), 184-198.

This article analyzes self-reported fear of four large carnivore species in a representative sample of the Norwegian population. People reported the most fear of the two largest and most dangerous carnivores, brown bears and wolves, and less fear of lynx and wolverines. Fear is greater in women than men and it increases with age in both sexes. People living in areas with a carnivore species were less afraid than people living in areas without the species. Experience with, or knowledge of, the large carnivore also affected the fear patterns. People experienced in outdoor activities were less fearful, as were people with more education. The authors discuss the results in terms of management strategies to reduce fear of large carnivores.

3 Management

This section considers wolf and cougar management plans, and describes some examples of management and campaign strategies undertaken to change inappropriate behaviours.

3.1 Examples of wolf/cougar management plans in other countries and states

Arizona Game & Fish Department. (2004a). Report of the mountain lion workshop. Tucson, Arizona.

This workshop report introduces the first results of a public engagement process to explore options by which lions in urban areas might be managed. The AZFGD problem is similar to that of Parks Canada. This report is the first of a series of workshops on this issue. Although it deals with urban instead of natural parks, the questions addressed in the report are very relevant. It points out knowledge gaps and research priorities for four main themes: 1) mountain lion-human interaction response protocols (level of interaction: sighting, encounter, incident, attack, and appropriate ecosystem-manager responses for each level of interaction); 2) Urban interface research (mountain lion behaviour, habitats studies, human behaviour); 3) Education (agency communication, networking, educational outreach; 4) Legislation (e.g., immunity, feeding)

Arizona Game & Fish Department. (2004b). Report of the Flagstaff and Phoenix mountain lion workshops. Retrieved March 2005 From www.gf.state.az.us/pdfs/w_c/lion/Flagstaff%20%20Phoenix%20Lion%20Workshops%20Report%2011-02-04.pdf.

This report is the second in the series. It follows up on the first one and proposes some approaches to the issue of mountain lions in the urban interface and human-mountain lion encounter problems. The topics addressed in the report are: an action plan, education and research (educational needs, tools, priorities, funding; research knowledge and priorities), and legislation.

Arizona Game & Fish Department. (2004c). Draft action plan for minimizing and responding to lion/human interactions. Retrieved March 2005 From [www.gf.state.az.us/pdfs/w_c/lion/Draft%20Lion%20Action%20Plan%20\(Protocol\)%2011-02-04.pdf](http://www.gf.state.az.us/pdfs/w_c/lion/Draft%20Lion%20Action%20Plan%20(Protocol)%2011-02-04.pdf)

This draft plan proposes the first steps to answer mountain lion-human interactions. It follows the two above workshop reports of the Arizona Game and Fish Department. It is aimed at guiding the department's responses with the problems, providing the public with an understanding of the basis for actions taken by the department, and aiding the

department in maintaining a central mountain lion-human interaction database using reporting forms to insure consistency in reporting.

Carpatian Wildlife Foundation, National Forest Authority, & Wildlife Consulting. (2002). Carpatian large carnivore project. Zarnesti, Romania: Annual report.

This report describes an example of carnivore management, including wolves and bears. Conflicts with humans are said to be understood only through livestock damage. For economic reasons, the management program actively promotes eco-tourism. It is very active in attracting tourists and organizing wildlife tours (even proposing approaching radio-collared wolves or lynx). The program also tries to change fears toward wolves in the local population. This very aggressive ecotourism orientation could be used as an example for understanding the importance of communication programs in tourist expectations, attitudes and behaviours toward carnivores during their visit in a park.

Drunkenmiller, H. S., Miller, S. W., Meyer, G. E., & Solberg, T. A. (1999). Wisconsin wolf management plan. Retrieved March, 2005, from <http://www.dnr.state.wi.us/org/land/er/publications/wolfplan/toc.htm>

This plan is an example of wolf management. In addition to the usual habitat and population management which represents the main part of the plan, it provides some insights, rules and data about livestock depredation and compensation. It also contains a short section about wolf education programs with a list of materials (e.g., booklets, magazines, web pages) and list of actions (e.g., cooperation with other organizations, special training).

Musiani, M., & Paquet, P. C. (2004). The practices of wolf persecution, protection, and restoration in Canada and the United States. *Bioscience*, 54(1), 50-60.

This paper reviews the history of wolf management in the US and Canada. It also points out the unresolved human-wolf conflicts with livestock depredation and describes different compensation programs. For the authors, history has demonstrated that societal values ultimately determine the survival of species such as the wolf.

Oregon Department of Fish and Wildlife. (2004). Oregon wolf conservation and management plan: Oregon Department of Fish and Wildlife.

This 176-page plan is among the few to address wolf-human interactions in a substantial chapter. The chapter addresses the encounters with hunters, trappers and other people and proposes strategies to deal with wolf-human interactions. The management plan also proposes an information and communication chapter for landowners and transients.

Sweanor, L., Logan, K., Bauer, J., & Boyce, W. (2004). Southern California puma project. Davis, Ca: California State Park and UC Davis Wildlife Health Center.

The main part of the report provides information about the relationships between pumas, people, and the environment. The end of the report provides some management recommendations such as to continue and expand educational programs on pumas. Components should include information on puma biology and behaviour, how to avoid puma encounters, respond to them during an encounter, and proper animal husbandry practices when living in puma habitat.

Treves, A., & Karanth, U. (2003). Human-carnivore conflict and perspective on carnivore management worldwide. *Conservation Biology*, 17(6), 1491-1499.

This article discusses human-carnivore conflicts and management. It presents an overview of historical perspectives on the topic with past management approaches such as eradication, regulated harvest, and preservation. The authors point out that the goals of carnivore management have changed from those based on fear and economic interests to those based on a better understanding of ecosystem function and adaptive management. They also discuss the increasing importance of avoiding intersection of human and carnivores activities. Management recommendations are mainly oriented toward animal management, rather than human management.

Wyoming Game and Fish Department. (2003). Final Wyoming grey wolf management plan: Wyoming Game and Fish Department.

This plan establishes guidelines for wolf management in Wyoming that are aimed at providing a sustainable wolf population, while minimizing wolf/human conflicts. Although most of the report is oriented toward wolf population management, some

sections describe wolf-human conflict management and public education. Wolf-human conflicts are mostly due to stock depredation. Some proposals for compensation for livestock losses are suggested. Four target audiences are proposed for public education: resident and non-resident hunters; schools, teachers and youth organizations; Wyoming population and park visitors; and livestock producers. This plan is one of the few that states in its information and education programs that the department will try to prevent wolves from obtaining human food and becoming habituated to humans.

3.2 Management oriented toward changing inappropriate human behaviours in natural areas

Ballantyne, R., & Hughes, K. (in press). Using front-end and formative evaluation to design and test persuasive bird feeding warning signs. *Tourism Management*.

This article examines the effectiveness of warning signs in Brisbane Forest Park after serious birds attacks on visitors were reported (some of which required hospital treatment). The signs are aimed at preventing people from feeding birds in picnic areas. Based on three theoretical approaches, the study examines three types of written signs. The results suggest that signs that directly target incorrect beliefs and clearly state why particular behaviours are problematic are likely to be the most persuasive. This paper opens interesting possibilities for application to carnivore areas.

Beckmann, E., Savage, G., (2003). Evaluation of dingo education strategy and programs for Fraser Island and literature review: Communicating to the public about potentially dangerous wildlife in natural settings. Brisbane, Queensland, Australia: Queensland Parks and Wildlife Service.

This is one of the most comprehensive documents found in this bibliographic search. It evaluated the communication strategies of ecosystem managers (*Queensland Parks and Wildlife Service-QPWS*) in a human-carnivore encounter context. It contains two parts: a description and evaluation of communication strategies, and a literature review on the topic (with a focus on dingoes). The communication strategies are oriented toward reducing inappropriate visitor behaviour (e.g., feeding) leading to negative encounters with dingoes (one fatality was reported in 2001). The *Be Dingo Smart!* Campaign launched by *QPWS* seems to have yielded good results. The target audience was

composed of residents, visitors, accommodation providers, backpacker service providers, and tour leaders. Although it focuses on dingoes, this report is very relevant for Parks Canada purposes.

Brown, T. J. (1999). Antecedents of culturally significant tourist behavior. *Annals of Tourism Research*, 26(3), 676-700.

This study investigates the culturally inappropriate tourist behaviour of climbing Uluru (Ayers Rock), in Australia, which is a protected natural site. The study utilized a sample of visitors to the area and applied the theory of reasoned action as a methodological framework to explore visitors' beliefs associated with the target behaviour. Results indicate that the strength of these beliefs vary according to gender and climbing behaviour. The findings are applied to inform persuasive efforts aimed at discouraging visitors from climbing Uluru.

Burns, G. L., & Howard, P. (2003). When wildlife tourism goes wrong: A case study of stakeholder and management issues regarding dingoes on Fraser Island, Australia. *Tourism Management*, 24(6), 699-712.

This paper addresses the problem of wildlife habituation with dingoes (*Canis lupus dingo*) and reviews the management strategies undertaken by the Fraser Island Park in Australia to deal with the problem after the fatal attack in 2001. Based on interviews, many conflicting perspectives on human-wildlife interaction as a component of tourism are identified. The conclusion stresses that managing people is very important to avoid wildlife habituation.

Decker, D. J., & Chase, L. C. (1997). Human dimensions of living with wildlife--a management challenge for the 21st century. *Wildlife Society Bulletin*, 25(4), 788-795.

This paper discusses the question of human aspects of wildlife management. It proposes a five different approaches (e.g., expert, passive-receptive, inquisitive, transactional, and co-managerial) to solve people-wildlife problems. The author suggests that there is not one best approach, but that the value of each depends on management objectives. This discussion may help in choosing the best approach(es) for dealing with human-carnivore encounter problems.

Molitor, A. B. (1995). The effects of persuasive communication messages on backcountry visitor behavior in occupied grizzly bear habitat. *Dissertation Abstracts International: Section B: The Sciences & Engineering*, 56(6), 2969.

This dissertation reviews various backcountry information programs designed to persuade individuals to engage in appropriate behaviours necessary for relatively safe hiking and camping in occupied grizzly bear habitat. Based on the theory of reasoned action (Fishbein & Ajzen, 1980), the author explores the effectiveness of a variety of persuasive strategies such as message-based persuasion and behavioural-based persuasion. A 1991 field experiment involving 760 visitors to the Jewel Basin Hiking Area exposed visitors to one of seven experimental persuasion treatments designed to increase visitor adoption of two specific behaviours--making noise while hiking and hanging food. The author found that visitors' experience level, knowledge, and attitudes influences how individuals respond to specific persuasive communication programs. Experienced visitors respond less to information programs. Visitors who receive written persuasive messages were more likely to adopt the expected behaviour (making noise) than those with behavioural-based persuasion. The first part of the dissertation is interesting for understanding visitors' behaviours when they backpack. The theoretical background and the second part of the dissertation is useful for helping in the creation of most appropriate information programs.

Orams, M. B., & Hill, G. (1998). Controlling the ecotourist in a wild dolphin feeding program: Is education the answer? *Journal of Environmental Education*, 29(3), 33-38.

This study assesses the implementation of management strategies to reduce tourist habituation behaviour with wildlife. The author notes that the negative behaviour of tourists, such as touching and feeding dolphins, was significantly reduced after the implementation of an educational program held in Moreton Island, Queensland.

Papageorgiou, K. (2001). A combined park management framework based on regulatory and behavioral strategies: Use of visitors' knowledge to assess effectiveness. *Environmental Management*, 28(1), 61-73.

This paper examines knowledge about park regulations, objectives and values in two groups (park local users and park non-local users). The author also examines the most

powerful factors that entered into the construction of their knowledge about the park. The results showed that living close to the park is not related to the knowledge of its rules, values and objectives, whereas having already experienced the park (or a similar one) is. Also, radio and television, schools, and magazines are the main sources of knowledge about parks in the population, and have more impact than tourist information, friends, or even park-supplied information. These results can help to orient long-term education strategies.

Wirsching, A., Leung, Y.-F., & Attarian, A. (2003). What agencies can do to decrease depreciative visitor behavior. *Parks & Recreation - Research Update* Retrieved March, 2005, from <http://www.nrpa.org/content/default.aspx?documentId=782>

In this short article, the authors present a literature review of different communication strategies that might be useful for changing depreciative visitors' behaviour in parks and protected natural areas. The review is organized in four themes: Getting the visitor's attention, understanding visitor preferences, the importance of education , and effective signs and behaviour modification. The authors note that there has been little research on this topic, and conclude by proposing a set of short guidelines that may help park managers focus on areas important in the literature.

3.3 Scientific Knowledge and theories about changing behaviours

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179–211.

This paper presents a theory used in the study of communication. It is an updated version of the theory of reasoned action, and it is used in some ecosystem manager programs included in this literature review. The theory of planned behaviour aims to predict behaviour intentions, not behaviour itself.

Ajzen, I. (1992). Persuasive communication theory in social psychology: A historical perspective. In M. Manfredi (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism and natural resources management* (pp. 1-27). Champaign, IL: Sagamore

This chapter reviews the development of persuasive communication theory. The author begins with the early approaches and ends with recent developments in the theory of reasoned action and the elaboration likelihood model of persuasion.

Beckmann, E. (2002). Communicating to the public about potentially dangerous wildlife in natural settings: A review of the research and management literature with an emphasis on the dingoes of Fraser Island. Brisbane, Queensland, Australia: Queensland Parks and Wildlife Service.

The literature review included in the Beckmann (2003) report provides a strategic analysis of international and Australian research and management literature related to communicating information about potentially dangerous wildlife. It also considers other types of community education that seek to manage risk by advocating changes in human behaviour. Although it focuses on Australia and dingoes, this document is very relevant for Parks Canada purposes.

Fishbein, M., & Ajzen, I. (1980). *Understanding attitudes and predicting social behavior*. London: Prentice Hall.

This book presents one of the most well-known theories about human behaviour, and it has led to applications in many areas. Some of these applications may be useful for parks management (see Ballantyne, 2005 and Molitor, 1995). The theory of reasoned action proposes that a person's behaviour is strongly influenced by his or her attitude towards the outcome of that behaviour and by the opinions of the person's social environment. Ajzen and Fishbein (1980, p. 62) proposed that a person's behaviour is determined by his intention to perform the behaviour and that this intention is, in turn, a function of his attitude toward the behaviour and his subjective norm. The book is out of print but is available online.

Manfredo, M. (Ed.). (1992). *Influencing human behavior: Theory and applications in recreation, tourism and natural resources management*. Champaign, IL: Sagamore.

This edited book collects 11 chapters about changing and managing human behaviour in natural environments. The book begins with well-known theories such as persuasive communication theory (Ajzen) and the theory of behaviour change (Fishbein). Persuasive communication is one of the concepts adopted in the book to propose

applications to natural recreation and tourism areas. The book also addresses sociocultural factors such as tourism advertising.

McCool, S. F., & Braithwaite, A. M. (1992). Persuasive messages and safety hazards in dispersed and natural recreation settings. In M. Manfredi (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism and natural resources management* (pp. 294-326). Champaign, IL: Sagamore.

The authors examine the topic of visitor safety and hazards with a focus on human-bear encounters. After defining what should be considered hazards in recreation settings, the authors review theoretical approaches to hazard research found in psychology, geography, consumer behaviour, and health. Building on Fishbein and Azjen's theory of reasoned action, they present a model of persuasive communication for hazard research.

Molitor, A. B. (1995). The effects of persuasive communication messages on backcountry visitor behavior in occupied grizzly bear habitat. *Dissertation Abstracts International: Section B: The Sciences & Engineering*, 56(6), 2969.

The theoretical background and the second part of the dissertation is useful for helping in the creation of most appropriate information programs.

Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. Manfredi (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism and natural resources management* (pp. 149-208). Champaign, IL: Sagamore.

In this article, the author provides a literature review that addresses the use of persuasion to reduce resource impact and visitor conflicts. The effectiveness of persuasion for a variety of different management objectives is addressed.