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DISSERTATION

**EVALUATING URBAN WILDLIFE MANAGEMENT ACTIONS:
AN EXPLORATION OF ANTECEDENT COGNITIVE VARIABLES**

Submitted by:

Doug Whittaker

Natural Resource Recreation and Tourism

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Spring 2000

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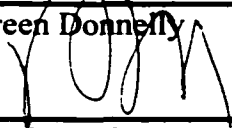
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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED
UNDER OUR SUPERVISION BY DOUG WHITTAKER ENTITLED "EVALUATING
URBAN WILDLIFE MANAGEMENT ACTIONS: AN EXPLORATION OF
ANTECEDENT COGNITIVE VARIABLES" BE ACCEPTED AS FULFILLING IN
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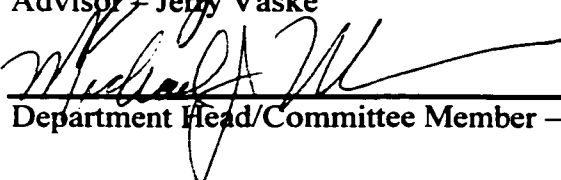
Maureen Donnelly



Richard Knight



Advisor - Jerry Vaske



Department Head/Committee Member - Michael Manfredo

ABSTRACT OF THE DISSERTATION

“EVALUATING URBAN WILDLIFE MANAGEMENT ACTIONS: AN EXPLORATION OF ANTECEDENT COGNITIVE VARIABLES”

Addressing urban wildlife conflicts has become a wildlife management priority, but public acceptability can limit choices among conflict prevention and response actions. Theoretically based survey research is crucial to understanding public acceptability and the development of consensus solutions. The dissertation presents three papers that explore relationships between the acceptability of urban wildlife management actions and antecedent cognitive variables. Data come from a 1996-97 mail survey of 971 Anchorage, Alaska residents focused on moose, bear, and geese management issues.

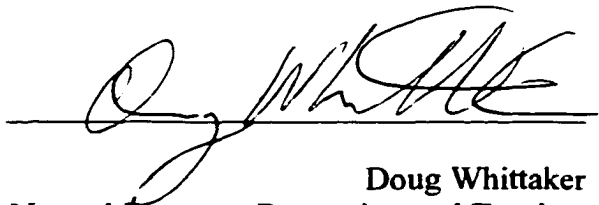
Applying a “cognitive hierarchy” framework, the papers use descriptive statistics, confirmatory factor analyses, and structural equation modeling to measure and link cognitive variables. The first paper compares beliefs and evaluations of possible hunt outcomes among those for and against an urban moose hunt, showing divergence in beliefs among the two groups. Belief differences suggest some opportunities for consensus decision-making, while also suggesting that certain conflicting beliefs are value-based and may be relatively resistant to change.

The second paper examines the value-basis of acceptability for several wildlife management actions, including population-level prevention actions (e.g., hunts) and post-

conflict response actions (e.g., killing individual animals involved in conflicts). Results suggest that patterns of basic wildlife beliefs align on two distinct value orientations (use-protection and wildlife appreciation), and these differentially predict action acceptability. Results also show stronger relationships with general acceptability for classes of actions or across several conflict situations, consistent with the cognitive hierarchy model.

The final paper relates the acceptability of a moose hunt to both wildlife value orientations and “condition evaluations” (assessments of current moose population levels, winter sightings in neighborhoods, moose-vehicle accidents, and landscape damage incidents). Results show that population evaluations fully mediate condition evaluations and acceptability, but only partially mediate value orientations and acceptability. The model supports the cognitive hierarchy concept, but indicates that use-protection value orientations may overshadow the influence of intermediate condition evaluations.

Linking chapters expand on the conceptual framework (the cognitive hierarchy, wildlife value orientations, and alternative research traditions for measuring evaluations) and discuss implications for future research and planning efforts. Appendices expand upon study methods and include the Anchorage Wildlife Plan, which was influenced by study results.

A handwritten signature in black ink, appearing to read 'Doug Whittaker', is written over a horizontal line.

Doug Whittaker
Natural Resource Recreation and Tourism
Colorado State University
Fort Collins, Colorado 80523
Spring 2000

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Doug Whittaker
Kenai, Alaska

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I. INTRODUCTION

Population and economic expansion throughout North America has increased development on the periphery of urban areas and had significant impacts on wildlife. Habitat degradation due to development (e.g., the loss of wetlands) is the most obvious change, and has caused dramatic losses of some wildlife species and communities (Grumbine, 1992; Wilson, 1992). The impacts of increased human activity (e.g., recreation use) have also contributed to some wildlife population losses and wildlife behavior changes (Knight & Gutzwiller, 1995).

Increased human development and activity, however, may actually benefit other species and lead to increased wildlife populations or modified wildlife behaviors. White-tailed deer, for example, find abundant food in suburban landscapes, shelter in the features of scattered park lands, as well as refuge from hunting which is often prohibited in residential areas due to safety concerns (Kellert, 1988; Decker & Richmond, 1995; McAninch, 1995; Messmer et al., 1997). These deer often learn to become attracted to, or at least unafraid of, human activity, and may be found in unusually high concentrations. Similarly, Canada geese populations in many parts of the country have often capitalized on open expanses of short grasses common in suburban yards and urban parks, as well as accessible water in natural and artificial ponds and lakes (U. S. Fish and Wildlife Service, 1998). Geese may also congregate in

large numbers of multi-family groups, and become aggressive and attack humans or their pets when disturbed – behaviors that are more rare in wild geese (Anchorage Waterfowl Working Group, 1998).

These types of changes in wildlife populations and behavior have a variety of consequences for how people and wildlife interact in urban areas. Above and beyond any ecological injury, the loss of some wildlife populations may diminish the quality or quantity of recreation and appreciation opportunities. Conversely, increases in other wildlife populations may also create or exacerbate conflicts with humans, particularly when wildlife become attracted to human environments or food sources (McCollough, 1982; Whittaker & Knight, 1996). Increased white tail deer populations and behavior changes that attract them to suburban neighborhoods, for example, have increased collisions with motor vehicles, the transmission of disease, and damage to landscaping or native vegetation (Conover et al., 1995; McAninch, 1995; Messmer et al., 1997; Loker et al., 1999). Similarly, increased geese populations have created significant hazards for aircraft, as bird-strikes can damage or shut down even large jet engines (Cleary et al., 1997).

When human communities become intolerant of these kinds of wildlife conflicts, researchers suggest that a “wildlife acceptance capacity” (Decker & Purdy, 1988) or a normative standard (Wittmann et al., 1998; Zinn et al., 1998) has been exceeded. In response, managers usually consider three general types of actions to minimize the number or effects of these wildlife problems (Messmer et al., 1997). The first type are prevention-oriented hunts or lethal control actions designed to reduce overall wildlife populations and reduce the number of “bolder” individual animals that

are more likely to cause wildlife conflicts. The second type focus on prevention-oriented education and regulation actions designed to change human behavior that may be contributing to the amount or type of conflicts. The third are essentially reactive responses after a conflict situation has occurred, and focus on actions taken toward individual animals involved in the conflict (e.g., translocations, destroying the animal).

Each of these types of actions has complex social and biological consequences, many of which may be incompletely understood or considered by wildlife managers during decision-making (Manfredo et al., 1996; Carpenter, 1994). As with other natural resource issues, interest groups and the public have also called for greater input during these decision processes (Decker et al, 1996). In response to demographic shifts, a widening diversity of wildlife values, and the increasing political effectiveness of interest groups, public acceptability has emerged as a major factor in choosing among actions (Decker et al., 1992; Peterson & Manfredo, 1993; Zinn et al., 1998). The lack of public acceptance, for example, has halted specific proposed hunts or lethal control actions (Deblinger et al., 1993; Donnelly & Vaske, 1995), while outcomes on ballot initiatives in several states have changed broader wildlife policies related to hunting and trapping, both with implications for managing wildlife conflicts (Zinn et al., 1998). Developing and then integrating social information into these decision-making processes has thus become a major item on the wildlife research and management agenda.

Attempts to accommodate public input have led to the development and advocacy of collaborative planning frameworks for natural resource issues in general (Crowfoote & Wondolleck, 1990; Daniels & Walker, 1996), as well as for wildlife

issues (Decker et al., 1992; Manfredo et al., 1996). Collaborative planning contrasts with more traditional hierarchical approaches, and features a power shift away from agency experts to interest groups (“stakeholders”) and the public (Friedmann, 1987). The goal of collaborative planning is consensus decision-making, and it is typically conducted through planning teams that include interest group members (Friedmann, 1987; Decker et al., 1996). Collaborative planning, however, does not obviate the need for sound social information for stakeholders and managers to consider (Lee, 1993). In many ways, evaluative information from the general public, usually through survey research, becomes even more important (Manfredo et al., 1995; Green et al., 1997).

“Human dimensions” research is identified with attempts to develop and then integrate this type of social information into natural resource decision-making (Decker et al., 1992; Manfredo et al., 1995). Human dimensions research borrows from several fields, including sociology, psychology, economics, and anthropology, but it is particularly linked with social psychological concepts such as values, attitudes, and norms (measurable cognitions that people have about the world and how it should work). By understanding the links between these variables for specific natural resource issues, human dimensions researchers provide the evaluative information useful in collaborative planning frameworks.

Collaborative planning and human dimensions information is particularly appropriate for addressing urban wildlife issues. Unlike wildlife management decisions in many wildland or rural areas, urban wildlife decisions are more multi-faceted. Instead of a focus on a single game species or an endangered species recovery effort, urban wildlife plans often address several game and non-game species together. Urban

wildlife planners also typically face higher proportions of private land, multiple agencies with a variety of missions managing the limited public land, and a wider diversity of interest groups. Finally, and perhaps most importantly, urban areas are modified environments where there is less agreement about standards of ecological health. By definition, urban areas are not “natural;” choices about appropriate species and population levels (or the actions necessary to manage them) thus depend more on social rather than ecological judgments.

With urban wildlife conflicts likely to increase in the near future, there is a need for more information about social judgments toward wildlife conflicts and the actions that may be used to address them. Wildlife are public resources and human-wildlife conflicts are a public problem. The management challenge is to consider both biological and social information when making decisions about urban wildlife. The human dimensions research challenge, in turn, is to develop theoretically sound and practically useful information for those efforts. This dissertation addresses this need by developing and linking systematic information about urban residents’ thoughts about urban wildlife, wildlife conflicts, and actions that might be used to address them.

DISSERTATION PURPOSE

This dissertation presents three papers and two linking chapters that explore relationships between the acceptability of urban wildlife management actions and a variety of antecedent cognitive variables (value orientations, attitudes, and norms related to wildlife issues). Data for the dissertation come from a survey of Anchorage, Alaska residents about urban wildlife issues; the survey was conducted in 1996-1997 as part of a larger wildlife planning effort that concluded in 1999.

The broad theoretical purpose of the dissertation is to explore the efficacy and utility of a general social psychological model (“the cognitive hierarchy”) as applied to urban wildlife issues. The dissertation builds upon emerging work measuring “wildlife value orientations” and the way they link to more specific attitudinal or normative evaluations of wildlife species, population levels, conflict levels, and the actions that could be used to address wildlife management issues (Fulton et al., 1996; Zinn et al., 1998). The long-term goal, partially addressed by this research, is to develop measurable variables that can be used in a generalizable theory of how people evaluate wildlife populations, conflicts, and management actions (Manfredo et al., 1995).

The dissertation also addresses an applied purpose because Anchorage has just completed a wildlife management plan addressing several controversial issues. Information from the research was inserted into a collaborative planning framework, and helped planners with several planning tasks (Note: the dissertation author was also the lead planner in this effort). Values-related information was useful for articulating management goals, while more specific evaluative information about species population levels, human-wildlife conflict levels, and specific management actions helped define issues, set standards, and choose among management actions. Information in the dissertation papers capitalizes on this situation by discussing the utility of theoretically based human dimensions information in real-life planning efforts, and linking research information to actual plan decisions. The final plan is also included in the dissertation as an appendix.

DISSERTATION ORGANIZATION

The dissertation includes three publication manuscripts that describe separate but related topics. These papers use the same data set and complimentary theoretical concepts, but they are designed to stand separately. In order to help link the papers, the dissertation provides two additional chapters that tie the papers to a common conceptual theory. An initial chapter outlines the conceptual framework for the papers, providing expanded coverage of theoretical topics that are inappropriate for concise journal publications. At the end of the dissertation, a concluding chapter summarizes research and management implications from the three papers, and suggests options for future research.

Because the individual papers are designed to stand alone, there is some repetition in their introductions and descriptions of the study area and methods. The papers also have been tailored for different journal outlets and audiences, and thus differ in their conceptual focus and style. In general, attention to the linking and concluding chapters of the dissertation, as well as the results and discussion sections of the papers, will provide the most useful information about the research and its conclusions.

The literature cited in each individual paper has been collected in a single section at the end of the dissertation to avoid additional repetition. Appendices provide additional details about the Anchorage Wildlife Study and the survey methods (including the survey instrument). A final appendix presents the multi-agency Anchorage wildlife plan (entitled “Living with Wildlife in Anchorage: A Cooperative Planning Effort”) to illustrate links between the research and actual planning decisions made by agencies.

II. CONCEPTUAL FRAMEWORK

The three papers in this dissertation are linked by a common conceptual framework and enduring methodological traditions, but each addresses distinct theoretical issues. In order to provide a context for the papers and suggest how they are linked, this chapter reviews the theoretical framework underlying the papers. More brief discussions of these concepts are repeated in the papers, but tailored to specific journal audiences. This chapter provides a broader examination.

The chapter begins with a review of the “cognitive hierarchy,” a general social psychology model for understanding relationships between values, value-orientations, attitudes, norms, and their affect on behavioral intentions and behavior. Following this, the chapter discusses two more specific conceptual issues relevant to the dissertation, focusing on (1) measurement of the emerging concept of “wildlife value orientations” and (2) alternative normative and attitudinal traditions for understanding evaluations of resource conditions or management actions. The chapter concludes with prologues to the three papers, explicitly suggesting how they offer additional understanding of cognitive hierarchy, build upon each other, and illustrate how theoretically-based research may be useful in planning efforts addressing urban wildlife conflicts.

THE COGNITIVE HIERARCHY

The “cognitive hierarchy” is a causal model within the cognitive social psychology tradition that suggests that humans construct internal mental states (beliefs, thoughts, or cognitions) that allow us to perceive the world, evaluate its elements, and respond to them (Fiske & Taylor, 1991). The hierarchy suggests that the cognitions are arranged in an ordered, logical (or nomological) network from the most abstract types of cognitions (values) to the most specific (attitudes and norms), and that deliberative, volitional behavior is directed via causal relationships between the layered variables of the model (Rokeach, 1979; Ball-Rokeach et al., 1984; Homer & Kahle, 1988; Fulton et al., 1996; Vaske & Donnelly, 1999).

While the concept of a cognitive hierarchy is relatively recent, many elements within the model (values, attitudes, norms, intentions, and behavior) have been in use since the advent of social psychology (and particularly in the post-World War II development of the field). Attitudes have perhaps received the greatest attention and are generally regarded as the cornerstone of social psychology (Fiske & Taylor, 1991; Eagly & Chaiken, 1993), but norms and values have also inspired enduring research traditions (Fiske & Taylor, 1991). There is depth and breadth to each of these literatures, however, and they show diversity in how these terms are conceptualized to understand human thought and behavior. Rather than review all of these traditions, this chapter focuses more narrowly on the concepts employed in this dissertation.

The specific notion of a cognitive hierarchy grew from an enduring cognitive psychology theory (the Theory of Reasoned Action) that relates attitudes and norms to behavior. Faced with the attitude-behavior inconsistency “crisis” in the late 1960’s

(Wicker, 1969), researchers began developing models that explained the conditions under which behavior does follow from attitudes and norms (Fishbein & Ajzen, 1975; Fazio et al., 1982). One major conclusion from this research line was that “corresponding levels of specificity” were critical when linking attitudes or norms with behavior (Ajzen & Fishbein, 1980; Fishbein & Manfredo, 1992; Eagly & Chaiken, 1993). Strong positive attitudes toward moose, for example, may not necessarily predict whether people take recreation trips to view moose, while their specific attitudes toward taking moose viewing trips are likely to predict that behavior.

The resulting causal models from this research tradition link volitional behavior, intentions to behave, and specific attitudes and norms about the behavior, while suggesting that other more general attitudes and norms only work to influence behavior through these more specific variables. Subsequent empirical tests of the model have shown its power and utility at predicting behavior (Fishbein & Manfredo, 1992), and appeared to “solve” the attitude-consistency problem. As long as one measured specific attitudes, behavior generally follows quite closely.

However, interest in more distal variables such as general attitudes and values has never disappeared (Rokeach, 1979; Ball-Rokeach et al., 1984; Homer & Kahle, 1988; Fiske & Taylor, 1991; Eagly, 1992). The ubiquity of attitudes (people probably form thousands each week as they experience new objects and situations) means that it is impractical to measure every one of interest. More importantly, there are tautological issues with the notion that attitude-behavior consistency only happens via extremely specific correspondence. Among the grails in social psychology are general attitudes or norms (e.g., prejudice toward minorities) that help predict a variety of specific attitudes

or norms (e.g., prejudices toward a specific minorities in a variety of specific situations) and behaviors (e.g., discriminatory actions in those situations) (Fiske & Taylor, 1991). The need is for an expansion of the basic model, one that explicitly incorporates more general attitudinal, normative, and value-based variables. The cognitive hierarchy is a version of that expanded model.

The cognitive hierarchy is presented in Figure 1, and shows the causal flow from more abstract values to concrete intentions and behavior (adapted from Fulton et al., 1996; Vaske & Donnelly, 1999). Explaining the model and the conceptual elements within it, however, is easier by working from behavior.

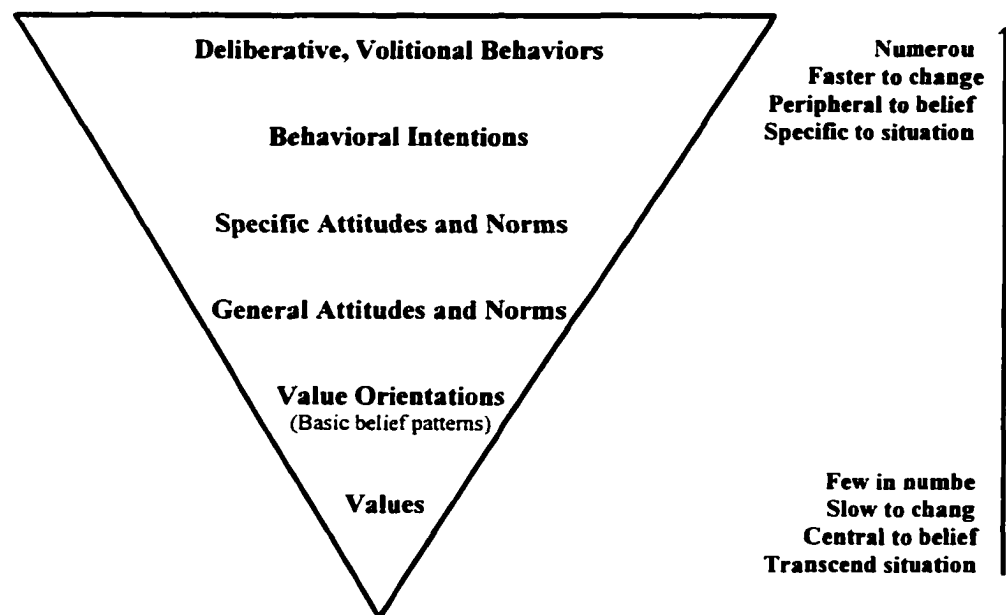


Figure 1. The general cognitive hierarchy model of volitional human behavior (adapted from Fulton et al. 1996; Vaske & Donnelly, 1999).

Behavior

Behavior refers to observable actions that people do, and would seem to be a self-evident construct in the model. However, there are different types of behavior, and cognitive antecedents may not have important effects on them all. People perform thousands of behaviors per day, and many do not depend upon effortful, cognitive thought (Cialdini, 1993). For example, considerable behavior is reflexive (e.g., when people avoid bumping into each other while walking down a crowded city street), while other behavior is based on habit (e.g., smoking); in either case, deliberative thought is unlikely to play a central role.

The attitude accessibility work of Fazio and others (1990) further suggests that individuals must be motivated and have the opportunity to engage in deliberative processes for those to affect behavior. When these are not present, behavior is more likely to be directed by spontaneous cognitive processes that feature heuristic short cuts or fixed-action patterns (Vincent & Fazio, 1992; Cialdini, 1993). While people probably have the ability to construct attitudes and other cognitions related to these situations (Converse, 1970), and many constructed cognitions would probably be consistent with the behavior, these actions do not appear to be fundamentally driven by systematic cognitive processes.

Deliberative behavior, in contrast, is all about cognition, and assumes that humans are reasoning animals who systematically use the information available to them to make behavioral decisions (Ajzen & Fishbein, 1980). While these authors probably overstate in suggesting that *all* socially relevant behavior is based upon deliberative cognitive processes, “reasoned action” is assumed to be at the heart of the public policy and natural

resource issues addressed in this dissertation. For example, deliberative processes are likely to dominate individual decisions about how to vote in a referendum about a hunt or other lethal control efforts, or about whether to participate in urban wildlife viewing activities. Similarly, at the institutional level, deliberative processes are a foundational principle of rational-comprehensive planning efforts and call for research attention on the cognitive antecedents of public attitudes toward urban wildlife issues.

Even after narrowing the focus to deliberative behavior, the behavioral element in the cognitive hierarchy is not simple. Researchers recognize there are multiple dimensions to human behavior, and attending to them can help explain when cognitions direct behavior (Fishbein & Ajzen, 1975; Epstein, 1979; Ajzen & Fishbein, 1980; Lord, 1982). The main issue here, as discussed above, is specificity, and Ajzen and Fishbein (1980) urge characterizing behavior by four key variables: target, context, action, and time. For example, a complete behavior description in an urban wildlife conflict situation should identify the target (e.g., moose), the situation context (e.g., moose are eating vegetation and are a potential threat to children), the action (e.g., haze moose out of the area) and the time (e.g., during the winter). Zinn et al. (1998) have further suggested the need for a fifth variable, location, to explicitly recognize the importance of geography in the situation context (e.g., from school property vs. from residential neighborhoods).

Finally, researchers have noted stronger causal links between cognitions and behavior for “multiple criterion behaviors” rather than single acts, which are subject to the dynamic influences of context and time (Ajzen & Fishbein, 1980; Lord, 1982). For example, a multiple criterion behavior related to urban wildlife such as Canada geese could be measured by combining several individual behaviors, including (1) the number

of times they stop at known viewing areas per year, (2) whether they photograph geese, (3) whether they feed geese, (4) whether they own books or have rented videos about geese, or (5) whether they plant landscaping that attracts geese to their yard. While any single act in this list may be only slightly related to an individual's attitude toward appreciation of geese in their city, a variable that measured all of these acts together is likely to strongly link with that attitude.

Behavioral Intentions

The Theory of Reasoned Action suggests that the strongest and most immediate predictor of behavior is the intention to behave, a natural assumption for behavior presumed to be under volitional control (Fishbein & Ajzen, 1975). Like behavior, intentions need to be specified in terms of target, context, action, and time and apply to a specific behavior (e.g., I intend to go to the Kenai Flats this weekend *to look* for caribou to view and photograph). They are also distinct from goal intentions (e.g., I intend *to find* caribou), or intentions to engage in a class of behaviors (e.g., I intend to go wildlife viewing); the former are not necessarily under a person's control, while the latter are more general and unlikely to predict behavior as well (Fishbein & Manfredo, 1992).

The behavior – intentions link in the Theory of Reasoned Action is notable as an alternative to a more traditional tripartite conception of attitude (Eagly & Chaiken, 1993). The tripartite notion suggests that attitudes are a larger concept that includes evaluative (affective), cognitive, and behavioral components. In the Theory of Reasoned Action, the behavioral part is separated, leaving a more simplified concept of attitude as cognitions + evaluation. While separation is not supported by all research (Eagly, 1992), it appears crucial in work where the goal is to predict behavior from attitudes.

The intentions concept has helped researchers expand and improve the Reasoned Action model by contemplating other variables that may combine with intentions to direct behavior. The Theory of Planned Behavior, for example, attempts to account for the skills, ability, and resources needed in combination with intention to direct behavior (Ajzen, 1991). Other researchers have also offered expanded models that include the potential influence of past behavior (Bentler & Speckart, 1979) or habit (Triandis, 1980) as parallel variables to intentions that mediate relations between attitudes and behavior. These expansions are chiefly notable as attempts to explain non-deliberative behaviors as in addition to those directed by reasoned thought.

Intentions to behave are important in many natural resource applications because the measurement of behavior may be difficult or even irrelevant to the issue under study. For example, Bright et al. (1993) focused on intention to support the National Park Service's controlled burn policy in Yellowstone in their study of attitudes and attitude change. The public does not generally vote on such policies, even as information about public support is critical for good decision-making. The theory thus allows researchers to focus on a concrete behavioral intention (e.g., I intend to vote to support the fire policy if a referendum were held), even when there is no (and never will be) an actual behavior to measure.

Specific Attitudes

As noted above, attitudes are a cornerstone of social psychology and a central focus of research for at least fifty years (Fiske & Taylor, 1991), so a comprehensive review is out of the scope of this dissertation. However, attitudes are generally conceptualized as a psychological tendency, a mental state, to evaluate some object as

positive or negative (Pratkanis & Greenwald, 1989; Eagly & Chaiken, 1993; Fiske & Taylor, 1991; Vincent & Fazio, 1992). From a larger perspective, the object can vary from people to places to behaviors to ideas. From the perspective of this end of the cognitive hierarchy, however, the focus is on attitudes that correspond to a behavior or intention (Fishbein & Ajzen, 1975).

The Theory of Reasoned Action suggests there is an additional underlying cognitive structure of attitudes toward a behavior that integrates 1) the salient or immediately accessible beliefs about potential outcomes of the behavior (expectancy beliefs) and 2) evaluations of those outcomes (the affective or evaluative component).¹ Measurement of attitudes thus starts with an “elicitation study” to determine a range of modal salient belief outcomes of the behavior in question. Following this, a larger survey instrument is used to gauge respondents’ beliefs about outcome likelihood and outcome evaluations, which are then used to create “belief-evaluation products,” an integrated variable. A person’s overall attitude is the sum of these cross products and is posited to predict intentions, while the individual cross products can be additionally used to compare people with different intentions to suggest which beliefs are driving the attitude. Chapter III in this dissertation examines this research issue.

The Theory of Reasoned Action concept of attitude has been criticized for its focus on specific behavioral objects, rather than more general objects that characterized earlier attitude work (Eagly, 1992; Eagly & Chaiken, 1993; Dawes & Smith, 1985). A

¹ These remain distinct from emotion-laden evaluations, which are not generally considered in the Theory of Reasoned Action. Chaiken et al. (1993) suggest use of different terms (“evaluation-affect” and “emotion-affect”) to distinguish the Theory of Reasoned Action approach from other bipartite definitions of attitude. Other researchers argue that consideration of both types are needed and that attitudes will be stronger and more likely to direct behavior if they have both cognitive-evaluative and affective-evaluative strength (Hodges et al., 1993).

common complaint is that the Theory of Reasoned Action is about a psychometric gain rather than a substantive one, a form of *reductio ad absurdum* (Eagly, 1992). It is hardly surprising, for example, that people who have a strong negative attitude toward voting for a moose hunt will vote against such a hunt. Nonetheless, the clear empirical finding is that these specific variables are the best predictors of intentions and behavior, and need to be included in a comprehensive model.

Specific Norms

There are dozens of uses of the term “norms” in the English language, including at least five distinct theoretical conceptualizations within the social sciences (Schaffer, 1983; Whittaker, 1997a). It is beyond the scope of this chapter to summarize these different uses, but at least two have been applied within natural resources and are relevant to the hierarchy framework and this dissertation.

The Theory of Reasoned Action hypothesizes the existence of specific “subjective norms,” parallel in structure to specific attitudes, which recognize the weight of social pressure in mediating and influencing behavior. This normative variable is defined as the perception of social pressure to perform (or not perform) the behavior in question, and it is theorized to correspond to behavior via the usual specificity variables of action, target, context, and time (Fishbein & Ajzen, 1975). These subjective norms are also hypothesized to have an underlying cognitive structure that integrates (1) attitudes toward the behavior that one attributes to salient others (important people in one’s life), and (2) the motivation to agree with those attitudes. For example, if you know your friends’ attitudes toward a behavior (e.g., they approve of hunting), and you care what they think, this perception is likely direct behavior (e.g., correlate with a person’s intention and

actual choice to hunt). The implication of this term in the model is that reinforcing behavior requires reinforcing the beliefs of significant others, or changing how the actor feels about them.

Subjective norm measurement proposed by Fishbein and Ajzen can be criticized for being awkward and indirect; example items on an “agree – disagree” scale might include “My parents will approve of me learning to hunt” and “In general, I do what my parents ask me to do.” More substantively, it attempts to capture the social pressure component of the norm concept but ignores any internalized version of the norm, including any moral component (Schwartz & Tessler, 1972). Several norm researchers have distinguished between internal or personal norms, and those that reflect social pressure or social norms (Cialdini et al., 1990; Shelby et al., 1996). For Theory of Reasoned Action proponents, these types of personal norms are apparently reflected in the attitude term. With other norm conceptualizations, however, normative cognitions are explicitly recognized as potentially different from simple attitudinal evaluations, and further emphasize a sense of personal obligation. The structural norm research tradition offers one of these alternatives, and appears adaptable to the cognitive hierarchy.

The structural norm concept was developed by Jackson (1965), but has evolved considerably over the past thirty-five years, particularly in natural resource applications (Shelby et al., 1996). Under this tradition, norms are similar to attitudes in their focus on evaluations of behavior or conditions in a social setting. However, they are also thought to carry additional conceptual baggage associated with (1) obligation or “should-ness” (Cialdini et al.; Blake & Davis, 1964; Gibbs, 1965; Cancian, 1975; Biddle, 1986; Shelby et al., 1996; Heywood, 1996); (2) norm agreement within a group or population (Cancian,

1975; Rossi & Berk, ; Jackson, 1965; Shelby et al., 1996); and (3) beliefs about internal and external sanctions, which are thought to enforce or reinforce norms (Heywood, 1996; Blake & Davis, 1964). In this way, norms might be considered “attitudes plus,” with the added concepts depending upon the research question at hand.

In the cognitive hierarchy (a model designed to explain individual behavior in terms of that same individual’s attitudes, norms, and values), the added focus is primarily on “evaluation plus obligation” and “evaluation plus shared agreement” with less attention paid to beliefs about sanctions. Instead of using both attitude and subjective norm terms in the Theory of Reasoned Action, for example, structural norm variables could be substituted in the hierarchy by measuring acceptability ratings related to the specific behavior. This integrated variable, while similar to attitudes in its evaluative dimension, thus carries the normative obligation component in the response scale. In addition, structural norm techniques would allow use of descriptive statistics to examine shared agreement about the norm, which could be useful in collaborative planning efforts.

Structural norms have been used in natural resource research to address a variety of research questions, including recent applications to similar urban wildlife issues explored in this dissertation (Zinn et al., 1998; Wittmann & Vaske, 1998; Wittmann, Vaske, Manfredo & Zinn, 1998). In these papers, researchers asked about the acceptability of various institutional behaviors toward wildlife in conflict situations (e.g., lethal control, translocations), rather than the acceptability of individual behavior. This kind of evaluation could probably be conceptualized as either attitudinal or normative, and is the subject of a separate discussion in this chapter.

In many more cases, structural norms have been used in natural resources to measure evaluations of conditions rather than behavior in recreation settings (e.g., the acceptability of encounter levels in backcountry, ecological impacts at campsites, or flow levels from dams) (Shelby et al., 1996). Most of this work evaluates the acceptability of different *quantities of conditions*, which are distinct from attitudinal traditions that tend to focus on evaluations of a single behavior. However, because many urban wildlife issues involve evaluations of quantity as well (e.g., acceptability of moose population or problem levels), structural norm ideas have further relevance for the research in this dissertation. While specific norms thus refer to the acceptability of an individual or institutional behavior, general norms (see below) might be applied to the acceptability of conditions created by a range of individual, collective, or institutional behavior (Shelby et al., 1996; Whittaker, 1997).

More Distal Attitudes and Norms

The Theory of Reasoned Action focuses on the underlying structure of specific attitudes and norms and the way they direct behavior through intentions; the cognitive hierarchy, in contrast, recognizes the need to focus equal attention on more general variables that predict a variety of specific attitudes and norms. General attitudes or norms are best understood as variables that have one or more of the specificity variables (e.g., target, context, action, time, and location) removed. Referring back to the moose hazing example, attitudinal variables might measure evaluations of (1) hazing wildlife in general (a class of actions); (2) moose in general (the target alone); or (3) wildlife in general (a class of objects that includes the target). Applying structural normative traditions, general variables might measure (1) the acceptability of different levels of

moose populations; (2) the acceptability of different levels of moose conflict problems (e.g., encounters, moose-vehicle collisions); or (3) the acceptability of different levels of the availability of moose for viewing.

There are many possibilities here, but the cognitive hierarchy suggests existence of several layers of general attitudes and norms for a given content area, each ordered by their ability to predict more specific variables. Some attitudinal work within natural resources supports this general framework (Fazio, 1986; Bright & Manfredi, 1996), but empirical work has been sparse and provides a clear research challenge.

Consistent with attitude theory (Ajzen & Fishbein, 1980), these general attitudes and norms are also theorized to have additional underlying cognitive structures that integrate (1) salient beliefs about the object, and (2) evaluations of those beliefs. For example, a general attitude toward moose is likely to depend on the variety of salient images one develops when thinking about moose, and how one evaluates those images. To take two simplified examples, a person whose salient image of an urban moose is a majestic animal in their backyard will likely have a positive attitude, while a person whose salient image is an aggressive moose stomping a person is likely to have the opposite. This underlying structure does not appear to be the subject of much research in natural resources, but may offer opportunities for future work.

Value Orientations

Value orientations are a recently evolved concept within the cognitive hierarchy and appear to be developing most fruitfully within the natural resource field. The general focus of the work is in an attempt to ascertain the extent to which broad environmental attitudes are value-based (Stern & Dietz, 1994), and may help predict a range of more

specific environmental attitudes (which are still theorized to be more general than attitudes or norms toward specific behaviors). In one sense, value orientations are simply more abstract general attitudes which transcend targets and situations, and thus help provide the links to the even more abstract fundamental cognitions, values (Vaske & Donnelly, 1999).

Although they have been measured in different ways, value orientations are revealed through patterns of basic beliefs about broader abstract objects such as the environment (Fulton et al., 1996). When these patterns can be represented along a few continua that appear to link to values, value orientations are identified.

Within natural resources, two approaches have been used to measure value orientations. The first approach, applied to developing general orientations toward wildlife on use-protection and appreciation continuums, arose out of factor analyses of several basic belief dimensions (hunting, fishing, wildlife rights, residential and recreation wildlife appreciation, wildlife learning, and wildlife existence/bequest value) (Fulton et al., 1996). Results suggest that reliable use-protection and appreciation dimensions could be formed and that these help explain general attitudes and behavior (e.g., participation in wildlife-oriented recreation such as viewing and hunting). Similar adaptations of these value orientation scales have provided additional utility by helping explain variance in the acceptability of wildlife management actions (Zinn et al., 1998). This dissertation follows this approach for measuring wildlife value orientations; a separate section in this chapter provides more detail about their measurement.

The second approach has explored more general value orientations toward nature, hypothesizing an anthropocentric – biocentric continuum. Examples of this work include

Shindler et al. (1993); Thompson & Barton, 1994; Steel et al. (1994); and Vaske & Donnelly (1999). All four found the continuum to be reliable and predictive of more specific attitudes or norms consistent with the hierarchy concept, although none explored more fundamental connections to values.

Values

Finally, values are the most basic and abstract cognitions in the hierarchy, reflecting the most enduring beliefs about the way the world should be (terminal values or end states of existence) or how one should behave in it (instrumental values) (Rokeach, 1973). The Rokeachian notion is that values are tied to our ultimate ideals and morals, providing the raw material from which we construct all our attitudes and norms.

Values, like all components of the cognitive hierarchy, are imagined to “facilitate adaptation to one’s environment” by ordering thoughts and helping one establish a consistent view of how the world works or should work (Homer & Kahle, 1988). Values can be implicit and un-reflected upon, even as measurement efforts require effortful deliberation. However, these authors also suggest that values work even when not explicitly recognized by the individual; they work “as if” the individual had reflected upon them. The notion here, which applies to the entire hierarchy model, is that even when people do not deliberate on the more abstract concepts, they work at an unconscious level to direct order and consistency among other more specific cognitions.

The Rokeachian method of measuring value priorities is a ranking exercise, which has been criticized for being too complex and not allowing ties, although simpler instruments have been devised (Khale & Timmer, 1983; Homer & Khale, 1988; Schwartz, 1992). Most conceptualizations suggest values are limited in number, and yet

acknowledge the difficulty of developing instruments that accurately tap a comprehensive but parsimonious set (Schwartz, 1992).

Behaviorists such as Skinner (1971) have argued that cognitions are simply “epi-phenomena,” words that people have been socialized to use to describe conditioned behavior after-the-fact. While this is probably an overstatement, concepts toward the values end of the hierarchy are so abstract that semantics and differential understanding of items can become problematic. However, research has demonstrated empirical relationships between measured values, attitudes, and behaviors (e.g., Rokeach, 1973; Homer & Khale, 1988; Kristiansen & Matheson, 1990), suggesting the concept has at least some predictive validity.

No one within the natural resources field appears to have studied values per se, nor linked them directly to other components in the hierarchy (except in theory). Heberlein (1977), however, has written about values as a special class of attitudes that have affective, cognitive, and behavioral components but simply lack an object. He also likens them to normative concepts because they represent some degree of morality, a concept echoed by Homer & Kahle (1988) and Schwartz (1992). In an interesting examination of the value-basis of attitudes, Heberlein (1981) also analyzed the content of an essay by Aldo Leopold about pine trees to illustrate horizontal and vertical structures of a cognitive/affective belief system. While there are some differences with the hierarchy as described above, Heberlein’s characterization is strikingly similar.

Heberlein’s model suggests that a single attitude (“I love pine trees”) is supported by a series of factual and evaluative beliefs, which is similar to the Fishbein & Ajzen (1975) view that distinguishes outcome beliefs and outcome evaluations. The more

salient factual and evaluative beliefs a person can evoke toward an object, the more stable and forceful that attitude will be. Leopold, as illustrated through his essay, has an unusually high number of factual and evaluative beliefs associated with pine trees, and they lead to the strong evaluation. Heberlein characterizes this as the horizontal structure, but it is distinct from horizontal dimension previously identified in the cognitive hierarchy, which is associated with the relationships of elements at the same level of specificity (e.g., attitudes toward bald eagles should be similar to attitudes toward song birds).

Heberlein also suggests that both factual and evaluative beliefs (attitudes) are supported by a vertical structure that links them to fundamental Rokeachian values, which is identical to the vertical dimension suggested for the cognitive hierarchy. Heberlein suggests that closer links between beliefs and values (fewer mediating beliefs) equates with a stronger basis for the attitude. In Heberlein's analysis, several of Leopold's beliefs are only two steps away from his fundamental values and are thus resistant to persuasion. To change Leopold's attitudes toward pines, you must (1) change several of his beliefs, (2) change several beliefs that are closely tied to values, and (3) change two particular beliefs that are tied to his most important or core values (i.e., the importance of a "world of beauty," and the importance of a world that "stimulates the imagination"). The average person, in contrast, is unlikely cogitate so intensely about pines (they will have fewer beliefs, and will not have tied them to deeper abstract notions about the world), nor identified so closely with particular values like beauty and the imagination. A partial explanation for the enduring quality of Leopold's thought may

rest with these explicit connections between natural resources and fundamental human values.

Integrating Elements in the Hierarchy

Examined holistically, the cognitive hierarchy emphasizes order among cognitions from the general to the specific, from the few to the many. Taken element-by-element, however, the hierarchy also acknowledges separate underlying cognitive structures of individual elements. Figure 2 presents this expanded conceptual view of the

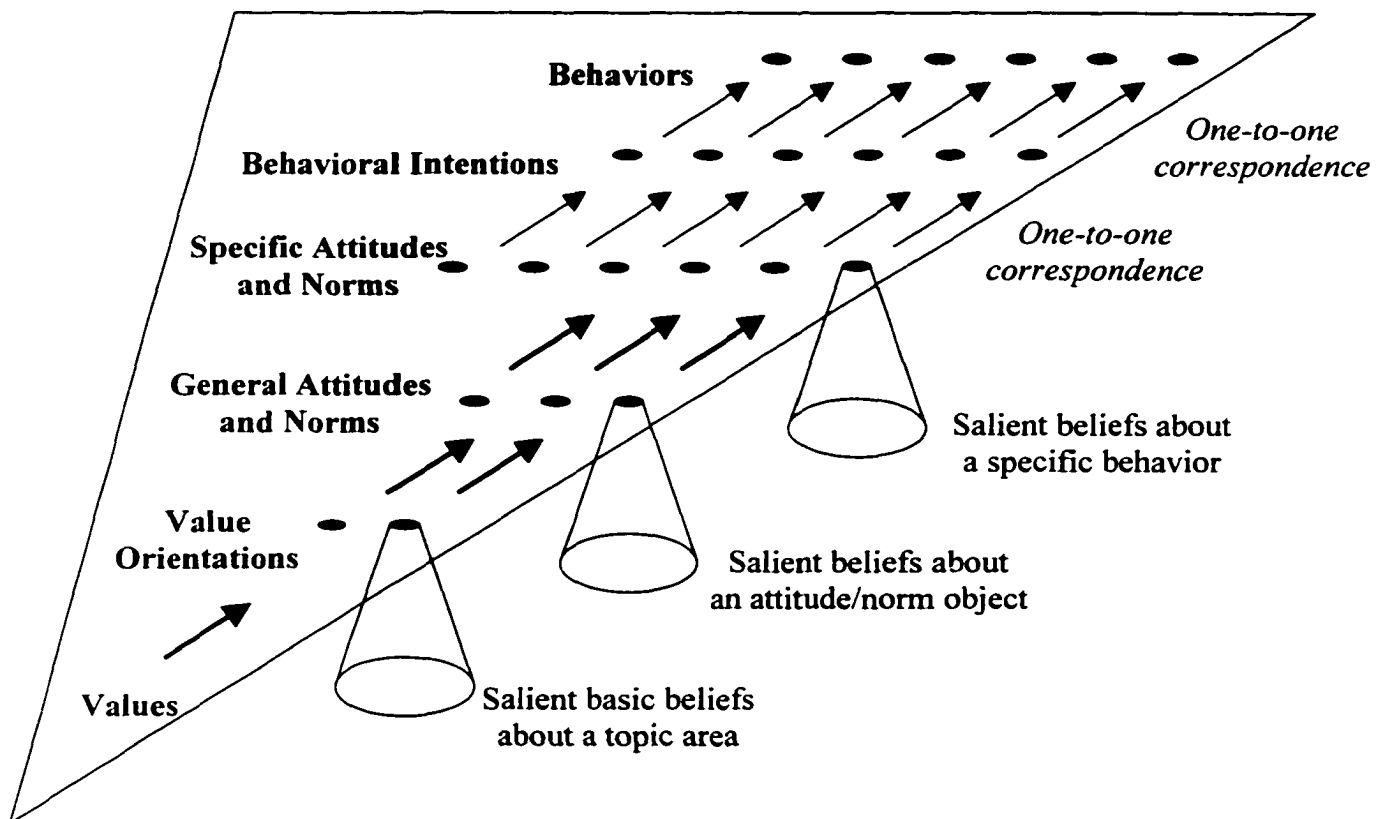


Figure 2. An alternative hierarchy model suggests horizontal and vertical structure, as well as an underlying depth to relationships among the elements.

hierarchy and recognizes complexity in three dimensions, integrating a traditional view of the cognitive hierarchy with Heberlein's horizontal dimension. In this integrated model, there is (1) a vertical dimension from abstract values to specific attitudes and norms that directly correspond to intentions and behavior; (2) a horizontal dimension that recognizes that there are multiple behaviors, intentions, and corresponding attitudes and norms, but fewer general attitudes, value orientations, and values that apply to groups of specific attitudes and norms; and (3) a depth dimension that reflects the importance of salient beliefs and evaluations for individual attitude, norm, or value orientation elements.

This conceptualization recognizes that when most people think of an attitude or norm, they do not necessarily deliberate about the links between those evaluations and more abstract elements (general attitudes or norms, value orientations, or values). In most cases, salient beliefs and evaluations are likely to be relatively few in number and distinctly not abstract (e.g., the underlying "cone" components of the model shown in Figure 2). Once these elements are measured, however, the hierarchy suggests distinct value orientations, attitudes, or norms will be correlated in consistent ways with more and less abstract elements in the model (the "triangular plane" component of the model, which is the same as Figure 1).

The essence of the hierarchy is that people do not evaluate the world or behaviors through a whimsical process. When given the opportunity to deliberate about an action or object, people will search for applicable cognitive information and use it in systematic ways. Furthermore, the hierarchy suggests that measured cognitions about a variety of behaviors and objects are likely to show internal consistency that relates back to the general attitudes and norms, value orientations, and values that are thought to have

spawned them, even if that happens unconsciously. Consistency and order among cognitions is a foundational concept within cognitive social psychology (Festinger, 1957; Abelson et al., 1968; Fiske & Taylor, 1991).

Individual studies that focus on a single behavior and hypothesized cognitive antecedents (a focus on the vertical dimension) are thus necessary but not sufficient to validate the notion of a cognitive hierarchy. It is also important to relate the more abstract elements to multiple actions and behaviors (a focus on the horizontal dimension), and show consistency between mediating variables in the model. Finally, there is a need to examine the third dimension in the model, the underlying cognitive structure of individual elements – and not only to help measure those elements. If the cognitive hierarchy is to be validated, it will need to show connections between the immediate salient beliefs that people use to form evaluations of an object as well as broader cognitive variables. The papers in this dissertation address parts of all three dimensions in the model. Considered collectively, they are designed to examine the utility of the general concept.

MEASURING VALUE ORIENTATIONS

Two of the three papers in this dissertation use wildlife value orientations as key independent variables, although brevity does not allow either paper to elaborate on measurement issues associated with the concept. The dissertation follows from methods developed by Fulton et al. (1996), but offers a replication that includes some newly-developed items, one new content domain, and analysis modifications designed to improve the reliability and predictive validity of the variables, as well as help confirm

their structure. This section briefly reviews the basic conceptual and measurement approach.

Value orientations are thought to be extremely broad, abstract cognitions about a content area, but which are linked to even more fundamental, object-less values (Fulton et al., 1996; Vaske & Donnelly, 1999). The general concept is that value orientations cannot be measured directly, but can be inferred from patterns of basic beliefs about the content area (Fulton et al., 1996).

Applied to wildlife, this dissertation measured value orientations by examining patterns of responses toward items in wildlife belief content areas as given below.

- **Wildlife Use.** Should wildlife populations be used and managed for human benefit? This domain focuses on beliefs about a general “stewardship ethic” that suggests use or harvest individual animals may be acceptable as long as populations are not threatened.
- **Hunting.** Is hunting considered safe, humane, and does it help hunters enjoy the outdoors and appreciate wildlife and natural processes? This domain focuses on beliefs about this fundamental human-wildlife interaction.
- **Wildlife rights.** Are human needs are more important than wildlife rights, or do both humans and wildlife have similar rights? This domain focuses on beliefs about whether individuals and populations of animals have legal or moral standing that should constrain human activities that affect wildlife. They are distinct from welfare beliefs (see below).
- **Wildlife Welfare.** Should people minimize the pain and suffering of wildlife caused by human activities? This domain focuses on beliefs about humane treatment of

individual wildlife, without the broader concern over the rights of a class or population of wildlife.

- **Wildlife Learning.** Should people learn about wildlife? This domain focuses on the importance of wildlife learning opportunities in society.
- **Wildlife Bequest/Existence.** Should wildlife populations be maintained for future generations, or even if people do not get to use them? This combined domain focuses on beliefs associated with protecting wildlife for future use (bequest value), or regardless of whether any use can occur at all (existence value).
- **Appreciation in Recreation Settings.** Should wildlife be available for people to enjoy in recreation settings? This domain focuses on beliefs about the importance of seeing wildlife on trips, or whether wildlife is an important reason for taking trips.
- **Appreciation in Residential Settings.** Should wildlife be available for people to enjoy in residential setting? This domain focuses on beliefs about the importance of seeing wildlife around their homes and their interest in attracting wildlife to their neighborhood.

Seven of these eight follow from Fulton et al. (1996), although those authors did not measure “wildlife welfare,” while they additionally measured a “fishing” domain parallel to the one for “hunting.” These eight are clearly not the only possible content domains associated with basic beliefs about the relationship of humans to wildlife, but they are presumed to be representative.

Also following from Fulton et al. (1996), the measurement approach involved two separate analysis steps to (1) confirm discriminant validity between the basic belief domains, and (2) examine whether these eight could be used to identify broader value

orientations on two hypothesized value orientation dimensions related to “use-protection” and “appreciation.” Figure 3 illustrates the conceptual approach.

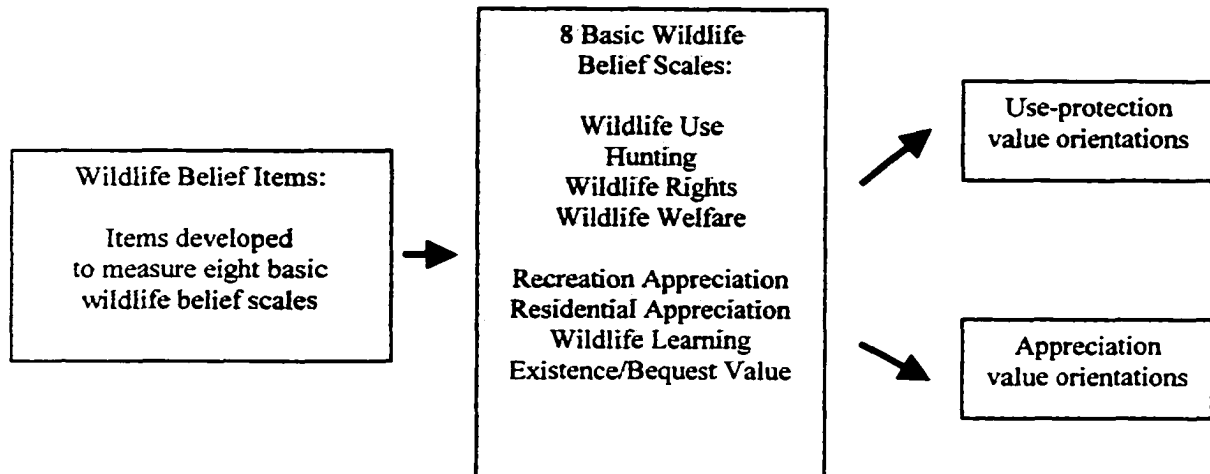


Figure 3. Conceptual model for measuring wildlife value orientations. Two value orientations emerge from patterns of responses among eight basic wildlife belief domains measured through a variety of belief items.

Specific belief items used in this dissertation also followed from Fulton et al. (1996), although several were modified to improve readability, narrow content within a belief domain, or address reliability issues illuminated by the earlier data set. This process of improving items is accepted practice within the domain sampling approach during conceptual development (Nunnally & Bernstein, 1994), and illustrates the emerging quality of the concept.

In both Fulton et al. (1996) and this dissertation, discriminant validity between the belief domains was assessed via a confirmatory factor analysis. Reliability of the hypothesized scale variables representing each belief domain was also examined. The

second paper in this dissertation summarizes the results of this analysis and shows support for the theorized model.

Fulton et al. (1996) subsequently conducted a second order exploratory factor analysis to examine potential links between the scale domain variables, and determine if those could be combined to represent the two value orientations. Their analyses supported the model, but also recognized the limitations of an exploratory analysis. In this dissertation, a second order confirmatory factor analysis is used to test the model more explicitly, and offers stronger support. Chapter IV provides results and discussion of this issue.

NORMS VS ATTITUDES: COMPETING OR COMPLIMENTARY RESEARCH TRADITIONS?

All three papers in this dissertation focus on evaluative variables that may be conceptualized under both attitudinal and normative research traditions. This brief section reviews issues in this theoretical debate, and suggests how papers in the dissertation address them.

Attitude research traditions have generally claimed evaluations for themselves, defining their fundamental concept – attitude – as an association between an object and an evaluative mental state (Fishbein & Ajzen, 1975; Pratkanis & Greenwald, 1989; Vincent & Fazio, 1992; Eagly & Chaiken, 1993). However, normative traditions have also examined evaluations, focusing on standards for behavior or conditions, and linking those internal standards to group and role processes that also work outside the individual (Homans, 1950; Blake & Davis, 1964; Gibbs, 1965; Jackson, 1965; Cialdini, Kallgren, & Reno, 1991; Cancian, 1975; Biddle, 1986; Miller & Prentice, 1995; Shelby et al., 1996; Heywood, 1996). So which tradition has it right? Are evaluations always attitudinal?

When is an evaluation normative? Can the same evaluation be understood under both traditions?

It is beyond the scope of this chapter to definitively answer these questions, but the work in this dissertation does not presume that attitudinal and normative traditions are exclusionary or competitive theories. Instead, they are viewed as offering distinct but complimentary ideas and approaches, with the larger cognitive hierarchy model offering opportunities to accommodate one, the other, or both.

Paraphrasing Heberlein (1981), neither norms nor attitudes probably “exist” in the true sense of the word. Both are hypothetical constructs assigned to intangible mental states that are inferred from verbal reports or behavioral observation. They exist largely because they appear to exist during introspection; we believe in them. But our ability to distinguish between different types of evaluations, their sources, and inter-play among other cognitions can allow alternative interpretations. Like blind men feeling the elephant, any single description is likely to be simultaneously accurate yet incomplete; evaluations are probably bigger and more complex than any one approach can address. If norm traditions offer understanding of the elephant’s trunk and how an elephant feeds, attitudes may help us understand its legs and how it moves. Without taking this analogy too far, perhaps the cognitive hierarchy offers a more holistic and integrated understanding of the animal. In the meantime, it is useful to briefly compare normative and attitudinal versions for points of similarity and distinction, helping to clarify how both traditions have been blended in this dissertation.

An initial distinction is that attitudes are probably the broader concept because it subsumes all evaluations, while norms refer to special kinds of evaluative standards that

have a “should” or “ought” component (Blake & Davis, 1964; Gibbs, 1965; Jackson, 1965; Cialdini, Kallgren, & Reno, 1991; Miller & Prentice, 1995; Shelby et al., 1996; McDonald, 1996; Heywood, 1996). As discussed above, however, normative research traditions also consider additional concepts beyond the strength of obligation or “shouldness,” including shared agreement about the norm within a social group or population (Labovitz & Hagedorn, 1973; Rossi & Berk, 1985), and links to both internal and external sanctions that may have helped form the norm (Heywood, 1997). While attitudinal traditions also cover additional concepts (e.g., underlying cognitive beliefs such as specific expectancies and evaluations of outcomes of a behavior), the focus in most cases is on the evaluation itself.

A second distinction between attitudes and norms relates to their respective disciplinary perspectives. Attitude concepts were developed from a cognitive psychology approach, and focus on internal evaluative mental states and how they direct behavior. While attitude research methods often use surveys to sample the attitudes and behaviors within a population, they basically consider each subject an experimental case for exploring attitude – behavior links.

Norm concepts, in contrast, were spawned from sociological concerns about roles and conformity (Sherif, 1936; Asch 1955; Deutsch & Gerard, 1955; Hogg & Turner, 1987), and have commonly focused on how evaluative standards are developed within, and shared among, people in a group (Heywood, 1996; MacDonald, 1996). While different norm traditions recognize both internal personal norms and external social norms (Jackson, 1965; Cialdini et al., 1991; Reno, Cialdini & Kallgren, 1993), there is a dual focus on both the person and the social group. Normative research methods also

tend to use surveys of a population, but many normative analyses (particularly within the structural norm tradition) examine aggregate rather than individual responses (Jackson, 1965; Shelby et al., 1996).

It is inaccurate to suggest that attitudes do not have sociological components, or that norms lack psychological ones. Most researchers would probably agree that both attitudes and norms are mental states within the individual that are learned through the socialization process and direct experience (Cancian, 1975; Abelson, 1982; Fazio, 1986). Many attitude models also explicitly address sociological or group process issues. The Theory of Reasoned Action, for example, suggests mechanisms by which salient beliefs about external social sanctions might help form attitudinal evaluations, and also recognizes an explicit social norm term (the subjective norm) to account for social influences on behavior (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). Overall, however, normative research traditions place greater emphasis on the links between individual and group evaluations, and have been more explicit in connecting both concepts and methods to social influences, particularly with regard to natural resources (MacDonald, 1996)

In the natural resources, the applied research focus is often on collective behavior issues and institutional solutions. Many environmental problems are about averting the “tragedy of the commons” and solutions typically require constraints on collective behavior (“mutual coercion, mutually agreed upon”) (Hardin, 1968). In these situations, shared agreement is a particularly important variable, and the explicit focus of the normative approach (Shelby et al., 1996). The use of an acceptability response scale also links evaluations with an obligation to comply, the mechanism for collective action

(Heberlein, 1977). Finally, normative research traditions are helpful for understanding when evaluations direct individual behavior for commons issues, suggesting that two specific types of beliefs (an awareness of consequences and an ascription of responsibility for individual actions) determine whether a normative evaluation will be strong and affect behavior (Schwartz, 1968, 1973, 1977; Van Liere and Dunlap, 1978; Hopper & Neilson, 1991; Vaske et al., In press).

A final distinction between attitudinal and normative research traditions relates to evaluations of multiple conditions or behaviors. Structural norm traditions, at least within natural resources, have often been applied to both the acceptability of different *quantities of conditions* created by an institutional, collective, or individual behavior (Shelby et al., 1996; Whittaker, 1997), as well as the acceptability of *a range of institutional actions* (Wittmann & Vaske, 1998; Wittmann et al., 1998; Zinn et al., 1998). Attitude models, in contrast, tend to focus on evaluations of a single behavior (e.g., voting for a white tail deer hunt), or a single general target (e.g., whitetail deer). It is possible, of course, to apply attitudinal approaches to varying quantities of conditions or behavior. The structural norm model, however, was specifically designed for this kind of evaluative information and arguably handles it more parsimoniously.

Despite these distinctions, attitudes and norms are fundamentally similar. Both are about evaluation. Both are based on underlying salient beliefs. Both are hypothesized to direct behavior only when they correspond via specificity variables. With care, most evaluations can be characterized and measured under either tradition. Is there a fundamental difference between a “good – bad” or “acceptable – unacceptable”

scale? In the final analysis, both are probably imprecise measures of the same latent evaluative raw material.

In this dissertation, examples of both research traditions and protocols are employed, with an eye toward understanding the cognitive hierarchy rather than promoting either tradition. In Chapter III, for example, attitude methods are used because they provide a useful foundation for exploring the salient beliefs associated with evaluations toward a controlled moose hunt. In Chapters IV and V, however, honor normative traditions through the use of “acceptability” scales, a focus on consensus support for institutional actions, and normative mediating variables that focus on condition evaluations. In all three papers, the focus is on how evaluations, regardless of whether they are considered attitudinal or normative, fit into a hierarchy of cognitions from values to behavior. Accordingly, while each of the three papers have necessarily adopted use of some terms that are exclusive to one of the traditions, the dissertation generally uses the more neutral term, evaluation, to describe the mediating variables of interest.

APPLYING THE HIERARCHY TO URBAN WILDLIFE ISSUES: PROLOGUES TO THE THREE PAPERS

The papers in this dissertation explore different aspects of the cognitive hierarchy, and individually have a relatively narrow focus. Collectively, however, the papers build upon each other and provide larger understanding of the hierarchy as applied to a specific set of natural resource issues, the management of urban wildlife conflicts. This final section of the chapter briefly reviews the issues addressed in the paper chapters, describing how they are linked in theory, and how theoretical understanding can be useful in wildlife planning efforts.

Chapter III: Understanding beliefs and attitudes toward an urban wildlife hunt

The first paper applies basic research traditions from the Theory of Reasoned Action to the issue of an urban wildlife hunt, and acts as warm-up for the rest of the dissertation. The paper examines the underlying cognitive structure of attitudes toward a hunt, specifically comparing expectancies and evaluations of possible hunt outcomes among those for and against the hunt. Presenting essentially descriptive information, the paper does not break new theoretical ground. However, it does provide a useful application that illustrates the depth dimension of elements within the cognitive hierarchy (see Figure 2). This information also proved useful during Anchorage's recent wildlife planning effort, highlighting areas of consensus about the hunt, and suggesting areas where additional work was needed.

The paper helps set the stage for the two subsequent papers. By providing descriptive data about respondents' salient beliefs and showing how those help form different attitudes, the paper shows there may be both factual and evaluative-based disagreements between people who support or oppose a management action. Furthermore, the paper provides *prima facie* evidence that some disagreements are value-based, as proposed in the hierarchy model, and urges a more direct test of that issue.

Chapter IV: The value-basis of support for urban wildlife management actions

The second paper takes on that challenge, specifically examining the value-basis of peoples' evaluations toward wildlife management actions. The paper extends and improves value orientation measurement developed by Fulton et al. (1996), and examines relationships between those variables and the acceptability of several wildlife management actions. The wildlife actions cover a range of species and possible actions,

including both population-level prevention actions (e.g., hunts and lethal control efforts), and post-conflict response actions (e.g., lethal destruction of individual animals involved in conflicts).

This paper tests several theoretical issues related to the hierarchy, but focuses on whether value-based variables (value orientations) are useful predictors of the acceptability of management actions, conceptualized as specific attitudes/norms. Referring back to Figure 2, this paper examines the vertical dimension in the cognitive hierarchy, although it ignores possible mediating variables (general attitudes/norms). However, the paper also examines the horizontal dimension by exploring value orientation influence on acceptability for a range of management actions. The hierarchy suggests that value orientations should influence action acceptability across species and across types of actions; this paper provides data that directly test those notions. Finally, the paper explores hierarchy correspondence issues by examining whether value orientations are better predictors of the acceptability of a class of actions than a single action.

The paper also provides some information useful for planners involved in collaborative planning efforts. By explicitly linking value orientations and management action acceptability, the data highlight why specific actions should be tied to the broader planning goals they are designed to achieve. More importantly, the data illustrate why agreement on larger goals is useful before addressing more contentious specific issues. Finally, the data appear to accurately characterize which management actions are likely to have a deeper value-basis, and thus be more contentious.

Chapter V: Value orientations, condition evaluations, and the acceptability of a moose hunt: Additional support for the cognitive hierarchy

The final paper in the dissertation examines a more complex version of the hierarchy, and includes mediating variables that follow from normative traditions. The focus here is on the vertical dimension of the hierarchy, from value orientations to general normative variables to the acceptability for one specific management action (the acceptability of a moose hunt). Unlike Chapter IV, this paper does not address the horizontal structure of the hierarchy.

The theoretical novelty in this paper is the inclusion of structural norm variables as mediators. These variables have obvious practical utility for establishing normative standards (Zinn et al., 1998; Wittmann et al., 1998) or social acceptance capacities (Decker & Purdy, 1988), but they also need to be understood in a larger context. Are evaluations of wildlife population levels or wildlife problem levels related to more general value orientations? Do these conditions evaluations influence the acceptability of management actions? The paper explores these questions for a single species (moose) and a single management action (a hunt to reduce numbers).

On a practical level, the paper also offered useful information to Anchorage planners. The moose hunt issue remains among the most contentious examined in the planning effort, and often centered on questions of how many is too many moose or moose problems. By showing that people answer these questions differently in part because they have different wildlife values, the data focused stakeholders on solutions that would address these more fundamental disagreements.

III. UNDERSTANDING BELIEFS AND ATTITUDES TOWARD AN URBAN WILDLIFE HUNT: MOOSE HUNTING NEAR ANCHORAGE, ALASKA

ABSTRACT

The use of hunting as a management tool in urban areas is often controversial and contrasts with many hunts in rural or wildland settings. Faced with contentious decision-making environments, managers increasingly want to understand public acceptability of hunts before implementing them. A survey of Anchorage residents about the acceptability of a nearby moose (*Alces alces*) hunt offered an opportunity to apply attitude theory to this issue. Results showed majority (51%) support for the hunt, although 34% were opposed, and 15% undecided. There was also considerable divergence in the underlying beliefs of those who support and oppose the hunt. Support was primarily based on beliefs that it would reduce moose–vehicle accidents, reduce potentially dangerous human–moose encounters, prevent moose overpopulation, and provide good hunting opportunities. In contrast, opposition was based on beliefs that the hunt would cost a lot to administer, generate conflict between pro-hunters and anti-hunters, prevent non-hunter use of the area, and potentially injure a hunter or someone else. Respondents unsure about the hunt generally held beliefs that were intermediate between those for and against the hunt, offering an explanation for their neutrality.

Belief differences among the groups suggest there may be opportunities to create greater consensus for hunt-related decisions, while also suggesting that some beliefs are value-based and may be relatively resistant to change. Findings also highlight the utility of the attitude model.

KEY WORDS

Behavioral intention, beliefs, public attitudes, moose hunting

INTRODUCTION

Some ungulate species such as white-tailed deer (*Odocoileus virginianus*) and moose (*Alces alces*) adapt well to urban and suburban environments, finding abundant food sources in residents' landscaping, shelter in the scattered park lands, as well as refuge from some predators. Coupled with limited hunting in these areas, ungulate population increases have often generated increasing conflicts with humans, including collisions with motor vehicles, the transmission of disease, damage to landscaping or native vegetation, and in the case of moose, aggressive encounters (Conover et al., 1995; McAninch, 1995; Messmer et al., 1997; Loker et al., 1999). When a human community becomes intolerant of these problems, researchers conceptualize that a "wildlife acceptance capacity" (Decker & Purdy 1988; Decker 1991) or a normative standard (Wittmann et al., 1998; Zinn et al., 1998) has been exceeded and reductions in animal population levels may be warranted.

One tool for managing these populations is to conduct public hunts. In contrast to most hunts in rural or wildland settings, however, urban hunts are often complex and controversial. Urban areas feature more complicated arrays of private lands, and may involve greater safety issues from the sheer density of human populations or development. Urban hunts can also be more contentious because of the size and diversity of groups with differing tolerances for problems caused by urban wildlife, different interests in wildlife viewing which can be impacted by hunting, and different values toward hunting in general.

In the face of this complexity, managers are increasingly interested in information about the public acceptability of proposed hunts (Green et al., 1997;

Messmer et al., 1997). In addition to determining simple levels of support and opposition, managers also need to understand the reasons underlying their attitudes, which may help create consensus for hunt-related decisions (Loker et al., 1999).

An enduring attitude model in social psychology, the Theory of Reasoned Action, provides one approach to exploring these issues (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). Developed to explain relationships between beliefs, attitudes, intentions, and behaviors, this research tradition prescribes specific methods that have proven their utility with several attitude-behavior topics (Sheppard et al., 1988). This model has also been applied to natural resource issues, including attitudes toward fire policy in national parks (Manfredo et al., 1990; Bright et al., 1993), wolf reintroduction in Colorado (Pate et al., 1996), and camping participation (Young & Kent, 1985). Among its advantages, the model helps differentiate underlying reasons for group attitudes, and may help identify whether those reasons are disagreements about factual beliefs or value-based judgments (Fishbein & Manfredo, 1992; Manfredo et al., 1995).

In this paper, we apply the methods of this attitude model to an urban hunt issue in Anchorage, Alaska during 1996-1997. The objectives of the research were to: (1) determine attitudes toward the hunt; (2) examine the beliefs that form the basis of those attitudes; (3) explore differences between respondents for, against, and unsure about the hunt; and (4) suggest how these differences may have implications for decision-making about the hunt.

STUDY AREA

Anchorage, Alaska (population 260,000) is a city with abundant wildlife, including moose. With relatively low hunting harvest and the existence of extensive

parkland and open space, moose populations in and around Anchorage have doubled since the late 1970s to about 1,900 animals. Of these, 200 to 300 are resident year-round in the developed part of the city (the “Anchorage Bowl”), while an additional 500 to 700 migrate into the Bowl each winter from adjacent lands in Chugach State Park and two large military reservations (Alaska Department of Fish and Game (ADF&G), 1999).

These large moose populations provide high quality viewing and hunting opportunities, help engender a sense of place, and connect residents to the natural environment (ADF&G, 1999). Both officially and informally, moose are recognized as a symbol of the city (Whittaker & Manfredo, 1997). They also cause a number of problems. There were an average of 156 moose killed in moose-vehicle collisions per year from 1994-1998 (ADF&G, 1999), and damage to vehicles and associated human injuries as a result of these accidents is substantial (Thomas, 1995). In addition, moose damage homeowners’ gardens and landscaping, and they may aggressively protect their young or block sidewalks and ski trails during winter, becoming a hazard to city residents and visitors (ADF&G, 1999). Anchorage moose have stomped two people to death (in 1993 and 1995), and they are also estimated to injure or kill 50 to 100 dogs each year (ADF&G, 1999).

The Anchorage moose population has been considered above biological carrying capacity of the area since the 1980s (ADF&G, 1999). A heavy snowfall winter of 1994-95 led to a 25-30% population decrease, and habitat in many areas is heavily over-browsed (ADF&G, 1999). Additional moose population growth appears to be checked by starvation deaths, limited hunting harvest, vehicle collision deaths, and occasional predation from brown bears (*Ursus arctos*) and wolves (*Canis lupus*). However, there

has been interest in the community to conduct additional hunts to reduce moose populations and provide more hunting opportunity (ADF&G, 1999).

Moose hunting near Anchorage is currently limited to highly regulated hunts conducted on two large military bases adjacent to the city, with about 60 moose harvested each year (ADF&G, 1999). The last year of extensive moose hunts in and adjacent to the Anchorage Bowl was 1975. However, small controlled hunts were also conducted above Hillside (a suburban area adjacent to the 500,000-acre Chugach State Park) and near the airport until 1985. The most notable of these, a 1983 two-day bow hunt held above Hillside, harvested 41 animals but was also controversial. Videotape of a wounded moose and a moose being field-dressed in the driveway of a suburban home was aired on local television news, and generated several letters to the editor and editorial columns in local newspapers. Possibly in response to this situation, many bow hunters did not support repeating this hunt until moose populations and conflicts peaked in the early 1990s (ADF&G, 1995).

Recent moose hunt proposals have included many conditions intended to minimize controversy. While a few hunts have been proposed for parks in the city, the most seriously considered proposals focus on a hunt in Chugach State Park above the Hillside. A survey of Anchorage residents was conducted to explore public attitudes toward this potential moose hunt, as well as a number of other wildlife issues in the city (Whittaker & Manfredo, 1997).

METHODS

Sampling and Data Collection

The population of interest was Anchorage residents 18 years of age; the sample for the primary mail survey was drawn from a registered voter list. The target sample size was 1,000, which would provide estimates of $\pm 4\%$ at the 95% confidence level for the entire population.

Individuals in the sample were sent a mail survey. A postcard reminder was sent to all respondents ten days later, and individuals who did not return a completed survey were sent two additional reminder letters and replacement surveys four and seven weeks after the initial mailing. A sample of individuals who still had not returned a survey after 13 weeks were called by phone to explore the possibility of non-response bias. The phone survey had a much smaller subset of questions than the mail survey.

Measuring Beliefs and Attitudes

Attitudes are evaluative judgments toward objects, and may be directed toward people, things, or behaviors (Eagly & Chaiken, 1993). An enduring and well-tested social psychology model, the Theory of Reasoned Action, suggests that the best predictors of human behavior are behavioral intentions, which are directed by attitudes toward that behavior (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). Under this paradigm, a person's attitude has an underlying cognitive structure that integrates salient ("top of the mind") beliefs about outcomes of a situation with corresponding evaluations of those outcomes (Fishbein & Manfredo, 1992). These beliefs are cognitions about what people hold to be true, even if those thoughts are not factually correct.

To measure attitudes across a population, researchers elicit a range of possible outcomes from one sample, and then measure belief strength (whether people believe certain outcomes are likely or unlikely) and evaluations (whether people judge those outcomes as good or bad) for each outcome across a larger sample (Ajzen & Fishbein, 1980). While the paired questions about beliefs and evaluations for each outcome may lack parsimony, this level of detail is necessary for comparing the underlying reasons for differing attitudes.

In this study, we were interested in attitudes toward a controlled moose hunt near Anchorage, expressed as the reported intention to vote for or against the hunt *if* a referendum were held.¹ The research explored salient beliefs about hunt outcomes through an elicitation study, then measured beliefs and evaluations for the modal salient outcomes in a larger sample via the mail survey. Analysis focused on comparisons of beliefs, evaluations, and an integrated variable among respondents for, against, or unsure about the hunt.

Elicitation Study

The elicitation study was conducted by telephone prior to the development of the mail survey. The goal was to identify modal salient beliefs (those outcomes that come to mind most readily in a given population), which are thought to predict attitudes better than researcher-identified items (Barro et al., 1994). They can be identified through open-ended responses from a small sample of the population. Fishbein and Ajzen

¹ The public does not vote on hunts in Alaska; these are decided by a governor-appointed Board of Game, which factors public opinion into its decisions. Using a hypothetical vote to measure intentions was designed to make support or opposition to the hunt as concrete and action-oriented as possible.

(1980) suggest that salient beliefs typically number between 3 and 15 for any given issue.

For this study, 27 randomly selected Anchorage residents were asked to list advantages and disadvantages of having a controlled moose hunt near Anchorage. Modal salient beliefs about hunt outcomes were determined from a content analysis of respondents' answers. In total, 11 specific outcomes of the controlled moose hunt were identified (Table 1).

Mail Survey Instrument

The mail survey included questions on several wildlife issues; this research focuses on one section regarding the controlled moose hunt. Respondents were provided a description of the hunt (developed by ADF&G to reflect existing proposals and agency concerns) as given below:

- The hunt would be held in specific areas in Chugach State Park at least one half-mile from trailheads or residential areas.
- Hunters would be required to use shotguns with slugs or a muzzle-loading rifle.
- About 40 hunters would get to participate; they would also have to pass a proficiency test and attend a hunter education class.
- Hunting would be monitored by agency staff during the hunt; the entire moose would have to be removed from the park.
- The hunt would be limited to cows and young bulls to reduce winter populations.

Respondents were then asked to answer two series of questions about the 11 possible outcomes from the hunt (developed from the elicitation study). The first series asked respondents to rate each outcome on a seven-point scale from “extremely unlikely” (−3) to “extremely likely” (+3), with a neutral response also available.² The second series asked respondents to rate each outcome on a seven-point scale from “extremely bad” (−3) to “extremely good” (+3), also with a neutral response available.² A final question asked respondents to report whether they would vote for or against the hunt, if there were a referendum. A “not sure” option was also available.

Analysis

Comparisons of beliefs and evaluations for each outcome were made via graphic displays of mean scores among those for, against, and unsure about the hunt (Figure 4). These provided a visual summary of the three groups’ responses for each outcome. Analysis of variance was used for statistical comparisons; overall differences between the three groups are reflected in F-statistics and an effect size measure (R^2) (Table 1). Larger effect sizes indicate larger overall differences between the three groups. Post hoc Scheffé tests were also conducted to determine which individual groups differed from the others.

The study also compared an integrated belief-evaluation variable among the three groups. Following techniques developed by Fishbein and Ajzen (1980), these belief evaluation (BE) scores were generated by multiplying belief scores by evaluation scores for each outcome. Because these scores can range from +3 to −3, “BE products”

² Gradations in responses on either side of “neutral” ranged from “extremely” to “moderately” to “slightly.”

can range from +9 to -9. A positive value results when an outcome is considered either likely and good (+ +), or bad but unlikely (- -). In either case, a positive BE product suggests positive attitudes toward the hunt. In contrast, a negative BE product results when an outcome is considered likely but bad (+ -), or unlikely but good (- +), either of which suggests a negative attitude toward the hunt.

Average BE product scores for respondents for, against, and unsure about the hunt were graphed to visually highlight differences among the three groups (Figure 5). Larger BE products (either positive or negative) suggest that an outcome has a stronger influence on intention to vote for or against the hunt. Similarly, larger differences between BE products for the three groups highlight differences between the groups. BE products for the three groups were compared via analysis of variance; both the F-statistic and an effect size (R^2) are reported (Table 1). Larger effect sizes indicate a greater overall difference between the groups. Post hoc Scheffé tests were also conducted to determine individual group differences.

RESULTS

Survey Response

Of the 1,654 individuals sent a mail questionnaire, 971 or 58.7% completed and returned the surveys. Tests for non-response bias suggested that differences between respondents and non-respondents were small and the data were not weighted.

Voting Intentions

If a referendum on the hunt were held, results suggest that 51% (n=481) would vote for the hunt, while 34% (n=315) would vote against it and 15% were unsure (n=137). The margin of error in these percentages is $\pm 4\%$ at the 95% confidence level.

As a result of item non-response, the total sample size for analyses in this study was 933.

Beliefs and Evaluations

Beliefs and evaluations are summarized in Figure 4. For each potential outcome of the hunt, the figure shows mean scores for respondents in the three groups (those for, against, and unsure about the hunt). These scores generally indicate whether a group believes an outcome is likely or unlikely, and whether that outcome is good or bad. The figure also visually highlights differences between the three groups, which are statistically compared in the first six columns of Table 1.

Beliefs. Table 1 shows significant differences ($p < .05$) in mean belief scores among the three groups for all 11 outcomes (with 10 of the 11 significant at the $p < .001$ level). Effect size measures, however, suggest that some differences were larger than others. Post hoc Scheffé tests show significant differences between belief scores among those for and against the hunt for all 11 outcomes. Unsure respondents, in contrast, were significantly different from both other groups for 8 of the 11 outcomes, but were similar to hunt supporters for two outcomes and similar to hunt opposition for another. For all but one outcome (“permanently reduce moose numbers”), belief scores for unsure respondents were intermediate between those for and against the hunt.

The largest differences between those for and against the hunt were over the likelihood it would “reduce the number of accidents” ($R^2 = .30$) and “reduce the number of potentially dangerous encounters between moose and people,” ($R^2 = .29$) with respondents for the hunt reporting each more likely. There were also large differences over the likelihood that the hunt would “injure somebody,” ($R^2 = .27$) and “hurt my

chances of seeing moose as often as I like,” ($R^2 = .28$) with respondents against the hunt reporting these more likely. Respondents were more similar to each other for beliefs that

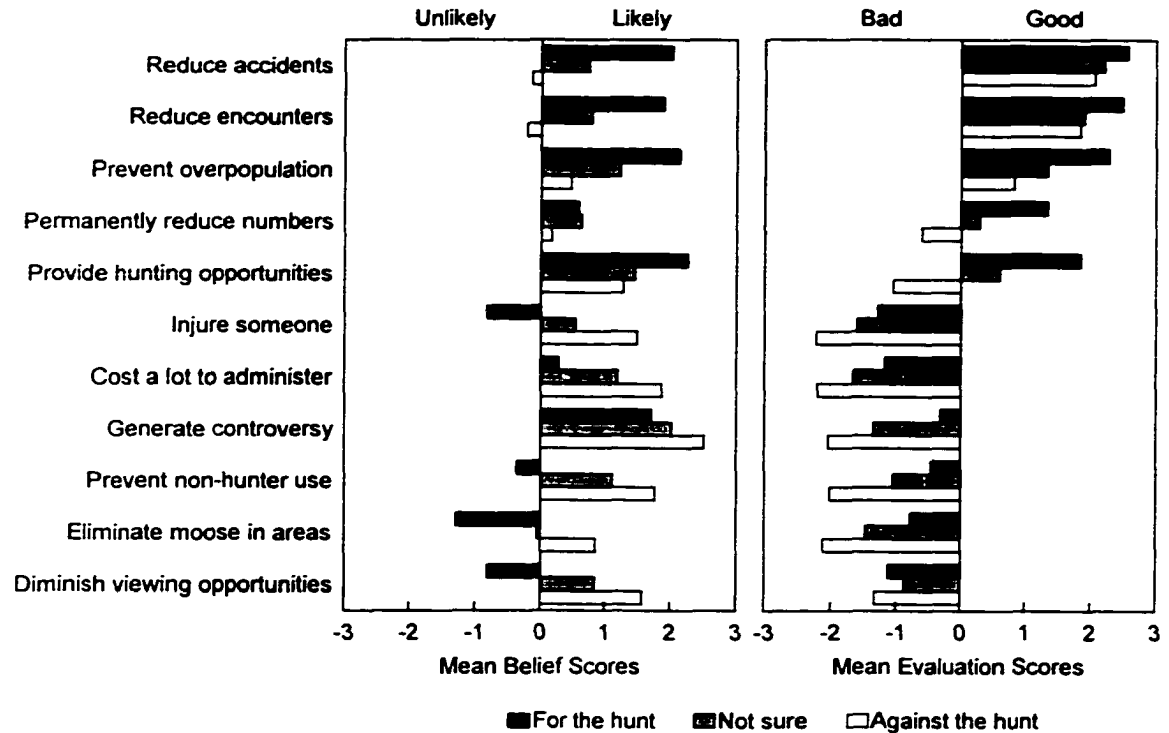


Figure 4. Mean belief expectancy and evaluation scores related to outcomes of a controlled moose hunt among respondents for, against, and unsure about the hunt.

Notes:

1. Belief scores can range from -3 (extremely unlikely) to +3 (extremely likely).
2. Evaluation scores can range from -3 (extremely bad) to +3 (extremely good).
3. Larger differences between grouped scores highlight differences among respondents for, against, or unsure about the hunt.

the hunt would “permanently reduce the number of moose in Anchorage” ($R^2 = .01$; mean scores suggest all groups thought this was slightly likely), “generate a lot of conflict between people who favor and oppose the hunt” ($R^2 = .07$; all groups thought this was moderately likely), and “provide more opportunities for Anchorage moose hunters” ($R^2 = .10$; all groups thought this was moderately likely).

Evaluations. Table 1 shows significant group differences among evaluations for 10 of the 11 outcomes at the $p < .001$ level. The only exception was for the hunt “hurting my chances of seeing moose as often as I like,” where mean evaluation scores suggest all three groups evaluate this outcome as slightly bad. Effect size measures and post hoc Scheffé tests, however, suggest that some differences were larger than others. Scheffé tests show significant differences between belief scores among those for and against the hunt for all 10 outcomes with overall group differences. Unsure respondents, in contrast, were significantly different from both other groups for 8 of these 10 outcomes, but were similar to hunt supporters for two others. For all 11 outcomes, mean evaluations for unsure respondents were intermediate between those for and against the hunt.

The largest difference between those for and against the hunt was for “providing more opportunities for Anchorage moose hunters” ($R^2 = .47$; supporters rated this moderately good, while hunt opposition rated this as moderately bad). Other relatively large differences were for evaluations that the hunt would “permanently reduce the number of moose in Anchorage” ($R^2 = .24$; hunt supporters rated this moderately good, while hunt opposition rated it slightly bad); “keep moose from being overpopulated,” ($R^2 = .22$; hunt supporters rated this much more positively than hunt opposition); and

“generate a lot of conflict between people who favor and oppose the hunt” ($R^2 = .23$; hunt opposition rated this more negatively than hunt supporters).

Belief Evaluation Product Scores

BE product scores for the three groups are given in Figure 5, with statistical comparisons given in the last three columns of Table 1. Results show that there were significant differences between the three groups for all 11 outcomes at the $p < .001$ level. Effect size measures suggest that some differences were larger than others, and that the pattern of differences demonstrates that groups base their attitudes on very different beliefs. Post hoc Scheffé tests show significant differences between belief scores among those for and against the hunt for all 11 outcomes. Unsure respondents were also significantly different from both other groups for 9 of these 11 outcomes, but were similar to hunt supporters and hunt opposition for one outcome each. For all 11 outcomes, mean BE product scores for unsure respondents were intermediate between those for and against the hunt.

Outcomes most strongly associated with support for the hunt (positive BE scores) included: the hunt would “reduce the number of accidents,” “reduce the number of potentially dangerous encounters between moose and people,” “keep moose from becoming overpopulated,” and “provide more opportunities for Anchorage moose hunters.” For these first three, respondents in all three groups tend to think the outcome is good, but hunt supporters believe the hunt is more likely to accomplish them. In contrast, respondents against the hunt are less likely to think the hunt will reduce accidents, encounters, or prevent moose overpopulation. For the “provide more hunting

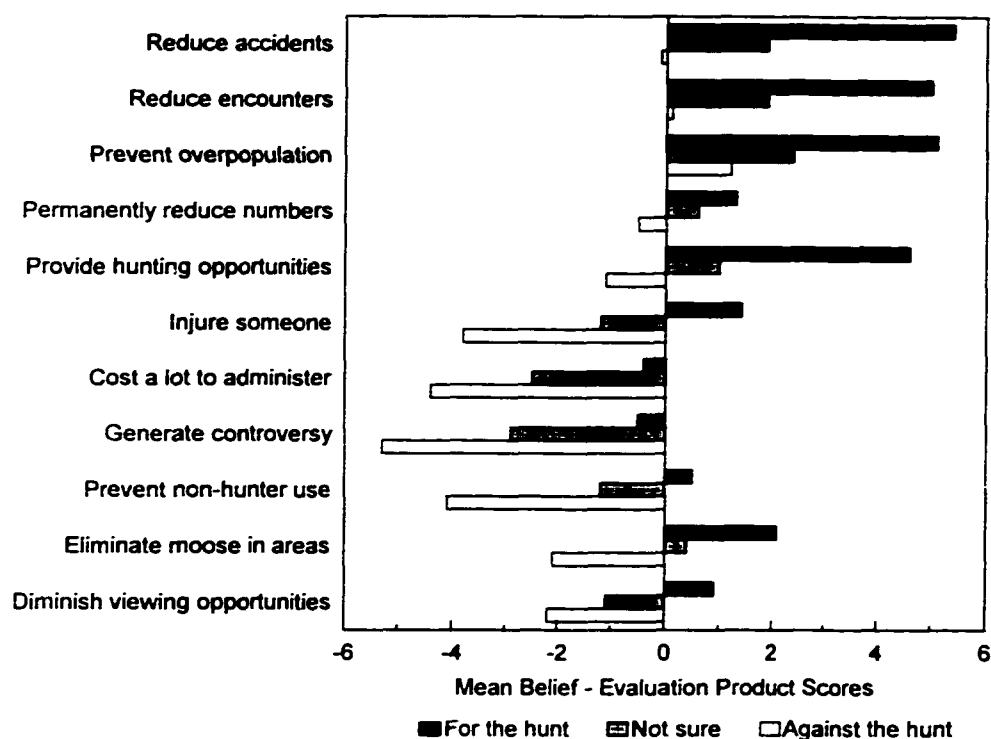


Figure 5. Mean Belief – Evaluation (BE) products related to outcomes of a controlled moose hunt among respondents for, against, and unsure about the hunt.

Notes:

1. Belief - Evaluation scores are the product of belief and evaluation scores (each can range from -3 to +3). BE scores can range from -9 to +9; the scale has been truncated.
2. A positive score can result from an outcome likely and good, or unlikely and bad; a negative score can result from an outcome likely and bad or unlikely and good.
3. Larger BE scores (either positive or negative) suggest beliefs have stronger influences on attitudes.
4. Larger differences between grouped BE scores highlight differences among respondents for, against, or unsure about the hunt.

Table 1. Comparison of mean expectancy, evaluation, and belief evaluation product scores between respondents for, against, and unsure about the hunt.

Outcome Item	Belief Scores			Evaluation Scores			BE Product Scores		
	F ^a	R ²	Scheffé ^b	F ^a	R ²	Scheffé ^b	F ^a	R ²	Scheffé ^b
The hunt would....									
...reduce the number of accidents involving moose	198.5	.30	abc	31.3	.06	aab	178.5	.28	abc
...reduce the number of potentially dangerous encounters between moose and people	187.4	.29	abc	45.9	.09	abb	173.2	.27	abc
...keep moose from being overpopulated	124.4	.21	abc	127.9	.22	abc	120.9	.21	abc
...permanently reduce number of moose in Anchorage	5.5	.01	aab	142.6	.24	abc	18.2	.04	abc
...provide more opportunities for Anchorage moose hunters	52.3	.10	abb	410.1	.47	abc	219.2	.32	abc
...injure a hunter or someone else	170.4	.27	abc	36.6	.07	abc	134.4	.23	abc
...cost a lot to administer	86.8	.16	abc	53.7	.10	abc	89.8	.17	abc
...generate a lot of conflict between people who favor and oppose the hunt	36.2	.07	aab	137.3	.23	abc	132.0	.22	abc
...prevent non-hunters from using the area	127.1	.22	abc	104.9	.19	abc	111.5	.20	abc
...eventually eliminate moose in some Anchorage areas	121.1	.21	abc	55.1	.11	abc	72.2	.14	abc
...hurt my chances of seeing moose as often as I like	178.3	.28	abc	<u>3.0</u>	.00	aaa	41.5	.08	abc

^a All F statistics significant at $p < .001$ except where noted in *italics* ($p < .05$) or underlined ($p > .05$ or not significant).

^b Different letters indicate significant differences ($p < .05$) among respondents for, unsure about, and against the hunt, respectively (e.g., "abc" indicates all means were different, "aab" indicates groups for and unsure about the hunt were similar, while the group against the hunt was different).

opportunities” outcome, all groups agree that the hunt would accomplish this, but they disagree about whether this is good.

Outcomes most strongly associated with opposition to the hunt included: the hunt would “generate conflict between those who favor and oppose the hunt,” “cost a lot to administer,” “prevent non-hunters from using the area,” and “injure a hunter or someone else.” For the “generate conflict” outcome, all groups agree the hunt would cause this, but hunt supporters were less likely to report this was “bad.” For the latter three outcomes, both groups generally rate these outcomes as negative, but respondents against the hunt reported that they were more likely while hunt supporters were less convinced they would occur.

DISCUSSION

A major purpose of this research was to determine Anchorage’s social climate for a controlled moose hunt in order to assist ADF&G and the Board of Game with its decision-making. Our research was accordingly designed to document attitudes toward the hunt, but also examine underlying reasons for support, opposition, or uncertainty.

Results demonstrated majority public support for the hunt (51%), although it also showed significant minority opposition (34%), as well as uncertainty among a sizeable proportion of the sample (15%). Data further suggest that uncertain respondents had mixed beliefs and evaluations that were generally different from, but intermediate between, those for and against the hunt. This finding offers an explanation for their neutrality, and suggests these respondents are likely to be split in their support or opposition to the hunt if they were forced to choose.

Although they refer to a different ungulate species, other studies have suggested similar or slightly higher support for controlled hunts of white tail deer in suburban settings. For example, Green et al. (1997) reported 59% of residents in a Virginia town would support a controlled hunt, while Loker et al. (1999) showed 69% support among residents in a Buffalo, New York suburb. In both these studies, as well as with Anchorage, other data suggest that residents are relatively aware of wildlife conflicts with these animals, as well as the potential management actions that might be used to address them. Taken together, these studies tentatively suggest that there may be majority support for controlled hunts in or near suburban areas where wildlife conflicts have received considerable attention, which contrasts with studies that presume greater support for non-lethal control methods (Curtis et al., 1993; Stout et al., 1997).

Findings from the study, however, also highlight the potential for controversy in implementing a hunt. Respondents recognized this potential themselves, with nearly 9 out of 10 respondents reporting that conflict between hunt supporters and opposition was a likely hunt outcome. More importantly, the findings demonstrate strongly divergent beliefs and evaluations of specific hunt outcomes among those for and against the hunt. This can complicate attempts to find consensus for a hunt decision even in the face of majority public support. Collaborative planning models typically require stakeholder consent for these types of decisions (even if complete support is not possible), and that becomes more difficult when there are disagreements over both what the hunt would accomplish *and* whether various outcomes are desirable.

This situation accurately characterizes recent moose management planning efforts in Anchorage. Although the Board of Game narrowly approved a Hillside moose

hunt in 1999 after considering survey results and stakeholder testimony, the hunt cannot occur without approval of Chugach State Park and its Citizen Advisory Board, both of which remain uncommitted at this time. A multiple agency and interest group wildlife planning effort (the Anchorage Wildlife Plan) was similarly unable to reach consensus about a moose hunt, and recommended additional step-down planning to resolve remaining issues (ADF&G, 1999).

Despite this lack of final consensus, study findings were useful in resolving some issues, as well as narrowing and clarifying others for that future effort (ADF&G, 1999). For example, data suggest that greater support for the hunt is likely if future research shows the hunt *will* reduce accidents, reduce potentially dangerous encounters, and prevent moose overpopulation. These potential outcomes are the heart of hunt support, but are considered less likely by undecided respondents and unlikely by those who oppose the hunt. The plan accordingly recommended specific research to explore links between hunting and the reductions of these problems (ADF&G, 1999). If they exist, and are widely accepted by the public, support for the hunt is likely to increase.

Similarly, based on study findings, the plan recognized the hunt might garner more support (or be opposed less vehemently) if managers address the concerns of people who are unsure or opposed to the hunt. Minimizing conflicts between park users (e.g., by making the hunt short in duration or holding it on weekdays during a low use period) and requiring participating hunters to pay hunt administration costs are two areas where managers can address perceived hunt “problems,” and were recommended in the plan. Further measures to decrease the perceived high risk of injury during the

hunt might also help increase hunt support, and were recommended for consideration during step-down planning.

Study results also suggest that polarized hunt attitudes are sometimes based on disagreements over facts rather than evaluations. For example, hunt opponents were more likely to believe the hunt would “eliminate moose in areas” or “diminish viewing opportunities” than hunt supporters. These fact-based differences may reflect a lack of familiarity with hunting, and might be reduced by educational efforts that emphasize the potential beneficial effects of hunting on wildlife populations (e.g., the prevention of overpopulation and dramatic winter mortality in heavy snowfall years), or the ways that hunts can be conducted to minimize effects on wildlife viewing. The plan subsequently recommended efforts to explicitly document and publicize biological carrying capacity issues related to moose (which are likely to identify biological carrying capacity problems), and develop any eventual hunt to minimize the loss of viewing opportunities in Chugach State Park.

Finally, study results appear to accurately predict the issues that have been more difficult to resolve during planning. Several differences in beliefs about the hunt appear to have “value-based” components, where the differences depend not upon whether an outcome is likely or unlikely, but whether it is considered good or bad. The most obvious example concerns “providing more hunting opportunities.” While most respondents recognized that a hunt would accomplish this, those for and against the hunt disagreed whether this was an appropriate goal. This may well reflect core differences in basic beliefs toward hunting, which are based on fundamental value orientations toward the use or protection of wildlife (Fulton et al., 1996; Zinn et al., 1998). These

fundamental value orientations, unlike fact-based beliefs, are theorized to be less mutable or susceptible to persuasion attempts, thus limiting managers' ability to craft a hunt acceptable to anti-hunting individuals (Fishbein & Manfredo, 1992; Manfredo et al., 1995). Future research should further explore relationships between value orientations, beliefs about outcomes, and attitudes toward hunts.

In conclusion, this research approach provides detailed information about public attitudes toward the hunt, including the beliefs and evaluations of specific outcomes that shape those attitudes. The approach is effective because it goes beyond a simple poll of public sentiment. Polling information may be adequate when public policy is dictated by the split in support or opposition, but policy decisions about hunts are rarely decided solely by overall public acceptability. There are several other biological and administrative issues to consider, as well as the interests of organized groups and other stakeholders (who often create and sustain controversy about these issues through greater involvement levels).

Wildlife, however, are a publicly owned resource even if the general public is not typically given the opportunity to vote on management goals or actions. Wildlife managers, particularly in urban settings, ignore public attitudes at their peril, even if the demands of highly involved interest groups and stakeholders seems more pressing. The approach in this study is useful because it not only identifies acceptability among the general public, but it also clarifies which specific beliefs and evaluations lead to hunt support or opposition. This directs attention toward the biological and social information necessary to help resolve them, and can help structure discussions and consensus decision-making among those more highly involved groups and stakeholders.

IV. THE VALUE-BASIS OF SUPPORT FOR URBAN WILDLIFE MANAGEMENT ACTIONS

ABSTRACT

Addressing urban wildlife conflicts has become a wildlife management priority, but public acceptability can limit or dictate choices among conflict prevention and response actions. Theoretically-based survey research is crucial to understanding public acceptability and the development of consensus solutions. Applying a “cognitive hierarchy” framework, this paper uses a combination of confirmatory factor analysis and structural equation modeling to (1) measure wildlife value orientations, and (2) assess their relationship with acceptability evaluations for a series of moose, bear, and geese management actions in Anchorage, Alaska. Results suggest that patterns of basic wildlife beliefs align on two distinct value orientations (use-protection and wildlife appreciation), and these differentially predict the acceptability of several specific actions. Results also show stronger relationships with general acceptability for classes of actions and across several conflict situations. Results support the cognitive hierarchy model, and suggest the possibility of generalizations about the value-basis of support or opposition to categories of wildlife management actions.

KEY WORDS

Wildlife value orientations, urban wildlife management, cognitive hierarchy

INTRODUCTION

Expanding urban and suburban development throughout North America has increased conflicts between humans and wildlife. This development not only places more humans in previously wild areas, but it may artificially increase wildlife populations that benefit from human-modifications of these environments.

For example, ungulates such as deer and moose often find refuge from hunting and abundant food sources in suburban areas. Increased numbers of both species, in turn, may damage considerable amounts of landscaping and present hazards to motor vehicle drivers (Conover et al., 1995; McAninch, 1995), while moose may also become aggressive towards humans while under winter stress (Alaska Department of Fish and Game, 1995). Similarly, increased numbers of urban geese and other waterfowl may damage lawns and golf courses, spread disease in water bodies (Graczyk, et al., 1998; Takakuwa et al., 1998), or create risks to aircraft (Cleary, Wright, & Dolbeer, 1997). Confronted with increasing human encroachment into their territories, predator species such as mountain lions, bears, and coyotes also pose increasing risks to people or their pets (Halfpenny, Sanders, & McGrath, 1991; Manfredo et al., in press).

When human communities become intolerant of wildlife conflict levels, researchers suggest a “normative standard” (Wittmann et al., 1998; Zinn et al., 1998) or a “wildlife acceptance capacity” (Decker & Purdy, 1988) has been exceeded. To address the problem, wildlife managers have choices among three basic prevention-oriented approaches: (1) attempt to modify wildlife behavior so animals learn to avoid human environments and conflict situations; (2) develop education and regulation programs to modify human behavior that may be attracting wildlife to potential conflict

situations; or (3) conduct hunts or lethal control actions to reduce overall wildlife population levels (which may also help eliminate “bolder” individual animals that are more likely to be involved in conflict situations). Should these approaches fail, however, managers then must choose among response approaches, including actions that (1) capture and relocate the animal involved; (2) harass the animal from the area; or (3) destroy the animal.

All of these prevention and response actions have social and biological consequences, as well as the potential for controversy (Manfredo, Vaske & Sikorowski, 1996). Public acceptability of these actions, in particular, can often dictate or limit management options (Decker et al, 1992; Peterson & Manfredo, 1993; Fulton et al., 2000). For example, proposed hunts of deer and moose have been foreclosed by a lack of public support (Deblinger et al., 1993; Donnelly & Vaske, 1995), while outcomes on state ballot initiatives have substantially changed hunting or trapping policies toward predator species, including black bears, mountain lions, coyotes, and wolves (Manfredo, Fulton, and Pierce, 1997; Wittmann et al., 1998; Zinn et al., 1998).

Collaborative planning techniques offer processes for integrating social concerns with biological considerations (Decker et al., 1996), but the availability of theoretically-based survey research is often critical (Manfredo et al., 1996). Information that describes the origin and links between public attitudes toward wildlife and the acceptability of actions provides managers the data they need to discuss competing public beliefs, address potential misunderstandings, and develop consensual solutions (Manfredo et al., 1995; Zinn et al., 1998; Whittaker et al., in review).

A general social psychological theory, the cognitive hierarchy, offers one approach to understanding attitudes toward wildlife issues (Fulton, Manfredo & Lipscomb, 1996; Tarrant, Bright & Cordell, 1997). This theory predicts that abstract value orientations affect general attitudes toward classes of objects or behavior that, in turn, affect more concrete attitudes toward specific objects or behavior, which ultimately influence behavior (Ajzen & Fishbein, 1980; Fishbein & Manfredo, 1992; Fulton et al., 1996; Vaske & Donnelly, 1999).

Considerable research has focused on various components of the hierarchy model. At the behavior end of the model, researchers have repeatedly demonstrated attitude-behavior consistency when variables are measured at corresponding levels of specificity (Sheppard et al., 1988). At the values end of the model, researchers have developed techniques for measuring values (Rokeach, 1973; 1979; Schwartz, 1992) and demonstrated relationships between those variables and some behaviors (Homer & Kahle, 1988). Attitude-behavior models have also been applied to a number of natural resource issues (Fishbein & Manfredo, 1992; Bright & Manfredo, 1996), and related work has focused on the measurement of “value orientations” (latent variables that reflect patterns of basic evaluative beliefs about wildlife or nature), and their potential influence on both general and specific attitudes, norms, and behavior (Fulton et al., 1996; Vaske & Donnelly, 1999).

Applied to human-wildlife conflicts, the cognitive hierarchy suggests that wildlife value orientations will predict the acceptability of management actions that might be used to prevent or respond to conflicts. This paper offers an empirical test of

the theory, assessing the value-basis of public support for a series of possible moose, bear, and geese management actions in Anchorage, Alaska.

Starting with the measurement of wildlife value orientations, the paper examines whether value orientations influence the acceptability of *specific* management actions (e.g., a moose hunt, a bear hunt, public lethal control of geese near airports, or destroying a bear after specific conflict situations), a central tenet of the model. The paper also examines whether value orientations influence the *general* acceptability of categories of population-level actions (e.g., hunting), or the *general* acceptability of one response action (destroying an “problem” animal) across several conflict situations. Consistent with the correspondence issue, relationships between value orientations (a general variable) and categories of actions (a general variable) should be stronger than relationships between value orientations and specific actions.

CONCEPTUAL APPROACH AND HYPOTHESES

The Cognitive Hierarchy

The concept of a “cognitive hierarchy” can be traced to an enduring social psychology theory that relates cognitions and human behavior (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). This model suggests that volitional behavior is directed by intentions to behave, which are directed by attitudes and norms at corresponding levels of specificity (Eagly & Chaiken, 1993). Concurrent interest in more distal influences on specific attitudes and norms, however, has led to an expanded hierarchy of cognitions that goes beyond specific evaluations of behavior to include classes of behavior, objects associated with the behavior, and object-less value orientations and

values (Ball-Rokeach, Rokeach, & Grube, 1984; Homer & Kahle, 1988; Rokeach, 1979; Fiske & Taylor, 1991; Eagly, 1992).

The hierarchy suggests that the cognitions are arranged in an ordered network from more abstract types (values) to more specific types (attitudes and norms), and that behavior is directed through causal relationships of the layered variables of the model (Homer & Kahle, 1988; Fulton et al., 1996; Vaske & Donnelly, 1998). Under this approach, people have relatively few general values, but these are central cognitions and difficult to change. Values, in turn, have pervasive effects on several general attitudes, which further influence a multitude of more specific attitudes that direct behavioral intentions and thus behavior. The model (see Figure 6) has been described as an inverted pyramid, and has both a horizontal dimension (applying across multiple behaviors and their corresponding intentions, attitudes, and norms) and a vertical dimension (from more abstract cognitions to more specific cognitions).

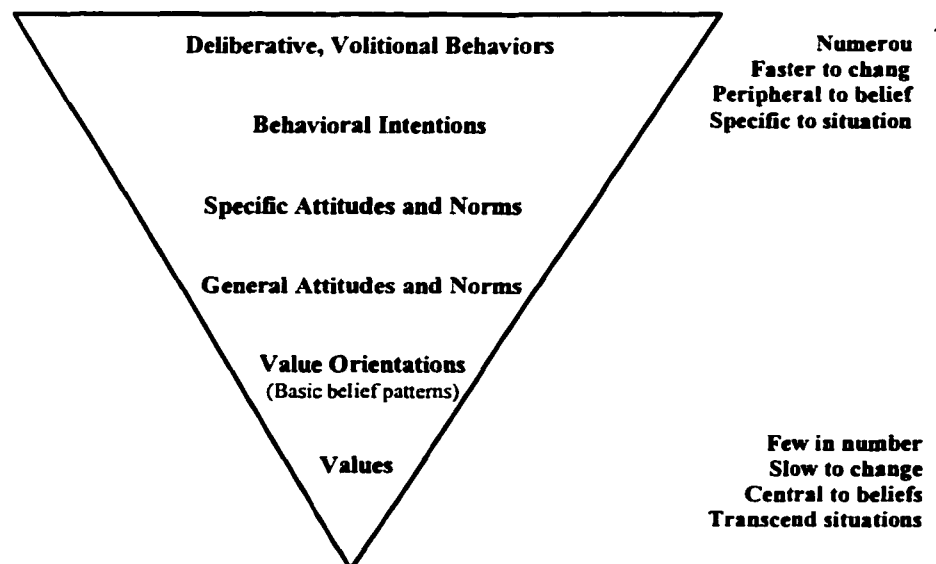


Figure 6. The general cognitive hierarchy model of volitional human behavior (adapted from Fulton et al. 1996; Vaske & Donnelly, 1999).

Wildlife Value Orientations

Value orientations are one element in the hierarchy and refer to patterns among basic beliefs toward an object. They are thought to indicate and give meaning to more abstract and fundamental values, which are considered object-less (Heberlein, 1981; Fulton et al., 1996; Tarrant et al., 1997; Vaske & Donnelly, 1999).

Within natural resources, two similar approaches have been used to assess value orientations. One has explored general environmental value orientations, focusing on an “anthropocentric-biocentric” continuum (Shindler, List, & Steel, 1993; Steel, List, & Shindler, 1994; Tarrant et al., 1997; Vaske & Donnelly, 1999). The second applies more specifically to wildlife value orientations, and arose from factor analyses of several basic wildlife beliefs (Fulton et al., 1996). This approach suggests there are patterns underlying general wildlife attitudes or “basic beliefs” (e.g., hunting, fishing, wildlife rights, the appreciation of wildlife in residential and recreation settings) and these patterns align on two distinct but related continua. The first continuum is related to wildlife use and rights, and measures a consumptive orientation similar to the biocentric-anthropocentric notion (hereafter labeled “use/protection”). The second is related to wildlife benefits or existence, and measures an appreciative orientation (hereafter labeled “appreciation”). Fulton et al. (1996) showed the two value orientations were reliable and had discriminant validity, and that both had moderate influences on participation in hunting and viewing activities. They also showed support for the cognitive hierarchy by demonstrating that attitudes mediate the relationship between value orientations and behavior.

Fulton et al. (1996), however, urged additional work in this area, recognizing the possibility of additional basic wildlife beliefs that could improve measurement, and the need for replications to confirm the model in other contexts. They particularly noted the need to link wildlife value orientations to other elements in the hierarchy across a set of wildlife issues (p. 43). In this paper, we follow the Fulton et al (1996) approach in measuring wildlife value orientations, and hypothesize that patterns of basic wildlife beliefs will arrange themselves along the hypothesized use/protection and appreciation dimensions. If supported, these value orientations can then be used to examine relationships with other elements in the cognitive hierarchy.

Management Action Evaluations

For this paper, the other elements of interest are evaluations of management actions to prevent, or respond to, urban wildlife conflicts. Measured in terms of “acceptability,” these evaluations can be viewed as either attitudinal or normative variables, with both research traditions offering conceptual and methodological understanding.

Attitude research traditions apply because they recognize complex affective, cognitive, and behavioral components of associations between objects and evaluations (Fiske & Taylor, 1991; Eagly & Chaiken, 1993), and thus encourage the search for links between these components. Although there are several competing attitude definitions, we follow common conceptualizations that suggest (1) attitudes are positive or negative evaluative mental states toward some object; (2) objects can include people, places, things, ideas, or behaviors; (3) attitudes are a function of salient (top of the mind) cognitive beliefs about the object; and (4) the link between attitudes and behavior are

notably relevant for attitudes toward volitional behavior (Ajzen & Fishbein, 1980; Fiske & Taylor, 1991; Vincent & Fazio, 1992).

Attitude research traditions are also useful because they recognize the importance of situational elements (action, target, context, location, and time) when distinguishing among the numerous attitudes people generate for a given content area (Ajzen & Fishbein, 1980). For example, attitudes toward agency responses to a human-bear conflict are likely to be different depending upon the proposed action and target (e.g., destroy the bear vs. relocate the bear), context (did the bear kill a person or just charge them?), and location (did the conflict occur in a wildland area or a suburban neighborhood?).

Normative research traditions also recognize the situational quality of evaluations, and offer additional concepts for understanding evaluations. Although norm definitions also vary (Schaffer, 1983; Shelby, Vaske & Donnelly, 1996), they are generally considered evaluative mental states directed toward some object (particularly behavior), and differ from attitudes by also focusing on (1) the influence of social pressure and shared agreement within groups (Blake & Davis, 1964; Labovitz & Hagedorn, 1973; Rossi & Berk, 1985; Cialdini, Kallgren, & Reno, 1991), and (2) the links between evaluations and moral obligation (Schwartz & Tessler, 1972; Schwartz, 1977). Norms go beyond the attitudinal “good vs. bad,” defining instead what a person should or should not do (prescription and proscription), and they are thought to be enforced by both internal and external sanctions (Blake & Davis, 1964; Jackson, 1965).

Natural resource applications of norm theory have typically employed the “structural norm” approach (Shelby et al., 1996), which measures individual evaluations

and aggregates responses to describe social norms (Jackson, 1965). The approach has been used to measure evaluations of individual behavior (what a person should do), evaluations of collective or institutional behavior (what people or agencies should do), as well as evaluations of conditions caused by individual, collective, or institutional behavior (Shelby et al, 1996; Whittaker, 1997). This paper focuses on institutional behavior evaluations, and uses a normative “acceptability” scale to measure them.

Value Orientation – Evaluation Correspondence

A central tenet of the cognitive hierarchy model is that values, value orientations, general evaluations, and specific evaluations will be related to each other. A second tenet, however, is the notion of correspondence: the strongest relationships should exist between adjacent variables in the layered levels of the model (Fishbein & Ajzen, 1975; Homer & Kahle, 1988). In general, one expects weaker relationships between a general variable (e.g., wildlife value orientations) and a specific one (e.g., evaluations of a single management action), while stronger relationships should be found if the variables are both general, or both specific.

The paper tests both tenets, examining relationships between wildlife value orientations and acceptability evaluations for a series of specific and general variables. First, following from Fulton et al. (1996), we hypothesize relationships between value orientations (a general variable) and several specific action evaluations, but these variables are not adjacent in the hierarchy model and links are likely to be moderate. Second, we hypothesize stronger relationships between value orientations and more general variables that integrate acceptability across a set of actions (or across a variety of situations) because these are closer in the hierarchy.

STUDY CONTEXT

Anchorage, Alaska (population 260,000) has abundant wildlife (Alaska Department of Fish & Game, 1999). With extensive open space, over 1,900 moose inhabit the Municipality, while about 300 are resident in the developed “Anchorage Bowl” during summer and an additional 500 to 700 migrate into the Bowl during winter. Many other species – including about 250 black bears about 60 brown bears – live in the city and are commonly seen, and there are also large populations of Canada geese (about 4,650 in 1998) and other migratory waterfowl (ADF&G, 1999).

This wildlife provides a variety of benefits to city residents. Providing extensive viewing opportunities, Anchorage’s wildlife provides a sense of identity and helps connect residents to the natural environment (Whittaker & Manfredo, 1997). Wildlife also cause a number of problems. For example, an average of 156 moose have been killed in moose-vehicle collisions in recent years (ADF&G 1999), and these create high levels of vehicle damage as well as occasional human injuries (Thomas, 1995). Moose also damage landscaping and pose safety risks when they protect their young or block sidewalks and driveways (ADF&G, 1995). In recent years, moose populations have been approaching biological carrying capacities in the area (ADF&G, 1999).

Bears are also involved in increasing numbers of conflicts with humans. Black bears regularly raid neighborhood garbage cans, pet food, and bird feeders, while brown bears occasionally travel through the city’s high density areas and present a potential hazard on its extensive trail system (ADF&G, 1999). Geese are also a significant hazard for aircraft using several city airports (geese caused a military plane crash in

1995 that killed 25 people), and have notable impacts on lawns and city playing fields (Anchorage Waterfowl Working Group, 1998).

Several specific wildlife interactions in the mid-1990's led to concern about conflict levels in Anchorage. Several federal, state, and local agencies manage wildlife in the area, so conflict prevention and response actions were often applied unevenly by different agencies. To address the problem, the Alaska Department of Fish and Game (ADF&G) led a multi-agency planning effort in 1996 – 99 to comprehensively address wildlife issues in Anchorage. An early task in the process was a survey of residents on wildlife issues, which included questions about basic wildlife beliefs and the acceptability of potential conflict prevention and response actions.

METHODS

Data for the study came from a 1996 mail survey of Anchorage residents 18 years of age; the sample for mail survey was drawn from registered voter lists (Manfredo & Whittaker, 1997). Individuals in the sample were sent the mail survey and a postcard reminder ten days later. Those who did not return a completed survey were sent two additional reminder letters and replacement surveys four and seven weeks after the initial mailing. Individuals who still had not completed a survey after 13 weeks were called by phone to explore possible non-response bias. Of the 1,654 individuals sent a mail questionnaire, 971 or 58.7% completed and returned the surveys. Tests for non-response bias suggested that respondent/non-respondent differences were small and the data were not weighted.

Variable Measurement

Wildlife Value Orientations

Following from Fulton et al., (1996), wildlife value orientations were developed in two steps. The first involved measuring basic wildlife beliefs, including: (1) wildlife use, (2) hunting, (3) wildlife rights, (4) wildlife welfare, appreciation of wildlife in (5) recreation settings, and (6) residential settings, (7) wildlife learning, and (8) wildlife existence and bequest value.¹ Two to six items were developed for each of the eight beliefs; they were measured on a seven-point agree-disagree scale, with a “no opinion” mid-point. Most of the items came from Fulton et al. (1996), but modifications were made based on their results and face validity concerns (Table 2).

The second step involved creating use/protection and appreciation wildlife value orientations from combinations of basic wildlife beliefs. Following from Fulton et al. (1996), the first four beliefs were combined for the use/protection scale, while the second four were combined for the appreciation scale (Table 3).

Management Action Evaluations

The survey asked two sets of questions about the acceptability wildlife management actions; each was measured on a seven-point scale (highly, moderately, and slightly acceptable/ unacceptable, with a “no opinion” mid-point). The first set measured the acceptability of population-level conflict prevention actions. These included public hunts to reduce moose, black, brown bear, and geese populations and several goose reduction or harassment actions designed to reduce the risk of aircraft strikes (Table 4).

¹ Fulton et al. (1996) measured 7 of these 8 scales; I measured welfare instead of fishing.

The second set measured the acceptability of destroying individual animals in response to 14 distinct moose or bear encounter situations. These encounter situations ranged from the benign (e.g., a moose has been seen eating landscaping in a neighborhood; a bear has been seen along a popular hiking trail) to the severe (e.g., a moose charges and tramples a person to death; a bear with a history of aggression mauls and kills a person). There were five moose situations and nine bear situations; they were developed to represent the range of encounter situations that occur in Anchorage. Situation descriptions were up to three sentences long, and included information about the type, location, and timing of the encounter, as well as other contextual information. Shorter descriptions of the 14 situations are provided with results in Table 5.

Analysis

Following from Fulton et al. (1996), a second order confirmatory factor analysis was used to test the hypothesized wildlife value orientations model. Analysis was performed with maximum likelihood estimation of correlation matrices in LISREL and four statistics/indices were used to assess the overall fit of the models (RMR, GFI, NFI, and CFI) (Joreskog & Sorbom, 1993). Cronbach's alpha were also computed for each belief and orientation scale.

The first analysis required 28 basic belief items (observed variables) to load on the eight basic beliefs (latent variables); five of the items were reverse coded to reflect their content (these are starred in Table 3). The second order factor analysis required the eight belief scales (treated as observed variables) to load on two value orientations; two of the scales (wildlife rights and welfare) were reverse coded.

Confirmatory factor analyses were also conducted to assess the suitability of creating scales to represent acceptability across several actions or situations (the general acceptability variables). Scale combinations for action evaluations are given in tables 4 and 5. In the interest of brevity, factor loadings, reliability coefficients, and fit indices are not shown, in all cases, combined evaluation variables had reliability coefficients over .79 and acceptable fit indices.

Relationships between value orientations and action evaluations were explored via structural equation modeling; four fit indices were used to assess the overall fit of the models (Joreskog & Sorbom, 1993). Results provide standardized path coefficients for the two orientation variables, as well as effect sizes (R^2), for each model. A single descriptive statistic for each action (the percent of the sample reporting each action as slightly, moderately, or highly acceptable) is also given for discussion purposes.

RESULTS

Wildlife Value Orientations

Two confirmatory factor analyses supported the hypothesized model used to represent wildlife value orientations. In the first factor analysis (Table 2), standardized factor loadings show that each of the 28 belief items loaded significantly on predicted basic belief dimensions, and model indices suggested the overall fit was acceptable (relative fit indices in the .90's, and an RMR less than .05). The ratio of χ^2 to degrees of freedom (1,143: 319) was also less than 5:1, an additional indication of an acceptable fit (Marsh & Hocevar, 1985). Internal consistency within the eight basic belief scales was demonstrated by reliability coefficients greater than .60 (with most greater than .70).

In the second factor analysis (Table 3), each of the 8 belief scales also loaded significantly on predicted value orientations, and model indices suggested there was an acceptable fit. Following from Fulton et al. (1996), a principle components factor analysis was also conducted for the eight basic belief scales (not shown). This analysis extracted two principle factors, and each basic belief loaded on only one factor (with six of eight having loadings $> .80$). Taken together, the two factors explained 67% of the variance among basic beliefs.

Management Action Evaluation Scales

Two confirmatory factor analyses explored the suitability of scale variables for representing general acceptability across categories of actions. The first combined hunt actions for the four different species (moose, geese, and both black and brown bears) and the second combined the variety of goose harassment and population control actions (see Table 4 for items). In both cases, fit indices and reliability statistics supported scale use.

Two additional confirmatory factor analyses explored the suitability of scale variables to represent general acceptability of a single action (destroying the animal) across several encounter situations. One analysis combined five moose situations, the second combined nine bear situations (see Table 5). In both cases, fit indices and reliability statistics supported scale use.

Table 2. Items used to measure eight basic wildlife beliefs and first order confirmatory factor analysis results (table continues on next page).

Basic belief dimensions and items comprising each scale	Factor Loading	Cronbach's Alpha
Wildlife Use		.73
Humans should manage wild animal populations so that humans benefit.	.68	
It is acceptable for human use to cause the loss of some individual animals as long as populations are not jeopardized.	.61	
It is important for humans to manage the populations of wild animals.	.58	
Hunting		.92
Hunting helps people enjoy the outdoors in a positive way.	.89	
Hunting is cruel and inhumane to animals.*	.79	
Hunting helps people appreciate wildlife and natural processes.	.86	
Hunting makes people insensitive to suffering.*	.75	
I would be offended or upset if I saw an animal killed or injured by a hunter.*	.80	
In general, I think hunting is a safe outdoor activity.	.83	
Wildlife Rights		.81
Although wildlife may have certain rights, most needs that people have are more important than the rights of wildlife.	.88	
The needs of people are always more important than any rights that wildlife may have.	.83	
The rights of people and the rights of wildlife are equally important.*	.59	
Wildlife Welfare		.62
People should not treat wildlife in ways that may cause pain and suffering, regardless of how much we may benefit.	.52	
If we can't minimize the pain and suffering caused to wildlife by an activity, then we should not allow that activity.	.84	

Table 2 (continued). Items used to measure eight basic wildlife beliefs and first order confirmatory factor analysis results.

Basic belief dimensions and items comprising each scale	Factor Loading	Cronbach's Alpha
Recreation Appreciation		.73
I enjoy watching wildlife when I take a trip outdoors.	.61	
Some of my most memorable outdoor experiences occurred when I saw wildlife I didn't expect to see.	.73	
The opportunity to see wildlife is one of the reasons I take trips outdoors (like camping, hiking, or sightseeing).	.75	
Residential Appreciation		.82
I'm interested in making the area around my home attractive to wildlife.	.70	
I notice the moose, birds, and other wildlife around me every day.	.50	
Having wildlife around my home is important to me.	.84	
An important part of my community is the wildlife I see there.	.85	
Wildlife Learning		.77
It is important that we learn as much as we can about wildlife.	.65	
I enjoy learning about wildlife.	.78	
It is important that all Alaskans have a chance to learn about wildlife.	.75	
Existence/Bequest Appreciation		.79
We should be sure future generations of Alaskans will have an abundance of wildlife.	.64	
It is important to maintain wildlife so that future generations can enjoy them.	.72	
It's important to know that there are healthy populations of wildlife in Alaska.	.80	
Whether or not I get out to see wildlife as much as I like, it is important to know they exist in Alaska.	.60	
- Responses were on seven-point scale from "strongly agree" to "strongly disagree," with a "no opinion" mid-point. - Starred (*) items were reverse coded in the confirmatory factor analysis. - Items were required to load on one hypothesized belief dimension only. - All latent belief variables were allowed to correlate. - Errors of three item pairs were allowed to correlate: use 1 & 3 (.25); hunting 2 & 5 (.12); residential 1 & 3 (.14). - Fit statistics: $\chi^2 = 1,443$ with 319 degrees of freedom; RMR=.047; GFI = .90; NFI = .91; CFI = .92.		

Table 3. Basic wildlife beliefs used to create wildlife value orientations and second order factor analysis results.

Wildlife value orientations and basic beliefs comprising each scale	Number of items in basic belief scale	Factor Loading	Cronbach's Alpha
Use-Protection Orientation			.80
Wildlife Use	3	.86	
Hunting	6	.68	
Wildlife Rights*	3	.62	
Wildlife Welfare*	2	.84	
Appreciation Orientation			.84
Recreation appreciation	3	.66	
Residential appreciation	4	.66	
Wildlife learning	3	.80	
Wildlife existence/bequest value	4	.82	

1. Starred (*) belief dimensions were reverse coded in the confirmatory factor analysis.
2. Belief dimensions were required to load on one hypothesized value orientation only.
3. Wildlife value orientations were allowed to correlate (-.30).
4. Errors of two item pairs were allowed to correlate: hunting and rights (-.32); recreational and residential (.22).
5. Fit statistics: $\chi^2 = 234.5$ with 17 degrees of freedom; RMR=.079; GFI = .95; NFI = .93; CFI = .93.

Relating Value Orientations and Action Evaluations

Population Level Prevention Actions

A series of structural equation models assessed relationships between wildlife value orientations and the acceptability of population-level actions and scales (Table 4). In all models, value orientations had significant effects on acceptability. Models for individual actions were also saturated, while models with scales had relative fit indices above .90, and RMRs below .05.

More interestingly, overall explained variance and the predictive ability of the two value orientations differed for models with different actions (or scales of multiple actions). For hunting actions, value orientations explained between 45% and 53% of the variance in acceptability, and differences between models for the four species were small. In all hunting models, use-protection predicted more than appreciation orientations (depending upon the species, use-protection coefficients were .69 and higher, while appreciation coefficients were always less than .07). Signs for the use-protection paths were in the hypothesized direction; people with higher use orientations were more likely to accept hunting. Signs for the appreciation paths, in contrast, were not in the hypothesized direction; people with higher appreciation orientations were more likely to accept hunting actions. The scale model explained about the same amount of variance as the four species models.

For the six goose population-management actions, value orientations explained less than 10% of the variance in four actions (i.e., trapping problem geese on private property, filling wetlands near airports, and destroying or collecting eggs to reduce population levels), but explained over 20% of the variance for the other two (i.e., harassing geese away from airports and shooting geese). In all six goose models (particularly the latter two), use-protection orientations predicted acceptability more than appreciation orientations. Use-protection coefficients were always above .19 and reached as high as .47 for the harassment action; appreciation coefficients were always lower than .17 (and often below .10). The scale model was similar to models for individual actions, but explained over 16% more variance (from an average of 12.8% for the individual actions to 29% for the scale).

Table 4. Influence of use-protection and appreciation value orientations on the acceptability of population management actions (or for scales of multiple actions).

Population-level management action	Percent acceptable ¹	Use-protection coefficient ²	Appreciation coefficient ³	R ²
Hunting Actions				
...to reduce the number of moose	61	.75	.07	.53
...to reduce the number of Canada geese	59	.69	.04	.45
...to reduce the number of brown bears	57	.69	.04	.45
...to reduce the number of black bears	56	.70	.05	.45
Scale for all four hunt actions together ^{5,7}		.69	.05	.46
Other Goose Management Actions				
Issue permits to residents to trap “problem” geese on private property and deliver them to authorities.	59	.26	-.06	.08
Have authorities harass and, if necessary, shoot geese near airports to reduce the risk of aircraft accidents.	84	.47	-.02	.22
Have authorities fill wetlands near airports used by nesting geese to reduce the number of geese and the risk of aircraft accidents.	64	.19	-.16	.09
Have authorities permanently reduce the number of geese in Anchorage (by up to one-half) to reduce aircraft accidents by...				
...destroying eggs in nests.	53	.19	-.17	.09
...allowing people to gather eggs for food.	71	.24	-.10	.08
...shooting geese and donating the meat to charity.	61	.40	-.13	.21
Scale for all six goose actions together ^{5,8}		.47	-.16	.29

1. % reporting slightly, moderately, or highly acceptable on 7-point scale; when used as continuous variable in models, higher acceptability score = more acceptable.
2. Higher use-protection scores = more use-oriented; lower scores = more protection-oriented.
3. Higher appreciation scores = higher appreciation orientation.
4. Error variances for value orientations in all models were set at 1 – Cronbach’s alpha.
5. Error variances for scales in scale models were calculated by LISREL.
6. All models with specific action variables were saturated.
7. Fit statistics for hunt model: $\chi^2 = 358.3$ with 8 d.f.; RMR=.049; GFI=.89; NFI=.94; CFI=.94.
8. Fit statistics for goose model: $\chi^2 = 171.6$ with 19 d.f.; RMR=.044; GFI=.96; NFI=.91; CFI=.92.

Conflict Situation Response Actions

A series of structural equation models assessed relationships between wildlife value orientations and the acceptability of destroying a moose or bear after conflict situations (Table 5). In all models, value orientations were significantly related to acceptability for specific situations, as well as across groups of situations (models for specific situations were saturated, and fit statistics for the general models were above or near .90, with RMRs at or below .054).

Explained variance and predictive ability of the two orientations, however, varied for different situations (or groups of situations). For moose situations, value orientations explained from 21% to 27% of the variance in acceptability. In most of these models, both use-protection and appreciation orientations had predictive power, although use-protection orientations usually had more. Depending upon the situation, use-protection coefficients ranged from .25 to .37, while appreciation coefficients ranged from .18 to .33. The highest use-protection influence and the lowest appreciation influence was for the one situation (moose kills a person) where a majority accepted destroying the moose. Path signs for both use-protection and appreciation were in the hypothesized directions for all the moose models: people with higher protection and appreciation orientations were less likely to accept destroying a moose.

Results for the scale model across all five moose situations were similar to those for individual situations, but the scale model explained over 12% more variance (from an average of 23.4% for the five individual situations to 36% for the scale). In the scale model, use-protection was also slightly more predictive than appreciation.

Table 5. Influence of use-protection and appreciation value orientations on the acceptability of destroying animals in encounter situations (or across multiple situations).

Encounter Situation	Percent acceptable to destroy ¹	Use-protection coefficient ²	Appreciation coefficient ³	R ²
Moose Situations				
Moose eating landscaping in neighborhood.	8	.25	-.31	.21
Moose blocking school children in neighborhood.	15	.32	-.27	.23
Moose repeatedly charges cross country skiers on a popular trail (but no contact).	19	.37	-.23	.24
Moose charges and knocks down hiker on park trail.	13	.31	-.32	.27
Moose tramples and kills a person in neighborhood.	53	.37	-.18	.22
Across all five moose situations ^{4,8}		.40	-.33	.36
Bear Situations				
Brown bear repeatedly seen on park trail.	19	.35	-.24	.24
Brown bear repeatedly seen in a neighborhood.	20	.36	-.33	.33
Brown bear feeding on moose carcass on park trail.	13	.25	-.36	.25
Black bear repeatedly getting into trash, etc. in neighborhood.	36	.46	-.18	.30
Bear kills several pets in neighborhood.	45	.43	-.19	.27
Bear charges/knocks down hiker on trail, then leaves.	15	.34	-.26	.25
Bear kills a person on park trail (no other details).	57	.45	-.10	.24
Bear kills person on a trail, but bear is a sow with cubs.	31	.39	-.25	.28
Bear kills person on a trail, but bear has history of aggression.	77	.38	-.06	.16
Across all nine bear situations ^{4,9}		.45	-.33	.41

1. % reporting slightly, moderately, or highly acceptable from 7-point scale; when used as continuous variable in models, higher acceptability score = more acceptable.

2. Higher use-protection scores = more use-oriented; lower scores = more protection-oriented.

3. Higher appreciation scores = higher appreciation orientation.

4. Situation scale variables created for each species, and taken together (see Tables 3 and 4).

5. Error variances for value orientations were set at 1 – Cronbach's alpha.

6. Error variances for scales of situation variables were calculated by Lisrel.

7. All models for individual situation variables were saturated.

8. Fit statistics for moose model: $\chi^2 = 84.2$ with 13 d.f.; RMR=.033; GFI=.98; NFI=.97; CFI=.97.

9. Fit statistics for bear model: $\chi^2 = 462.8$ with 40 d.f.; RMR=.054; GFI=.90; NFI=.93; CFI=.93.

For bear situations, value orientations explained from 16% to 33% of the variance in acceptability (with an average near 26%). In these models, both use-protection and appreciation orientations predict acceptability, although the former was generally higher. Depending upon the situation, use-protection coefficients ranged from .25 to .46 and averaged .38, while appreciation coefficients ranged from .06 to .36 and averaged .22.

There was no obvious pattern among coefficients in the different models. There were, however, at least two notable findings: (1) appreciation predicted more than use-protection for only one model (bear feeding on a moose carcass), and (2) appreciation paths were generally lower for more severe conflict situations, with one exception (sow with cubs kills a human). Path signs for all models were in the hypothesized directions: people with higher protection and appreciation orientations were less likely to accept destroying a bear.

The scale model was consistent with individual models, but explained over 13% more variance (from an average of 25.8% for the nine individual situations to 39% for the scale). In the scale model, path coefficients showed that use-protection (.43) was slightly more predictive than appreciation (.33).

DISCUSSION

Results suggest several conclusions about wildlife value orientations and their influence on the acceptability of actions to prevent and respond to wildlife conflicts. Discussion is organized in three areas: (1) measurement of value orientations; (2) theoretical support for the cognitive hierarchy and its application to wildlife issues; and (3) management implications.

Measurement Issues

Findings suggest that methods for measuring wildlife value orientations are useful and defensible. Results from the two-stage confirmatory factor analysis demonstrate discriminant validity among the eight basic wildlife beliefs, and show two underlying patterns that correspond to distinct value orientation dimensions. Taken together with similar findings from the Fulton et al. (1996) analysis, we conclude that these procedures offer a reliable and valid approach to measuring value orientations related to wildlife.

Having declared measurement success, we also recognize that there are opportunities for improvement. As Fulton et al. (1996) noted, the eight basic beliefs measured here may be an incomplete sample of all basic beliefs, and the inclusion of others may help identify one or more additional wildlife value orientations. For example, beliefs about wildlife as a source of subsistence, or the religious importance of wildlife, could underlie a value orientation associated with wildlife spirituality. Research exploring cross-cultural differences for this or other wildlife value orientations (e.g., between Caucasian Americans and Native Americans) could be particularly illuminating.

Individual items used to measure the eight basic beliefs in this research could also be improved. In both confirmatory factor analyses reported here, error variances of some item pairs were allowed to correlate to improve the overall fit of the models. Results thus suggest some shared content among items, and the development of more distinct items is warranted in these cases. We also note that reliability of the welfare

belief scale could be improved; while an alpha of .62 with just two items is acceptable, future work may be able to increase this with improved or additional items.²

Finally, we acknowledge the lack of parsimony in measuring 28 items in order to define two value orientations. While other research has adopted and measured the value orientation idea with a smaller subset of items (Zinn et al., 1997), more systematic work is needed to identify an item subset that reflects value orientations developed from the larger set.

Theoretical Issues

Results provide support for the cognitive hierarchy applied to evaluations of wildlife conflict management actions, suggesting at least three conclusions with implications for theory development. First, as hypothesized, wildlife value orientations are predictive of action acceptability, although the strength of those relationships vary by type of action, situation, or species. Fulton et al. (1996) demonstrated that value orientations affect attitudes toward and participation in wildlife-related activities (hunting and viewing), and suggested that orientations would predict patterns of attitudes and behaviors across sets of wildlife issues. This research supports their assertion for at least one set, the acceptability of actions in urban wildlife conflicts. If other studies can show this relationship for additional issues (e.g., habitat conservation, wildlife learning and recreation), wildlife value orientations deserve consideration as foundational general cognitive variables in the hierarchy.

Second, results support the hypothesized notion of correspondence among elements in the hierarchy. Relationships between value orientations and acceptability were stronger for models involving *general* measures of acceptability across actions (or

² A third welfare item was eliminated in this study because it confused both use and welfare concepts.

situations) in comparison to those involving *specific* actions (or situations). Value orientations not only influence the acceptability of any single action, but they have stronger influences on general acceptability of categories of actions. This confirms the hierarchical notion of the theory, and urges additional work conceptualizing, measuring, classifying, and ordering a full range of general variables relevant to the acceptability of wildlife management actions.

Third, results suggest there are differential effects of value orientations on acceptability for different actions and conflict situations. The acceptability of some actions appears to be more value-based than others (have higher levels of explained variance), and the effects of use-protection and appreciation orientations also vary in different models.

Value orientations, for example, have greater overall influence (higher explained variances) on the acceptability of hunting actions, regardless of the species, than on any of the other population-level actions directed toward geese. Similarly, orientations had more influence on the acceptability of goose control actions that involve killing geese in comparison to those that involve collecting or destroying eggs, altering habitat, or trapping specific problem geese. This finding suggests that actions with more severe consequences for wildlife may be more likely to be value-based, a conclusion supported by other research (Zinn et al., 1997).

Differences in the influence of use-protection and appreciation orientations for different actions or situations are also interesting. For example, use-protection orientations have considerably greater influence than appreciation orientations for the hunting actions and four of the six goose actions, while the other two goose actions

(filling wetlands near airports and destroying eggs in nests) show similar influences from use-protection and appreciation orientations. This also suggests there may be an “action-severity” effect, where actions with more severe consequences for wildlife (e.g., hunting, lethal control of populations) are more directly tied to the use-protection continuum. It may also indicate a “viewing opportunity” effect, where appreciation orientations play a larger role when the action will have direct consequences for the opportunity to observe wildlife (i.e., if wetlands remain or geese are not reduced).

Another conclusion suggested by differential influences of the two value orientations is evident in the conflict situation results. Use-protection tends to exert greater influence than appreciation in more severe situations (e.g., when a bear gets into residents’ trash, a bear kills several pets, a bear kills a person, or a moose kills a person), but differences are narrowed when the situation is more benign and involves viewing opportunities (e.g., bear seen on a park trail, bear seen in a neighborhood, bear feeding on a moose carcass on a park trail). Taken together, these results suggest a “species-hazard” effect, where “more dangerous” animals (e.g., bears in the more severe situations, a moose that has killed a person) are considered differently from “less dangerous” animals. With the former, a use-protection orientation is dominant; with the latter, appreciation also applies. The “viewing opportunity” effect may also be evident in these situation results, because the more benign encounters are inarguably high quality viewing opportunities.

While these “effects” are speculative, the differential influence of use-protection and appreciation orientations within these categories of actions or situations is a good area for future work. The search for consistent relationships between general variables

(e.g., value orientations) and issue-specific evaluations (e.g., acceptability of management actions) are likely to be more successful when we have classified the types of actions or situations in which they apply. Measures of action severity, situation severity, and consequences on viewing opportunity offer three ways to distinguish actions or situations and thus explain differential influence by value orientations.

Management Implications

Findings from this research also have implications for planners addressing wildlife conflicts in Anchorage or elsewhere. While specific descriptive results can identify obviously acceptable population-level prevention actions or conflict response policies, these results offer additional understanding of the basis of public beliefs, and could prove useful in at least three ways.

First, results confirm that values influence the acceptability of many actions, and that use-protection and appreciation orientations are differentially relevant to different actions. This is important because most planning processes require actions to link with broader goals and objectives in a plan. Goals are qualitative, abstract statements about what managers are trying to provide, and ideally reflect values-level concepts. The careful development and measurement of wildlife value orientations may help planners to articulate wildlife goals, and information about values-acceptability relationships can help planners explicitly tie actions to appropriate ones.

Second, while descriptive results may identify splits in public acceptability of an action (an indicator of potential controversy), information about the value-basis of acceptability may identify if those controversies are likely to be resolved. Values are more resistant to change than more specific evaluations (Rokeach, 1973; Heberlein,

1981; Fulton et al., 1996; Vaske & Donnelly, 1999), so resolving issues that feature actions with a strong value-basis is likely to be more difficult. This conclusion accurately characterizes planning efforts associated with a proposed moose hunt in Anchorage. While survey data show majority support for the hunt (51% support; 34% oppose; 15% have no opinion), the data also show considerable diversity in beliefs among those for and against the hunt (Chapter III). In collaborative planning sessions, stakeholders have been unable to find consensus about whether a hunt should be implemented, although they have agreed on some issues in the debate. More interestingly, while some disagreements among stakeholders are specific to various hunt proposals, the fundamental lack of consensus appears to reach back to core values about the appropriateness of using or protecting wildlife, as predicted in these findings.

Finally, information about value orientations and acceptability can help planners address issues when specific survey data are unavailable. It is not possible to collect acceptability information for every possible wildlife conflict action, but these data suggest that may not be necessary. Results show some consistency among relationships between values and acceptability within classes of actions (e.g., hunting, situations involving the death of a human), so planners may be able to extend information about the known acceptability of some actions to those for other species or situations. By understanding the structure of cognitions about wildlife issues, planners have the ability to anticipate public reaction as new issues emerge.

V. VALUE ORIENTATIONS, CONDITION EVALUATIONS, AND THE ACCEPTABILITY OF A MOOSE HUNT IN ANCHORAGE, ALASKA

ABSTRACT

Urban wildlife hunts designed to reduce human-wildlife conflicts can be contentious and require public acceptability to implement. Theoretically based survey research offers ways to understand public acceptability and the cognitive variables that may predict it. Applying a “cognitive hierarchy” framework, this paper uses confirmatory factor analysis and structural equation modeling to measure and relate Anchorage, Alaska residents’ (1) general wildlife value orientations, (2) evaluations of current moose interaction and problem levels, (3) evaluations of current moose populations, and (4) acceptability of a hunt to reduce moose populations. Results suggest that two distinct value orientations (use-protection and wildlife appreciation) differentially predict both condition and population evaluations, as well as hunt acceptability. Results also show that population evaluations fully mediate condition evaluations and acceptability, but only partially mediate value orientations and acceptability. The model emphasizes the strength of the direct relationship between use-protection value orientations and hunt acceptability, and shows that both value orientations have some influence on condition and population evaluations. Results support the cognitive hierarchy model, but also suggest the pervasive influence of use-protection value

orientations may overshadow the influence of intermediate evaluative variables. Results also support ideas about Wildlife Acceptance Capacities (WAC) and the utility of normative approaches to evaluating wildlife-caused conditions or population levels, which has implications for establishing management standards for moose conditions in Anchorage, as well as choosing management actions to address them.

KEY WORDS

Norms, attitudes, wildlife value orientations, urban wildlife management

INTRODUCTION

Ungulates such as moose and white-tailed deer adapt well to urban and suburban environments, finding abundant food sources in residents' landscaping, shelter in the scattered parklands and undeveloped private lands, as well as refuge from some predators. Coupled with limited hunting in these areas, ungulate population increases have often generated increasing conflicts with humans, including collisions with motor vehicles, damage to landscaping or native vegetation, and in the case of moose, occasional aggressive encounters (Connelly, et al., 1987; Conover, 1995; Alaska Department of Fish & Game, 1999). When a human community becomes intolerant of these conflicts, researchers conceptualize that a "wildlife acceptance capacity" (Decker & Purdy, 1988) or "normative standards" (Wittman et al., 1998; Zinn et al., 1998) have been exceeded and reductions in wildlife population levels may be warranted.

One tool for managing these populations is to conduct public hunts. In contrast to most hunts in rural or wildland settings, however, urban hunts are often controversial. Urban areas feature more complicated arrays of private lands, and urban hunts may involve greater safety issues from the sheer density of human populations or development. Urban hunts may also be more contentious because diversity within an urban population accentuates different tolerances for the problems caused by urban wildlife, different interests in wildlife viewing which may be impacted by hunting, or different values toward hunting in general (Messmer et al., 1997; Chapter III).

As interest groups and the public increasingly demand participation in wildlife decision-making, understanding the public acceptability of management actions such as hunts also becomes more important (Decker, et al. 1996; Peterson and Manfredo, 1993).

Theoretically based survey research has the potential to provide this information, allowing managers and stakeholders involved in collaborative planning efforts to systematically discuss competing public beliefs, address potential misunderstandings, and develop consensual solutions (Manfredo et al., 1995). Theory-based research also helps build on past work and guide item selection, allowing comparisons between different settings and populations and enhancing the generalizability of findings.

Recent research applying an enduring social psychological theory, the cognitive hierarchy, demonstrates that public acceptability of many wildlife management actions has a value-basis (Chapter IV). In particular, this research suggests that “use-protection” wildlife value orientations strongly influenced the acceptability of urban hunts for bears, moose, and geese, explaining nearly 50% of the variance in the dependent variable. The open question suggested by this research and the hierarchy framework is whether intermediate variables influenced by wildlife value orientations explain additional variance in hunt acceptability.

The allied concepts of wildlife acceptance capacity (WAC) and normative standards help suggest the content of possible intermediate variables. Adapted from biological and social carrying capacity concepts, WAC refers to a maximum wildlife population level for an area based on social rather than biological criteria (Decker & Purdy, 1988). It hypothesizes that the acceptability of wildlife population levels depends on assessments of the problems and benefits of those levels. Like social carrying capacity in recreation settings (Shelby & Heberlein, 1986), the WAC concept also recognizes that people may assess problems or benefits differently, and so there may be different capacities for different groups (Decker & Purdy, 1988).

Normative theory applied to natural resource issues offers specific ways to conceptualize and measure these WAC-related assessments, urging a focus on “condition evaluations.” This theory suggests people have “norms” or “evaluative standards” they use to judge the acceptability of behavior or conditions in a given context (Shelby et al., 1996). Applied to urban wildlife issues, norm variables measure the acceptability of various conditions (including wildlife problem levels, interaction levels, or overall population levels) and define what conditions *should* exist, all bearing upon the question, “how many is too many?” (Shelby & Heberlein, 1986).

Integrated into the cognitive hierarchy, normative measures are good candidates for the mediating variables between wildlife value orientations and judgments of hunt acceptability. They are more specific than orientations because they refer to a single species and context, but they are also more general than hunt acceptability, a single action that may only be one of several ways of addressing conflicts or benefits created by wildlife populations.

In this paper, we examine the links between value orientations, normative condition evaluations, and hunt acceptability for moose in Anchorage, Alaska. The research explores the influence of wildlife value orientations on normative evaluations of moose problem or interaction levels, and whether those evaluations, in turn, influence evaluations of moose population levels and the acceptability of a hunt to reduce them. The purpose is to assess support for the cognitive hierarchy model, as well as determine the utility of normative evaluations within that model. Applicability of the model, in turn, has implications for managing moose population levels via hunts

in Anchorage, as well as for understanding the relationship of hunt acceptability to wildlife acceptance capacities and the normative standards that define them.

CONCEPTUAL APPROACH AND HYPOTHESES

The Cognitive Hierarchy

The concept of a “cognitive hierarchy” is an enduring social psychology theory that relates cognitions and human behavior (Rokeach, 1973; Fishbein & Ajzen, 1975; Homer & Kahle, 1988; Fulton et al., 1996; Tarrant et al., 1997; Vaske & Donnelly, 1999). This model suggests that cognitions are arranged in an ordered network from more abstract types (values) to more specific types (attitudes and norms), and that behavior is directed through causal relationships of the layered variables of the model (Homer & Kahle, 1988; Fulton et al., 1996; Vaske & Donnelly, 1998). Under this approach, people have relatively few general values, but these are central cognitions and difficult to change. Values, in turn, have pervasive effects on several general attitudes and norms, which further influence many more specific attitudes that direct behavior.

Wildlife Value Orientations

Value orientations are one element in the hierarchy and refer to patterns among basic beliefs toward an object. They are thought to indicate and give meaning to more abstract and fundamental values, which are considered object-less (Heberlein, 1981; Fulton et al., 1996; Tarrant et al., 1997; Vaske & Donnelly, 1999). Within natural resources, two similar approaches have been used to assess value orientations. The first explores general environmental value orientations, focusing on an “anthropocentric-biocentric” continuum (Thompson & Barton, 1994; Shindler, List, & Steel, 1993; Steel, List, & Shindler, 1994; Tarrant et al., 1997; Vaske & Donnelly, 1999). All of these

studies have generally found that orientations were related to specific environmental management attitudes (i.e., people with biocentric orientations support protection for wildlife, forests, or wilderness more than people with anthropocentric orientations).

The second approach applies more specifically to wildlife value orientations, and arose from factor analyses of several basic wildlife beliefs (Fulton et al., 1996; Chapter IV). This approach suggests there are patterns underlying general wildlife attitudes or “basic beliefs” (e.g., hunting, wildlife rights, the appreciation of wildlife in residential and recreation settings) and these patterns align on two distinct but related continua. The first continuum is related to wildlife use and rights, and measures a consumptive orientation similar to the biocentric-anthropocentric notion (hereafter labeled “use-protection”). The second is related to wildlife benefits or existence, and measures an appreciative orientation (hereafter labeled “appreciation”).

Fulton et al. (1996) showed relationships between wildlife value orientations and both hunting and viewing participation, while Chapter IV showed relationships between orientations and the acceptability of several wildlife management actions. This paper follows a similar research line, exploring relationships between wildlife value orientations and additional elements in the cognitive hierarchy.

Wildlife Acceptance Capacity and Normative Condition Evaluations

The elements of interest in this case are suggested by the general concept of “wildlife acceptance capacities” (Decker & Purdy, 1988), and more specific variables developed from structural norm theory (Jackson, 1965) and its applications to resource issues (Vaske, 1977; Shelby et al., 1996; Whittaker, 1997b; Wittmann et al., 1998).

WAC was derived from well-understood concepts of biological carrying capacity (Dasmann, 1964; Caughley, 1976) and social carrying capacity in outdoor recreation management (Shelby & Heberlein, 1986). The fundamental premise of any “carrying capacity” is that there are environmental limits on the number of organisms that can use resources in an area, but these limits depend upon the criteria applied to define health of the population or health of the environment (Shelby & Heberlein, 1986). The carrying capacity of a piece of rangeland, for example, will be higher if the goal is to maximize animal productivity than if the goal is to maintain a diversity of plant species. Similarly, the social carrying capacity of a recreation area is higher if that area is expected to provide a frontcountry, high density experience (e.g., a lakeside beach near an urban area), in comparison to a backcountry, solitude-oriented experience (e.g., a lakeside beach 20 miles into a wilderness area). In both cases, evaluative judgments are needed to specify what conditions equate with quality before a capacity can be determined (Shelby & Heberlein, 1986).

Wildlife acceptance capacity also requires these evaluative judgments, and recognizes that they vary for different people and groups (Decker & Purdy, 1998). More importantly, the concept suggests that capacity judgments (how many is too many animals for a given area) depend upon individuals’ thresholds for impacts caused by a species, as well as judgments about the species’ economic, aesthetic, ecological, or other values (Decker & Purdy, 1988). In essence, the concept implicitly links capacities to evaluations of the positive and negative consequences of different population levels.

Normative research traditions applied to natural resource issues prescribe specific ways to understand and measure these evaluations (Shelby et al., 1996). Under

this tradition, norms are standards that people use to evaluate behavior or the conditions created by behavior as acceptable or unacceptable (Shelby et al., 1996). Norms are about prescription or proscription, go beyond attitudinal preferences in carrying a sense of obligation (Blake & Davis, 1964; Jackson, 1965), and are therefore useful for developing management standards that define quality in natural resource settings (Vaske, Donnelly, & Shelby, 1993; Shelby et al., 1996).

Applications of normative theory have led to the development of a variety of measurement techniques. The classic structural norm model (Jackson, 1965) describes norms through the use of a graphic device called an impact acceptability curve, providing evaluative acceptability ratings along a vertical axis for a range of conditions arrayed along a horizontal axis (see Vaske et al., 1986 for a complete discussion). Social norms are described as averages of individual ratings, and various statistical properties and points along an impact acceptability curve are used to describe the “structural characteristics” of the norm. These curves are particularly useful for understanding evaluations toward different quantities of impact, the focus of many natural resource issues (Shelby et al., 1996).

A related norm measurement technique asks people to specify a single preferred or minimally acceptable condition level, and is arguably more parsimonious because it does not require repetitive evaluations of a variety of conditions (Vaske et al., 1986; Shelby et al., 1996). This type of data can be used to approximate or identify points along an impact acceptability curve (Shelby & Whittaker, 1995); allows comparisons of current conditions with preferred or acceptable conditions to define an “impact problem” (Shelby, Whittaker, Speaker, & Starkey, 1987; Whittaker, 1990); has practical

utility in helping establish threshold management standards (Shelby et al., 1996; Whittaker, 1997); and also allows norms to be classified by type (e.g., zero tolerance, single tolerance, and multiple tolerance norms) (Whittaker & Shelby, 1988).

A final norm measurement technique asks people to evaluate the acceptability of current conditions as too high, too low, or about right. This is useful when a range of conditions is difficult to quantify in terms that people understand, but admittedly offers less precise information about the acceptability of other levels.

Applied to urban moose issues, normative variables were developed to measure the acceptability of both positive and negative moose-caused conditions. In Anchorage, the three prominent moose interaction issues are moose-vehicle accidents, landscaping damage incidents, and the frequency of human-moose sightings in neighborhoods in winter (see study context below). A fourth normative variable evaluates the overall moose population level, and acts as a summary condition evaluation. As a group, these norm measures are conceived as intermediate variables in a hierarchy relating broad wildlife value orientations and the acceptability of a moose hunt to reduce populations.

Hypotheses

Following from the concepts described above, several hypotheses are advanced about relationships among wildlife value orientations, condition evaluations related to moose problems, human-moose interactions, and moose populations, and the acceptability of moose hunts:

- H₁ Wildlife value orientations will be related all three specific condition evaluations as well as to overall evaluations of moose population levels.
- H₂ Wildlife value orientations will be related to hunt acceptability.

- H₃ Population level evaluations will be related to hunt acceptability.
- H₄ Specific condition evaluations will be related to hunt acceptability, but these will be fully mediated by population level evaluations.
- H₅ Population level evaluations will partially mediate the relationship between wildlife value orientations and hunt acceptability.

Taken together, these hypotheses suggest a hierarchical network of relationships from value orientations, through condition evaluations, to hunt acceptability (see Figure 7).

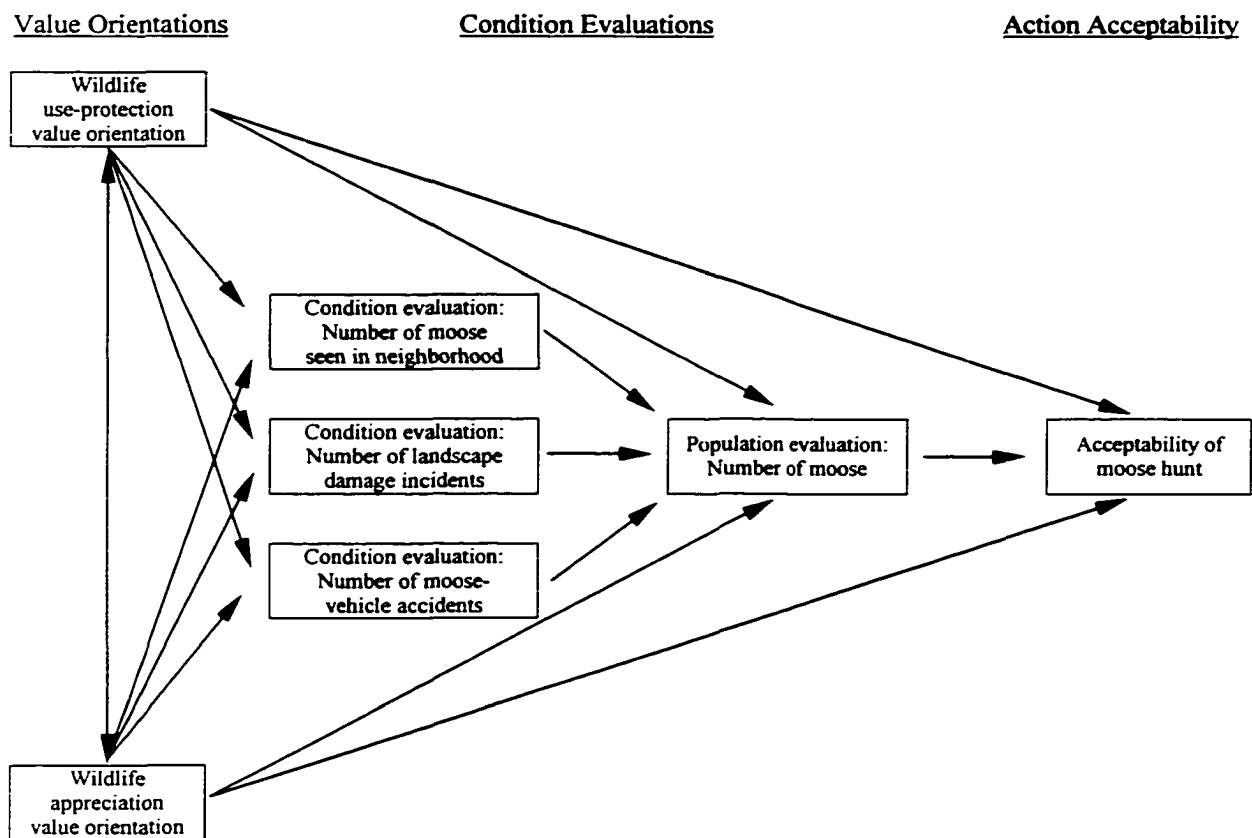


Figure 7. Hypothesized relationships between wildlife value orientations, condition evaluations, and the acceptability of moose hunts.

STUDY CONTEXT

Anchorage, Alaska (population 260,000) is a city with abundant wildlife, including moose. With relatively low hunting harvest and the existence of extensive parkland and open space, moose populations in and around Anchorage have doubled since the late 1970s to about 1,900 animals. Of these, 200 to 300 are resident year-round in the developed part of the city (the “Anchorage Bowl”), while an additional 500 to 700 migrate into the Bowl each winter from adjacent lands in Chugach State Park and two military reservations (Alaska Department of Fish and Game (ADF&G), 1999).

These large moose populations provide high quality viewing and hunting opportunities, help engender a sense of place, and connect residents to the natural environment (ADF&G, 1999). Both officially and informally, moose are recognized as a symbol of the city (Whittaker & Manfredo, 1997). They also cause a number of problems. There were an average of 156 moose killed in moose-vehicle collisions per year from 1994-1998 (ADF&G, 1999), and damage to vehicles and associated human injuries as a result of these accidents is substantial (Thomas, 1995). In addition, moose damage homeowners’ gardens and landscaping, and they may aggressively protect their young or block sidewalks and ski trails during winter, becoming a hazard to city residents and visitors (ADF&G, 1999). Anchorage moose have stomped two people to death (in 1993 and 1995), and they are also estimated to injure or kill 50 to 100 dogs each year (ADF&G, 1999).

The Anchorage area moose population has been considered above the biological carrying capacity since the 1980s (ADF&G, 1995). A heavy snowfall winter of 1994-95 led to a 25-30% population decrease, and habitat in many areas is heavily over-

browsed (ADF&G, 1999). Additional moose population growth appears to be checked by starvation deaths, limited hunting harvest, vehicle collision deaths, and occasional predation from brown bears and wolves. However, there has been interest in the community to conduct additional hunts to reduce moose populations and provide more hunting opportunity (ADF&G, 1999).

Moose hunting near Anchorage is currently limited to highly regulated hunts conducted on two large military bases adjacent to the city, with about 60 moose harvested each year (ADF&G, 1999). The last year of extensive moose hunts in and adjacent to the Anchorage Bowl was 1975. However, small controlled hunts were also conducted above Hillside (a suburban area adjacent to the 500,000-acre Chugach State Park) and near the airport until 1985. The most notable of these, a 1983 two-day bow hunt held above Hillside, harvested 41 animals but was also controversial. Videotape of a wounded moose and a moose being field-dressed in the driveway of a suburban home was aired on local television news, and generated several letters to the editor and editorial columns in local newspapers. Possibly in response to this situation, many bow hunters did not support repeating this hunt until moose populations and conflicts peaked in the early 1990s (ADF&G, 1995).

Recent moose hunt proposals have included many conditions intended to minimize controversy. While a few hunts have been proposed for parks in the city, the most seriously considered proposals focus on a hunt in Chugach State Park above the Hillside. A survey of Anchorage residents was conducted to explore public attitudes toward this potential moose hunt, as well as a number of other wildlife issues in the city (Whittaker & Manfredo, 1997).

METHODS

Data for the study came from a 1996 mail survey of Anchorage residents 18 years of age; the sample for the primary mail survey was drawn from registered voter lists. Individuals in the sample were sent the mail survey and a postcard reminder ten days later. Those who did not return a completed survey were sent two additional reminder letters and replacement surveys four and seven weeks after the initial mailing. Individuals who still had not completed a survey after 13 weeks were called by phone to explore possible non-response bias.

Of the 1,654 individuals sent a mail questionnaire, 971 or 58.7% completed and returned the surveys. Tests for non-response bias suggested that differences between respondents and non-respondents were small and the data were not weighted.

Variable Measurement

Wildlife Value Orientations

Following from Fulton et al., (1996), wildlife value orientations were developed in two steps. The first involved measuring basic wildlife beliefs, including: (1) wildlife use, (2) hunting, (3) wildlife rights, (4) wildlife welfare, appreciation of wildlife in (5) recreation settings, and (6) residential settings, (7) wildlife learning, and (8) wildlife existence and bequest value. Two to six items were developed for each of the eight beliefs; they were measured on a seven-point agree-disagree scale, with a “no opinion” mid-point. Most of the items came from Fulton et al. (1996), but modifications were made based their results and face validity concerns about item cross-loading.¹

¹ Fulton et al. (1996) measured 7 out of these 8 belief scales; this study measured wildlife welfare instead of fishing.

Whittaker et al. (previous chapter) presents the 28 items, organized by the eight beliefs, and describes analyses that supported scale development.

The second step involved creating use-protection and appreciation wildlife value orientations from combinations of basic wildlife beliefs. Following from Fulton et al. (1996), the first four beliefs were combined for the use-protection scale, while the second four were combined for the appreciation scale. Whittaker et al. (Chapter IV) presents the eight beliefs and their associated value orientations, as well as describing analyses that supported scale development.

Specific Condition Evaluations

Three separate condition evaluations were measured, each focusing on evaluations of current conditions rather than a range of conditions. The first variable was an arithmetic comparison of paired items that measured how often respondents see, and want to see, moose in their neighborhood in winter. Response categories and question format are given below:

	I see moose in my neighborhood.....	I would like to see moose in my neighborhood.....
Never	1	1
Rarely (a few times each winter)	2	2
Occasionally (a few times per month)	3	3
Frequently (a few times per week)	4	4
Very frequently (daily or almost daily)	5	5
It doesn't matter to me		

The evaluation variable was created by subtracting the “reported” variable (first column) from the “standard” variable (second column). “Difference scores” could range from -4 to +4 because there were five levels of sighting frequencies. A negative score means the person believes current sighting levels are too frequent relative to their standard, while a positive score indicates a person believes sighting levels are too

infrequent. Respondents who checked the “it doesn’t matter” answer (7%) were removed from the analysis.

The other two condition evaluations asked respondents to react to current numbers of “vehicle accidents caused by moose,” and the number of “incidents where moose eat people’s gardens or young trees.” In both cases, response options were recorded along an ordinal scale from [there are] “an acceptable number” to “too many” and “way too many.” Because these are considered negative conditions, no “too few” response option was offered, although respondents could report that either condition “doesn’t matter to me” (people who reported this were removed from the analysis).

Population Level Evaluations

The moose population evaluation variable also focused on an evaluation of current levels, and was measured on a five-point ordinal scale from [there are] “way too few moose,” “too few moose,” “about the right amount of moose,” “too many moose” and “way too many moose.” An “it doesn’t matter to me” option was also available; respondents who reported this were removed from the analysis. In total, after all the cases where people reported any condition evaluation “doesn’t matter” were removed, the effective sample size was 752.

Hunt Acceptability

Finally, the survey asked about the acceptability of moose hunting near Anchorage to reduce populations. This was measured on a seven-point scale (highly, moderately, and slightly acceptable/unacceptable, with a “no opinion” mid-point).

Analysis

Whittaker et al. (previous chapter) describes analysis conducted in support of the wildlife value orientation scales. This involved two confirmatory factor analyses which supported use of 28 items to measure eight basic wildlife beliefs, and which, in turn, were combined to represent to wildlife value orientation scales along “use-protection” and “appreciation” continua.

Statistics and frequencies for the variables in the model were calculated for discussion purposes. Means and standard deviations are provided for the two wildlife value orientation scales, as well as the neighborhood sighting difference scale (Table 6). Frequencies are provided for the variables used to create the difference scale, as well as the other variables in the model (Table 6).

Structural equation path analyses were used to test the predictive validity of the model and assess the mediation roles of condition and population evaluations. In analyses involving wildlife value orientations, error variances were set at 1 – Cronbach’s alpha for the scale (.20 for use-protection and .16 for appreciation). The two wildlife value orientations were also allowed to correlate in these models. Error variances for all other variables were set at .05 because they were single item variables.

Analyses were conducted in stages. The first stage involved assessing direct relationships between wildlife value orientations and all the other variables in the model (Table 7). Mediation of the condition and population evaluation variables were then tested in a series of four subsequent models that explored whether (1) population evaluations fully or partially mediate relationships between condition evaluations and

hunt acceptability, and whether (2) population conditions fully or partially mediate relationships between wildlife value orientations and acceptability.

Variables mediate a relationship when they account for the variance between a predictor variable and a criterion variable (Baron & Kenny, 1986). To demonstrate mediation in path analyses, a series of separate models must be compared. First, the predictor variable must be significantly related to the mediator as well as to the criterion, and the mediator must be significantly related to the criterion (direct effects models). Second, when the criterion is regressed on both the predictor and the mediator, the relationship between predictor and criterion should be less than in the direct effects model. If this relationship becomes non-significant or extremely small, full mediation is said to exist. If this relationship is only slightly less, partial mediation is said to exist.

Four different models assessing the possible mediation combinations (partial-partial, partial-full, full-partial, and full-full) were calculated and are compared in Table 2. These include the path coefficients for the various relationships as well as summary fit statistics. A final path model from the “best” model is presented in Figure 8.

RESULTS

Descriptive Results

Table 6 provides descriptive characteristics for the variables in the model. Wildlife value orientation results suggest that, as a group, Anchorage residents are more use- than protection-oriented, and they are strongly appreciation-oriented. Use-protection scores show much greater variance than appreciation scores.

Neighborhood moose sighting results show that two-thirds of residents see moose a few times a month or less in winter, and only one in ten reported seeing moose on a daily basis. Results also suggest that, in aggregate, respondents saw moose about as often as they wanted (there were similar percentages at each frequency level for the preferred variable, and the mean difference score was close to zero). Individual difference scores, however, reveal that 22% saw more than their standard while 25% saw less (Whittaker & Manfredo, 1997), and it is this variability that is useful.

The other two condition evaluation results show a majority (54%) report unacceptable numbers of moose-vehicle accidents in Anchorage, while only 25% report the same for landscaping damage incidents. Results also show that 59% report that current moose populations are “about right,” with only 6% reporting that there are too few moose while 30% report there are too many.

Hunt acceptability results, in contrast to other model variables, show a bi-modal distribution that indicates some polarization. Overall, however, 61% rated the hunt acceptable (29% highly acceptable) while 34% rated the hunt unacceptable (22% highly unacceptable), with 5% responding they had “no opinion.”

Table 6. Descriptive characteristics of variables in the model.

Variable	Mean	Standard deviation
Use-protection value orientations (-3=protection-oriented; 3=use-oriented)	1.45	5.26
Appreciation value orientations (-3=low appreciation; 3=high appreciation)	2.76	2.90
Number of moose sighted in neighborhoods	Reported level (%)	Standard (%)
Never	2	5
Rarely (a few times per winter)	22	19
Occasionally (a few times per month)	43	37
Frequently (a few times per week)	23	23
Very Frequently (daily or almost daily)	10	9
It doesn't matter to me	--	7
	Mean	Standard deviation
Difference score (4=sightings too infrequent; -4=sightings too frequent)	-0.05	1.11
Number of moose-vehicle accidents	Percentage of respondents	
An acceptable number	42	
Too many	42	
Way too many	12	
It doesn't matter	4	
Number of landscaping damage incidents		
An acceptable number	61	
Too many	14	
Way too many	9	
It doesn't matter	16	
Overall number of moose		
Way too few	1	
Too few	5	
An acceptable number	59	
Too many	22	
Way too many	8	
It doesn't matter	4	
Acceptability of hunt to reduce moose numbers		
Highly unacceptable	22	
Moderately unacceptable	7	
Slightly unacceptable	5	
No opinion	3	
Slightly acceptable	15	
Moderately acceptable	17	
Highly acceptable	29	

Value Orientations and Condition/Population Evaluations (H₁)

In support of the first hypothesis, the two value orientations were significantly related to the three specific condition evaluations, and use-protection orientations also significantly influenced population level evaluations (direct effects in Table 7; also shown in Figure 8). In all cases, the signs in these relationships were also in the expected direction. For example, individuals that were more use-oriented (higher on use-protection) wanted to see less moose in their neighborhoods in winter, and were more likely to evaluate the number of landscaping damage incidents, the number of moose-vehicle accidents, and overall moose populations as too high. Similarly, individuals with higher appreciation value orientations wanted to see more moose in their neighborhoods, and were more likely to evaluate the number of landscaping incidents or moose-vehicle accidents as acceptable, and were more likely to evaluate overall moose population levels “about right” or “too few.”

The strength of relationships between value orientations and condition/population evaluations, however, varied. Value orientations explained higher proportions of the variance in evaluations of winter moose in neighborhoods (31%) than evaluations of landscaping incidents (18%), and relatively little of the variance in moose-vehicle accident evaluations (3%). In the direct effects models, the two value orientations also explained 22% of the variance in population evaluations.

There were also differences in the relative influence of the two wildlife value orientations. Appreciation orientations were more important than use-protection orientations for evaluations of moose seen in neighborhoods ($r=.44$ compared to $-.23$) and the number of landscaping incidents ($r=-.34$ compared to $.16$), while use-

Table 7. Direct effects and mediation model comparisons.

Predictor	Criterion	Direct Effects	Model 1	Model 2	Model 3	Model 4
Use-Protection Value Orientations	Moose in neighborhood	-.21	-.22	-.23	-.22	-.23
	Landscape damage incidents	.13	.15	.16	.15	.16
	Moose-vehicle accidents	.09	.10	.10	.10	.11
	Moose population evaluation	.34	.22	.22	.24	
	Acceptability of moose hunt	.75	.70	.70		
Appreciation Value Orientations	Moose in neighborhood	.41	.44	.44	.44	.44
	Landscape damage incidents	-.31	-.34	-.34	-.34	-.34
	Moose-vehicle accidents	-.06	-.10	-.10	-.10	-.10
	Moose population evaluation	-.29	-.04	-.04	-.04	
	Acceptability of moose hunt	.08	.12	.11		
Moose in neighborhood	Moose population evaluation	-.49	-.43	-.43	-.42	-.53
	Acceptability of moose hunt	-.24	(-.03)		-.05	
Landscape damage incidents	Moose population evaluation	.22	.22	.21	.21	.25
	Acceptability of moose hunt	.11	.04		.04	
Moose-vehicle accidents	Moose population evaluation	.20	.21	.21	.21	.22
	Acceptability of moose hunt	.04	(.01)		(.02)	
Population evaluation	Acceptability of moose hunt	.41	.10	.13	.38	.39
		χ^2	240.6	242.6	614.3	689.9
		χ^2/df	80.0	40.4	122.9	69.0
Model summary statistics	GFI		.93	.93	.85	.84
	NFI		.88	.88	.69	.66
	CFI		.88	.88	.69	.66
	RMR		.09	.09	.12	.14

1. Cell entries are standardized regression coefficients; NA = latent construct not included in model.
2. All regression coefficients significant at the $p < .05$ level unless in parentheses.
3. Direct effects models were saturated.
4. Use-protection and appreciation value orientations allowed to correlate in all models ($r = -.34$).
5. Model 1 (Partial – partial): Condition evaluations partially mediate value orientations and hunt acceptability, and population evaluations partially mediate condition evaluations and hunt acceptability.
6. Model 2 (Partial – full): Condition evaluations partially mediate value orientations and hunt acceptability, but population evaluations fully mediate condition evaluations and hunt acceptability.
7. Model 3 (Full – partial): Condition evaluations fully mediate value orientations and hunt acceptability, but population evaluations partially mediate condition evaluations and hunt acceptability.
8. Model 4 (Full – full): Conditions evaluations fully mediate value orientations and hunt acceptability and population evaluations fully mediate condition evaluations and hunt acceptability.

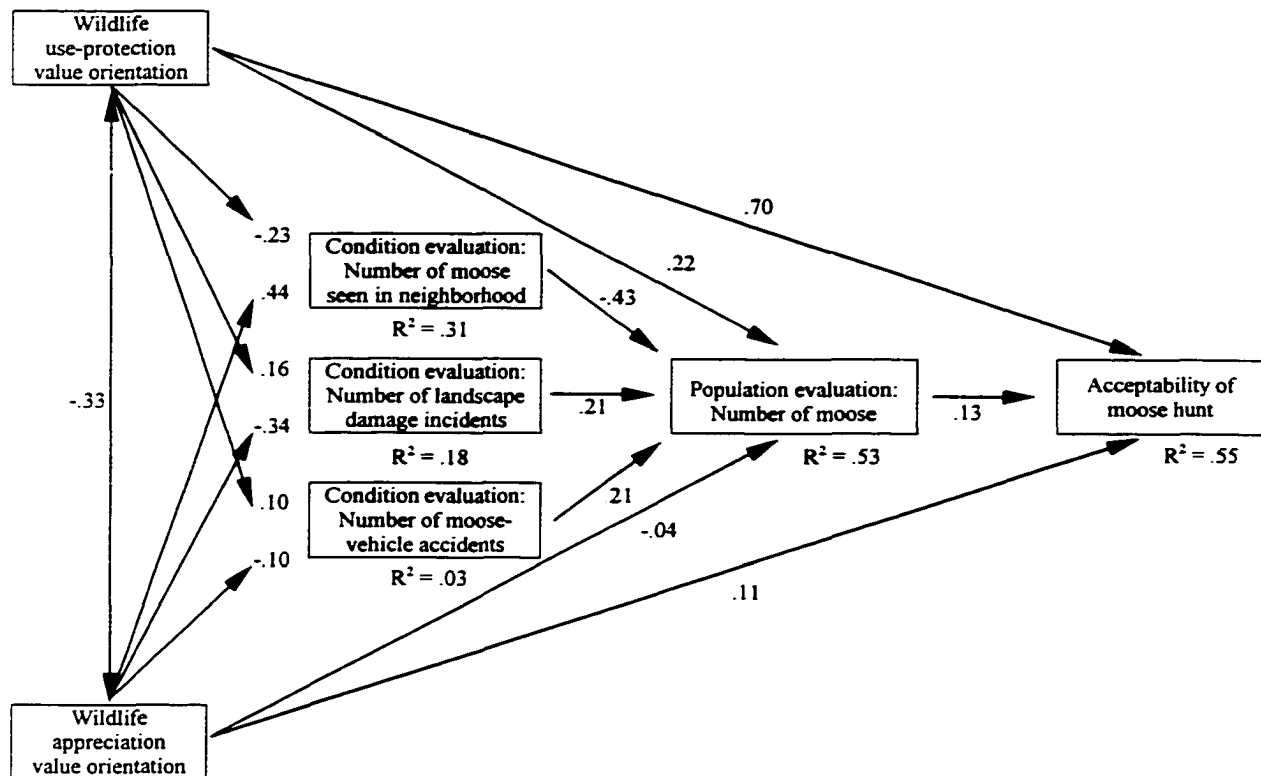


Figure 8. Relationships between wildlife value orientations, condition evaluations, population evaluations, and the acceptability of a hunt to reduce moose populations using the best model (Model 2). All paths are significant at the $p < .05$ level.

protection and appreciation had equal effects on moose-vehicle accidents ($r = .10$ and $-.10$).

In direct effects models, use-protection orientations had a slightly stronger influence than appreciation orientations on population evaluations ($r = .34$ compared to $-.29$). In the final model shown in Figure 8, however, appreciation orientations have considerably less effect (the path coefficient drops to $-.04$), and apparently influence population evaluations through specific condition evaluations.

Wildlife Value Orientations and Hunt Acceptability (H₂)

In direct effects models, both wildlife value orientations were also significantly related to hunt acceptability, supporting the second hypothesis. This direct effects model explained nearly 53% of the variance in hunt acceptability, and showed that use-protection orientations had a greater influence than appreciation orientations ($r=.75$ compared to $.08$). Interestingly however, the sign for the appreciation coefficient was not in the expected direction: higher appreciation orientations corresponds to more rather than less hunt acceptability. There were similar results in the “best” model that includes an additional path from population evaluations to hunt acceptability ($r=.70$ for use-protection; $r=.13$ for appreciation, $R^2=.55$).

Population Evaluations and Hunt Acceptability (H₃)

In direct effects models, population evaluations alone explained 17% of the variance in hunt acceptability ($r = .41$), supporting the third hypothesis. In the “best” model that includes paths between wildlife value orientations and hunt acceptability, however, the path coefficient drops substantially to $.13$. These findings suggest that much of the variance in acceptability explained by population evaluations is redundant with information in the value orientation variables (see results for H₅ below).

Tests for Mediation:

Condition Evaluations, Population Evaluations and Hunt Acceptability (H₄)

A series direct effects, partial, and full mediation models were developed to test the fourth hypothesis, which suggests that population evaluations fully mediate relationships between condition evaluations and hunt acceptability. Direct effects models showed significant relationships between all the relevant variables necessary for testing mediation. This included relationships between hunt acceptability and all the

condition evaluations (criterion variable and predictors), population evaluations and all the condition evaluations (mediator and predictors), and hunt acceptability and population evaluations (criterion variable and mediator).

In the partial mediation models (Model 1 and 3 in Table 7), paths between condition evaluations and hunt acceptability (predictors and the criterion variable) drop when population evaluations are included (paths for landscape damage incidents and moose-accidents even become non-significant at the $p < .05$ level). Results thus support a full mediation model (Model 2 in Table 7 and in Figure 8).

This model suggests that condition evaluations explain over half (53%) of the variance in population evaluations (although this includes effects from the two value orientations), and that evaluations of neighborhood moose numbers ($r = -.43$) were more strongly related to population evaluations than evaluations of landscaping damage incidents ($r = .21$) or moose-vehicle accidents ($r = .21$).

Tests for Mediation:

Wildlife Value Orientations, Population Evaluations, and Hunt Acceptability (H_5)?

Direct effects, partial mediation, and full mediation models were developed to test the final hypothesis, which suggests that population evaluations partially mediate relationships between wildlife value orientations and hunt acceptability. Direct effects models showed significant relationships between all the relevant variables. This included relationships between hunt acceptability and the two value orientations (criterion variable and predictors), population evaluations and the value orientations (mediator and predictors), and hunt acceptability and population evaluations (criterion variable and mediator).

In the partial mediation models (Models 2 and 4 in Table 7), direct paths between value orientations and hunt acceptability (predictors and the criterion variable) did not substantially change when population evaluations were included (use protection only dropped from .75 to .70, and appreciation increased from .08 to .11). A full mediation model was also calculated and it explained only 18 percent of the variance in hunt acceptability, while the partial mediation model explained 55%. Results thus support the partial mediation model shown in Figure 8.

Combining Results: The Full Path Model

Integrating results from all the previous analyses suggests that Model 2 (partial mediation between value orientations and hunt acceptability; full mediation between condition evaluations and hunt acceptability) is the “best” model. Summary fit statistics also suggest the relative superiority of this model, with a χ^2 of 242.6 with 6 degrees of freedom, and fit indices that are acceptable for a model of this complexity (RMR = .089, GFI = .93, NFI = .89, and CFI = .89). This model has wildlife value orientations influencing all other variables in the model, with population evaluations fully mediating between the three condition evaluations and acceptability, but only partially mediating between value orientations and acceptability. The model emphasizes the strength of the direct relationship between use-protection value orientations and hunt acceptability ($r=.70$), but also shows that both value orientations have some influence on condition evaluations and population evaluations. Finally, it suggests that condition evaluations taken together (and the evaluation of the number of moose in neighborhoods in particular) are good predictors of population evaluations.

DISCUSSION

Results suggest several conclusions about the relationships between wildlife value orientations, evaluations of moose conditions and moose population levels, and the acceptability of a moose hunt. Discussion is organized in two areas: (1) theoretical support for the cognitive hierarchy and its application to wildlife issues; and (2) management implications for moose management decisions in Anchorage.

Theoretical Issues

First, this study follows from previous empirical research (Homer & Kahle, 1988; Fulton et al., 1996; Tarrant et al., 1997; Vaske & Donnelly, 1999; Chapter IV) in showing that value-based variables influence more specific evaluative variables within a cognitive hierarchy. In this research, wildlife value orientations (and use-protection orientations in particular), are shown to predict the acceptability of a hunt to reduce moose populations, as well as help predict intermediate normative variables that measure evaluations of moose population levels and related conditions caused by moose (the extent of landscaping damage, moose-vehicle accidents, and moose sightings in neighborhoods).

Second, while the data generally support the concept of a cognitive hierarchy, they also demonstrate that elements in the hierarchy are not necessarily rigidly ordered. Value orientations in this study influence hunt acceptability both directly and through intermediate variables, suggesting that some actions elicit broader value-based cognitions while they concurrently elicit more specific evaluations of species population levels and associated benefits or problems.

There are probably other intermediate variables that mediate the relationship between value orientations and hunt acceptability. For example, based on additional findings from the same study (Chapter III), other mediators might include evaluations of (1) safety risks involved in urban hunts; (2) likelihood that hunts would reduce moose problems such as landscaping damage incidents, moose-vehicle accidents, or neighborhood encounter rates; or (3) the hunt's perceived secondary costs (e.g., hunt administration costs, loss of viewing opportunities) or benefits (e.g., satisfaction of hunting demand, reduction in number of aggressive moose because those are more likely to be harvested). However, even if these variables are included, value orientations are likely to have pervasive effects on several elements, particularly hunt acceptability. Heberlein (1981) has noted that some attitudes (similar in kind to evaluations) are strongly value-based and lack "vertical structure," while less stable attitudes may be linked to values through multiple intermediate variables. Hunt acceptability appears to be a good example of the former, implying that even if conditions or evaluations change, hunt acceptability is likely to be relatively stable.

Third, these data support concepts implied by the social acceptance capacity concept, demonstrating moderate relationships between evaluations of wildlife population levels and the conditions created by those population levels. People think there are too many moose when they think there are too many landscaping damage incidents, too many moose-caused accidents, and when they see moose in their neighborhoods more often than they prefer. While the normative condition evaluations used in this research can probably be measured more effectively (all three were ordinal scales, and two of the three had only three response levels), and there may be other

conditions that influence population evaluations, these norms appear to have predictive power. Future research may be able to build on these results by examining more quantitative measures of condition evaluations (i.e., adopting the paired question format for other conditions or applying the standard structural norm multiple impact evaluation format), or by exploring additional conditions.

Management Implications

These findings also have several implications for wildlife managers in Anchorage (and potentially other urban areas that are contemplating hunts to reduce ungulate populations). First, hunt acceptability appears to be partially related to evaluations of current moose population levels and the conditions those populations create. As moose population levels grow, or negative impacts such as accidents and landscape damage incidents increase, more Anchorage residents are likely to accept the idea of a hunt. Documenting these conditions, and associating them with moose population levels, is probably a critical monitoring task for Anchorage wildlife managers. This kind of information does appear to influence public acceptability, and thus has a role to play in making a hunt decision.

Second, evaluations of population levels are even more strongly related to specific evaluations of the number of moose people see and want to see in their own neighborhoods, suggesting that people depend on direct experience when evaluating reductions in the number of moose. Managers should not assume that city-wide moose impact statistics (e.g., the number of collisions per year, estimates of landscape damage) will be central to residents' evaluations of moose population levels; information about

population and condition perceptions/evaluations may be as important as information about actual levels.

Third, specific descriptive information from condition evaluations may help managers decide when impacts are too high, which can help set standards for populations or suggest appropriate harvest levels from hunts. Normative research traditions are particularly well-suited to helping planners set “management standards,” and were developed by applied recreation researchers precisely for this purpose (Shelby et al, 1996). Applications of the normative approach for wildlife acceptance capacity issues may bring similar dividends.

By measuring a variety of normative variables, attention is focused away from an overall WAC to the more specific indicators and standards that define quality in the urban wildlife setting. The obvious urban wildlife management goal is to increase benefits of wildlife while reducing the problems they cause. The population management actions implied by the WAC concept may not be the only solution. A focus on normative standards allows for broader thinking about alternative actions.

In a related point, results suggest that some residents recognize that population management is not the only way to address unacceptable conflict levels. For example, only 30% of Anchorage residents thought that current Anchorage moose populations were too high, while 54% reported there were too many moose-vehicle accidents. Taken together, it appears that roughly 1 in 4 residents are interested in addressing certain moose problems (e.g., accident levels) but do not want to reduce the number of moose.

The Anchorage Wildlife Plan (ADF&G , 1999) embraced the normative approach by establishing standards for several moose interaction indicator variables. In particular, standards reflected normative data that suggested current neighborhood sighting and landscape damage levels were at acceptable levels but that current moose-vehicle accident levels were not. The plan also embraced the overall WAC concept by recommending population goals for a variety of species (including moose), and explicitly noted how those goals were based on both biological and social criteria. More importantly, the plan recommended a variety of actions (e.g, highway improvements to reduce accidents, education programs to address encounters) designed to address both condition and population level issues, explicitly noting that population management may be necessary but not sufficient to address the variety of conflict problems.

Fourth, having noted the utility of the normative approach in wildlife planning, results also suggest the importance of wildlife value orientations in understanding hunt acceptability. Use-protection value orientations are the dominant influence on hunt acceptability, and both types of orientations flavor evaluations of moose populations or the conditions they cause. The implication, within bounds, is that regardless of actual moose population or condition levels, use-oriented people are likely to perceive them as too high and support hunts, while protection-oriented people are likely to see them as acceptable and oppose hunts. Similarly, individuals high on appreciation are unlikely to report they ever see more moose than they want to (although this value orientation does not necessarily translate into hunt support because many hunters are also high on appreciation).

This finding foreshadows actual positions in debates over moose hunts in Anchorage (ADF&G, 1999; Chapter III), which appear to have a strong value-basis. Hunt supporters appear willing to support a hunt even if it will not necessarily solve many conflict problems, and people who oppose the hunt appear to resist hunts even if they will reduce some of those conflicts. As planners attempt to find consensus over whether to hold urban moose hunts (or develop standards that define when population or conflict levels are too high), they should recognize that fundamental values may be at the center of the debate. The outstanding issues are evaluative in nature, and people are likely to respond to the same “facts” in different ways depending upon their values. Resolution is thus unlikely to come only through an examination of biological population or condition information, and frank recognition and discussion of value differences may be required.

VI. CONCLUSION

Taken together, the three preceding chapters suggest several broad conclusions about how people evaluate urban wildlife management actions, how researchers should study those, and what managers can learn from this information. This final chapter reviews the dissertation's broader theoretical, methodological, and management implications, and then concludes with brief descriptions of research efforts that may offer additional understanding.

INTEGRATING THE FINDINGS

Theoretical Issues

The chapters in this dissertation collectively suggest several theoretical conclusions. First, they support enduring theories within social psychology that suggest humans develop consistency among their cognitions (Festinger, 1957; Abelson et al., 1968; Fiske & Taylor, 1991), and access those cognitions through deliberative processes when evaluating behavior (Fishbein & Ajzen, 1975). The chapters show that people do not evaluate wildlife management actions through whimsical processes, and that both factual and evaluative information influence evaluations in systematic ways.

Chapter III, for example, shows how people with distinct evaluations about a hunt (shown through intentions to vote for or against it) also have divergent beliefs and evaluations about the salient outcomes of that hunt. Similarly, Chapters IV and V show

how wildlife value orientations (general latent constructs that measure patterns of basic beliefs about wildlife) influence more specific attitudinal and normative evaluations of urban wildlife, the conditions those wildlife cause, and the actions that might be taken to address wildlife problems.

Second, the chapters support the causal ordering of cognitions from abstract to specific predicted by the cognitive hierarchy model. While Chapter III only offers *prima facie* evidence that acceptability evaluations are value-based, Chapters IV and V show moderate to strong relationships between more general value orientations and specific evaluations. Chapter IV also shows how those relationships are stronger between value orientations and general acceptability of action classes (or across multiple situations) than between value orientations and specific action acceptability, thus supporting the correspondence notion consistent with the hierarchy model. Chapter V further illustrates that normative evaluative variables (evaluations of the number of moose or the level of human-moose interactions or moose-caused problems) mediate relationships between value orientations and action acceptability.

Third, the chapters provide evidence that the structure of the cognitive hierarchy may differ for different types of action evaluations. Some evaluations appear more closely related to measured value orientations than others (e.g., hunts, lethal control actions in less severe encounter situations), implying that some issues elicit connections to these deeper, more abstract, and less malleable cognitions. Hunting actions in particular appear to have strong direct links to use-protection value orientations. Although speculative at this time, there may be classes of actions or issues with different hierarchical structures; some may have a more compressed structure that

feature direct links to general variables, while others are more expanded with several layers of mediating variables between specific evaluations and more abstract, fundamental beliefs and values. Heberlein (1981) theorized a similar notion, further suggesting that persuasion efforts are likely to be less effective for attitudes that are only a step or two away from values.

Fourth, the chapters suggest that wildlife value orientations are useful general constructs for understanding more specific evaluative cognitions. While the utility of value-based variables is only implied in Chapter III, it is confirmed by Chapters IV and V. Wildlife value orientations may not be the only general constructs that influence wildlife-related cognitions and evaluations, but they show considerable promise because they influence a wide range of those evaluations.

Finally, Chapter V suggests that the cognitive hierarchy should be expanded to include normative evaluations of both conditions and behaviors, an expansion which has more typically applied to traditional attitudinal models in the past. Value orientations influence normative evaluations of moose population levels as well as condition levels caused by moose, which in turn have some effect on the acceptability of a moose hunt to reduce moose populations. The cognitive hierarchy may have links to attitudinal models (i.e., the theory of reasoned action), but its principles appear adaptable to other research traditions. Structural norm variables in particular offer promise for exploring evaluations with obligation and shared agreement components, or which focus on evaluations of the quantity of some behavior or condition.

Methodological Issues

Methodologically, the chapters offer at least two general conclusions with implications for future work. First, as discussed in Chapter IV, wildlife value orientations are reliable, and have both discriminant and predictive validity in cognitive hierarchy models. While there is room for improved measurement of individual basic wildlife beliefs (particularly the rights and welfare domains), the validity of a fundamental approach that reduces multiple items into sets of basic beliefs (e.g., wildlife rights, residential appreciation) and then two value orientations (use-protection and appreciation) is confirmed in this research. Similar to the findings reported by Fulton et al. (1996), this approach holds promise for developing well-defined general constructs that can be measured across a variety of wildlife studies and lead to greater generalization in the field.

Theoretically sound, wildlife value orientations require measurement and analysis protocols that are methodologically straightforward and offer ways to assess their reliability and validity. As the approach is applied to other populations, results will allow researchers to assess whether particular items, domains, or overall orientations continue to “hold together.” Although it is early in their development, combined findings from Fulton et al. (1996) and this research are encouraging. There appear to be stable reliabilities among the items in the various domains, and confirmatory analysis of the scales suggest relative stability among relationships between the basic belief domains and the two orientations. If future work shows similar results for other populations and settings, the approach could become a standard

methods protocol, particularly if work concurrently focuses on more parsimonious ways to measure these orientations.

In a related point, other researchers have noted that the use-protection wildlife value orientations are probably similar to broader environmental value orientations developed along an anthropocentric-biocentric continuum (Vaske & Donnelly, 1999; Vaske et al., in review), and they have urged measurement studies to make direct comparisons. Although this research does not suggest probable findings from such comparisons, speculation suggests the links will be quite strong. In fact, the measurement of wildlife value orientations may provide among the more effective ways of measuring broader value orientations toward “the environment.” The use or protection of wildlife is among the most tangible ways people interact with the environment, and is not as confounded by human interests. For example, even the most extreme anthropocentric positions recognize the necessity of unpolluted water sources, so it is difficult to assess anthropocentric or biocentric values through questions about basic beliefs toward clean water. Wildlife, in contrast, is not essential to modern urban life (at least for survival purposes), so human responses to wildlife are likely to be more “pure” indicators of their environmental value orientation position.

Second, findings from Chapter V suggest that while normative evaluation variables are useful additions to the cognitive hierarchy model, there is considerable opportunity to improve how these variables are measured and used. Approaches to measuring normative variables in this research were constrained by researcher judgments about the probable inability of Anchorage residents to evaluate multiple specific quantities of moose conflict or interaction levels, or a range of moose

population levels. All four normative variables accordingly focused on evaluations of current levels (which we assumed they could evaluate as acceptable, too low, or too high), and only one (the comparison of reported and preferred winter sightings) included a component that included reference to actual conditions.

The ability to evaluate specific condition levels and specify a norm is an empirical issue, however, and ripe for further investigation. Can people specify the acceptable number of human-moose accidents in a year? Can they specify the acceptable number of landscape damage incidents? Structural norm researchers have termed this issue “norm prevalence,” (defined as the percent of respondents who can specify a norm in a given context) and have shown how this characteristic of social norms varies for different recreation interaction norms (Donnelly, Vaske, Whittaker & Shelby, 1996). For some wildlife conflict conditions, prevalence may in fact be quite low and require the approach employed in this research. For other conditions, however, people may have well-defined ideas of acceptable levels and classic structural norm approaches are likely to pay important dividends.

Management Conclusions

Management implications from the individual chapters have been reviewed previously, but two additional general implications emerge from a collective examination of the research in the dissertation. First, the chapters highlight the utility of developing planning goals that reflect wildlife value orientations in the population. People do have basic beliefs about wildlife, and patterns among those beliefs reveal general orientations that influence a wide variety of attitudes and norms toward wildlife

issues. Plans that ignore these orientations miss an opportunity to link concrete management actions with broader expressions of societal values.

Specific information from the data set suggests that a majority of Anchorage residents show a general use orientation toward wildlife, urging the development of planning goals that highlight wildlife stewardship and opportunities for wildlife use (e.g., viewing, hunting). Protection orientations were also represented in the Anchorage population, however, suggesting other planning goals should highlight humane treatment of wildlife and the importance of creating some protected areas. Finally, data showed extremely high wildlife appreciation orientations in the population, urging the need for planning goals that reflect residents' interest in wildlife availability in both recreation and residential settings, as well as opportunities for wildlife learning. Goals in the Anchorage Wildlife Plan (see Appendix D) were developed to address each of these value issues, and data from the study were at least partially responsible for this planning outcome.

Second, the chapters emphasize the utility of linking management actions to broader planning goals, as well as intermediate standards that define acceptable levels of wildlife conflicts and population levels. The dissertation chapters illustrate that residents connect these in their own thinking, and suggest that explicit parallel associations in a management plan are likely to help people understand the rationale behind institutional behavior. The Anchorage Wildlife Plan also honored this notion; each of the plan's priority actions contained language that tied them to plan goals, objectives, or standards stated earlier in the document.

NEXT STEPS: DEVELOPING A RESEARCH PROGRAM

The ability to answer certain questions is one characteristic of good research, but the ability to pose new questions and suggest new ways to examine them is perhaps of equal importance. In this spirit, the following final section briefly outlines a series of research efforts that extend the concepts and methods in the dissertation, focusing on the work necessary to advance theory and applications.

Development of Wildlife Value Orientation Measures

There is a need to continue development of the two existing wildlife value orientation measures: honing individual basic belief items, testing reliability and validity of value orientation scale construction, and comparing the stability of relationships across a variety of study populations. University students provide a large, accessible, and probably diverse enough population for this type of work, allowing researchers to serially test evolutions of the measurement instrument in a relatively short period of time. Developing a more parsimonious set of basic belief items (probably less than 15) should also be a goal during this work, so that value orientation scales will have a lower response burden and can be streamlined for broader use.

As discussed in Chapter IV, additional value orientation research might also examine a wildlife spirituality dimension, which might include symbolic value of wildlife used for food and other subsistence needs. There is considerable work required here, and university students are less likely to be an appropriate study population for item and scale development. Differences between indigenous populations (who still rely on subsistence use of wildlife) and European/North American populations are likely to be of particular interest here, requiring research among both groups.

In an allied point, some adaptation of the wildlife value orientation measurement items and protocol may be necessary as researchers expand their focus from modern North American or European populations to indigenous peoples or residents in developing parts of the world. In the developed world, people largely interact with wildlife in appreciative or recreational use settings (e.g., viewing or hunting), or during nuisance or conflict situations (e.g., mice in the house, auto accidents with deer). In the developing world, by contrast, subsistence needs met by wildlife are likely to be more substantial and conflict situations are often more extreme (e.g., the crop destruction that can be caused by elephants in areas adjacent to African game parks). While we think that the basic beliefs that comprise the two wildlife value orientations examined here are fundamental, it is unlikely that the items used to estimate them will translate universally to every culture and potential wildlife management setting. These are particularly well suited to studying modern urban society in the developed world. Developing parallel value orientation scales for less developed or rural societies is an excellent avenue for future work.

Development of Normative Condition Evaluation Measures

There is considerable opportunity to apply alternative normative evaluation approaches to urban wildlife issues, particularly structural norm formats. We do not know whether people will be able to specify norms for a range of conflict levels, but this is an empirical issue and worthy of study. In most wildlife management settings, biological indicators and standards are used to decide appropriate wildlife population sizes. In urban areas, however, social criteria may trump biological criteria. Normative approaches offer a clear methodology for studying whether people have standards for

various conflict levels, but a series of studies will be needed to test their utility. If people have difficulty evaluating specific numbers, the paired format used in this research for neighborhood moose sightings offers an alternative.

Extensions toward Other Species and Study Populations

The current research focused on urban wildlife conflicts with bears, geese, and moose in Anchorage, Alaska and probably cannot be generalized to other species in other areas. Replications that explored similar issues for other species and areas is thus an obvious direction for future work, particularly if they employ a similar approach. There has been considerable work exploring public acceptability of wildlife management actions in urban areas, with most focused on the acceptability of hunts. Unfortunately, this work tends to focus on simple descriptions of support or opposition, rather than linking evaluations to potential antecedent cognitive variables. A more focused research program that systematically explored relationships between hunt acceptability and wildlife value orientations for a variety of species and settings may well lead to broad generalizations about the way humans understand and evaluate hunts or other population-level management actions.

Extensions to Other Wildlife Management Actions and Issues

Finally, there is a need to expand research of value orientations and normative condition evaluations to other wildlife management actions and issues. In urban areas, research could be extended to a variety of actions managers use to prevent or respond to wildlife conflicts. In rural or wildland areas, there are also opportunities explore relationships between wildlife value orientations and the acceptability of a wide range of management strategies. In Alaska and other western states, there is increasing

controversy over issues such as trapping, aerial hunting of wolves or other predators, and the reintroduction or conservation of endangered species. All of these issues appear to have some value-basis, yet research has largely ignored their possible connections to broad value-based variables like wildlife value orientations, or even normative evaluations of population and conflict levels. The current research suggests that these antecedent cognitive variables can help explain public support for particular management actions; additional work is needed to explore whether these variables have a similar influence for other issues and other settings.

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APPENDIX A

ADDITIONAL INFORMATION

ABOUT THE ANCHORAGE WILDLIFE STUDY

The following appendix includes excerpts from the Anchorage Wildlife Study Proposal and the Colorado State University application to conduct human subjects research.

EXCERPTS FROM THE STUDY PROPOSAL (Submitted to ADF&G on 4/23/96)

Introduction

Anchorage, Alaska is a city with abundant wildlife. With extensive open space, the city is home to a large resident population of moose, and also provides prime winter range for moose from the neighboring Chugach Range. Many other species -- including both black and brown bears, wolves, coyotes, eagles, and beaver -- are regularly seen in the city as well, along with large populations of Canada geese and other migratory waterfowl.

This wildlife provides a variety of benefits to city residents, but also has a number of negative consequences. Providing extensive viewing opportunities, Anchorage's wildlife help provide a sense of place and connect residents to the natural environment. On the other hand, these wildlife cause a number of problems. Moose create hundreds of traffic accidents each year, they eat significant amounts of landscaping, and can be a safety problem when they protect their young or block sidewalks and driveways. Black bears regularly raid area garbage cans and pet food, while brown bears occasionally travel through high density areas and are a real hazard on the extensive trail system around the city. Geese can also cause a significant hazard for aircraft using several city airports.

Several specific wildlife interactions in 1994 and 1995 have led to concern about how to manage wildlife populations in the Anchorage urban area. In two separate incidents, moose stomped people to death, leading the state legislature to ask the Alaska Department of Fish and Game (ADF&G) to evaluate the usefulness of a hunt to reduce their populations. In the summer of 1995, a bear also mauled and killed two people on a trail just a few miles from the city and there were calls by some to decrease bear

populations as well. Geese were also the primary cause of a military airplane crash that left twenty-four people dead. ADF&G, with the primary management responsibility for wildlife in the state, is currently reviewing these and related issues and making decisions as needed. Ultimately, however, the Department has recognized a need to comprehensively address wildlife issues in Anchorage through an area wildlife management plan.

ADF&G hopes to initiate a cooperative planning effort in 1996 with other interested agencies (e.g. the municipal government, Chugach State Park, Bureau of Land Management, and the military bases). Concurrently, ADF&G has recognized a need to develop better information about wildlife interactions in Anchorage and how residents feel about them. This proposal describes a study that would fulfill many of those information needs.

Study Purpose

A key component of most rational planning or decision-making processes is public representation and participation. Decisions in the natural resources arena, including wildlife management decisions, also require this public input. While interactive consensus building between agencies and identifiable groups representing various publics offers one model for ensuring representativeness, these efforts sometimes fail to include the interests of the wider public. Heberlein (1976), among others, contend that survey methods are one effective method for assessing wider public views.

Social assessments which are broadly representative of the public can have different utility during the various stages of a planning or decision-making process (Manfredo, Vaske, & Sikorowski, in press). In the early stages of the process (visioning and goal setting; identification of issues, problems, and opportunities), surveys can help identify basic public value orientations, general desired futures, and assess the extent of existing and potential problems. Later, as the planning focus moves toward setting specific objectives and standards, surveys can help identify whether there is consensus on those standards or objectives. Finally, as the planning effort develops and evaluates alternatives that might help meet objectives, surveys can assess public support for those alternatives and help predict the impacts of implementing them.

In the proposed study, some information will be collected for each of these areas. Because the planning effort is in its initial stages, the survey will focus on identifying basic value orientations and general desired futures. It is also possible, however, to anticipate the type of potential objectives or standards that will become relevant as the plan proceeds, as well as the range of possible management actions that are likely to be proposed. Accordingly, the survey will also ask residents about these issues.

Study Goals

The primary purpose of this study is to provide information about Anchorage residents which will be useful in efforts to conduct wildlife management planning in Anchorage. More specific goals of this study are as follows.

- To assist in the formulation of goals and objectives, this study will examine Anchorage residents' wildlife value orientations and attitudes toward specific species of wildlife
- To assist in the development of objectives and standards, this study will examine Anchorage residents' attitudes regarding the acceptability of different types of wildlife encounters.
- To guide selection of management responses, this study will examine Anchorage residents' attitudes regarding the acceptability of management actions (population level and animal specific) for various situations. Situations will be tied to different geographic regions in and around Anchorage as well as different types of incidents.
- To determine possible needs for education efforts, this study will identify salient normative beliefs about appropriate behavior responses in various wildlife encounter situations.

Information will also be collected regarding general socio-demographic characteristics and recreation participation patterns of subjects.

Study Applications

The study will provide several kinds of information as suggested above. Specific information relevant to the planning process, and how it might be used, is discussed below.

Information about wildlife values to help define plan goals

Goal setting is a key step in any planning process, and represents the clarification and expression of human values. The study will assist in this step by identifying wildlife value orientations: whether people feel positively or negatively toward animal use, animal rights, hunting, fishing, bequest and existence value, residential wildlife experiences, recreational wildlife experiences, and wildlife education. These measures then allow the application of cluster analytic techniques to identify distinct segments of the public that have orientations toward animal use (hunting and fishing), animal rights, a combination of these values, or those with low interest in wildlife. The relative size of these groups can be invaluable for creating a "mind set" among planners attempting to satisfy a diversity of wildlife interests.

Information about wildlife problems and opportunities

A second step in many rational planning processes involves clarifying problems, and in a more proactive sense, identifying opportunities. This could include identifying the intensity of issues, describing the extent and severity of existing and potential problems, and determining the basis of potential conflicts. The study can assist in this

step by measuring broad public attitudes toward various wildlife species and potential problems, suggesting the extent to which the Anchorage residents feel positively or negatively toward particular species such as moose and bear, and the problems or benefits each creates. For example, recent fatal encounters with moose and bears may have heightened concern about these wildlife encounters; this study will explore the extent to which that concern has penetrated the general population.

Information about wildlife encounter acceptability to help develop objectives and standards

Developing objectives and standards is the next critical step in the planning process, and often the most difficult. Objectives are statements that clarify management intent and give specific meaning to more broad goal statements. Standards are measures of whether objectives are being met. The study will explore the acceptability of different kinds of wildlife encounters by species and situation, providing information planners need to define acceptable levels of different types of encounters in Anchorage. For example, the study might explore the acceptability of encounters along greenway trails, in neighborhoods in different parts of the city, in school yards, or along major roads. Results could then help planners make decisions about whether there should be an active effort to reduce encounters in some settings.

Information about the acceptability of management actions

The next planning step is developing alternative management strategies and actions to meet objectives and standards. The study can help by providing information about the acceptability of management alternatives. The Anchorage wildlife management plan is likely to include decisions about when it is appropriate to destroy or relocate a problem animal, when and how aversive conditioning efforts should be used, and when or how general population reductions should be implemented. The study will identify how the public feels about these or other options, ensuring that planners are not making decisions in a vacuum. This information may also help identify interest groups for more in-depth consultations to ensure the political viability of proposed solutions.

Information about the potential effectiveness of management alternatives

Many wildlife management issues are addressed by education and regulation efforts. For example, moose problems in Anchorage are probably exacerbated by people who feed moose or approach too closely, and education or regulation efforts that reduced these behaviors could minimize problem encounters. The open question is whether regulatory or education and information (I&E) techniques are likely to reduce these behaviors. The study can help identify people's beliefs about how they should behave during wildlife encounters and suggest whether regulatory or I&E efforts are likely to influence those behaviors, suggesting ways to refine existing educational efforts or develop future ones.

Methods

Instrument

The data will be collected by a mail-out survey. The instrument will be developed in cooperation with members of the Anchorage Wildlife Study Team consisting of ADF&G personnel, Colorado State University (CSU) researchers, and other selected agency staff (e.g., Chugach State Park, City, BLM Campbell Track, and military base staff). Instrument development will be guided by methods established in previous research. For example, attitude and belief measurement will follow procedures described by Ajzen and Fishbein (1980), value orientations will adapt from procedures described by Fulton, Manfredo & Lipscomb (in press), salient norms will be measured using procedures described by Basman et al. (in press), and agreement among normative standards and acceptability curves will be developed from theory and methods described by Shelby, Vaske & Donnelly (1996).

Sampling

The study population includes Anchorage area residents. The sampling goal is 1,000 residents, which should provide sufficient sub-samples to assess differences in responses between several groups (trail users and non-trail users, people who live in low and high density housing areas, hunters and non-hunters, long time and short-time residents). Sampling details will be finalized in a study team meeting held in July, 1996.

Data Collection

Data collection will be jointly conducted by CSU and ADF&G. ADF&G will obtain a sample of Anchorage names and addresses from voter registration lists. CSU will administer the survey. Surveys will be administered to respondents through a standard mail survey three wave approach: an initial mailing, a post card reminder, and two subsequent mailings to those who have not returned their surveys.

Analysis

Data will be encoded and analyzed at Colorado State University. Analysis will be conducted using routines available in SPSS. General statistical summaries (means percentages) will be provided for the entire sample and for sub-samples as desired by the study team. Acceptability curves will be developed using procedures described by Vaske et al. (1986). Hypotheses will be tested using structural equation analysis available in LISREL8 (Jöreskog and Sörbom, 1993). If appropriate, display of results will be facilitated using geographic information system capabilities.

Publications

Products to be delivered at the completion of this study will include a presentation of preliminary results in March 1997 and a final report in September 1997. In addition to the project reports, peer reviewed journal articles may also result from this study with the condition that the opportunity for co-authorship on each article is extended to all the principals involved in the study (including Whittaker, Miller and Manfredo).

Study Schedule

Study start and initial survey development meetings	July 1996
Survey review	September 1996
Obtain sample	October 1996
Survey administration	November-December 1996
Coding	December-January 1996
Analysis	January-February 1997
Preliminary results for Board of Game meeting	March 1997
Final report	September 1997

Budget

Research Assistant Salary/Tuition	
Doug Whittaker	\$16,000
Travel	
Mike Manfredo 3 trips	\$5,000
Doug Whittaker 3 trips	\$5,000
Survey	
Phone/sample identification	\$5,500
Printing/envelopes, etc.	\$6,000
Mailing (ADF&G)	
Coding (CSU)	\$1,000
Miscellaneous	\$1,000
Subtotal: Direct Expenses	\$39,500
Overhead @ 17 percent	\$6,715
Grand Total	\$46,215

COLORADO STATE UNIVERSITY
Human Research Project Form

PROJECT TITLE: Living with Wildlife in Anchorage: A Survey of Public Opinion

PRINCIPAL INVESTIGATOR: Dr. Michael Manfredo, Professor

CO-INVESTIGATORS: Doug Whittaker, Research Assistant
Dr. Jerry Vaske, Professor

DEPARTMENT: Natural Resource Recreation and Tourism

FUNDING AGENCY: Alaska Department of Fish and Game (ADF&G)

DEADLINE: November 1, 1996

PROJECT START DATE: July 1, 1996

SURVEY START DATE: November 1, 1996

PROJECT END DATE: September 30, 1997

OBJECTIVES OF PROPOSED RESEARCH:

The primary purpose of this study is to provide information about Anchorage, Alaska residents which will be useful in efforts to conduct wildlife management planning in Anchorage. More specific goals of this study are as follows.

- To assist in the formulation of planning goals and objectives, this study will examine Anchorage residents' wildlife value orientations and attitudes toward specific species of wildlife
- To assist in the development of planning objectives and standards, this study will examine Anchorage residents' attitudes regarding the acceptability of different types of wildlife encounters.
- To guide selection of wildlife management responses, this study will examine Anchorage residents' attitudes regarding the acceptability of management actions (population level and animal specific) for various situations. Situations will be tied to different geographic regions in and around Anchorage as well as different types of incidents.
- To determine possible needs for education efforts, this study will identify salient normative beliefs about appropriate behavior responses in various wildlife encounter situations.

Information will also be collected regarding general socio-demographic characteristics and recreation participant patterns of subjects.

DESCRIPTION OF HUMAN SUBJECTS:

The study population includes all residents of the Municipality of Anchorage, Alaska. The sample will be drawn from a list of registered voters in the Municipality, recently obtained by Alaska Department of Fish and Game. The sampling goal is 1,000 residents, which should provide sufficient sub-samples to assess differences in responses between several groups (trail users and non-trail users, people who live in low and high density housing areas, hunters and non-hunters, long time and short-time residents and so forth). Based on previous survey efforts by ADF&G using voter registration lists, we expect a 20 percent undeliverable rate and a 60 percent response rate using standard three wave mail survey techniques (see below). This means we will need an initial sample frame of about 2,200 from the voter registration lists. ADF&G staff will draw this sample.

DESCRIBE THE RESEARCH INCLUDING PROCEDURES TO BE FOLLOWED WITH SUBJECTS:

The data will be collected by a mail-out survey. The instrument (attached) was developed in cooperation with members of the Anchorage Wildlife Study Team consisting of ADF&G personnel, CSU researchers, and other agency staff from Chugach State Park, the Municipality of Anchorage, and the two Anchorage military bases.

Items in the survey instrument have been extensively used in previous surveys and they were also pre-tested for this study effort. Question format and specific items follow from a prominent human dimensions in natural resources theoretical perspective for exploring basic wildlife beliefs, value orientations, attitudes, and norms. The pre-test effort included a sample of 30 Anchorage residents; most were ADF&G clerical staff and they all participated voluntarily. Friends of CSU researchers and ADF&G staff also participated in the pre-test. Pre-testing indicated that none of the questions were viewed as sensitive or burdensome. Pre-test data was not coded and had no names attached to the survey forms. Additional details about the theoretical approach and development of survey items is available in the attached study proposal.

Data collection will be jointly conducted by CSU and ADF&G. ADF&G will draw the sample from voter registration lists it has already obtained, and provide the names and addresses to CSU researchers. CSU will administer the mailings, coding, analysis, and report writing. Subsequent to the study, the data will be available to the public in accordance with Alaska State Law; all connections between data and the names and addresses of respondents will be severed by the time the data is made available to ADF&G or the public.

Respondents, the human subjects, will receive an initial mailing with the survey instrument and a cover letter, along with a self-addressed, stamped envelope in which to return the completed survey. A reminder postcard and two additional surveys with

cover letters will be sent to those who do not return the initial survey. These reminder postcards and letters will be sent ten days, one month, and one and a half months from the initial mailing. Copies of the cover letters and postcard reminder are also attached. Cover letters stress the voluntary nature of the survey, and state that answers will never be associated with their names. At the request of ADF&G, CSU involvement in the project is not being specified in the cover letters; the agency feels that response rates will be higher emphasizing Anchorage and Alaska agency sponsorship and administration.

Identification numbers will be printed on the return envelopes so researchers will know who to send reminder letters. Once that information is recorded, surveys will be removed from the envelopes and identification numbers will be disassociated from individual surveys. With this procedure, data will never be able to be associated with individual names or addresses, so full confidentiality of results is assured.

WILL BLOOD OR OTHER BIOLOGICAL SAMPLES BE TAKEN? No.

DESCRIBE AND ASSESS ANY POTENTIAL RISKS:

There are no known physical, psychological, or legal risks associated with responding to this survey effort.

ASSESS THE POTENTIAL BENEFITS TO BE GAINED:

Subjects participating in this study will help guide wildlife authorities' responses to wildlife problems in Anchorage. Participants will benefit from management agencies that are more aware of their own beliefs, attitudes, and preferences, which are likely to lead to more proactive and sensitive wildlife management decision-making. Subjects may also benefit indirectly by simply fulfilling a participatory role in government.

Anchorage residents at large will similarly benefit from having wildlife authorities understand their beliefs, attitudes, and preferences regarding wildlife issues and various management alternatives. The study will provide several kinds of information relevant to wildlife management planning in Anchorage, as discussed briefly below.

Information about wildlife values to help define plan goals

Goal setting is a key step in any planning process, and represents the clarification and expression of human values. The study will assist in this step by identifying wildlife value orientations: whether people feel positively or negatively toward animal use, animal rights, hunting, fishing, bequest and existence value, residential wildlife experiences, recreational wildlife experiences, and wildlife education. These measures then allow the application of cluster analytic techniques to identify distinct segments of the public that have orientations toward animal use (hunting and fishing), animal rights, a combination of these values, or those with low

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Information about wildlife problems and opportunities

A second step in many rational planning processes involves clarifying problems, and in a more proactive sense, identifying opportunities. This could include identifying the intensity of issues, describing the extent and severity of existing and potential problems, and determining the basis of potential conflicts. The study can assist in this step by measuring broad public attitudes toward various wildlife species and potential problems, suggesting the extent to which the Anchorage residents feel positively or negatively toward particular species such as moose and bear, and the problems or benefits each creates. For example, recent fatal encounters with moose and bears may have heightened concern about these wildlife encounters; this study will explore the extent to which that concern has penetrated the general population.

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DESCRIBE CONSENT PROCEDURES TO BE FOLLOWED.

Informed consent will be obtained by respondents through the act of returning the survey. People who do not consent to participation in the study will simply not fill out or return it. The survey is innocuous, anonymous, and voluntary. The cover letters attached stress the voluntary nature of survey participation.

DESCRIBE THE CONFIDENTIALITY SAFEGUARDS:

As discussed above, confidentiality is assured by the survey administration procedures. While names and addresses will have identification numbers associated with them as the survey is being administered, once a survey is returned, those identification numbers will be disassociated from the instrument. Identification numbers will never be placed on the individual surveys; they will only be placed on the envelopes in which they are returned. Data entered into the computer will never have a name and address associated with it.

LOCATION OF RESEARCH PROJECT:

Returned surveys will mailed to researchers at CSU. Data will be coded and analyzed at offices in the Forestry building.

I certify that the preceding information is an accurate description of the research to be conducted using human subjects.

Principal Investigator Date

I understand that my signature certifies that I have read and approve of this research.

Department Head Date

APPENDIX B

ADDITIONAL INFORMATION ABOUT SURVEY METHODS

The following appendix includes methods descriptions excerpted and paraphrased from the Anchorage Wildlife Study reference report (Whittaker & Manfredo, 1997).

Mail Survey Instrument Development

An initial public workshop was conducted in the winter of 1996 to identify topics of concern. The survey instrument was developed in cooperation with members of the Anchorage Wildlife Study Team consisting of ADF&G personnel, Colorado State University researchers, and other area agency staff (e.g., Chugach State Park, City of Anchorage, BLM Campbell Tract, and military base staff). Instrument development was guided by a variety of methods established in previous research; specific theoretical and methodological traditions that suggested question formats and response options are discussed as results are presented.

Mail Survey Sampling Frame and Data Collection

Data were collected through a mailed survey to a random sample of Anchorage residents. The sample was developed from purchased voter registration lists. A total of 2,200 residents were in the initial sample frame; 24.8% of the surveys were undeliverable, resulting in an effective mailing of 1,654 surveys (see Table B-1). A

postcard reminder and two subsequent mailings with additional surveys were sent to non-respondents to encourage them to participate.

Table B-1. Summary of sampling frame and response rate.

	Number	Percent
Initial sampling frame	2,200	100
Undeliverable addresses	546	24.8
Valid addresses	1,654	75.2
Effective mailing list	1,654	100
Returned surveys before 3/20	971	58.7
Returned surveys after 3/20 (not used in analysis)	18	1.1
Non-respondents	665	40.2

A total of 971 completed, usable surveys were returned, for an overall response rate of 58.7%. The sample size, by design, is large enough to provide population and several sub-group estimates at the $\pm .05$ interval level at with a 95 percent confidence level.

Non-Response Check

A telephone non-response check was conducted among non-respondents with listed phone numbers. A total of 294 numbers were identified, contact was made with 139 non-respondents, of which 76.9% completed the follow-up survey. Results suggest there were some differences between respondents and non-respondents, but the magnitude of these differences was small. Similarly, a comparison of the percentage of male and female survey respondents with Anchorage census data suggested only minor differences. Taken together, this information led us to conclude that it was unnecessary to weight the data in order to adjust for non-response bias. Details about the telephone

non-response check, as well as information about gender and a comparison of census information, are available in Whittaker & Manfredo (1997).

Telephone Sample

At the start of the phone survey effort, there were approximately 850 non-respondents to the mail survey. Using the current Anchorage phone listings, we were only able to positively identify phone numbers for a subset of these non-respondents. Positive identification required a single current phone listing with a matching address, first name, or initials for the respondent, and was difficult because many people have unlisted phone numbers, have chosen not to list their first names or addresses, or have listed their numbers under a spouse's name which we did not know. In all, we were able to identify phone numbers for 294 non-respondents, or 35% of all non-respondents.

This sample is susceptible to a gender bias, since men are more likely than women to list their full names and addresses, and because women are more likely to be listed under their husband's name than the converse. Accordingly, comparisons between respondents and non-respondents were adjusted by gender to match proportions in the mail survey sample.

Survey Procedures and Call Outcomes

The telephone non-response check was conducted from February 23 to March 2, 1997 by trained interviewers. The survey was conducted using QPL software; interview outcomes were also recorded. Each non-respondent and associated phone number were called a minimum of three times if a completed interview or other terminal outcome was not recorded. Call outcomes are summarized in below in Table B-2.

Table B-2. Call outcomes during telephone survey non-response check.

	Number	Percent
Respondents with identifiable phone numbers	294	100
Respondents contacted	139	47
Respondents unable to be contacted	155	53
Outcomes of contacts	139	100
Outright refusals	25	18
Refused because recently mailed back survey	4	3
Refused due to language barrier	3	2
Total completions	107	77
Reasons for non-contacts	155	100
No answer/busy	18	12
Respondent not home	11	7
Answering machine/fax	47	30
Moved or deceased (subtract from mailed deliverables)	66	43
Wrong number, assumed moved (subtract from mailed deliverables)	13	8

Survey Instrument

The telephone survey non-response check was considerably shorter than the mailed survey (see Appendix C), focusing on four key questions that would help suggest whether there were overall differences between respondents and non-respondents. The choice of questions was primarily based on a preliminary analysis of variables related to a proposed controlled moose hunt in Anchorage, one of the major issues addressed by the study. Concern over response burden also influenced question choice (limiting choices to less complicated questions); minimizing response burden is a major issue in non-response checks because the sample includes people who have already refused to complete mailed surveys after three reminders.

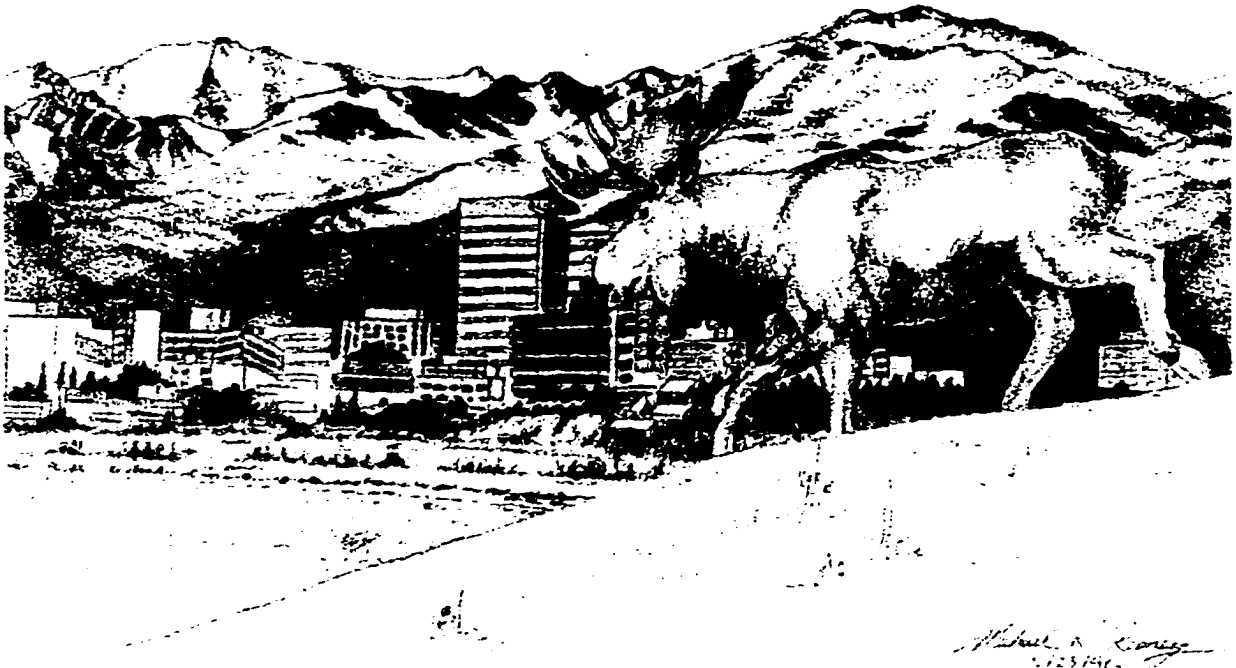
The interview format used in the non-response check is given in Appendix C. Questions and prefaces to the questions were designed to mimic those in the mailed survey. Some minor language changes, however, were required to make the phone survey language more verbally concise and understandable. The phone survey also began with simpler questions first, which required a change in question order from the mail survey which asked hunting and wildlife viewing questions at the end.

Analysis Strategies

A variety of analysis strategies were used to explore data from the survey. This report focuses largely on descriptive statistics (frequencies, means, and so on) presented in graphic and tabular form; the goal was to summarize Anchorage residents' opinions on a variety of wildlife issues. In a number of cases, however, analysis involved comparing sub-groups on particular variables, creating multiple-item variables to explore latent or underlying constructs (attitudes, basic wildlife beliefs, and value orientations), factor analyses to explore how variables group together, cluster analyses to explore how respondents group together, or regression models to suggest relationships between variables. An effort has been made to summarize findings from these analyses rather than presenting all their details. Readers with statistics expertise will find various statistics reported along with significance levels, but further information about the analyses has been limited.

**APPENDIX C:
SURVEY INSTRUMENTS**

Living with Wildlife in Anchorage A Survey of Public Opinion



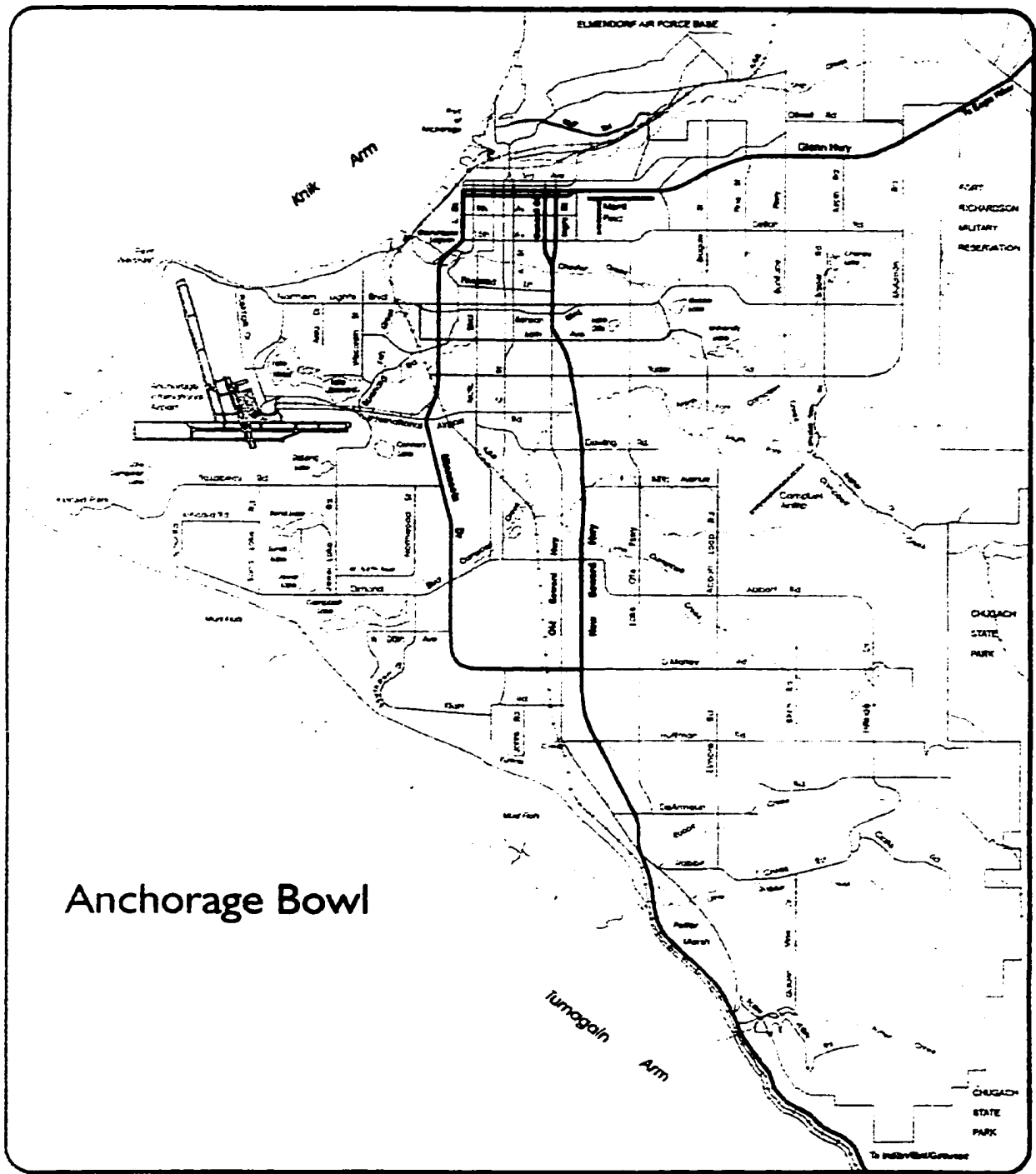
Wildlife provides a variety of benefits to Anchorage residents, but it can also cause some problems. In order to manage wildlife in the city, authorities need good information about how people feel about wildlife or wildlife problems. This survey is designed to collect this type of information.

While your participation in this survey is voluntary, we would appreciate your help.

It is important that the survey is completed by the person to whom it was addressed. We are interested in what you believe; don't ask other people for their opinions. The best answers are the ones that most closely reflect your own feelings and beliefs.

Please answer all the questions in the survey. It takes about twenty minutes to complete. When you are finished, place the survey in the stamped, self-addressed envelope provided and mail it back to us.

Thank you for your participation.



Section A. Your residence in the Municipality of Anchorage and Alaska

- On the map on the facing page, please mark the area where you live with an **X** about this size. If you live in an area that is not on the map, check the place from the list below:

☐ Eagle River	☐ Chugiak/Birchwood/Peters Creek	☐ Fort Richardson
☐ Indian / Bird	☐ Girdwood	☐ Other (specify) _____
- How many years have you lived in your neighborhood, the Municipality of Anchorage, and Alaska?

_____ years in your neighborhood

_____ years in the Municipality of Anchorage

_____ years in Alaska
- Have you ever lived in another part of Alaska (outside the Municipality of Anchorage)? *Check all that apply.*

☐ No
☐ Yes, in Fairbanks, Juneau, Palmer/Wasilla, or Kenai/Soldotna
☐ Yes, in other cities, towns, or villages accessible by paved roads
☐ Yes, in "bush Alaska"
- How close do you live to a large undeveloped area frequented by wildlife (like parks or greenbelts)?

☐ Very close (within one or two blocks)
☐ Close (within about five blocks)
☐ Not very close (further than five blocks)

Section B. Your beliefs about wildlife (including all wild birds and mammals)

The following statements reflect different beliefs people have about wildlife. Please indicate the extent to which you agree or disagree with each. Circle one number for each statement. If you don't agree or disagree with a statement, circle "no opinion." While some statements may appear similar, we would like you to respond to all of them. Beliefs are complex and need to be measured from many angles.

	Strongly Agree	Moderately Agree	Slightly Agree	No Opinion	Slightly Disagree	Moderately Disagree	Strongly Disagree
We should be sure future generations of Alaskans will have an abundance of wildlife.	1	2	3	4	5	6	7
I enjoy watching wildlife when I take a trip outdoors.	1	2	3	4	5	6	7
Humans should manage wild animal populations so that humans benefit.	1	2	3	4	5	6	7
Hunting helps people enjoy the outdoors in a positive way.	1	2	3	4	5	6	7
I'm interested in making the area around my home attractive to wildlife.	1	2	3	4	5	6	7
Although wildlife may have certain rights, most needs that people have are more important than the rights of wildlife.	1	2	3	4	5	6	7
It is important that we learn as much as we can about wildlife.	1	2	3	4	5	6	7
People should not treat wildlife in ways that may cause pain and suffering, regardless of how much we may benefit.	1	2	3	4	5	6	7
I take pride in the amount of wildlife in the Anchorage area, even if they cause some problems or hazards.	1	2	3	4	5	6	7

Section B. Your beliefs about wildlife (continued)

	Strongly Agree	Moderately Agree	Slightly Agree	No Opinion	Slightly Disagree	Moderately Disagree	Strongly Disagree
Some of my most memorable outdoor experiences occurred when I saw wildlife I didn't expect to see.	1	2	3	4	5	6	7
Hunting is cruel and inhumane to animals.	1	2	3	4	5	6	7
I notice the moose, birds, and other wildlife around me every day.	1	2	3	4	5	6	7
The needs of people are always more important than any rights that wildlife may have.	1	2	3	4	5	6	7
It is acceptable for human use to cause the loss of some individual animals as long as animal populations are not jeopardized.	1	2	3	4	5	6	7
Hunting helps people appreciate wildlife and natural processes.	1	2	3	4	5	6	7
While moose cause some problems, these problems make life in Anchorage seem more interesting and special.	1	2	3	4	5	6	7
Having wildlife around my home is important to me.	1	2	3	4	5	6	7
I enjoy learning about wildlife.	1	2	3	4	5	6	7
It is important for humans to manage the populations of wild animals.	1	2	3	4	5	6	7
An important part of my community is the wildlife I see there from time to time.	1	2	3	4	5	6	7
It is important to maintain wildlife so that future generations can enjoy them.	1	2	3	4	5	6	7
The possibility of encountering a brown bear is a positive aspect of living in the Anchorage area.	1	2	3	4	5	6	7
It is important that all Alaskans have a chance to learn about wildlife in the state.	1	2	3	4	5	6	7
Hunting makes people insensitive to suffering.	1	2	3	4	5	6	7
The rights of people and the rights of wildlife are equally important.	1	2	3	4	5	6	7
The opportunity to see wildlife is one of the reasons I take trips outdoors (like camping, hiking, or sightseeing).	1	2	3	4	5	6	7
It's important to know that there are healthy populations of wildlife in Alaska.	1	2	3	4	5	6	7
I would be offended or upset if I saw an animal killed or injured by a hunter.	1	2	3	4	5	6	7
If we can't minimize the pain and suffering caused to wildlife by an activity, then we should not allow that activity.	1	2	3	4	5	6	7

Section B. Your beliefs about wildlife (continued)

	Strongly Agree	Moderately Agree	Slightly Agree	No opinion	Slightly Disagree	Moderately Disagree	Strongly Disagree
If animal populations are not threatened, we should use wildlife to add to the quality of life.	1	2	3	4	5	6	7
While some wildlife encounters can be dangerous, they make life in Anchorage more interesting and special.	1	2	3	4	5	6	7
Use of wildlife is okay as long as we try to minimize the pain and suffering of individual animals.	1	2	3	4	5	6	7
Whether or not I get out to see wildlife as much as I like, it is important to know they exist in Alaska.	1	2	3	4	5	6	7
In general, I think hunting is a safe outdoor activity.	1	2	3	4	5	6	7
People who live in the Anchorage area should learn to live with some conflicts or problems with wildlife.	1	2	3	4	5	6	7

Section C. Your experiences with wildlife

Please check any of the following experiences you have personally had with moose, bears, or geese. *Check all that apply.*

1. Experiences with moose. I have.....
 - ☐ ...enjoyed watching moose in the Anchorage area.
 - ☐ ...driven or been a passenger in a vehicle that had to swerve or brake to avoid hitting a moose.
 - ☐ ...driven or been a passenger in a vehicle that has hit a moose.
 - ☐ ...had moose eat trees, shrubs, or gardens in my yard.
 - ☐ ...been charged by a moose in my yard or neighborhood.
 - ☐ ...been charged by a moose on a trail in the Anchorage area.
 - ☐ ...had a pet injured or killed by a moose.
2. Experiences with bears. I have.....
 - ☐ ...seen a bear in my Anchorage neighborhood.
 - ☐ ...seen a bear in Alaska.
 - ☐ ...taken trips specifically to view bears in Alaska.
 - ☐ ...had a close encounter with a bear in Alaska.
 - ☐ ...had bears eat or get into my garbage at my home in the Anchorage area.
 - ☐ ...had bears damage my Anchorage area property (breaking into sheds, damaging doors, and so on).
 - ☐ ...had a pet injured or killed by a bear.
3. Experiences with Canada geese. I have.....
 - ☐ ...enjoyed watching Canada geese in Anchorage.
 - ☐ ...fed geese in Anchorage.
 - ☐ ...driven or been a passenger in a vehicle that has hit a Canada goose in Anchorage.
 - ☐ ...driven or been a passenger in a vehicle that had to swerve or brake to avoid hitting geese in Anchorage.
 - ☐ ...had geese eat my lawn and leave a lot of droppings.
 - ☐ ...used playing fields or golf courses that were covered with goose droppings.
4. If you encountered an aggressive moose at close range (less than twenty feet), what would you do?
Please be brief.
5. If you encountered an aggressive brown bear (grizzly) at close range (less than twenty feet), what would you do?

Section D. Wildlife encounter situations

PLEASE READ BEFORE ANSWERING MORE QUESTIONS

This section contains a series of questions about 14 hypothetical wildlife-human situations in Anchorage involving moose or bears. For each situation, please rate the acceptability of management actions that might be used to address the situation. The actions include:

- **Offer advice and monitor the situation.** Authorities take no immediate action toward the animal, but monitor the situation and provide information to the public about how to protect themselves, their families, pets, or property. This could include posting warning signs. As the situation develops, however, authorities might need to take further action.
- **Close the area until the animal has left.** For situations in city or state parks, authorities close the area where a problem has occurred until a bear or moose is believed to have left.
- **Capture and relocate.** Authorities try to capture and relocate the animal away from Anchorage. This action can be successful, but it has some drawbacks. Relocated animals sometimes die, they may cause problems at their new locations, or they may return to Anchorage. When an animal stays away, a new one often takes its place. Relocation is also very expensive.
- **Frighten the animal away.** Authorities try to frighten the animal from the immediate area with fireworks or rubber bullets. This can be successful, and can help teach wild animals to be wary of humans, but it also has some drawbacks. Usually the animal is only frightened away for a short time. If the animal stays away, a new one usually takes its place.
- **Destroy the animal.** Authorities destroy the problem animal. This approach prevents further problems with the individual animal, but it also has some drawbacks. It results in the death of a bear or moose, and a new bear or moose usually moves into the territory.

Even though it may seem unlikely that some of these situations could occur where you live, please answer all the questions. There are no right or wrong answers; circle the response that best represents your feelings.

Situation 1. Over a two week period, several people report seeing a brown bear (grizzly bear) along a popular hiking trail in Chugach State Park near Anchorage.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Do nothing	1	2	3	4	5	6	7
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the area until the bear has left	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

Situation 2. A moose has been seen in your neighborhood for several weeks one fall, and has been eating people's shrubs, young trees, and gardens.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Capture and relocate the moose	1	2	3	4	5	6	7
Frighten the moose away	1	2	3	4	5	6	7
Destroy the moose	1	2	3	4	5	6	7

Situation 3. A person in your neighborhood leaves for work one winter morning, not realizing a moose is in the yard. The moose charges and tramples the person, resulting in the person's death.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Capture and relocate the moose	1	2	3	4	5	6	7
Frighten the moose away	1	2	3	4	5	6	7
Destroy the moose	1	2	3	4	5	6	7

Situation 4. A brown bear (grizzly bear) is seen feeding on a moose carcass about two miles up a popular hiking trail in Chugach State Park near Anchorage.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Do nothing	1	2	3	4	5	6	7
Offer advice/monitor the situation	1	2	3	4	5	6	7
Remove the moose carcass and close the area for about a week	1	2	3	4	5	6	7
Do not remove the moose carcass and close the area for several weeks	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

Situation 5. A bear has killed several pets in your neighborhood over a period of two weeks one summer.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
<i>Pet owners</i> involved in the situations	1	2	3	4
The <i>individual bear</i> who has killed several pets	1	2	3	4
<i>Wildlife authorities</i> for not controlling bear populations	1	2	3	4

Situation 6. A moose is standing within thirty feet of a group of elementary school children in your neighborhood one winter morning. The moose refuses to move and the children are unable to pass by.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Capture and relocate the moose	1	2	3	4	5	6	7
Frighten the moose away	1	2	3	4	5	6	7
Destroy the moose	1	2	3	4	5	6	7

Situation 7. Over a two week period, several people report seeing a brown bear (grizzly bear) roaming your neighborhood.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Do nothing	1	2	3	4	5	6	7
Offer advice/monitor the situation	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

Situation 8. On a summer day, a hiker encounters a bear coming out of thick brush onto a trail near Anchorage in Chugach State Park. The bear charges and knocks down the hiker, causing minor injuries, but then leaves the immediate area.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the general area until the bear has left	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
The hiker involved in the situation	1	2	3	4
Wildlife authorities for not controlling bear populations	1	2	3	4
The individual bear who has charged the hiker	1	2	3	4

Situation 9. A moose has charged several cross country skiers on a popular ski trail. Although the moose has not made contact with any skiers, there have been several close calls.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Do nothing	1	2	3	4	5	6	7
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the area until the moose leaves	1	2	3	4	5	6	7
Capture and relocate the moose	1	2	3	4	5	6	7
Frighten the moose away	1	2	3	4	5	6	7
Destroy the moose	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
Trail managers who didn't close the trail after the first incidents	1	2	3	4
The individual moose who charged several skiers	1	2	3	4
Wildlife authorities for not controlling moose populations	1	2	3	4
The skiers involved in the encounters	1	2	3	4

Situation 10. A black bear has been repeatedly seen in your neighborhood for over two weeks. The bear has been seen on people's decks, eating pet food, and getting into garbage. The bear does not seem to be afraid of people or dogs.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
The individual bear who has been on decks, eating pet food, or getting into garbage	1	2	3	4
Wildlife authorities for not controlling bear populations	1	2	3	4
Residents involved in the situations	1	2	3	4

Situation 11. On a fall day, a hiker encounters a bull moose coming out of thick brush onto a trail near Anchorage in Chugach Park. The moose charges and knocks down the hiker, causing minor injuries, but then leaves the immediate area.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Do nothing	1	2	3	4	5	6	7
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the area until the moose leaves	1	2	3	4	5	6	7
Capture and relocate the moose	1	2	3	4	5	6	7
Frighten the moose away	1	2	3	4	5	6	7
Destroy the moose	1	2	3	4	5	6	7

Situation 12. On a fall day, a person picking berries encounters a bear about two miles up a trail near Anchorage in Chugach State Park. The bear charges and mauls the person, resulting in the person's death.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the general area until the bear has left	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
The <i>person</i> involved in the situation	1	2	3	4
The <i>individual</i> bear who charged and mauled the person	1	2	3	4
<i>Wildlife authorities</i> for not controlling bear populations	1	2	3	4

Situation 13. A bear has killed a person as described in Situation 12, only this time the person happened to get between a mother bear and her cubs.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the general area until the bear has left	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
Wildlife authorities for not controlling bear populations	1	2	3	4
The person involved in the situation	1	2	3	4
The individual bear who charged and mauled the person	1	2	3	4

Situation 14. A bear with no cubs has killed a person as described in Situation 12, only this time the bear has a history of aggressive behavior towards people.

1. How acceptable or unacceptable is it for authorities to take the following actions? *Circle one number for each action.*

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptable	Moderately Unacceptable	Highly Unacceptable
Offer advice/monitor the situation	1	2	3	4	5	6	7
Close the general area until the bear has left	1	2	3	4	5	6	7
Capture and relocate the bear	1	2	3	4	5	6	7
Frighten the bear away	1	2	3	4	5	6	7
Destroy the bear	1	2	3	4	5	6	7

2. Without learning more detail about this situation, who do you assume is responsible for causing it?

	None of the responsibility	Some of the responsibility	Most of the responsibility	All of the responsibility
The individual bear who charged and mauled the person	1	2	3	4
Authorities who did not deal with the bear earlier	1	2	3	4
The person involved in the situation	1	2	3	4
Wildlife authorities for not controlling bear populations	1	2	3	4

Section E. Acceptability of other management actions

The following questions ask you to rate the acceptability of general actions that might be used to manage wildlife populations. Please circle one number for each.

	Highly Acceptable	Moderately Acceptable	Slightly Acceptable	No Opinion	Slightly Unacceptabl e	Moderately Unacceptable	Highly Unacceptabl e
Hold public hunts near Anchorage to reduce the number of....							
.....moose	1	2	3	4	5	6	7
.....geese	1	2	3	4	5	6	7
.....brown bears	1	2	3	4	5	6	7
.....black bears	1	2	3	4	5	6	7
Have wildlife authorities destroy some animals in Anchorage (and donate the meat to charity) to reduce the number of.....							
.....moose	1	2	3	4	5	6	7
.....geese	1	2	3	4	5	6	7
.....brown bears	1	2	3	4	5	6	7
.....black bears	1	2	3	4	5	6	7
Issue permits.....							
.....to residents to trap and destroy beavers who damage their private property.	1	2	3	4	5	6	7
.....to residents to trap problem geese on private property and deliver them to authorities.	1	2	3	4	5	6	7
Have authorities.....							
.....harass and, if necessary, shoot geese near airports to reduce risk of aircraft accidents.	1	2	3	4	5	6	7
.....fill wetlands near airports used by nesting geese and other animals to reduce the number of geese and the risk of aircraft accidents.	1	2	3	4	5	6	7
Have authorities permanently reduce the number of geese in Anchorage (by up to one-half), to reduce the risk of aircraft accidents by.....	1	2	3	4	5	6	7
.....destroying eggs in nests.	1	2	3	4	5	6	7
.....allowing some people to gather eggs for food.	1	2	3	4	5	6	7
.....shooting geese and donating the meat to charity.	1	2	3	4	5	6	7
.....moving geese out of town every summer (although many will return).	1	2	3	4	5	6	7
Enact a law that fines people who don't keep garbage and dog food away from bears.	1	2	3	4	5	6	7

Section F. Acceptability of a controlled moose hunt near Anchorage

Some people have suggested having a moose hunt in Chugach State Park near Anchorage to provide accessible hunting opportunities and help reduce problems with moose. A brief description of a potential hunt is given below. Please read this and answer the following questions.

Description of a Potential Moose Hunt near Anchorage

- The hunt would be held in specific areas in Chugach State Park at least one half-mile from trailheads or residential areas.
- Hunters would be required to use shotguns with slugs or a muzzle-loading rifle; both have short ranges.
- About 40 hunters would get to participate; they would have to pass a proficiency test and attend a hunter education class.
- Hunting would be monitored by agency staff during the hunt; the entire moose would have to be removed from the park.
- The hunt would be limited to cows and young bulls to reduce winter moose populations in Anchorage.

1. Please tell us whether you think this hunt is likely or unlikely to cause the following outcomes. Circle one number.

This hunt will....	Extremely Likely	Moderately Likely	Slightly Likely	No Opinio n	Slightly Unlikely	Moderately Unlikely	Extremely Unlikely
.....reduce the number of accidents involving moose.	3	2	1	0	-1	-2	-3
.....reduce the number of potentially dangerous encounters between people and moose.	3	2	1	0	-1	-2	-3
.....keep moose from becoming overpopulated.	3	2	1	0	-1	-2	-3
.....permanently reduce the number of moose in Anchorage.	3	2	1	0	-1	-2	-3
.....provide more opportunities for Anchorage moose hunters.	3	2	1	0	-1	-2	-3
.....injure a hunter or someone else.	3	2	1	0	-1	-2	-3
.....cost a lot to administer.	3	2	1	0	-1	-2	-3
.....generate a lot of conflict between people who favor and oppose the hunt.	3	2	1	0	-1	-2	-3
.....prevent non-hunters from using the area.	3	2	1	0	-1	-2	-3
.....eventually eliminate moose in some Anchorage areas.	3	2	1	0	-1	-2	-3
.....hurt my chances of seeing moose as often as I like.	3	2	1	0	-1	-2	-3

2. Please tell us whether you think each of these outcomes is good or bad. Circle one number for each.

	Extremely Good	Moderately Good	Slightly Good	No Opinio n	Slightly Bad	Moderately Bad	Extremely Bad
Reducing the number of accidents involving moose is.....	3	2	1	0	-1	-2	-3
Reducing the number of potentially dangerous encounters between people and moose is.....	3	2	1	0	-1	-2	-3
Keeping moose from becoming overpopulated is.....	3	2	1	0	-1	-2	-3
Reducing the number of moose in Anchorage is.....	3	2	1	0	-1	-2	-3
Providing more opportunities for moose hunters is.....	3	2	1	0	-1	-2	-3
Holding a hunt that might injure someone else is.....	3	2	1	0	-1	-2	-3
A hunt that costs a lot to administer is.....	3	2	1	0	-1	-2	-3
A hunt that generates a lot of conflict between people who favor and oppose the hunt is.....	3	2	1	0	-1	-2	-3
A hunt that prevents non-hunters from using the area is.....	3	2	1	0	-1	-2	-3
Eventually eliminating moose in some Anchorage areas is.....	3	2	1	0	-1	-2	-3
Being able to see moose as often as I like is.....	3	2	1	0	-1	-2	-3

3. If there was a vote on this hunt as described above, would you be likely to vote for or against the hunt?

Check only one.

☐ For the hunt

☐ Against the hunt

☐ Not sure or no opinion

Section G. Some final questions about wildlife issues

1. Increased lighting, moose fences, and moose underpasses along the highway between Anchorage and Eagle River have dramatically reduced moose accidents there. Similar efforts could be made along other roads, but this would be costly. Would you be willing to pay an increase of \$10 per year for each vehicle you have registered in Anchorage if the money was used to increase lighting and build moose fences along Anchorage roads? *Check one response.*

☐ Yes.....SKIP TO QUESTION 3
☐ No

2. Please check any of the following reasons that help explain why you would **not** be willing to pay this vehicle registration fee increase. *Check all that apply.*

☐ Because I don't think the moose accident problem is severe enough.
☐ Because a fee increase of \$10 per vehicle per year is too high.
☐ Because I don't trust the government to use the money wisely or efficiently.
☐ Because I oppose increases in vehicle registration fees or other taxes in general.
☐ Because I drive safely and won't hit a moose, so the program would not help me.

3. About how often do you see moose in your neighborhood in an average winter, and how often would you like to see them? *Check one response for each column.*

	I see moose in my neighborhood.....	I would like to see moose in my neighborhood.....
Never	☐	☐
Rarely (a few times each winter)	☐	☐
Occasionally (a few times per month)	☐	☐
Frequently (a few times per week)	☐	☐
Very frequently (daily or almost daily)	☐	☐
It doesn't matter to me		☐

4. In general, do you think there are an acceptable number, too many, or way too many of the following incidents in the Anchorage area? *Circle one number or check "it doesn't matter" for each item.*

	An acceptable number	Too many	Way too many	It doesn't matter to me
Vehicle accidents involving moose	1	2	3	☐
Moose deaths caused by vehicle accidents	1	2	3	☐
Close encounters between moose and people on park trails	1	2	3	☐
Close encounters between moose and people in neighborhoods	1	2	3	☐
Incidents where moose eat people's gardens or young trees	1	2	3	☐
Close encounters between bears and people on park trails	1	2	3	☐
Close encounters between bears and people in neighborhoods	1	2	3	☐
Incidents where bears get into people's garbage	1	2	3	☐

5. In general, do you think there are too few, about the right amount, or too many moose, bears, or Canada geese in Anchorage. *Circle one number or check "it doesn't matter" for each species.*

	Way too few	Too few	About the right amount	Too many	Way too many	It doesn't matter to me
Moose	1	2	3	4	5	☐
Brown bears	1	2	3	4	5	☐
Black bears	1	2	3	4	5	☐
Canada geese	1	2	3	4	5	☐

Section H. Questions about you

1. Please check each of the following activities that you do several times per month in season.
 - ☐ Walking on Anchorage area trails (like the Coastal Trail, Chester Creek Trail, and so on).
 - ☐ Jogging, running, bicycling, or in-line skating on Anchorage area trails.
 - ☐ Cross country skiing on Anchorage area trails.
 - ☐ Day hiking on backcountry trails near Anchorage (like those in Chugach State Park).
2. Please check each of the following activities that you do several times per year. *Check all that apply.*
 - ☐ Camping in developed campgrounds in Alaska.
 - ☐ Camping in backcountry areas in Alaska.
 - ☐ Taking trips in Alaska for the primary purpose of viewing or photographing wildlife.
 - ☐ Fishing in road-accessible areas in Alaska.
 - ☐ Fishing in backcountry areas in Alaska (access by plane, motorboat, float boat, four-wheeler, or on foot).
3. Do you hunt? ☐ No ☐ Yes ☐ Not now, but I used to....
4. Are you a member of any environmental, conservation, fishing, hunting, or animal rights or animal welfare organizations? *Please check any that apply, and write the name of the organization(s).*
 - ☐ Environmental or conservation organizations _____
 - ☐ Fishing or hunting organizations _____
 - ☐ Animal rights or animal welfare organizations _____
5. What is your age? _____ years old
6. What gender are you? *Check one.* ☐ Male ☐ Female
7. Do you have any children younger than 12 living in your household? ☐ No ☐ Yes
8. Do you commute to work further than five miles (one way)? ☐ No ☐ Yes
9. Is your yard a half-acre in size or larger? ☐ No ☐ Yes
10. How much formal education have you completed? *Check one response.*

☐ Grade school	☐ Some college
☐ Some high school	☐ College degree
☐ High school degree	☐ Some graduate school
☐ Technical / vocational school	☐ Graduate degree
11. Which of the following best describes your ethnic background? *Check one response.*

☐ White or Caucasian	☐ Hispanic or of Spanish origin
☐ Native American or American Indian	☐ Asian or Pacific Islander
☐ Black or African-American	☐ Other _____
12. In what size of town did you primarily grow up? *Check one response.*
 - ☐ Rural area
 - ☐ Small town (less than 5,000 people)
 - ☐ Small city (5,000 to 50,000 people)
 - ☐ Large city (over 50,000 but less than 300,000 people)
 - ☐ Very large city (300,000 or more people)
 - ☐ Suburb of a large or very large city
 - ☐ I did not grow up in a particular size of city (I lived in many)

Thanks very much for participating in this survey.

NON-RESPONSE CHECK PHONE SURVEY

Hello, may I speak to _____. Hello, Mr./Ms. _____, my name is _____. I'm calling for the Anchorage Wildlife Study and the Department of Fish and Game. A month or so ago we mailed you a questionnaire about wildlife in Anchorage, and we have not received it back. We're sorry to have to bother you again, but we are very interested in your opinions. If you could answer just four quick questions over the phone, you would really help us out. All your answers will be kept confidential.

IF YES...

...Thank you.

IF NO...

...Sorry to disturb you, have a good evening.

IF HE/SHE RETURNED QUESTIONNAIRE...

...Thanks for your help, sorry for the mix-up, good-night.

IF RESPONDENT IS UNKNOWN OR NO LONGER AT NUMBER...

...Sorry for the mix-up, good-night.

1. Do you hunt?
(You can answer "yes," "no" or "no, but I used to")

YES

NO

NO, BUT I USED TO...

REFUSED TO ANSWER

2. Do you take trips in Alaska for the primary purpose of viewing or photographing wildlife?

YES

NO

REFUSED TO ANSWER

The final two questions concern hunting.

3. In general, do you agree or disagree that hunting is a safe outdoor activity? Is that strongly, moderately, or slightly (agree/disagree)?

STRONGLY AGREE

MODERATELY AGREE

SLIGHTLY AGREE

SLIGHTLY DISAGREE

MODERATELY DISAGREE
STRONGLY DISAGREE
REFUSED TO ANSWER

4. **And finally: In general, how acceptable is a public hunt near Anchorage to reduce the number of moose? Is that highly, moderately, or slightly (acceptable/unacceptable)?**

HIGHLY ACCEPTABLE
MODERATELY ACCEPTABLE
SLIGHTLY ACCEPTABLE
SLIGHTLY UNACCEPTABLE
MODERATELY UNACCEPTABLE
HIGHLY UNACCEPTABLE
REFUSED TO ANSWER

That's all; thanks again for your help. Good-night.

APPENDIX D

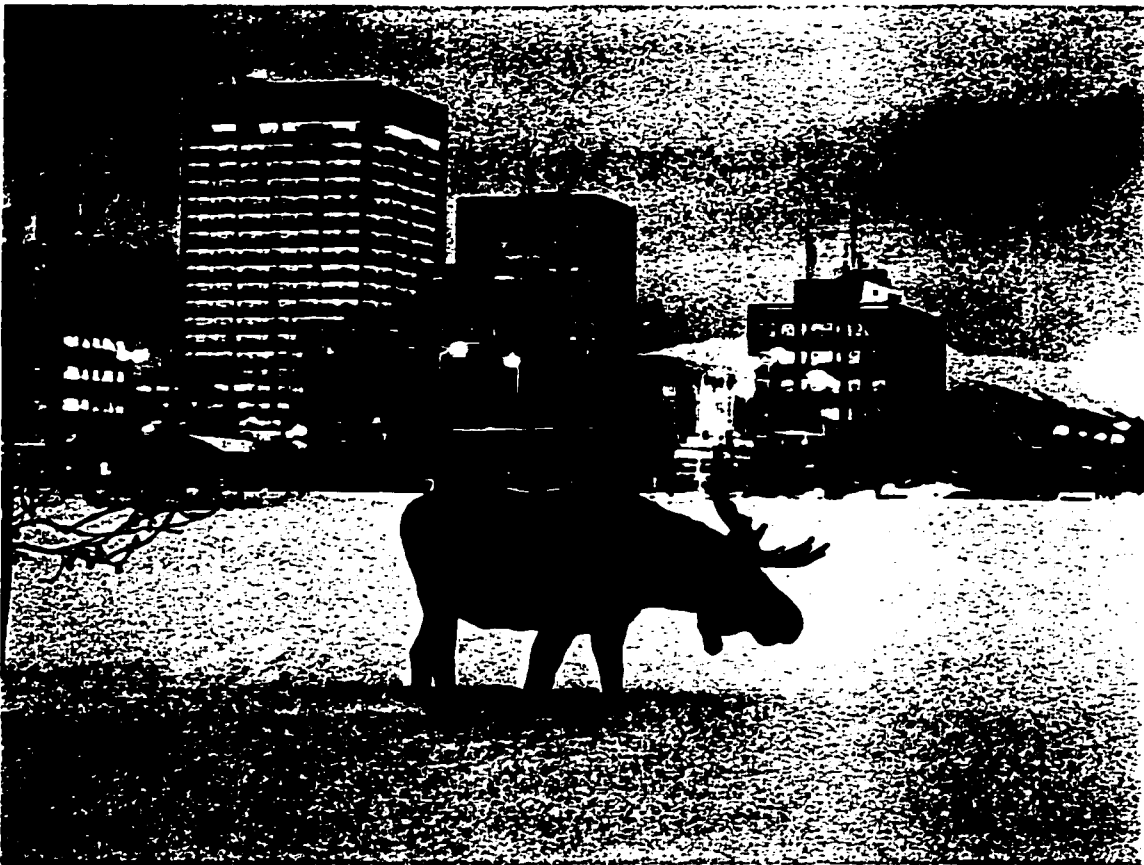
FINAL DRAFT OF

“LIVING WITH WILDLIFE IN ANCHORAGE:

A COOPERATIVE PLANNING EFFORT”

Living with Wildlife in Anchorage: A Cooperative Planning Effort

January, 2000



BOB HALLINEN/ANCHORAGE DAILY NEWS

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

**TONY KNOWLES,
GOVERNOR**

P.O. BOX 25526
JUNEAU, AK 99802-5526
PHONE: (907) 465-6068
FAX: (907) 465-6078

December, 1999

Dear Reader:

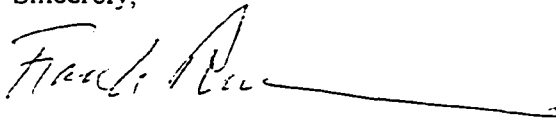
This plan captures the results of a pioneering effort, spearheaded by the Alaska Department of Fish & Game, to help Anchorage residents and visitors co-exist with the multitude of wildlife living in and around the nation's seventieth-largest city. No other city of its size boasts the number and diversity of wild animals found throughout the Municipality of Anchorage, a point of pride to most residents and a major factor in their quality of life.

Managing wildlife in an urban setting is extremely complicated and challenging, however. There are numerous competing interests to consider, as well as serious safety concerns. The public and a wide array of local, state, military, and federal organizations worked together to develop this plan at considerable cost of time and effort over the past three years. It is an accomplishment that every participant, including the members of the public who generously shared their time and thoughts, can be proud.

In the coming months, the plan will be reviewed by the municipal government for inclusion in the Anchorage Comprehensive Plan, an action strongly supported by all of the contributing organizations. Adding a wildlife component to the master plan will guide Anchorage's development over the next decade to help ensure wildlife remains an integral part of life in Alaska's largest city. And, because the comprehensive plan is revised and updated on a regular basis, it provides the incentive and flexibility for similar revisions regarding wildlife.

Given the unique nature of this planning effort, I think you will agree with me that this first edition of *Living with Wildlife in Anchorage: A Cooperative Planning Effort* represents a bold first step in assuring the conservation of wildlife in Anchorage, for the benefit of its residents. I welcome your suggestions for improvements to the plan in future editions, and I urge your support for inclusion of the plan in the Anchorage Comprehensive Plan.

Sincerely,



Frank Rue
Commissioner

Page 1

Acknowledgments

Development of this plan would not have been possible without the commitment of many agencies and organizations which worked together over the past three years to address the wildlife issues of Anchorage. The full list of participants is included in Chapter 2, and speaks to the broad array of organizations and agencies who claim a stake in the future of Anchorage's wildlife, and who contributed substantively to this plan.

Individuals and agencies deserving recognition for their valuable, substantive contributions to the plan, as well as their perseverance, include (in no particular order): Malcolm Ford of the Anchorage Audubon Society; Karen Deatherage of the Alaska Wildlife Alliance; Evie Witten of The Great Land Trust; Ray Reekie and Patrick Wright of the Anchorage Fish & Game Advisory Committee; Thede Tobish of the Municipality of Anchorage, Community Planning & Development; Judi Ramage of the Chugach State Park Advisory Board; Al Meiners, Superintendent of Chugach State Park; Kate Wedemeyer and Tom Liebscher of U.S. Air Force, Elmendorf Air Force Base; Bill Gossweiler and Laurie Angell of U.S. Army, Ft. Richardson; and Karen Laing and Maureen de Zeeuw of the U.S. Fish and Wildlife Service. These representatives consistently offered valuable insight and contributions to the substance of the plan, and gave freely of their materials, time and good will at public meetings. Their expertise, dedication and patience are sincerely appreciated.

We extend our special thanks to several individuals:

- ✱ to David Fulton (Alaska Department of Fish and Game) who structured the process, formed the group, and led the process through its first, critical year;
- ✱ to Maureen de Zeeuw (U.S. Fish and Wildlife Service), who gave generously of her time to incorporate photographs and professionally edit the manuscript;
- ✱ to Rick Sinnott (Alaska Department of Fish and Game), who shared his considerable expertise as Anchorage's Area Biologist;
- ✱ to Jonne Slemons (Alaska Department of Fish and Game), who managed the project; and
- ✱ to Doug Whittaker (Three Rivers Research, Inc.), who led the group and the process during the final two productive years, who maintained focus in the maelstrom, and who "brought it all together," writing the lion's share of the final manuscript.

Finally, we would like to thank the many members of the Anchorage public who attended both working meetings and public meetings; who took the time to call and write with their comments and suggestions; and for whom this plan is written.

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Chapter 1: Introduction

Anchorage is a city with abundant wildlife, including hundreds of moose and both black and brown bears -- animals that no other cities of 260,000 people can boast as their own. Extensive natural areas in and around the city provide habitat for these and other species, including Dall sheep, mountain goats, wolves, wolverines, coyotes, lynx, beavers, bald eagles and other raptors, loons, swans and other waterfowl, shorebirds, and numerous species of migratory and resident songbirds. Marine mammal species, including beluga whales, are also present in the nearby waters of Cook Inlet.

These distinctive wildlife populations offer outstanding recreational opportunities to Anchorage residents and visitors, contributing to a quality of life unmatched in urban areas across the nation. Many of these species are also valued as symbols of wild Alaska, and most Anchorage residents have some appreciation for the wildlife that live here. Wildlife is truly an integral part of the Anchorage community.

As Anchorage continues to grow, however, interactions between wildlife and people are also increasing, leading to some conflicts. Burgeoning moose populations present hazards to drivers on slick winter roads, they can damage considerable amounts of landscaping and gardens in summer, and they may become dangerously aggressive towards humans in certain situations. Similarly, geese and other waterfowl damage lawns, ball fields and golf courses, and present risks to aircraft. Attracted to food sources available in human environments, bears, coyotes and wolves also pose increasing risks to people or their pets, or become "nuisance" animals, some of which are killed by residents or authorities each year.

In addition to conflicts between people and wildlife, growth in Anchorage has also diminished or degraded some types of natural habitat and increased lawn and other "urban habitats," changing wildlife population levels, wildlife behavior, or relationships between wildlife species. Wildlife dependent upon freshwater wetlands, for example, have decreased in the past several decades, while increased populations of exotic species such as starlings and pigeons may out-compete or spread disease among native bird species.

The obvious management goal is to enhance the benefits of wildlife while minimizing wildlife-related problems. However, this can be challenging. Urban settings provide uneven patterns of land use and wildlife habitat, and the actions of different landowners, government agencies, and the public may have profound effects on wildlife populations and behavior. In addition, there is considerable diversity of opinion among urban residents about how people should live with wildlife. As Anchorage continues to grow, changes in wildlife habitat and species are inevitable; the challenge is to manage that change so that both people and wildlife benefit.

This plan is the first step in trying to meet this challenge. Offering a broad vision for wildlife management in Anchorage, the plan is a pioneering attempt to coordinate and integrate decisions by local, state, and federal government. Initiated by the Alaska Department of Fish and Game, the plan has been developed by a team of people from a variety of local, state, and federal agencies with wildlife responsibilities, as well as people from other wildlife-related interest groups and the general public. The plan outlines general wildlife management goals for the Municipality, and then identifies actions and policies that may help Anchorage residents enjoy and minimize problems with the city's wildlife.



WILLIAM GOSSWEILER

Why does Anchorage need a wildlife plan?

While many cities have wildlife management issues, few have developed comprehensive plans addressing multiple species. Although some people question the need to formally coordinate wildlife decision-making in Anchorage, there are several compelling reasons for this planning effort.

Wildlife are a valued part of Anchorage life. A recent survey of Anchorage residents suggests that wildlife makes Anchorage "interesting and special," even if it causes some problems. There is probably no other large city in North America with similar populations of large animals and diverse migratory birds. This plan is a pioneering attempt to ensure that a large and growing city can enjoy and maintain its wildlife.

Development and human population growth have decreased some kinds of wildlife habitat. Anchorage has grown dramatically in the past few decades, and this growth has resulted in considerable loss of open space and wildlife habitat. Well over half of the area's wetlands have been lost to development since the 1950s, there has been considerable loss of spruce forest, and riparian, or streamside, areas have also been degraded from pollution and development. A plan is needed to identify and protect the important habitat that remains, including tracts of undeveloped natural areas and the corridors that link them.

Increasing demand and funding for wildlife recreation. Demand for wildlife-related recreation opportunities has been increasing in recent years, and a significant increase in federal funding for these appears likely. Cities with developed plans will be poised to capture and efficiently use these funds.

Development favors certain generalist species that out-compete others or become nuisance wildlife. Increased development has created new ecological niches that favor generalist species (e.g., pigeons, starlings, Canada geese, gulls and feral rabbits) that do well in urban settings. Some of these species out-compete native species, or amass in numbers that create conflicts with people.

Increased human-wildlife conflicts. There have been increasing human-wildlife conflicts in Anchorage as more people, more development, and increasing numbers of some wildlife species (particularly moose, bears, and geese) share the same environment. Potential actions to address some of these issues (e.g., hunts, lethal responses) are controversial, while others require coordinated public efforts to be effective (e.g., education programs to minimize bear or geese attractants, or landscaping that reduces nuisance wildlife situations).

Need for coordinated wildlife management. There are multiple agencies in Anchorage with wildlife-related responsibilities, or whose decisions affect wildlife-related problems. Coordination between them is currently *ad hoc*. Wildlife do not recognize agency jurisdictions or land management boundaries, so what happens in one part of the city can affect how wildlife behave somewhere else. The plan provides a formal mechanism for developing a consensus vision and coordinating actions. The public does not care how agencies divide wildlife responsibilities, but they do care that those responsibilities are met. This plan can help.

Need to develop and share wildlife information. Planning efforts provide an impetus to collect, organize, and share wildlife information that is crucial to making good resource decisions.

Integration with the Municipality's Comprehensive and Open Space plans. The Municipality is in the process of updating its Comprehensive Plan, as well as the affiliated Parks, Recreation and Greenbelt Plan, which will affect a number of land use patterns and policies in the area. This is an excellent opportunity to integrate wildlife concerns into that effort. It is proposed that this plan be adopted as a part of the Comprehensive Plan.

Need for a long-term vision for wildlife. If government is going to be an agent for positive change, it needs to avoid the "tyranny of small decisions." This requires a formal process that can be used to develop a broad vision, set long term goals and objectives, and collaborate with the wide range of wildlife interests present in a large city. This planning effort provides such an opportunity.



ALASKA DEPT. OF FISH & GAME

Plan Purpose

The purpose of this plan is to outline wildlife management goals and objectives, and identify priority actions that can be taken by local, state, and federal agencies to enhance the benefits of wildlife to the community while minimizing human-wildlife conflicts.

The plan is a “vision” document that attempts to outline common goals for Anchorage wildlife management. However, it is important to recognize that the plan will not be the final word on Anchorage wildlife decision-making. Instead, the plan is intended to provide a framework for agency-specific decisions. Specific tasks in the plan include:

- Develop population goals for different wildlife species.
- Review actions that could reduce or enhance populations out of step with those levels.
- Develop thresholds for acceptable wildlife conflict levels and identify actions to minimize conflicts.
- Outline wildlife conflict response policies.
- Recommend a process for prioritizing desirable wildlife habitat to be conserved on public land.
- Develop/prioritize actions to encourage private land owners to protect critical habitat on their lands.
- Develop/prioritize projects that would increase wildlife recreation or education opportunities.

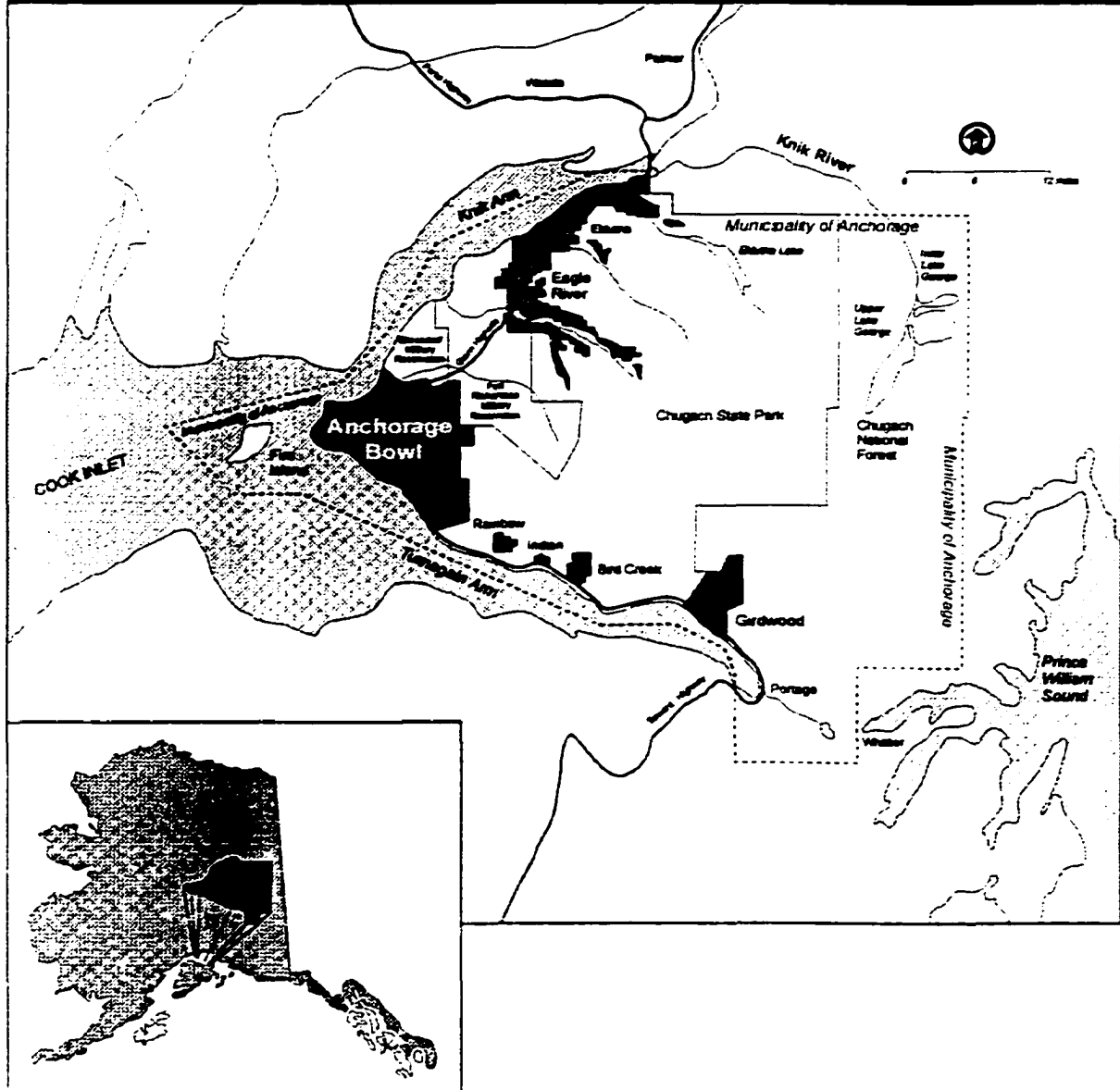
The plan is being developed by multiple agencies and interest groups, each with their own missions, regulations, policy guidelines, and bureaucracies. As a result, the plan will not be a legally binding list of agency policies and projects. Many actions in this plan will require greater specificity, the approval of other governmental agencies, and environmental compliance analysis before they can be implemented.

Instead, this plan should be considered a collaboratively developed “to do” list. After the plan is adopted, it will be up to Anchorage’s individual agencies and groups, as well as the public, to implement the actions identified and prioritized in these pages.

Geographic Area

The plan addresses the entire Municipality of Anchorage from the Knik River to Portage. This area includes Elmendorf Air Force Base, Fort Richardson, and Chugach State Park. However, the plan often focuses on wildlife issues in the Anchorage Bowl and other developed areas (e.g., Eagle River/Chugiak, Girdwood). The map on the following page shows the geographic boundaries of the plan.

Municipality of Anchorage Vicinity Map

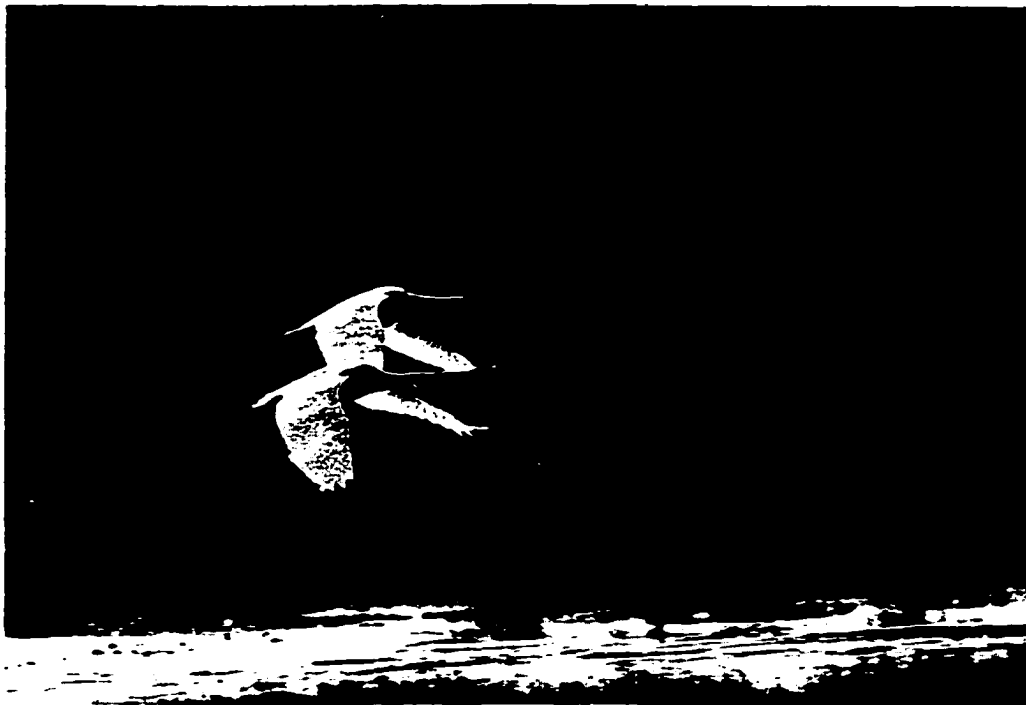


Map 1. Anchorage and the Anchorage Bowl. The plan addresses the entire Municipality, but focuses on issues in the Anchorage Bowl and developed areas such as Eagle River/Chugiak and Girdwood. (Map courtesy of Municipality of Anchorage.)

Plan Limitations

As discussed above, the plan will not be legally binding. It is simply a collaborative attempt to identify the major wildlife management priorities in Anchorage. Because it covers the full range of wildlife management issues in the city, the plan is also limited in the level of specificity it provides for many actions or policies. Most actions in the plan will need to be developed in greater detail to assess public support, legal and physical constraints, potential environmental impacts, financial costs, and agency responsibilities.

The plan also limits its focus to terrestrial wildlife, and does not address fisheries and marine mammals. Parts of the plan, however, will address opportunities to integrate fish and wildlife management in Anchorage, in keeping with the principles of ecosystem management.



WILLIAM GOSSWEILER

Relationship of This Plan to Other Plans

This plan is designed to complement and complete the Municipality's Comprehensive Plan and the associated Parks, Recreation and Greenbelt Plan. In order to avoid duplicating the work being done in those efforts, this plan generally does not comment on detailed land use decisions and specific open space priorities. However, it does establish wildlife-related goals and objectives, and a list of recommended actions designed to be incorporated in the Municipality's plans. A Memorandum of Understanding (MOU) developed among the agencies (provided at the end of this plan), formally describes agency perspectives toward plan recommendations. Additional discussion of the Parks, Recreation and Greenbelt Plan is also provided in the Chapter 6 discussion of habitat actions.

This plan also supports actions associated with several other wildlife-related planning efforts already underway within Anchorage (e.g., the Anchorage Waterfowl Working Group; the planning and fund-raising effort to build the Potter Marsh Nature Center), or wildlife-related planning efforts which have been completed for other significant land tracts in the Municipality (e.g., Fort Richardson, Elmendorf Air Force Base, Chugach State Park, or BLM's Campbell Tract). In no case does this plan intend to duplicate or supplant those efforts, which are typically more detailed. When we have included information about those efforts or actions, our intent is to provide support for them, or help explain how they can be integrated into the city's larger wildlife management context.

Finally, as discussed under plan limitations, this plan does not address Anchorage fisheries management, which is covered by a series of other plans and documents. Accordingly, this plan supports several existing policies, including: the existing river and lake stocking plan (currently undergoing environmental review), the "natural rebuilding" salmon stocking plan for Chester Creek (as advocated by community councils), the general ADF&G policy addressing illegal introductions of northern pike or aquarium fish into area lakes and streams, and fishing regulations developed through the Board of Fish. In a few cases, however, this plan does identify areas where wildlife and fisheries management could be integrated to a greater extent. For example, this plan includes actions concerning the protection of loon and other bird nesting areas from lake users (including anglers, boaters, and photographers), and the need to educate recreation users about bear hazards along salmon streams. While fisheries in the Anchorage area might also benefit from a parallel effort that coordinated local, state, and federal planning, this is a lower regional priority for the Alaska Department of Fish and Game, which would be the logical agency to lead such an effort.

Organization of this Document

The plan is divided into six chapters. **Chapter 2** summarizes **the planning process**. This describes the history of the planning effort, lists the involved agencies and interest groups, and reviews how the public was invited to participate. This chapter also details a list of "planning principles" that were used to guide decision-making in the plan.

Chapter 3 presents the **goals and objectives** of the plan. These are broad, value-based statements about the importance of wildlife in Anchorage and how it should be managed. These goals and objectives form the foundation of the plan.

Chapter 4 describes **the state of the Municipality's wildlife in 1999**. It begins with a list of wildlife issues and describes area wildlife species, including estimated current population levels and planning team consensus about preferred population levels (or ranges). This chapter also provides some information from a recent survey of Municipality residents about wildlife issues, characterizing the state of public attitudes toward wildlife. Finally, the chapter ends with some wildlife conflict statistics and identifies standards that define acceptable levels of conflict.

Chapter 5 describes recommended **actions and policies** related to **wildlife population management and wildlife conflict responses**. It begins with separate sections on moose, bears, geese, and feral animal population management; it then defines conflict response policies (what is done after certain types of human-wildlife conflicts occur).

Chapter 6 describes forty **actions to enhance wildlife benefits or prevent wildlife conflicts**. This includes longer descriptions of a "top twenty-five" actions and shorter descriptions of fifteen other supported but lower priority actions. The top priority actions are grouped by the general goals they are designed to address, and short prefaces to these groups suggest how they can be integrated to achieve desired objectives. The chapter concludes with actions considered but rejected.

Finally, the **Memorandum of Understanding** closes out the document, identifying the public agencies and interest groups that are signatories to the plan, and formally describing their intention to help implement the plan as funding and other constraints allow.



JULIE WHITTAKER

Appendices list references, a list of wildlife species in Anchorage, a summary of wildlife population estimation methods, and a listing of acronyms used in this plan. Maps of critical habitat and wildlife concentration areas are published separately for the Municipality's Parks, Recreation and Greenbelt Plan.

Chapter 2: The Planning Process

This chapter describes the effort and ideas involved in developing this plan. It begins with a brief history of the plan, and describes the major steps in the process. It also includes a list of participating agencies and interest groups, and reviews how the public was invited to participate in the process. Finally, it provides a list of "planning principles" that were used to guide decision-making in the plan.

A Chronology of the Planning Effort

Oct. 1993-Sep. 1995	Several wildlife conflict incidents result in human deaths. (Woman killed by moose in Oct. 1993; man killed by moose in Jan. 1995; two people killed by bear in Chugach Park in July 1995; 24 people killed in aircraft collision with Canada geese in September 1995.)
Winter 1994-1995	Harsh winter results in 25 to 30% decline in moose population, including a record number of moose-vehicle collisions (resulting in 239 moose deaths).
November 1995	Representative Con Bunde holds a legislative hearing on moose problems and solutions in Anchorage.
1995, 96, 97, and 99	Board of Game considers controlled moose hunt in Chugach State Park.
February 1996	Focus groups on moose hunt conducted for ADF&G.
Winter 1996-1997	General population survey on wildlife issues initiated by ADF&G in conjunction with Colorado State University. Public meeting on survey issues held at the Alaska Public Lands Information Center (APLIC).
1997	Municipality begins Anchorage Bowl Comprehensive Plan.
Fall 1997	Public meeting on survey results held at Campbell Creek Nature Center.
Fall 1997	Creation of planning team.
Winter 1997-1998	Agreement on planning team group process, etc.
February 1998	Public meeting to identify planning issues, goals/objectives held at APLIC.
Spring 1998	Planning team develops plan goals and objectives.
Spring/Summer 1998	Inter-agency commitment documented via development of Memorandum of Understanding (MOU).
Fall 1998	Planning team develops actions.
January 1999	Public meeting/open house to review actions held at Fairview Recreation Center.
Spring 1999	Planning team prioritizes actions and begins drafting plan.
May 1999	Public Review Draft Plan and newsletter summary released.
May-June 1999	Public meeting on Public Review Draft Plan, and public comment period.
July-October 1999	Planning team responds to public comments and revises Final Plan
November 1999	Final plan released.

Steps in the Process

The planning effort followed a standard comprehensive planning process. The basic steps were to: 1) review issues; 2) collect information about issues; 3) develop goals and objectives; 4) develop actions that could be used to meet goals and objectives; and 5) choose among these alternative actions. By calling them steps, this process implies tasks were approached serially; however, the planning team revised goals, objectives, and alternatives throughout the process. A brief discussion of these steps is given below.

Issues. "Scoping" and the development of a list of issues was the starting point for the plan. These were developed by the planning team but included input from public meetings held in fall of 1997 and February 1998. The list of issues is provided in Chapter 4.

Goals and objectives. These are broad, qualitative statements about what managers are trying to accomplish in the plan. Goals attempt to reflect broad public values toward wildlife and the environment, while objectives are more concrete. The planning team spent considerable time on this step through the winter of 1997-98 so they could be included in the goals and objectives of the Anchorage Municipality Comprehensive Plan. Information from the February 1998 public meeting and the survey of residents was useful during this step. Chapter 3 presents the goals and objectives for the plan.

Indicators/standards. This step involves choosing measurable variables to define and give meaning to the qualitative objectives above. Indicators and standards define healthy population ranges for different species, and establish tolerance thresholds for wildlife conflicts. The planning team implicitly developed these throughout the process, but explicitly defined them in the Public Review Draft. Information from the survey of residents and the public meeting/open house in January 1999 was useful for this step. Indicators and standards are presented in Chapter 4 on the state of wildlife in Anchorage.

Developing and prioritizing alternatives. The bulk of the planning effort in the past eight months has focused on brainstorming actions that could be used to meet the goals, objectives, and standards in the plan. Much of this work was done in planning team meetings, but included consideration of survey results and information from the public meeting/open house held in January 1998. The list and description of actions are the heart of the plan, and are presented in Chapters 5 and 6.

Draft and final plans. A Public Review Draft was developed in the spring of 1999 and was also summarized in a newsletter. As with any draft plan, the goals, objectives, standards, and actions in the plan were considered proposals, and the planning team received considerable public comment about them throughout the summer of 1999. Several revisions in the plan were based in part on those comments, and are discussed in sections of this Final Plan, which was prepared in August-September 1999.

Agency and Interest Group Participation

The following lists the agencies and interest groups that participated in the planning effort. The list includes primary contacts for each agency.

Alaska Department of Fish and Game	David Fulton, Gay Muhlberg, Rick Sinnott, Jonne Slemons, Barry Stratton, Doug Whittaker (consultant)
US Fish and Wildlife Service	Maureen deZeeuw, Karen Laing
US Army – Fort Richardson	Laurie Angell, Bill Gossweiler
US Air Force -- Elmendorf	Tom Liebscher, Kate Wedemeyer
Bureau of Land Management, Anchorage Office	Jeff Denton, Bruce Seppi
Chugach State Park	Al Meiners
Chugach State Park Advisory Board	Judi Ramage
Municipality of Anchorage:	
Community Planning & Development	Thede Tobish
Cultural and Recreational Services	Jerry Walton
Heritage Land Bank	Michelle Weston York
Anchorage Fish & Game Advisory Committee	Ray Reekie, Patrick Wright
The Great Land Trust	Beth Silverberg, Evie Witten, Abby Wyers
Alaska Wildlife Alliance	Greg Brown, Karen Deatherage
Anchorage Audubon Society	Malcolm Ford, George Matz
Eagle River Valley Community Council	Bob Carlson
South Addition Community Council	Karen Cameron
Bayshore Klatt Community Council	Smiley Shields
US Forest Service, Glacier Ranger District	Susan Oehlers
Risk Management, Anchorage School District	Tom Bibeau
Anchorage Convention & Visitors Bureau	Barbara Bryant
Anchorage Chamber of Commerce	Sean Skaling
Parks & Recreation, Girdwood Board of Supervisors	Norman Starkey
Nordic Ski Association	Dirk Sisson, Kimberly Griffin

Public Involvement

Interest groups and the public had a number of opportunities to assist in developing the plan. Public involvement was essentially built into the process along three tracks.

First, the planning team was developed with representatives from several agencies or interest groups with wildlife responsibilities. While certain groups chose not to participate to a significant degree, they were kept informed throughout the process via summaries of planning team meetings. This collaborative process provided excellent opportunities for diverse voices in the community to express their views and shape the plan.

Second, periodic public meetings/open houses were held to keep interested individuals informed about the process. As shown in the chronology above, five public meetings were held during the development of the plan. All public meetings were advertised in the newspaper, and the meetings on actions and the draft plan were also publicized through a planning newsletter sent to wider mailing lists of individuals who might be interested in the effort.

Finally, values and attitudes of the general public were assessed through a scientific survey of residents (Whittaker and Manfredo, 1997). This survey was initiated in the beginning of the process, but anticipated a number of issues in the plan. A summary of the survey results is available from ADF&G.



DOUG WHITTAKER

The public was invited to comment on the plan throughout the process. (Open House to brainstorm plan actions at Fairview Recreation Center, January, 1999.)

Planning Principles

In developing the plan and preparing this document, the planning team was asked to consider a number of “planning principles,” listed below. The intent was to design a process appropriate to the need for a collaborative, integrated vision for Anchorage wildlife management. These “principles” helped define content needed in the plan, and encouraged an informal but effective decision-making environment.

The plan must be clear and understandable; the general public is the target audience. The public is largely unimpressed by planning efforts. They often view planning as a ritualistic exercise that rubber-stamps decisions that have already been made, or as a long, drawn-out process that keeps bureaucrats employed writing unreadable documents. To combat this problem, the plan should be as accessible as possible with explicit statements about what government agencies would like to do and why.

The plan should be comprehensive, but based on available information. The “comprehensive” planning ideal requires consideration of all possible information about an issue and consultation with all possible publics and stakeholders. In reality – mostly because of funding or schedule constraints – this plan must be developed with available information and open but limited opportunities for public involvement. When a decision cannot be made because we do not have enough detailed information, that decision should be deferred and information needs identified.

Recognition that the plan will be non-binding, but important. As a plan that addresses the authorities and interests of several agencies and groups, we recognize that complete agreement is unlikely and that no agency will be able to commit to every idea in the plan. Accordingly, the plan is not designed to be legally binding. However, agencies should not underestimate the power of this kind of “vision plan.” In developing this plan, agencies are committing to seriously consider and utilize this plan in the making more detailed plans or other decisions relevant to their Anchorage wildlife management responsibilities.

Recognition of a limited planning time horizon (about ten years). Plans are based on snapshots of information and reflect the interests and priorities of the time in which they are developed. The goal is to anticipate future issues and resources, but the ability to accurately predict is always limited. Accordingly, the plan should generally consider a ten-year planning horizon. If new information or circumstances create the need to revise decisions in the plan during the ten year period, amendments to the plan offer an explicit way for agencies to re-think positions and actions.

Recognition of differences between “now” decisions, and intentions. Plans can have many different types of decisions. Some are “now” decisions designed for immediate implementation (e.g., policies on how to deal with wildlife conflicts). Others are “intentions” – what government should do if funding or other resources became available. The key to good planning is to recognize and clearly identify which kind of decisions are being made.

The goal is to make decisions, even on controversial issues. A fault of many plans is that they only get agreement on the “easy” decisions. However, there is little point in planning only to satisfy the “lowest common denominator.” Accordingly, the goal is to push the team as far as it can go on every decision.

If the planning team can’t reach consensus on a decision, a deferred decision is acceptable. In some cases, consensus may not be possible. In these cases, we will not use a majority vote to make a decision that will not be generally supported by all agencies. In these cases, our obligation is to document the

points of disagreement and defer the decision; we will also offer a specific process, timeline, and lead agency for tackling these issues in the future.

Recognition of complexity and diversity in developing urban wildlife plans. Urban wildlife plans are usually more complex than those for rural or wildland areas. In this plan, decisions will address multiple species, issues, interests, and agencies.

Recognition that Anchorage is likely to continue growing in both population and development levels. Anchorage has grown dramatically in the past three decades, and indicators suggest the city will continue to increase in population and development levels in the foreseeable future. The issue in this and other natural resource plans is to manage that growth so it does not diminish the characteristics, function, and benefits of the resources (e.g., wildlife and open space) that enhance the quality of life for residents and visitors.

Recognition of the limitations of managing wildlife in urban areas. Urban wildlife plans are challenging because most of the land is not in public ownership, and lands that are public are managed for a variety of specific purposes that may or may not be compatible with wildlife goals. Many actions will need to include education/regulation options in addition to direct actions that can be contemplated for public lands.



BOB HALLINEN
ANCHORAGE DAILY NEWS

Recognition that cities are essentially “non-natural” areas. Urban areas are modified environments – there is little sense in thinking they can be managed to provide the full diversity of “natural” ecosystems. More importantly, plan choices may often need to be based on social values toward various species and habitat types, not full ecological potential. These decisions require both social and biological information.

Recognition that there are few models for urban wildlife plans. There are few (if any) good models of multiple-species urban wildlife plans. In this effort, the planning team faces a challenge, but also has an opportunity to pioneer new ideas and think beyond the boundaries of more narrow agency mandates.

Distinction between representing interest groups/agencies and representing the interests of the greater Anchorage public. Each planning team member represents an agency/group and will be expected to represent that agency at certain times in the process. However, there are other times when team members should remove their “agency hat” and put on a “community hat.” Wildlife do not respect land ownership boundaries, and there is good evidence that the public is unconcerned about the fine line of agency jurisdictions. The goal in this effort is sound, integrated wildlife management for Anchorage; this is more likely with a focus on the larger picture.

Chapter 3: Plan Goals and Objectives

This chapter presents the goals and objectives of the plan. These are broad, value-based statements about the importance of wildlife in Anchorage and the principles upon which it should be managed. Although different planning frameworks define these terms differently, we have followed the Anchorage Municipality's planning model in developing the goals and objectives below. More quantitative standards or "performance measures" for the plan are presented in Chapter 4.

Some comments on the Public Review Draft Plan urged planners to prioritize these goals and objectives because it is possible that some situations may place them in conflict. Although the planning team recognizes this potential, no priority for them has been established. Ultimately it is hoped that this plan and subsequent actions will address them all in some substantial way.

Overall Goal

In order to enhance the quality of life for Anchorage's residents and visitors, conserve and enhance a wide diversity of native wildlife and their habitats throughout the Municipality, while allowing species to prosper in harmony with the community.

Goals and Objectives

- I. Conserve, enhance, and restore optimal populations of native wildlife and their habitats in the Municipality of Anchorage.
 - Identify, map, and evaluate wildlife habitat availability and wildlife population levels of key species.
 - Identify and conserve, enhance, or restore areas of important wildlife habitat on public lands, including the corridors that connect those habitats in order to avoid net losses in functional habitat types or abundance.
 - Identify areas of important wildlife habitat on private lands in Anchorage and promote ways to conserve, enhance, or restore those areas in an effort to avoid net losses in functional habitat types or abundance.
 - Promote educational efforts for agency staff, land use developers, the public and others that describe the characteristics and importance of wildlife habitat and the ways it can be conserved, enhanced, or restored.
 - Maintain native wildlife populations at biologically and socially optimal levels. If these levels conflict, the lower of the two will take precedence in most situations. In balancing these dual objectives, social capacities should generally receive greater weight in developed areas while biological criteria should generally receive greater weight in undeveloped or natural areas (e.g., Chugach State Park, Bicentennial Park/Campbell Tract).
 - Enhance declining native wildlife populations so they can return to biologically and/or socially optimal levels.
 - Reduce non-native wildlife populations to socially acceptable levels.
 - Identify ways the public can conserve or enhance habitat.

2. Maximize opportunities for positive interactions between wildlife and people.
 - Provide for a diversity of wildlife recreation opportunities through the development and maintenance of recreation facilities such as trails, interpretive stations, visitor centers, etc.
 - Provide for a diversity of wildlife learning opportunities through the development of wildlife education programs and facilities.
 - Develop and distribute information that helps residents and visitors take advantage of the diversity of wildlife recreation and natural history learning opportunities available in the area.
3. Minimize opportunities for conflicts between wildlife and people, while responding to conflict situations as required.
 - Promote educational efforts that help residents and visitors avoid wildlife conflict situations and respond appropriately when they arise.
 - Promote education and/or regulation efforts to minimize attraction of “nuisance” wildlife to areas with high potential for human-wildlife conflicts.
 - Design and maintain recreation facilities to minimize the risk of human-wildlife conflicts.
 - Respond to wildlife conflicts in ways that balance public safety needs with humane wildlife control methods.
4. Foster a sense of stewardship for wildlife and their habitats among the public, non-governmental organizations, and local governmental agencies.
 - Promote cooperative efforts that help the variety of public agencies share and integrate information and resources dedicated to wildlife management.
 - Promote increased public involvement in wildlife stewardship through the development of volunteer projects.
5. Promote the economic, social and other benefits related to wildlife and their habitats.
 - Support research efforts that will help identify the benefits of wildlife.
 - Develop wildlife education programs that help residents and visitors recognize the benefits of wildlife and their habitat.

Chapter 4: Wildlife in Anchorage, 1999

This chapter describes the state of Anchorage's wildlife in 1999. It begins with a list of wildlife issues, and describes prominent city wildlife species, including estimated and preferred population levels (standards). The chapter also provides information about residents' general attitudes toward wildlife. It concludes with a section on wildlife conflict statistics and standards that define acceptable levels of conflict.

Wildlife Issues and Concerns

The following list summarizes issues and concerns developed by the planning team with input from the public. The items are meant to be evocative of the issues discussed at meetings, not exhaustive or comprehensive. They are organized within categories that roughly correspond to plan goals and objectives (see Chapter 3).

Habitat and Population Level Issues

- Habitat fragmentation and loss due to increasing development
- Impacts (disturbance) to species from increasing human use on public land
- Loss of wetlands and wildlife corridors
- Wildlife habitat concerns that do not become integrated into land use decision-making (e.g., zoning, road improvement landscaping choices)
- Current development trends that favor exotic species (pigeons, starlings, etc.)
- Loss of critical habitat for some species (loons, cranes, other wetland species, etc.)
- Lack of wildlife-related inventory data (population trends, biological carrying capacity estimates, etc.)



U.S. FISH AND WILDLIFE SERVICE

As the human population and development in Anchorage increases, many people are concerned about wildlife habitat losses



NANCY TANKERSLEY FAIR

Wildlife-oriented recreation is increasingly popular for residents and visitors

Wildlife Recreation and Learning Issues

- High interest in and demand for viewing opportunities by residents and visitors
- Need for more wildlife education (facilities and interpretation services and materials)
- Demand for increased Anchorage hunting opportunities

Wildlife Conflict Prevention and Response Issues

- Lack of information about human/wildlife conflicts (When, where, why, how many, what kind?)
- Concern about the number of moose-vehicle accidents
- Concern about the number of aggressive moose encounters in neighborhoods and on trails
- Concern about the extent of landscaping damage by moose
- Concern about the number of and potential for bear-human encounters on area trails and in neighborhoods
- Increasing attraction behavior by bears in response to garbage, dog food, and birdseed around homes.
- Goose-aircraft accident risk
- Concern about the amount of goose droppings in parks, ball fields, lakes and on lawns
- Liability concerns regarding human/wildlife conflicts
- Agency responsibilities and jurisdictions for responding to wildlife-human conflicts
- Educating residents (especially new residents) on appropriate behavior around wildlife
- Lack of coordinated government/organizational programs to reduce wildlife conflicts
- Lack of training of public safety officials to deal with wildlife conflicts
- Conflicts between domestic animals/pets and wildlife
- Concern about landscaping that attracts wildlife and exacerbates conflicts (at schools, along roads)
- Concern that salmon fishery development may be attracting bears into the city
- Concern about other conflict problems: pigeons, gulls, beaver, coyotes, wolves, etc.



SUE DAYTON

Wildlife conflicts are an important issue in Anchorage. For example, bears that become attracted to garbage, pet food and birdseed can become public safety hazards.

Other Issues

- Need to promote the benefits of wildlife in the city
- Lack of recognition of wildlife benefits within some government agencies
- Need to integrate wildlife agency decision-making among multiple agencies at local, state, and federal level

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A Summary of Anchorage's Wildlife

This section describes the state of Anchorage's wildlife by species or group. For each major species or group, we attempt to provide population estimates and trends, as well as short descriptions of preferred habitat and management issues. When available, citations and sources for the information in this section are provided. In most cases, however, information is based on current (1999) professional judgments of biologists with the Alaska Department of Fish and Game. This information is not necessarily definitive, and is offered to provide readers with a general view of the wildlife situation in Anchorage. Actions in this plan are designed to address the lack of more comprehensive information for several species in the future.

This section also suggests population goals for several species, in an attempt to identify those that need to be enhanced or reduced. **Establishing a population goal that is lower than current levels, however, does not necessitate any particular action.** These population goals simply highlight the potential for increased wildlife conflicts or biological capacity problems. Additional discussion of population management policies and actions are given in Chapter 5.

Throughout this section, the "Anchorage area" refers to the entire Municipality from Knik River to Portage, including Chugach State Park. In contrast, the "Anchorage Bowl" refers to the land from the Chugach foothills to Cook Inlet, and from Potter Marsh to the military bases; it does not include Fort Richardson, Elmendorf Air Force Base, Chugach State Park, Eagle River/Chugiak/Peters Creek, or Turnagain Arm communities.

Readers should also note that **fish and other aquatic species are not included within the scope of this plan** (see Chapter One, Plan Limitations).

General Biodiversity. Overall, the Anchorage area supports 52 species of mammals, and at least 230 bird species (with about 150 bird species likely to be regular visitors or year-round residents) (Scher, 1993). That's about half of the bird species recorded in the whole state. Anchorage has one native amphibian species (the wood frog), and no reptiles. There are also a myriad of insect species and other invertebrates, few of which have been studied specifically in Anchorage.



WILLIAM GOSSWEILER

Black Bears. An estimated 250 black bears live in the Anchorage area (between the Knik River and Portage), including Chugach State Park. Perhaps one-third of these bears spend at least part of the summer in or adjacent to residential areas in the Anchorage Bowl, Eagle River/Chugiak, or Girdwood. Black bears in Anchorage prefer forested habitat, including stream corridors. Judging by the number of cubs, the black bear population is probably increasing; this is further supported by the number of calls to ADF&G from residents, which have sharply increased in recent years. Black bears can easily become attracted to human food sources such as trash, pet food, and birdseed, making them potentially dangerous to humans and their pets or livestock (some Anchorage residents have rabbits, chickens, or other small livestock).

Brown Bears. About 60 brown bears live in the Anchorage area, and four or five are regularly seen in residential areas each summer (e.g., in the Anchorage Bowl or other developed areas such as Eagle

River/Chugiak or Girdwood). However, subdivisions are expanding rapidly into bear habitat adjacent to Chugach State Park, particularly in Eagle River, along Hiland Road, and on the Hillside. Large lots and dense natural vegetation allow bears to use these subdivisions without being seen. Brown bears are generally likely to avoid humans and human environments, but can also learn to associate food opportunities (trash, fish offal, or small livestock) with people. They are also occasionally attracted to the Anchorage Bowl by winter-killed moose, abundant moose calves in spring, and spawning salmon in streams. Because of their size and potential aggressiveness, brown bear use of residential areas presents a definite human safety risk.

The number of both black and brown bears in the Anchorage area has increased in the last three decades, due to hunting restrictions and availability of human food sources. Black bear hunting was eliminated in the Eagle River valley, in the Anchorage Bowl (south of Tudor Road), and in adjacent portions of Chugach State Park in 1987. Black bear hunting in the rest of the Municipality allows only one black bear per hunter per year. Brown bear hunting has been prohibited in Chugach State Park and the Anchorage Bowl since 1973.



RICK SINNOTT

About 60 brown bears live in the Anchorage area, but only about five inhabit residential areas

Moose. The moose population in and around Anchorage has remained high since the 1970s, with about 1,900 animals in the entire Municipality (including Chugach State Park) in 1998. In the Anchorage Bowl, moose are also abundant, with approximately 200-300 in the area year-round, and about 700-1,000 moose in the winter. The winter moose come from adjacent areas (Fort Richardson, Elmendorf Air Force Base, and the mountains east of town in Chugach State Park). In Anchorage, moose are concentrated in area parks, greenways and undeveloped open space, but may frequently visit suburban neighborhoods.

The Anchorage moose population is controlled primarily through starvation, vehicle collisions, some calf predation from bears and wolves, and limited hunts on the two military reservations. Despite this, moose

populations appear to be rising again to the peak levels that were experienced in 1994. At that time, there were an estimated 2,100 moose in the Anchorage area and probably over 1,000 wintering moose in the Anchorage Bowl. This was followed by a sharp decline during the harsh winter of 1994-1995, when nearly a third died. In recent years, habitat in many areas also appears to have been over-browsed, particularly on Fort Richardson and in the Anchorage Bowl. From 1994 to 1999, an average of about 156 moose were killed in vehicle collisions in the entire Anchorage area each year, with the high year being 1994-95 (when there were 239 documented kills by collisions). About 100 moose are harvested annually in local hunts, most of which occur on the military reservations.

Moose are symbolically linked with Anchorage (the town mascot used by the Convention and Visitor's Bureau is a moose named "Seymour"), and they provide residents and visitors with exceptional viewing opportunities, especially in winter. However, they are also a hazard to drivers during the winter, and individual moose can become aggressive when under stress or protecting their young or territory. Certain human behaviors toward moose (e.g., people who feed them, individuals who harass them with snowballs) can exacerbate human-moose interactions, with damaging results. People have been stomped to death by moose in Anchorage (in 1993 and 1995), as many as 50 to 100 dogs are injured (some killed) annually, and cross country skiers and dog mushing teams using city trails have been charged on numerous occasions. There is concern among some trail users (particularly dog mushers) that moose are becoming more aggressive toward humans in the past decade. ADF&G has to destroy some individual aggressive moose each year.



RICK SINNOTT

Moose are very common in Anchorage, with winter populations in the Anchorage Bowl approaching 1,000. They provide superlative viewing opportunities, but also create the potential for conflicts.

Dall Sheep. Sheep are numerous in Chugach State Park (which has an estimated population of 2,400), and dozens of sheep can be seen on the hillsides above the Anchorage Bowl. Sheep generally live in the steep, rocky alpine terrain of the Chugach Mountains, but will visit lower elevations to access mineral deposits. One mineral lick, at Windy Point on the Seward Highway, has become a popular sheep viewing area, but traffic congestion at this relatively undeveloped site affects the quality and safety of viewing opportunities. Planned highway and viewing facility improvements (as advocated in the actions section of this plan) are likely to address some of these problems. Sheep populations in the park and at the Windy Point viewing area appear to be stable.

Dall sheep are common in Chugach State Park and are readily viewable along Turnagain Arm

RICK SINNOTT



Mountain Goats. In addition to Dall sheep, there are also an estimated 200 mountain goats in the mountains of Chugach State Park, with over 500 more goats in portions of the Municipality east of the Park. Mountain goats live in steep alpine terrain, and are less likely to be seen along roads or on the slopes above the Anchorage Bowl. The goat population appears to be increasing slowly.



WILLIAM GOSSWEILER

Beaver are also common in Anchorage, living along stream corridors

Beaver. The number of beavers in the entire Municipality is unknown, but there are an estimated 150 in the Anchorage Bowl. Beavers live along area streams, which are largely within publicly-owned parklands and greenbelts or on the military bases. Beaver activity provides important benefits to salmon and water quality. Their ponds create rearing and overwintering habitat for juvenile salmon; provide invertebrates, trapped organics, and other nutrient input including spawned-out salmon carcasses essential to the food web of the stream; and help water quality by allowing fine sediments to settle out. Large woody debris and ponds add complexity to a stream, which is vital to healthy fish habitat. Beavers occasionally cause damage on developed or private lands by cutting down trees or building dams that cause flooding. The beaver population in Anchorage appears to be stable.

Wolves. There are four or five packs (a total of 25-30 wolves) in the Anchorage Municipality, and two packs active in the Anchorage Bowl (about 12 wolves total). Wolves can inhabit a wide variety of terrain, and may have huge territories. In Anchorage, wolves appear to be relatively adept at avoiding humans, but may still be involved in some conflict situations. For example, wolves appear to kill up to about five dogs each year in the Anchorage area (although most of these dogs are found to have been running free). Wolf populations in Anchorage appear to be stable at this time.

WILLIAM GOSSWEILER



Two packs of wolves are active in the Anchorage Bowl, while other packs may use parts of Chugach State Park

RICK SINNOTT



There are a number of small mammals in Anchorage, including porcupine

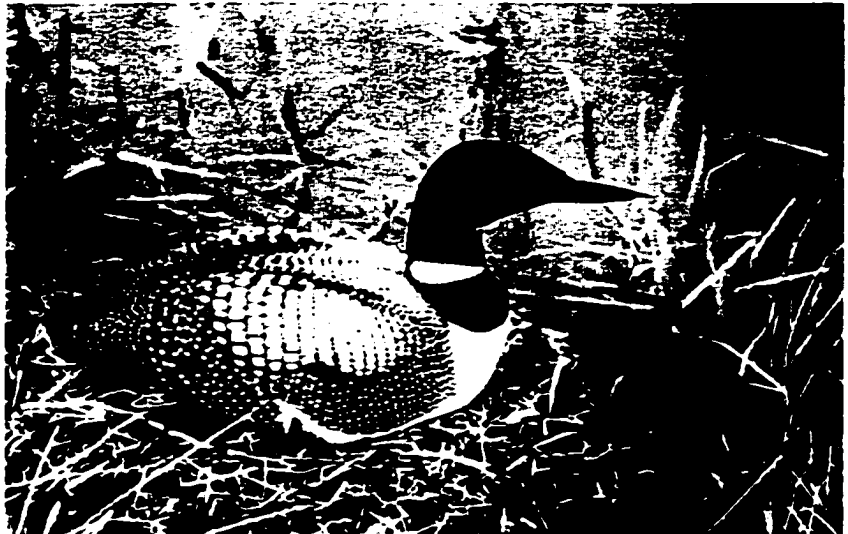
Other Furbearers and Small Mammals. A variety of other furbearers are present in the Municipality of Anchorage, including wolverine, coyote, lynx, snowshoe hare, red fox, mink, weasel, and marten. Other small mammals include porcupine, red and northern flying squirrels, hoary marmot, little brown bat, and mice, voles, and shrews. (See Appendix C for complete list of mammals.)

Coyote and red fox numbers are unknown, but they appear to be stable or increasing, based on sightings. Lynx populations fluctuate in cycles with snowshoe hare populations, and appear to number 15-20 in the Anchorage Bowl in 1999. Lynx sightings in Chugach State Park appear to be increasing in the past two years. There is generally little trapping of these species in the Anchorage area.

Feral Rabbits. There are probably hundreds of feral rabbits in the Anchorage Bowl, all descended from tame rabbits released by humans. Adept at surviving in urban and suburban environments, they appear to be increasing. They are currently not a threat to native snowshoe hares through competition or interbreeding. (Snowshoe hares number in the thousands and also appear to be stable within a cyclic population range.) However, feral rabbits may transmit diseases, they do compete with snowshoe hares, and they can create property damage with their burrows and feeding habits.

Anchorage is the largest city in North America with nesting loons. Habitat conservation and measures to prevent disturbance appear necessary to maintain these populations.

This is a common loon. Pacific loons, with gray head and bright throat patch, also nest in Anchorage.



US FISH AND WILDLIFE SERVICE

Loons. Anchorage is the largest city in North America with nesting loons, and up to thirteen pairs of loons attempt to nest each year on city lakes (Fair, 1998). This includes up to seven pairs of Pacific loons (most on lakes in the Anchorage Bowl) and up to six pairs of common loons (most on lakes on the two military reservations). Although there are 45 lakes of suitable size for loon nesting, only about fourteen lakes have been actively used by loons since 1994. In the period from 1982-1994, twenty-one different lakes were used by at least one pair in one year. Since 1994, an average of 4.8 nesting pairs of common loons have fledged an average of 5.5 chicks annually, while an average of 4.5 pairs of Pacific loons have fledged an average of 2.0 chicks annually. The Pacific loon reproductive rate is lower than necessary to sustain the local population (an estimated 0.5 chicks per pair per year is required). Both of these breeding populations are vulnerable to local extirpation because of their low current numbers and geographic

isolation from other loon populations. Both of these species have been identified by the planning team as needing greater protection and management attention to prevent future population losses.

Grebes. Anchorage lakes also support breeding populations of both red-necked and horned grebes, although the latter are much less common or prolific in this area. Like loons, horned grebes appear to be more sensitive to human disturbance while nesting, and population stability may require habitat conservation or enhancement efforts.

Cranes. Sandhill cranes nest and raise young along the coast and in remaining large, open wetland areas. They can be sensitive to disturbance during nesting and migration. Crane populations in Anchorage appear to be stable at this time, but have probably declined from mid-century when development levels were lower and there were more extensive wetlands.

While most noticeable in Anchorage when giving their loud, gurgling call during migratory flights, sandhill cranes also nest in our coastal wetlands.



US FISH AND WILDLIFE SERVICE

Canada Geese. Geese began nesting in Anchorage in the early 1960s and were not reported here before that time. There are several subspecies of Canada geese. Most Anchorage geese are lesser Canada geese. Geese both feed and stage in Anchorage, and prefer habitat that features available grass adjacent to open water. Summer goose population levels have grown to about 4,600, and they are increasing at about 6% per year even as wildlife authorities have attempted to check increases through an egg collection and gosling translocation program.

Geese are a significant threat to aircraft (an Air Force plane crashed in 1995 after colliding with a flock of geese and 24 people were killed), and local air fields all have active harassment programs designed to keep geese from those areas. Geese can also become a nuisance around lakes and at parks, ball fields, and golf courses. Their feces make areas unattractive to many people and may contribute to the dispersion of a parasite that causes swimmer's itch. Chapter 5 contains a section summarizing the extensive management efforts associated with this species.



US FISH AND WILDLIFE SERVICE

Anchorage has over 4,000 resident geese, and many others fly through the area during their annual migration



ELMENDORF AIR FORCE BASE

Large numbers of resident geese can create some hazards or nuisances for humans. Authorities around airports and airfields have developed harassment programs to prevent aircraft-geese collisions.

Mallards and Other Waterfowl. Like Canada geese, mallards and some other waterfowl species have increased in the Anchorage area in recent years. Based on the Audubon Society's Christmas Bird Count (CBC),¹ about 3,000 mallards now remain in the Anchorage area each winter. Most of these live in the Bowl, and are attracted by human hand-outs and open water. The mallard population is generally increasing, but may have dropped for a year or two after a 1996 road reconstruction reduced the amount of open water near the Spenard Road side of Westchester Lagoon. In more recent years, population numbers have returned to about 3,000 birds in winter. This high mallard population contributes to the nuisance problems identified with geese.

¹ The Christmas Bird Count has been held periodically in mid-winter in Anchorage since 1941, and continuously since 1960.

Waterfowl and Wetlands

Waterfowl are attracted to the area's lakes, streams, and wetlands, but the wetlands have significantly decreased since the 1950s. Ducks and geese are hunted in the Anchorage Coastal Wildlife Refuge, with about 1,000 harvested annually.

Other waterfowl that migrate through Anchorage include swans, northern pintail, goldeneyes, mergansers, green-winged teal, bufflehead, scaups, and several other duck species. Additional information about waterfowl species and their abundance is needed for Anchorage, and actions in this plan are designed to increase our knowledge.

Anchorage wetlands and bodies of water provide habitat for many waterfowl like this wigeon



US FISH AND WILDLIFE SERVICE

Shorebirds. Forty species of shorebirds have been recorded in the Municipality (Scher, 1993), but only ten (including common snipe, lesser yellowlegs, short-billed dowitcher, least sandpiper, semipalmated plover, and spotted sandpiper) appear to regularly nest in the Anchorage Bowl. Other species, including Hudsonian godwits, may occasionally breed in the area (C. Maack, personal communication, 1999). Because considerable wetlands in the Bowl have been drained since 1950, breeding populations of these water birds have probably also declined (L. Tibbitts, personal communication, 1999). Retention of remaining wetlands within the Bowl will help ensure persistence of breeding species; protection of nesting areas from human disturbance may also be important and is addressed through recommended actions in this plan.



US FISH AND WILDLIFE SERVICE

Semipalmated plovers sport a bright orange bill and legs. They nest regularly in open habitat in Anchorage.

Many other shorebirds depend on the wetlands and upper Cook Inlet mudflats during spring and fall migration. Species that migrate through in high numbers include short-billed dowitchers, Hudsonian godwits, greater and lesser yellowlegs, and least and pectoral sandpipers. In general, population levels of migrants seem to be stable at this time but protection of tidal areas remains critical (L. Tibbitts, personal communication, 1999; B. Andres, personal communication, 1999).

Gulls and Terns. Eighteen species of gulls and terns have been recorded in the Municipality (Scher 1993). During the last two decades, numbers of glaucous-winged and herring gulls increased dramatically, overtaking numbers of the smaller mew gull which was formerly the most common gull in Anchorage. Retention of wetlands within the Bowl, particularly the Anchorage Coastal Wildlife Refuge, can help maintain populations of other species, such as Arctic tern, which are less adaptable to urban environments.



US FISH AND WILDLIFE SERVICE

Arctic terns nest in Anchorage wetland areas such as Potter Marsh.

Protection of remaining wetlands is critical to maintain these and other birds, such as shorebirds and less common gull species.

Glaucous-winged and herring gulls adapted easily to the increase in human garbage available in Anchorage, and are commonly seen at dumpsters. Although population surveys have not been conducted, biologists have counted more than 100 ground nests on a single empty lot in midtown Anchorage each spring. Large gulls become nuisances by vigorously defending nests on roofs and other structures, destroying roofing, fouling water, spreading avian diseases, and increasing nest predation on other birds. In 1999 natural resource agencies received more calls complaining about gulls than about any other birds. The USDA Wildlife Services program had contracts with 10 local businesses to remove gull nests where aggressive gulls threatened human safety, and the Municipality removed gull nests from several problem areas. Elimination of waterfowl feeding, and better attention to covering dumpsters, might help reduce the numbers and problems associated with large gulls.

Bonaparte's gull is one of Anchorage's smaller gulls



JON NICKLES, USFWS

Bald Eagles. There are probably dozens of bald eagles resident in the Municipality, and there are at least 9 nesting pairs in the Anchorage Bowl, with higher population numbers in winter. Eagles generally live and feed along streams, lakes, or the coast, but eagles occasionally scavenge human trash in Anchorage, particularly in winter. The eagle population in Anchorage appears to be stable or increasingly slightly.



US FISH AND WILDLIFE SERVICE

There may be nine or more nesting pairs of bald eagles in the Anchorage Bowl, and populations appear stable

Hawks. Thirteen species of hawks have been recorded in the Anchorage Bowl (Scher 1993). Although quantitative data are not available on population trends for these species, forest-dwelling birds, including sharp-shinned hawk, northern goshawk, red-tailed hawk and merlin, have likely declined due to forest fragmentation caused by urban development. Populations of alpine-breeding species such as golden eagle, northern harrier and gyrfalcon have probably remained unchanged, because their habitat has not been altered by human development.

Owls. Seven species of owls have been recorded in the Anchorage Bowl (Scher 1993). Resident species include the forest-dwelling great horned owl, boreal owl, and northern saw-whet owl. Boreal owls have likely declined as forests have been cut for development during the past three decades. Forest loss may not have affected great horned owls as much, because they use forest openings, which may actually increase as forests are fragmented. The Anchorage population status of the little saw-whet owl is uncertain, and is currently under study (B. Dittrick, personal communication, 1999). Snowy owls, great gray owls, northern hawk owls and short-eared owls reside in the area in winter or during migration, although northern hawk owls may also occasionally nest in the Municipality.

Seven species of owls, including great horned owl, may be found in Anchorage



WILLIAM GOSSWEILER

Migratory Songbirds and Other Small Land Birds. Anchorage supports year-round resident songbirds as well as many migratory species that arrive in the spring to breed. Other species occur here occasionally. Over 90 species of land birds have been recorded in the Anchorage Bowl (see Appendix C for list of most common species). About 58 species, including the 29 year-round resident species, breed here (Scher, 1993). This group includes families such as kingfishers, woodpeckers, flycatchers, jays and ravens, swallows, chickadees, thrushes, warblers, sparrows and finches.



Townsend's warbler, with olive back and a mask of mustard yellow and black, is one of Anchorage's most striking songbirds. The male's singsong voice is heard from the tops of mature spruce trees from late May to early July.

This banded bird is part of a study to determine effects of the recent bark beetle infestation on this spruce-dependent species

STEVE MATSUOKA, USGS

The Christmas Bird Count suggests that 40 to 50 bird species (not all of them songbirds) are regularly seen in winter. The most common land birds recorded in winter are rock dove (pigeon), black-billed magpie, raven, black-capped chickadee, red-breasted nuthatch, Bohemian waxwing, pine grosbeak, redpoll, and six species of sparrow. Grouse and ptarmigan species are local resident land birds more commonly found in less developed forested and alpine areas of the Municipality.

Alaska's state bird is the willow ptarmigan, which is found year-round in the Chugach Mountains



US FISH AND WILDLIFE SERVICE



Many local songbird nests, like this one belonging to a golden-crowned sparrow, are built on the ground.

Ground-nesting species are particularly vulnerable to free-roaming pets and to the common landscaping practice of removing the protective forest understory.

US FISH AND WILDLIFE SERVICE

Collection of quantitative data on population changes in songbirds and their allies has only recently begun. However, loss and fragmentation of forests and wetlands within the Anchorage Bowl have likely reduced breeding populations of some species. Many species require larger tracts for sufficient foraging or nesting habitat. Retention of large tracts of remaining spruce-birch forest and wetlands would benefit numerous songbird and raptor species. Retention of forested *corridors* which connect smaller tracts would help these tracts function as larger tracts, and also facilitate the dispersal of young birds.

Another habitat factor that has significant effects on biological diversity (numbers of species) and population sizes is the vertical structure of the forest. When the *understory* (shrubs and other plants growing naturally under the forest canopy) is removed, many birds lose nesting, foraging, and protective habitat. The problem of protective understory loss is made worse by the increase in free-roaming domestic cats as the city grows. Cats are efficient songbird predators: biologists estimate that cats kill hundreds of millions of birds each year in the United States alone.

Hairy woodpecker is one of about 30 species of land birds that live in Anchorage year-round



USGS

Biologists and birders have recently noticed several interesting changes in bird populations. Although they remain relatively uncommon, populations of downy, three-toed, and black-backed woodpeckers appear to have recently increased as a result of the spruce bark-beetle outbreak in the late 1990s (B. Andres, personal communication, 1999). In contrast, other songbird species (e.g., Townsend's warbler, ruby-crowned kinglet) have probably lost habitat as a result of the outbreak. The long-term effects of the spruce bark-beetle infestation on these and other bird species are still unknown. Recent outbreaks of bill deformities in black-capped chickadees and avian salmonella in redpolls and pine siskins have been noted, but the causes are presently unknown.

Ravens. There are probably over 1,000 ravens in the Anchorage Bowl in winter and the population seems stable. There is a noticeable seasonal movement of these birds, with only about 200 birds resident in summer. Ravens are intelligent birds with the ability to live in a variety of environments, and are adept at scavenging human food. This can occasionally create conflicts with humans who do not secure their trash.



RICK SINNOTT

The raven is among the most common bird species in Anchorage during winter

Rock Doves (non-native). The rock dove or pigeon is an exotic species that may number over 2,000 in the Municipality, with about half that number in the Anchorage Bowl. This population is growing, and they may be out-competing several other native bird species, or harboring diseases such as avian salmonella that affect other birds or people. Pigeons are all descended from tame birds that were released, and can successfully live in urban environments, especially when people feed them. One positive consequence of rock dove populations in Anchorage is that they may be attracting avian predators (e.g., gyrfalcon, which have been regularly observed since rock doves arrived in the city).

European Starlings (non-native). This is another exotic species that has spread across North America since its introduction from Europe in the 1890s. Starlings arrived in Anchorage in the last decade and are now year-round residents in the Bowl. The starling population in Anchorage is unknown and appears to be small but growing. They are a concern to biologists because starlings aggressively compete with cavity nesters such as woodpeckers and chickadees, their large roosts in buildings and trees can create noise and odor nuisances, and their droppings may allow a soil fungus to spread histoplasmosis, which humans can contract. Pests in many lower-48 communities, once their populations have been established they have proven nearly impossible to control.

Invertebrates. In addition to birds, mammals, fish, and wood frogs, there are thousands of invertebrate species in Anchorage, each with roles in the larger ecosystem. While it is beyond the scope of the current plan to identify and discuss conservation issues with regard to these species, the planning team would like to recognize their importance.

Of particular concern are aquatic insects such as stoneflies, mayflies, caddisflies, blackflies, crane flies, and midge flies, all of which are present in the city's streams. They are essential to the fish and wildlife food web, and may be good indicator species for water quality because they are sensitive to pollution. Similarly, dragonflies and damselflies are prominent species around lakes, ponds, and other freshwater wetlands. Mosquitoes, of course, are another important insect species in the ecosystem, despite their obvious nuisance qualities to humans and their pets. As the city has become more developed and both wetlands and heavy brush decrease, it is likely that certain insect species such as mosquitoes have decreased.

Summary of some major Anchorage mammal species

Table 1. Summary of some major Anchorage mammal species. (Note: See text for a discussion of sources.)

Species	Population		Trend	Population Goal
	Summer	Winter		
Black bear	~250 in Municipality ~30 to 50 in Anchorage Bowl		Stable or increasing	Maintain population: encourage avoidance behavior.
Brown bear	~60 in Municipality ~5 in Anchorage Bowl		Stable	Maintain population: encourage avoidance behavior.
Moose	~1,900 in Municipality ~200-300 in Bowl	~700 to 1,000 in Anchorage Bowl	Fluctuating: limited by available forage	Possibly reduce (see discussion in Chapter 5)
Dall sheep	~2,400 in Municipality		Stable	Maintain population in park and at Windy Corner area.
Mountain goat	750 in Municipality		Stable	Maintain population.
Beaver	~150 in Anchorage Bowl		Stable	Maintain population.
Wolf	4 to 5 packs in Municipality (~25-30 wolves) 2 packs in Anchorage Bowl (~12 wolves)		Stable	Maintain population.
Red fox	Unknown		Stable or increasing	Maintain population.
Coyote	Unknown		Stable	Maintain population.
Lynx	Unknown		Cyclic	Maintain population range.
Snowshoe hare	Unknown		Cyclic	Maintain population range.
Feral rabbit	Hundreds in Anchorage Bowl		Increasing	Reduce or eliminate population.

Summary of some major Anchorage bird species or families

Table 2. Summary of some major Anchorage bird species or families. (Note: See text for sources.)

Species/group	Population		Trend	Population Goal
	Summer	Winter		
Common loon	Max. of 6 pairs	0	Stable	Enhance/protect population due to its small size.
Pacific loon	Max. of 7 pairs	0	Declining	Enhance/protect population due to its small size
Sandhill crane	Unknown	0	Stable	Maintain population.
Canada goose	~4,600 in Bowl	0	Increasing	Reduce existing population, and maintain at 2,000 in Anchorage Bowl.
Mallard	Unknown	~3,000 in Bowl	Increasing	Maintain population at current levels.
Shorebirds	Unknown	0	Stable in recent years.	Maintain populations.
Gulls	Unknown	Unknown	Some increases; some stable	Maintain populations.
Arctic tern	Unknown	Unknown	Unknown	Maintain population.
Bald eagle	Dozens in Bowl		Stable or increasing	Maintain population.
Hawks	Unknown	Unknown	Stable in recent years.	Maintain populations.
Rock dove (pigeon)	>2,000 in Bowl		Increasing	Reduce or eliminate population.
Owls	Unknown	Unknown	Stable in recent years.	Maintain populations.
Migratory songbirds and other small land birds	Unknown	Unknown	Some species stable in recent years; others unknown	Maintain populations.
Common Raven	< 200 in Bowl	>1,000 in Bowl	Stable	Maintain population.
European Starling	Unknown	Unknown	Increasing	Reduce or eliminate population.

General Values and Attitudes toward Anchorage Wildlife

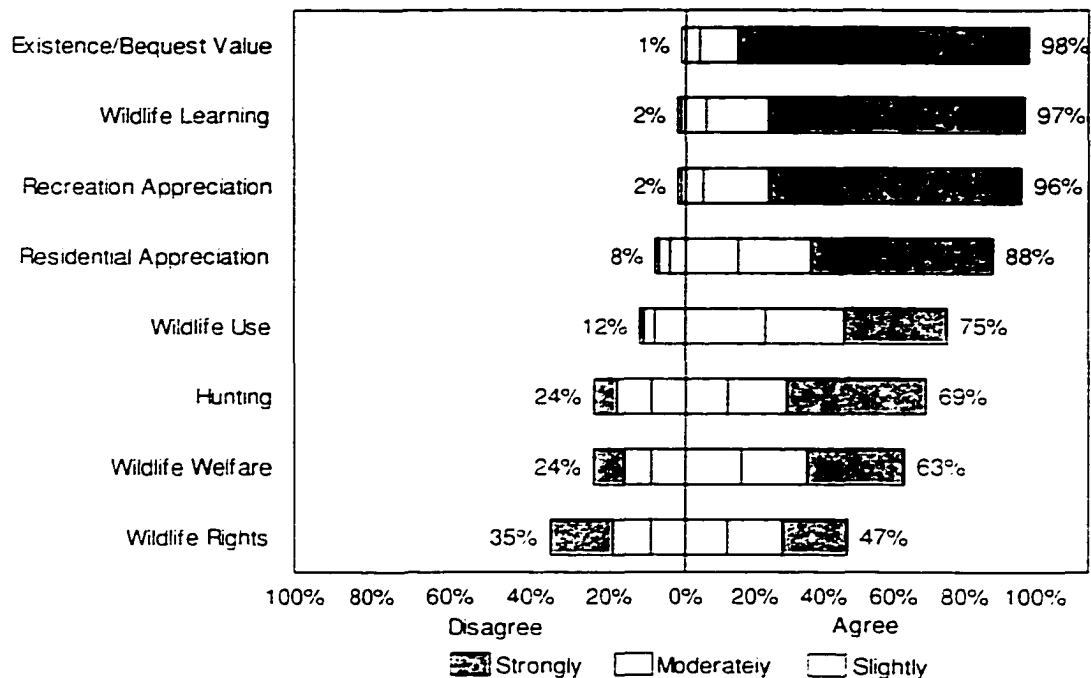
This section provides a sample of information from the 1997 study of Anchorage residents' attitudes toward wildlife and wildlife issues. It is useful for characterizing current wildlife interest levels and general values toward wildlife. Readers interested in more information about the survey findings are referred to the summary report (Whittaker and Manfredo, 1997), available from the Alaska Department of Fish and Game.

Wildlife Recreation Participation

Anchorage residents appear to be highly interested in wildlife recreation. Well over one-third (39%) report they have taken trips explicitly to view wildlife, and very high majorities report having enjoyed watching moose (96%) and geese (92%) in Anchorage. Over one-quarter of residents also report having fed geese, suggesting a significant minority of residents feel a strong affiliation with this species. Almost half of the residents surveyed also reported past or current participation in hunting. Over one quarter (28%) reported being current hunters, while another 20% reported they have hunted in the past.

Basic Wildlife Beliefs

People's attitudes toward wildlife species, problems, and management actions are thought to be influenced by their beliefs and values toward wildlife in general. The survey asked people about 29 statements that reflect eight different "basic wildlife beliefs." Combining results into eight scales reveals general patterns of attitudes toward wildlife, as shown below and discussed on the following page. (Note: "neutral" responses are not shown).



Wildlife Existence/Bequest Value Beliefs. Four questions measured existence and bequest value of wildlife. Existence questions focused on the importance of maintaining wildlife populations even if people don't see them, while bequest questions focused on maintaining wildlife populations for future generations. Almost all residents agreed with these types of statements.

Wildlife Learning. Three questions measured wildlife learning beliefs, focusing on whether residents enjoy learning about wildlife and whether they think wildlife learning is important. Almost all residents agreed with these statements, although there was variation in their strength.

Appreciation in Recreation Settings. Three questions measured residents' appreciation for wildlife in recreation settings, focusing on whether people enjoy watching wildlife on trips, or whether wildlife is an important reason for taking trips. Almost all residents agreed with these statements, although there was variation in their strength.

Appreciation in Residential Settings. Four questions measured appreciation for wildlife in residential settings, focusing on whether people enjoy watching wildlife around their homes and whether they are interested in attracting wildlife to their neighborhoods. Most residents agreed with these statements, but to a slightly lesser degree than for other "appreciation" beliefs.

Wildlife Use. Four questions measured wildlife use beliefs, focusing on whether wildlife populations should be managed for human benefit and whether it is acceptable for wildlife use to cause the loss of individual animals as long as populations are not threatened. A majority (75%) of residents hold pro-use beliefs, indicating general interest in a wildlife stewardship ethic.

Hunting. Six questions explored hunting beliefs, focusing on whether it is considered safe, humane, and whether it helps hunters appreciate wildlife and natural processes. Taken together, a majority of residents agree with pro-hunting beliefs while less than a quarter hold anti-hunting beliefs.

Wildlife Welfare. Two questions measured wildlife welfare beliefs, focusing on whether people should minimize wildlife pain and suffering if it is caused by human activities. A majority of residents generally agreed with a welfare position, indicating concern about the humane treatment of animals.

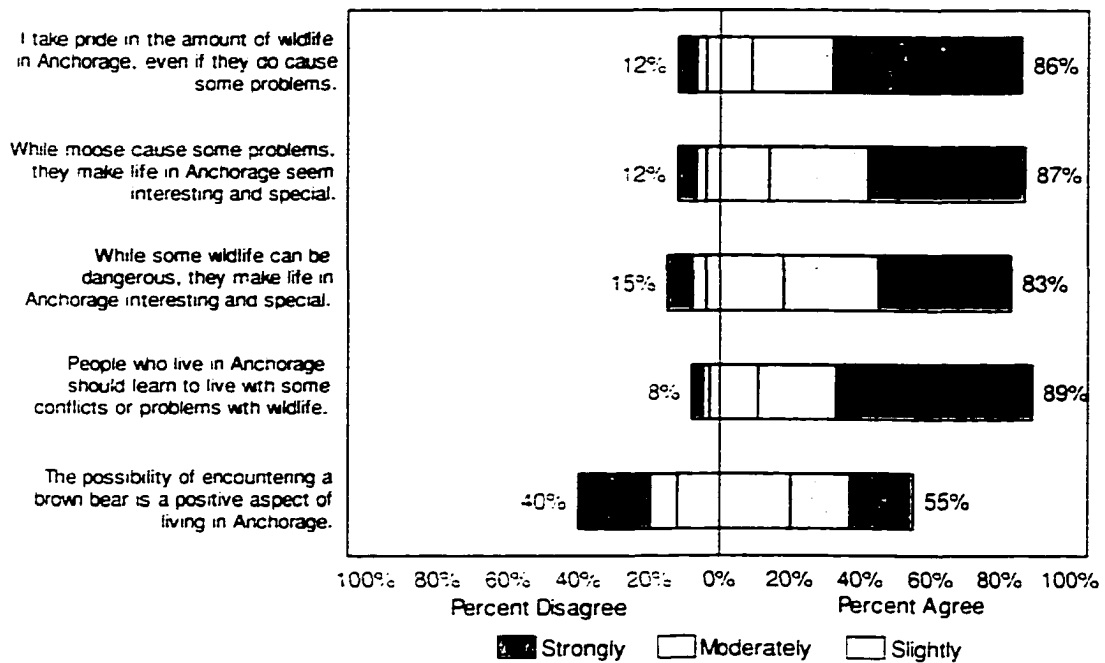
Wildlife Rights. Three questions measured whether human needs were more important than wildlife rights, or whether human and wildlife rights were equally important. While more people agree than disagree with wildlife rights, there was greater polarization over these beliefs.

Summary. Overall, these results suggest two general conclusions. First, very large majorities of Anchorage residents show appreciation for wildlife. They are interested in learning about them, seeing them during outdoor recreation and around their homes, and conserving them for future generations.

Second, while most residents hold use-oriented beliefs, a majority also agrees with some wildlife welfare or rights positions. This may seem initially inconsistent, but could simply reflect complexity among peoples' beliefs. For example, it is possible to be both pro-use and pro-welfare: many hunters are concerned with the humane treatment of wildlife even during harvest.

Pride in Anchorage's Wildlife

The survey also asked respondents to agree or disagree with five statements relating to "wildlife place-identity," the extent to which people symbolically link wildlife with Anchorage's quality of life and a sense of place. Results are given in the following figure (showing the percent that slightly, moderately, and strongly agreed/disagreed with each).



Results suggest that a majority of Anchorage residents take pride in the city's wildlife, even if these animals cause some problems. For many residents, it appears that wildlife problems actually enhance the quality of life in the city because they make it seem "interesting and special." A large majority also agreed that "people who live in Anchorage should learn to live with some conflicts or problems with wildlife," although a smaller majority thought that the possibility of encountering brown bears was a positive aspect of Anchorage life.

Summary

On balance, these survey results show Anchorage residents to be highly appreciative of wildlife, as well as relatively tolerant of wildlife problems in the city. Results also suggest that a majority of residents support the use and management of wildlife species, while also showing concern that uses and management activities are conducted in humane ways and without threatening long-term population levels. The planning team considered these general values and attitudes throughout the planning process. More specific survey results were also considered when choosing among actions, and are presented in this plan where relevant.

Wildlife Conflict Statistics and Standards

Wildlife in Anchorage do cause some problems, and while most residents seem willing to tolerate existing levels, many are concerned about any increase in conflicts. This section provides some information on current wildlife conflict levels in Anchorage, and develops initial “standards” that define the point at which levels go from being acceptable to being unacceptable.

Exceeding these standards does not require any particular action, but they are seen as the “alarms” that signify a problem in need of increased attention. In general, the standards are set to reflect the acceptability of current conditions, but they also suggest the need to avoid any substantial increase.

Public comments during the draft planning stage suggest that some people prefer standards at levels significantly lower than current levels, particularly those related to black bears. The planning team accordingly revised bear-conflict standards to reflect conditions in 1997 rather than those in 1999.

Because conflict levels can fluctuate in any given year, these standards are not intended to be rigid and inflexible (i.e., a large increase in any single year because of aberrant weather or other factors may not be cause for over-concern). However, they suggest serious intent to maintain levels at or below the standards over time.

We also recognize that some of these conflict variables may be susceptible to manipulation by individuals or groups who have a strategic interest in demonstrating a conflict problem. People who favor the dramatic reduction of moose populations, for example, could conceivably lodge complaint calls about encounters with aggressive moose that never happened. While we do not think such manipulations are likely, we want the plan to explicitly recognize the potential. There are weaknesses in using some of these standards to decide when there is a conflict problem in Anchorage. However, until more systematic information about conflicts (and people’s tolerances for them) can be developed, we feel these offer useful, measurable ways to assess how much conflict is occurring.

Finally, the standards also do not imply that it is desirable to have a certain level of conflicts: the obvious goal is to have as few as possible. However, with a city of 260,000 people and abundant wildlife, standards set at zero are unrealistic.

Several actions described in Chapters 5 and 6 of this plan offers ways to address wildlife conflict prevention and responses. In this section, we are simply identifying information that helps define when we have a problem.

Moose-Vehicle Accidents

An average of 156 moose were killed in moose-vehicle collisions each year in the Anchorage Bowl from 1994 to 1999. The record was in the winter of 1994-1995, when 239 moose were killed. However, there are probably many other collisions that only injure moose, or accidents and near-accidents that are caused by people attempting to miss a moose. This compares with about 9,000 total vehicle accidents in Anchorage each year. In a study in rural Alaskan areas (Thomas, 1995), moose collision damage averaged \$15,100 (including repairs, insurance, medical costs, and lost wages). In this same study, most accidents were shown to occur during dark hours (by a 3:1 ratio).

Standard:

- Less than 150 moose-vehicle accidents in the Anchorage Bowl resulting in a moose death per year over any three-year period.



KATE WEDEMEYER

Since 1994, an average of 156 moose were killed in collisions with vehicles each year. Standards in this plan recognize the need to prevent this number from increasing even if Anchorage's population and traffic levels increase.

Moose Encounters

The Alaska Department of Fish and Game receives an estimated 1,000 calls per year about nuisance or aggressive moose in Anchorage. More than 100 people are charged each year by moose. Many of these are "bluff" charges that do not result in any physical contact between the moose and person. However, all of these are potentially serious, and 5 to 10 are estimated to result in human injuries each year. Since 1993, two people have been killed by moose. In addition, it is estimated that as many as 50 to 100 dogs are injured by moose each year, including those along trails designated for sled-dog racing. On average, about 10 aggressive moose are killed by wildlife authorities each year.

Standards:

- Less than 1,000 calls per year about nuisance or aggressive moose (until an improved system can monitor actual incidents of various types; actions in Chapter 6 address this issue).
- Less than 10 human injuries from moose charges per year.
- Less than 10 aggressive moose killed by wildlife authorities or in defense of life each year.



JULIE WHITTAKER

Moose may act aggressively toward humans for a variety of reasons. Standards in this plan recognize the need to prevent increases in the number of aggressive moose encounters.

Moose Property Damage

Moose eat ornamental trees, shrubs, and gardens throughout the year. Damage estimates are in the hundreds of thousands of dollars, but no statistics are available. Landowners are expected to find their own means to protect their property from this damage (usually an 8 foot high or electrified fence is required). Accordingly, we have not established a standard for the amount of acceptable moose property damage. Note: Even without a standard, the plan has actions designed to help landowners protect themselves from this damage.

Black Bear Encounters

Black bears are attracted to residential areas because of natural foods as well as available human garbage, pet food, and birdseed. In the past several years, ADF&G received 300 to 400 calls about nuisance bears per summer. In 1998, however, this rose sharply to about 1,500 calls, and in 1999 the number of calls remained high.

Black bears may kill pets (although no accurate statistics are available) and occasionally injure people, but there has never been a reported human fatality from a black bear in Anchorage. By comparison, there are 600 reported dog attacks (on humans) in Anchorage each year.

From 1995-1998, between 9 and 16 black bears have been shot per year in defense of life or property, or by law enforcement or wildlife authorities for public safety. This is up from the years 1990 through 1994, when this number averaged only about 3 black bears dispatched per year.

Standards:

- Less than 300 calls per year about nuisance or aggressive black bears.
- No injuries to humans by black bears in any year.
- Less than 5 black bears killed in defense of life/property or by wildlife authorities on average each year.

In recent years, calls about aggressive black bears have increased dramatically, and the number of bears killed by residents and wildlife authorities has also increased. Standards recognize that current conflict conditions are unacceptable and should be reduced.

(photo shows brown bear)



RICK SINNOTT

Brown Bear Encounters

Brown bears are also occasionally attracted into residential areas because of natural foods as well as available human garbage, pet food, and discarded fish offal. In the past several years, ADF&G received about 50 calls about nuisance brown bears each year. Brown bears are particularly dangerous animals, and occasionally attack livestock or pets, or chase bikers or joggers on city trails. Two people were killed by a brown bear in Chugach State Park in 1996, and a brown bear injures someone in Anchorage about every two to three years. In recent years, between one and three brown bears have been shot per year by residents (in defense of life or property), or by wildlife authorities (for public safety).

Standards:

- Less than 50 calls per year about nuisance or aggressive brown bears in the Anchorage Bowl.
- No injuries to humans by brown bears in any year.
- No more than 1 brown bear killed in defense of life/property or by wildlife authorities on average each year.

Canada Geese Aircraft Strikes and Property Damage

Canada geese are a significant hazard for aircraft and can damage the aesthetic appeal of lakes, lawns, ball fields, and golf courses.

An active and more detailed plan to address these problems has been developed by the Anchorage Waterfowl Working Group, so no standards are developed for these conflicts here. For a summary of the geese management efforts being led by this group, refer to Chapter 5.

Chapter 5: Wildlife Population Management and Conflict Response Actions

This chapter presents policies and actions related to wildlife population management and wildlife conflict responses. It begins with separate sections on moose, bears, geese, and feral animal population issues, and then describes conflict response policies.

Wildlife Population Management Recommendations

While the planning team was able to agree generally about wildlife population goals for major species, there was less consensus about the means to achieve those goals if current population levels are higher. In this section of the plan, we examine these population management issues for moose, bears, Canada geese, and exotic species (pigeons, starlings, and feral rabbits). The intent is to define areas of agreement and disagreement, and make recommendations for resolving the latter.

Readers should note that **this plan is not the final word on population management decisions in Anchorage**. Public hunts, trapping, and other lethal control actions directed at game species are generally the responsibility of the governor-appointed Board of Game, which also works in tandem with the Anchorage Fish and Game Advisory Committees. These actions may also require approval from landowners in the areas where they are proposed. If firearms are involved, legal exceptions to ordinances prohibiting firearm discharge within certain land management areas may also be required. Similarly, other governmental authorities and laws are involved in Canada geese or feral animal control in Anchorage, and not all have been extensively involved in this planning effort. Accordingly, this plan makes recommendations on how governmental agencies should proceed with population management decision-making, but final actions are likely to be determined in other forums.

Moose Population Management

There was no consensus among the planning team about the need for hunts or lethal control programs in the Anchorage area to reduce moose populations. While a majority of the planning team agreed that current moose populations may be too high (based on biological criteria), there was sharp division over the need for hunts or lethal control actions to reduce them. There was also unresolved discussion over whether such reductions would have noticeable effects on the reduction of moose conflicts such as moose-vehicle collisions, aggressive moose encounters, or moose-related property damage.

This lack of consensus is mirrored in the community and other wildlife decision-making authorities. While the Board of Game recently approved a new moose hunt in Chugach State Park, the voting margin was narrow (4-3). In addition, the approval of Chugach State Park officials and its Citizen's Advisory Board is necessary for the hunt to take place, and there appears to be division in that group as well. Finally, the moose management issue has been a focus of considerable discussion at public meetings and in public comments associated with this planning effort. During the most recent public comment period on the Draft Plan, well over half of the comments focused primarily on moose management issues, with 64% opposed to a hunt while 36% supported a hunt.

A scientific survey of Anchorage residents conducted in 1996 showed contrasting results (Whittaker and Manfreda, 1997). Survey findings indicated that a majority (61%) would accept public hunts to reduce

moose populations, but that views were also strongly polarized. When asked about a specific moose hunt in Chugach State Park, results showed 51% support, 34% opposition, with 15% reporting that they "don't know." Additional analysis of the park hunt results revealed that hunt opponents and supporters had divergent beliefs about the consequences of a hunt, some of which appear to trace back to fundamental differences in values toward the use or protection of wildlife (Whittaker et al., In press).

The survey also provided information about residents' evaluations of moose population levels and the problems those may cause. While a majority supported moose hunts, most residents did not consider the current moose population too high. Results suggest that 69% thought there were "too few" or "about the right amount" of moose in Anchorage, while only 31% thought there were "too many." In addition, nearly two-thirds reported that moose encounters on trails or in neighborhoods were "at acceptable levels," and 61% reported the same about moose-related property damage incidents (moose eating gardens and trees). However, 60% did report that there were "too many" moose deaths from moose-vehicle collisions.

Taken together, survey results highlight the complex attitudes Anchorage residents hold toward moose and moose management actions. While there is clear concern about some moose problems (vehicle collisions), there is less concern about others (encounters and property damage). And while most people would accept or support a hunt, most also do not think that population reductions are necessary.

Given this background, the planning team was unable to decide for or against a hunt, and agreed to defer recommendations on moose population actions. Instead, **this plan recommends a "step-down" planning effort to resolve this and related moose population issues.** While we recognize potential public frustration with a plan that simply advocates more planning, additional information and consensus-building appears necessary to resolve key issues in the debate.

The Alaska Department of Fish and Game has agreed to lead this step-down planning effort, which is expected to be organized along similar lines to the Anchorage Waterfowl Working Group (developed to address geese management issues). The timeframe for this planning effort is fall and winter 1999-2000.

Although agencies and existing authorities (ADF&G, Chugach State Park, and the Board of Game) will ultimately be responsible for moose population decisions, the working group is expected to include representation from a diversity of other public agencies and citizen advisory boards, including the Anchorage Fish and Game Advisory Committee, the Chugach State Park Citizen's Advisory Board, the military reservations, BLM, and the Anchorage Municipality's Division of Parks and Beautification. The working group is also expected to provide extensive opportunities for interest groups and interested individuals (e.g., hunting groups, park user groups, Hillside residents) to become active participants in the planning effort or to provide comments.

As this new group begins its work, the planning team has identified a number of additional information needs and issues which should be used to structure decision-making processes and content. These are summarized below.

- ***If moose reductions are necessary, either hunts or lethal control programs should be considered.*** The planning team could not agree on the need for actions to reduce populations. However, if such a need is established, there was general agreement that either hunts or lethal control programs could be used to accomplish this, depending upon population reduction goals and locations. While the 1996-97 survey of residents showed greater acceptability for hunts than control actions (even if the latter

lead to charitable donations of meat). respondents were provided few details about how such a program would work. In particular, the question did not specify how guides or sharpshooters (as opposed to agency personnel) could be used to reduce moose populations in developed areas, where safety issues make public hunts less acceptable.

The planning team has recognized demand for additional moose hunting opportunities in the Anchorage area, as well as the generally lower costs of administering public hunts in comparison to lethal control programs. However, if moose reductions are necessary in residential or more developed parts of the city, the planning team suggests that safety concerns might favor lethal control in those areas.

- ***Consider expanding existing hunts first.*** There are already moose hunts in the Anchorage area: 125 permits are issued each year to hunters on the military reservations, and these typically result in the harvest of about 50 to 65 moose. If the decision is made to reduce moose populations, it may be possible to expand the season or number of hunters involved in those existing hunts before developing new ones. This would obviously require participatory decision-making with authorities at Elmendorf and Fort Richardson. Potential problems with this approach include: 1) expanding existing moose hunts could change the quality or harvest success rate of the military hunts; 2) moose population reductions on the military reservations could have few practical impacts on moose populations in the city; and 3) moose population reductions could diminish wildlife viewing opportunities on the reservations.
- ***Specify goals of any hunt or lethal control actions before they are implemented.*** Data from the survey of residents show divergent beliefs among hunt supporters and opponents (Whittaker et al., In press). For example, support is based on beliefs that a hunt will reduce moose-vehicle collisions, reduce the potential for human-moose encounters, and keep moose from becoming overpopulated. In contrast, opponents of the hunt were far less likely to believe the hunt would address these problems. If a hunt is conducted, a connection between the hunt and the reduction of these problems should be determined (see below) and the hunt designed accordingly.
- ***Need for additional information on consequences of population reductions*** Hunt supporters believe reduced moose population levels would help reduce both moose-vehicle collisions and moose encounter levels. These links, however, have not been quantified: increased monitoring of these incidents thus might help determine if these relationships exist. One of the actions described in the next chapter (creation of an urban wildlife position/program), would provide for this monitoring effort.
- ***Need for additional information on biological carrying capacity for moose in Anchorage.*** Biological carrying capacity (BCC) refers to the limits of an area to support a sustainable population of a certain species, such as moose. Despite the common use of this term and concept, defining BCC is complex and depends upon value judgments about what one means by "sustainable" (Dasmann, 1964; Shelby and Heberlein, 1986; Decker and Purdy, 1988). To take a simple example, BCC is different depending upon whether the goal is to maximize the number of animals, the overall health of those animals, or the overall health of the vegetation that is needed to feed those animals over time. In each case, scientists must monitor different indicator variables to decide whether the system is "healthy."

Current estimates of BCC for moose in Anchorage are based on professional judgments that focus on browse condition (which is currently poor) and population changes after severe winters (precipitous decreases of 25 to 30% in after the winter of 1994-95 suggest that population levels were too high). More rigorous quantification of these variables is possible, however, and may be necessary to establish the need for hunts to reduce overpopulation. Newly developed techniques for assessing moose health during winter may also help assess BCC for moose (e.g. fat-content analyses of moose droppings, estimates of rump fat). One of the priority actions in this plan is to fund studies to develop and periodically monitor these types of indicators.

- ***Biological carrying capacity for moose is different from social acceptance capacity.*** It is important to distinguish biological carrying capacity (BCC) from social acceptance capacity (SAC) (Decker and Purdy, 1988). The former is about the health of the moose population and the resource base upon which it depends, while the later is about the number of moose that people will tolerate (and which can vary for different groups of people). BCC is determined by biological information; SAC is determined by social information. In some urban areas, for example, SAC is far lower than BCC for white-tailed deer. These areas could biologically sustain more deer but many residents are interested in keeping their numbers lower to minimize conflict problems including vehicle accidents, landscaping damage, or the transmission of Lyme's disease (Loker et al., 1999). In Anchorage, however, data suggest that SAC is higher than BCC for moose. Survey data suggest that most residents (69%) do not feel that there are too many moose in Anchorage, while ADF&G biologists suggest that current populations are probably at or above BCC.

The implication is that moose population goals should consider both BCC and SAC, and probably manage for the lower of the two. The planning team generally agrees that moose populations in Anchorage should be kept below BCC, but there is division over whether we have enough quantifiable information to determine that number. The best current estimate of BCC is about 600 to 700 wintering moose in the Anchorage Bowl, which is the low end of the fluctuating range that has existed in Anchorage over the past 15 years. Current winter populations may be as high as 1,000 moose.

- ***Any hunt should minimize safety hazards and loss of public land access to non-hunters.*** Based on survey results, hunt opponents have concerns about safety issues and loss of access to public land during hunts. Any hunt should therefore be designed to minimize these problems. Requiring short-range firearms or bows, hunter education certification, teams of hunters, extensive monitoring by game officials, weekday and late-season hunts, and removal of the entire animal after harvest are all potential options.
- ***Ensure no dramatic loss of viewing opportunities or populations.*** The planning team agreed that even if moose population reductions are necessary, care should be taken to avoid dramatic reductions caused by human means (e.g., hunting or lethal control). In addition, any decision on reduction actions should consider the effects on wildlife viewing opportunities. Hunts or lethal control may eliminate less wary moose, which are generally easier to view, or may change the behavior of moose in general, making them more wary. Survey results suggest that a majority of Anchorage residents (69%) feel there are an acceptable number or even too few moose, while 31% reported there were "too many" or "way too many" moose. This reiterates the notion that social acceptance capacities for moose in Anchorage are high (probably higher than the biological carrying capacity). The planning team generally agrees that robust moose populations, even if they cause some problems, appear acceptable to most Anchorage residents.

- ***Recognition that there may be long-term alternatives to hunts or lethal control programs*** Even if no hunt or lethal control program is implemented, moose population reductions are likely to occur periodically during harsh winters. The ultimate goal is to prevent these sharp declines over the long-term by stabilizing moose populations at levels that are biologically and socially optimal. If hunts or control programs in some parts of the city are not feasible, it may be possible to make those areas less attractive to moose (or attract moose from residential areas to less developed public lands). The planning team recognizes that this is a long-term process that would require challenging behavior changes among the Anchorage populace (e.g., changes in their landscaping preferences), but it does offer an alternative way to minimize the problem. Another alternative solution, a moose sterilization program similar to those being researched for white-tailed deer, is currently considered infeasible and too costly for Anchorage moose.

Moose management is likely to remain an on-going issue in Anchorage, even if a controlled moose hunt is authorized and held. Anchorage residents have a diversity of complex attitudes toward moose, the problems they may cause, and the hunts or lethal control actions that might be used to manage their numbers. The planning team is under no illusion that decisions about moose populations will become less controversial through a step-down planning effort, but it hopes that some of the issues will be less contentious with additional information and continued interaction between the people and groups with opposing viewpoints.

Bear Population Management

This plan does not recommend reductions in either brown or black bear populations in Anchorage. However, throughout the Draft Plan comment period and over the course of the 1999 summer, there has been increasing concern about bear conflict problems. As noted in Chapter 4, calls to ADF&G about nuisance or aggressive black bears have increased dramatically in the past two summers. While some people have called for reductions in black bear populations, there is a lack of information about whether increased conflicts are population- or behavior-driven. Accordingly, the planning team is recommending development of a step-down plan to explore this issue in greater detail.

The Alaska Department of Fish and Game has agreed to lead this effort, which is expected to be organized along similar lines to the Anchorage Waterfowl Working Group (developed to address geese management issues). The timeframe for this planning effort is fall and winter 1999-2000.

Although agencies and existing authorities (particularly ADF&G and the Board of Game) will ultimately be responsible for any bear population management decisions, the working group is expected to include representation from a diversity of other public agencies and citizen advisory boards with responsibilities relative to bear management in Anchorage. These include the Anchorage Fish and Game Advisory Committee, the Chugach State Park Citizen's Advisory Board, the military reservations, BLM, and the Anchorage Municipality Division of Parks and Recreation. The working group is also expected to provide opportunities for interest groups and interested individuals to become active participants in the planning effort or to provide comments.

As this group begins its work, the planning team urges systematic consideration of a number of issues in addition to population management. Readers should also note that several policies and actions

recommended in this plan are designed to work together to help reduce bear conflict problems. These include 1) the explicit bear conflict response policies that are likely to remove "repeat offender" bears; 2) an urban wildlife position/program designed to monitor and respond to conflicts; 3) conflict response training for law enforcement staff; 4) a coordinated bear encounter safety program to teach people how to behave appropriately in conflict situations; and 5) a coordinated bear attractant ordinance and education program designed to help remove attractants that may encourage bears to become dependent on human food sources, and may lead to aggressive behavior. The latter part of this chapter addresses the conflict response policies, while sections in Chapter 6 address the various prevention actions.

Canada Goose Population Management

Anchorage has a growing number of breeding Canada geese (*Branta canadensis*) which are causing some safety, economic, and nuisance problems, as well as potential health risks to geese and people. The collision between geese and an Air Force plane at Elmendorf Air Force Base in September 1995, killing 24 people, was the most devastating outcome of these problems to date.

In response to these problems, the Anchorage Waterfowl Working Group (AWWG) was formed in 1995 to collect and share information on goose population dynamics, goose habitats, and ways to help manage and minimize geese problems. At least two important planning documents have been developed in cooperation with this group. The first was an Environmental Assessment developed by the U.S. Fish and Wildlife Service in March 1998. This EA states that there would be no significant impact to Alaska goose populations if Anchorage's population was maintained at 2,000 geese. The second document was an Anchorage Goose Management Plan (April 1998), which recommended a number of actions including the reduction of geese populations from 4,600 to about 2,000 by the year 2002.

To avoid duplication, this plan has not revisited geese management issues. Instead, this plan fully supports the work and decisions made in the AWWG effort. For completeness, however, we have summarized the major decisions in the Anchorage Goose Management Plan as given below.

Background. The number of Canada geese nesting and residing over the summer in the Anchorage Bowl has increased more than 10-fold during the past two decades. This increase is a result of changes in the urban environment that initially attracted a few geese, then allowed for successful reproduction and high rates of survival. In the summer of 1998 the Anchorage goose population was estimated at more than 4,600. With growth rates as high as 14.6 percent per year since 1974, unchecked growth could result in as many as 15,000 to 20,000 geese in Anchorage by 2007. Based on these data, it is clear that the biological carrying capacity for geese in Anchorage is considerably higher than current population levels.

In the last 40 years, humans have inadvertently created ideal goose habitat in Anchorage by enhancing two habitat features: 1) open expanses of short grass in the form of mowed lawns and parks; and 2) accessible water in the abundant natural and artificial lakes and ponds. As Anchorage grew, particularly during the 1970s and early 1980s, natural forested and bog habitats that previously supported few geese were converted to residential neighborhoods, commercial developments, and public facilities. Geese able to adapt to urban conditions found ideal grazing habitat. As these geese reproduced successfully, their offspring returned to nest within two or three years, and the population increased rapidly. We know from banding studies that most of the geese currently in Anchorage did not come here from elsewhere in the state – they were hatched here.

Anchorage's geese have developed certain behaviors which are different from geese found in wild habitats. They congregate in large numbers where food is readily available – particularly where people feed them. Geese in wild habitats do not congregate like this. They can also become aggressive and attack when disturbed, while geese in wild habitats are very wary and rarely aggressive. Finally, Anchorage goose families with goslings will form multi-family groups (several adult pairs and their goslings), a behavior that is rare in wild habitats. Anchorage's Canada geese are still wild birds, but these behavioral differences with their counterparts in wild habitats are significant.

Population management goals and means. The Anchorage Goose Management Plan recommends reducing geese populations to 2,000 by 2002. These reductions are to be accomplished by using a combination of control methods. During summers in 1998 and 1999, this included egg collection, gosling relocation (goslings removed will generally return to the new location), harassment, habitat alteration, and limited lethal control. The focus of these efforts was the area around airports, but it included other areas where geese congregate.

In general, the plan recommends a dramatic focused effort to reduce geese populations in the next three years, so that fewer geese will need to be destroyed over the long-term. The Environmental Assessment estimated 350 geese would have to be destroyed annually to maintain the population at 4,000, while only 150 would need to be destroyed annually to maintain the population at 2,000 birds.

Alternative long-term solutions. The goose management effort has also explored alternatives to lethal control and other population management efforts. The best long-term solution to minimizing human-geese conflicts in urban areas is to replace expansive, grassy lawns to with habitat less attractive to geese. Unfortunately, many people prefer grassy lawns and parks, and there is no widely acceptable substitute for grass on golf courses and athletic fields. Recent AWWG efforts are exploring alternative grasses that may be less palatable to geese, and the development of an outreach program that will educate the Anchorage public about geese issues, management options, and ways they may be able to help reduce geese problems. These outreach programs emphasize how the public can help reduce geese problems by retaining or planting native vegetation (e.g., shrubbery, wildflowers, trees) in place of lawns, and by supporting efforts to have natural vegetation retained or planted in portions of parks or other public areas. This plan fully supports these efforts. If possible, AWWG hopes that alternative measures will obviate the need for lethal control, although in the short term it appears that some population measures will be necessary.

Costs and Funding Sources. Anchorage International Airport, Elmendorf Air Force Base, and Merrill Field spent about \$1 million annually on goose hazing and habitat alteration in 1997 and 1998. These costs may be cut substantially if the goose population is reduced and geese learn that airports are places to avoid. The outreach geese education program is being led by US Fish and Wildlife Service, Elmendorf Air Force base staff and the AWWG group, and is supported by cooperating agencies through staff salaries.

Non-Native and Feral Animal Population Management

One objective in the plan is to reduce non-native wildlife populations to socially acceptable levels. Although the 1996 survey of residents did not address these species, ADF&G staff suggest that there may be problems associated with growing pigeon, starling, and feral rabbit populations (domestic rabbits who escape or are released into the wild and then thrive). In response, the plan recommends halting the population growth of these species and, if possible, significantly reducing their numbers. In addition, the plan also recommends the development and distribution of educational advice to homeowners and businesses to minimize problems caused by these animals.

Pigeons. Pigeons or rock doves are relative newcomers to Anchorage, with the first flock established in the downtown area in the late 1960s. Audubon volunteers have tallied increasing numbers of pigeons (>900) during their December bird count in recent years, but these counts tend to underestimate actual populations. The U.S. Department of Agriculture Wildlife Services Program (formerly Animal Damage Control) has trapped and destroyed about 1,000 pigeons/year in Anchorage since 1996, suggesting pigeon populations are at least twice as high as the Audubon counts for the Anchorage Bowl.

Pigeons carry diseases that can affect other birds and people. A salmonella epidemic has killed thousands of native birds such as redpolls and pine grosbeaks at birdfeeders in recent winters, and this may have been nurtured in the growing pigeon population. Pigeons in the city also compete with native ravens and magpies in winter when food is scarce. Pigeons roost and nest in buildings and other man-made structures. They often cover roof tops, fresh-air ventilation equipment, ledges, and sidewalks with their droppings.

The USDA Wildlife Services office in Palmer has contracts with businesses and condominiums throughout Anchorage to eliminate flocks of pigeons. They have the expertise and equipment to trap and destroy pigeons, but require a funding source. At Wildlife Service's current level of response, pigeon control costs are approximately \$8,750 per year. The bulk of these costs are born by the individuals or organizations experiencing pigeon damage. Increased efforts might be funded through city or state appropriations. Reducing these populations dramatically in one year would lower costs in the long term, and would reduce the number of pigeons that need to be eliminated in subsequent years. However, such an effort would initially require annual funding in excess of current levels.

European starlings. Starlings are dark, robin-sized birds. Their light speckling may not show at a distance. Since their introduction to North America from Europe in the 1890s, starlings have spread across the continent. They arrived in Anchorage within the last decade, and are now year-round residents in the Anchorage Bowl.

Biologists are concerned about the growing population of starlings in Anchorage. Starlings aggressively compete for nest sites with native cavity-nesting birds such as swallows, chickadees, nuthatches, and woodpeckers. In other states, this competition has caused a severe drop in populations of native birds. Once established, effective reduction of starling populations is extremely difficult. Huge roosts in buildings or trees create filth, noise and odor. Slick accumulations of droppings are safety hazards. Starling droppings may also allow soils to develop a fungus that may cause histoplasmosis, a disease humans can contract. In addition, flocks of starlings have caused fatal aircraft accidents in other parts of the country, making them a management challenge at airports.

The USDA Wildlife Services office in Palmer will control starlings at the request of property owners as they do for pigeons. However, there is as yet no organized effort to eradicate starlings from Anchorage. Reducing the starling population now would considerably lower long-term costs, and would reduce the total number of birds that need to be eliminated in the future. However, this type of effort would require a funding source.

Feral rabbits. Feral rabbits have become established in Anchorage in recent decades after people released them into the wild or they escaped. Small breeding populations are now scattered throughout the Anchorage Bowl, notably on the Hillside and at the Clitheroe Center in west Anchorage. Total numbers probably exceed several hundred and may be as high as 1,000. Rabbits compete for food with Alaska's native snowshoe hares (the two species do not inter-breed), although rabbits are unlikely to out-compete hares except in rare circumstances. They are also considered a nuisance in some neighborhoods because they kill ornamental shrubs and flowers and eat garden produce. Unlike hares, rabbits are good burrowers and can easily dig under a fence or house, causing other types of damage as well.

As with pigeons, USDA Wildlife Services have the expertise and equipment to conduct rabbit control; however, they will need a funding source, which could come from state or city appropriations.

Wildlife Conflict Responses

The Alaska Department of Fish and Game (with help from other public safety authorities such as state troopers, city police, and airport police), currently respond to most wildlife conflict situations in the Municipality, particularly involving potentially dangerous animals such as moose and bears. However, different agencies and land managers have slightly different conflict response policies for their lands. The following section describes ADF&G's general policies, and is followed by information about additional response policies for Chugach State Park, in BLM's Campbell Tract, and the two military reservations.

Decisions about whether to destroy the animal (or take other actions) in these situations are based on professional judgments that consider a number of factors outlined in ADF&G guidelines. These guidelines, however, have been developed without significant public input. In this planning process, ADF&G has taken the opportunity to summarize and invite comment about them. These guidelines were developed based on traditional agency responses, but also consider information from the 1997 survey of residents, which contained a number of questions about the acceptability of response actions. Upon adoption of this plan, these guidelines will become active (identifying these as "now" decisions rather than "intention" decisions).

Readers should note that all responses to wildlife conflicts involve professional judgments by the responding authority. A number of definitions and policies in this summary are also subject to some interpretation. For example, while definitions attempt to distinguish between "nuisance" and "aggressive" animals, there is obviously a continuum of behavior that we are splitting into two categories. Similarly, there is obviously some judgment required when assessing whether a moose has charged a person or pet "with little apparent provocation" or from beyond "a substantial distance." All of the following policies should be thus be considered guidelines rather than strict rules, and authorities need to assess all of the available on-scene information before deciding how to classify an animal and respond appropriately.

Overall ADF&G Conflict Response Principles *(in order of priority)*

- Ensure public safety (avoid human injuries and/or deaths).
- Minimize damage to private property or pets (although property owners are expected to take reasonable precautions to protect their property and avoid attracting wildlife).
- Minimize adverse effects to wildlife populations.
- Use humane methods during response or control actions.
- Inform the community about the situation and response that just occurred in order to help educate residents and visitors how to avoid these situations in the future. (Note: Education to prevent these situations in the first place is perhaps the highest priority, and is addressed in several actions in Chapter 6).

ADF&G Moose Conflict Response Policy

Definitions:

- ***Overly defensive behavior.*** Moose that threaten, bluff charge or attack people or pets when they are cornered or defending a calf or calves are exhibiting normal defensive behavior. *Overly defensive* moose refer to those that persist in an attack after a threat has been removed or retreated, or when a moose attacks a human or pet from a substantial distance with little apparent provocation.
- ***Deliberate approaches.*** These occur when a moose follows or directly approaches humans. This is not natural behavior and is usually associated with a moose that has been fed; it may escalate into an attack without warning.
- ***Nuisance moose.*** A nuisance moose is one whose behavior prevents human access to homes, businesses, or other structures, or behavior that results in property damage (eating gardens, ornamentals, etc.). Nuisance behavior is distinct from aggressive behavior (see below).
- ***Aggressive moose.*** An aggressive moose is one whose behavior appears intended to intimidate or harm a human or pet. This may include kicking, stomping, bluff charges, charges, rearing on hind legs, "overly defensive behavior," or "deliberate approaches."

Summary of major moose response policies:

- In general, ***nuisance moose*** will be herded from school grounds or heavily used public areas where they create an obvious safety hazard. This needs to be undertaken by trained ADF&G staff, school officials, or public safety/law enforcement officers. Training for individuals who might be involved in these responses is a priority action in this plan.
- In general, ***nuisance moose*** will not be herded from yards, gardens, school bus stops, roads or recreational trails. Residents and visitors need to learn how to live with moose in these settings, and ADF&G will provide advice on ways that individuals can safely deal with the moose or encourage it to leave. An education program designed to develop and distribute information on these types of situations is a priority action in this plan.
- In general, ***aggressive moose*** will be destroyed, although the circumstances involved in each incident will be considered. If the moose is approached after an incident and is no longer acting aggressive, it may be allowed a second chance. A moose exhibiting any *pattern* of aggressive behavior will be destroyed.
- An ***aggressive moose*** may be captured and relocated if: 1) a suitable release site is located at least 30 miles from the capture site; 2) the release site has an adequate supply of browse for the remainder of the winter; 3) the release site is at least five miles from residences and popular recreation areas; and 4) staff and funds are available. There is currently no funding source for this type of action.
- When necessary, moose will be dispatched with a 12-gauge shotgun with rifle sights and slugs. Law enforcement authorities will be contacted before shooting. Prior to killing a moose on private property, landowner permission should be obtained and adjacent residents should be forewarned to the extent possible. Moose deaths will be reported to law enforcement so a charity can salvage the meat.
- If possible, nuisance moose will be herded without use of rubber slugs, cracker shells, or roman candles. If these are needed, law enforcement authorities will be notified. Use of this equipment

requires care to avoid property damage or inhumane treatment of the moose. A priority action in the plan involves increasing moose situation training for law enforcement staff.



WILLIAM GOSSWEILER

ADF&G Bear Conflict Response Policy

Definitions:

- **Attraction behavior.** Attraction refers to a bear that repeatedly searches out and feeds on human food sources (garbage, dog food, or birdseed). This behavior creates safety problems for people and is to be strongly discouraged. A bear-attractant ordinance and education program is a priority action in this plan: it is designed to help residents discourage this behavior.
- **Habituation behavior.** Habituation refers to situations where an animal ignores a stimulus; it is commonly confused with attraction. A bear may be in the habit of raiding trash cans, but this is attraction, not habituation. However, habituated bears are unafraid of humans, which may lead to opportunities to find non-natural food sources, and then ultimately lead to attraction and aggressive behavior. In general, habituated bears are appropriate in wildland areas where it is desirable for bears to ignore human activity. In urban or suburban areas, avoidance behavior is desirable (see below).
- **Avoidance behavior.** This behavior refers to bears that avoid and move away from humans or human environments. This is the "natural" behavior of bears that fear humans, and is generally desirable among an urban bear population. Bears exhibiting this behavior may live near in residential areas but remain secretive and present fewer safety risks to humans or their pets.
- **Non-aggressive bear.** A bear that is simply seen in a residential or developed area, but has not been seen feeding on human food sources and not approaching humans or pets is characterized as non-aggressive. Non-aggressive bears generally display avoidance behavior around humans and their pets.
- **Nuisance bear.** A nuisance bear is one that is repeatedly seen in a residential or developed area, and may occasionally be seen feeding on non-natural but available food sources (pet food, trash, or bird feed intentionally or unintentionally left by humans for bears to scavenge). In general, nuisance bears are habituated (unafraid) of humans. However, nuisance behavior is distinct from aggressive behavior (see below).
- **Aggressive bear.** An aggressive bear is one that either: 1) acts aggressively toward humans or pets for no apparent reason (when it is not defending a cub or food source); 2) kills or attempts to kill livestock; 3) deliberately approaches humans or dogs; 4) repeatedly attempts to break into structures (e.g., sheds, houses, vehicles) that contain food or garbage; or 5) has become chronically attracted to human environments and has become a problem and threat to humans. A bear that is protecting a natural food source or cubs is behaving defensively and is not automatically presumed to be aggressive.

Summary of major response policies:

- **Non-aggressive brown bears** in less developed residential parts of the city (e.g., Eagle River, Chugiak, Girdwood, or Hillside) will generally be monitored, but no other action will be taken. Residents are expected to learn how to live with brown bears that are behaving naturally.
- **Non-aggressive brown bears** sighted in heavily developed areas in western or downtown Anchorage will be "herded" by ADF&G or other qualified law enforcement staff to undeveloped areas *if* the sighting occurs on weekends or between 6 p.m. and 7 a.m. At other times, this type of action is inappropriate because there are likely to be too many people or activity in areas where the bear may be herded, increasing the potential for encounters.

- Under extraordinary circumstances, **non-aggressive brown bears** sighted in these developed areas may be darted and relocated. These circumstances include: 1) the availability of ADF&G or other qualified staff to conduct the darting and translocation; 2) the ability to eliminate risk of human-bear encounters in the area while the darting is in process; 3) the availability of a release location at least 75 miles from Anchorage. There is no current funding source for this type of translocation. A released bear that returns to Anchorage will be destroyed.
- In general, **nuisance brown bears** in developed or residential areas will be destroyed. Brown bears are dangerous enough that even a single incident of attraction behavior is cause for concern. Capturing and releasing the bear is dangerous, expensive, and does not appear to work for most classes of bears (bears often return to their home range or may be unable to survive in the new location because it is occupied by other bears) (McArthur, 1981; Rogers, 1986; Bostick, 1997). In addition, releasing a nuisance brown bear to a new location may only be transferring the problem.
- In all cases, **aggressive brown bears** or brown bears that present a significant threat to human life will be destroyed.
- **Non-aggressive black bears** seen in developed areas or residential neighborhoods do not require any action. Residents and visitors are expected to learn how to live with black bears that are behaving naturally.
- At the discretion of the area biologist, **nuisance black bears** may be darted and relocated to a remote location (at least 50 miles from Anchorage) and at least two miles from a private residence or established recreation area. However, there is no current funding source for this type of action, and studies indicate it is rarely successful for bears that have some history of food conditioning (Bostick, 1997).
- In general, **nuisance black bears** will not be dispatched. Residents are expected to learn to live with bears by removing food attractants; occasional incidents where a black bear finds an available human food source is not sufficient to kill the bear. However, ADF&G will attempt to monitor these bears.
- If a **nuisance black bear** continues to find food sources or becomes more aggressive in its search for human food, it will be considered an **aggressive bear** and destroyed.
- In general, **aggressive black bears** will be destroyed.
- When necessary, bears will be destroyed with a 12-gauge shotgun with rifle sights and slugs. Law enforcement authorities will be contacted before shooting. Prior to killing a bear on private property, landowner permission should be obtained and adjacent residents should be forewarned to the extent possible. Bear meat, hides and skulls will be salvaged to the extent possible for charity, educational, or research purposes.
- If a female bear with cubs is destroyed, the cubs will be captured and held at the Alaska Zoo provided space is available. Cubs will be destroyed after seven days if no zoo will take them.
- Crowd control and general assistance from other law enforcement are desirable during bear response actions in developed areas. A spokesperson will also be used in these situations to inform the media of the situation.

Responses to a Bear Mauling

Whenever a bear mauling (a bear injures or kills a person) occurs in Anchorage, ADF&G will help assess the circumstances and aid in decisions about the appropriate response. In Chugach State Park, the military bases, and on BLM's Campbell Tract, the lead managing agency will have final decision authority about the agency response. In other areas of Anchorage, ADF&G assumes final authority.

Details of response procedures are available from ADF&G. In general, however, the following steps and principles apply:

- **Locate and identify the bear.** ADF&G will use investigative skills to identify the location and identity of the bear through hair samples, blood, saliva, tracks, etc.
- **Determine initial circumstances.** An initial attempt will be made to determine the circumstances of the attack. In keeping with bear conflict response guidelines, any aggressive bear that is an immediate threat to human life or rescue attempts will be destroyed.
- **Dart, tag, and radio collar the bear.** If there is no immediate threat from the bear and it can be located, it should be darted, tagged, and fitted with a radio collar.
- **Determine whether the bear should be destroyed.** At this point, representatives from the land managing agency should consult with the regional supervisor, the regional biologist, the area biologist, and a bear biologist to determine whether to destroy the bear. Criteria include:
 - Positive identification of the bear involved in the attack
 - The provocation for the attack (was the human approaching a bear?)
 - The severity of the attack (did the bear make a single charge and leave?)
 - Previous behavior by the bear (had it approached other humans?)
 - Potential for future attacks
 - The location of the attack (in a high use or developed area versus backcountry).
- **Monitor the bear if it is not destroyed.** If the circumstances do not warrant destruction of the bear (e.g., it was acting naturally in defending cubs, or a natural food source and has shown no past or continued aggressive behavior), it will be released with a radio collar for future monitoring. If it shows additional aggressive behavior, it will be destroyed.

Additional Bear Conflict Policies and Information

Moose carcasses on or near Chugach State Park trails. If a moose carcass is reported on or near (within 300 feet) of a park trail, it presents a significant hazard to park visitors using the trail. A moose carcass is likely to have been killed or found by a bear, who may actively be feeding on it or may return to it. Even if the moose death was from other causes, it is likely to be an attractant to bears.

Policy: As soon as practical, park staff (preferably a park ranger), will temporarily close the trail with flagging and a sign to conduct a field evaluation. If a bear is not present and the carcass can be removed, it will be. If it cannot be removed, the trail shall remain closed until the carcass has been consumed or deteriorated and is no longer an attractant to bears. Public notice of the trail closure may also be made through postings at trailhead and/or media releases.

Moose carcasses on or near BLM Campbell Tract trails or other public use areas. BLM makes decisions about removal of a moose carcass on case by case basis. In general, however, BLM also will remove carcasses that likely to attract bears if they are close to trails or public use areas, or close the trail or area to use until the threat has diminished.

Bear studies on Elmendorf Air Force Base. Elmendorf Air Force Base authorities have conducted studies to determine the utility of various bear management efforts over the past decade, including experiments with aversive conditioning and an extensive translocation program (Bostick, 1997). Results suggest that bears can become habituated to (learn to ignore) even systematic aversive conditioning efforts, and that translocation efforts have limited success, except among female brown bears without a history of attraction to human food sources. Results also suggest that sub-adults appear to learn about human food sources from particular sows, who may be responsible for several sets of "repeat offenders." Finally, the Elmendorf bear program suggests that attempts to remove garbage attractants at recreation areas (by installing bear-proof cans) were successful at reducing the number of problem bears after some initial "repeat offender" bears were removed from the area. The success of these types of efforts points to the need for coordinated bear management efforts that remove attractants and the most aggressive bears.

ADF&G Responses to Conflicts with Beavers

Beavers are common along Anchorage's waterways and their dam-building efforts provide important benefits to salmon habitat. However, beavers have the potential to cause extensive damage to human property when they build lodges and dams. In addition to the individual trees they cut down in these pursuits, beaver activity can clog culverts and flood extensive areas.

Because most stream courses in Anchorage are on public land (the Military reservations, Campbell Tract/Far North Bicentennial Park, and along the greenbelts) and development is out of the floodplain, beaver control is not generally required. If beaver activity appears likely to create major property damage (e.g., flood a building or a road; creating numerous hazard trees in a recreation area), however, ADF&G will consider beaver removal on a case-by-case basis. In general, this will involve trapping individual beavers.

ADF&G Responses to Conflicts with Other Mammals

Several other mammal wildlife species also have the potential to become involved in conflicts with humans or their pets. Both wolves and coyotes have occasionally attacked dogs (usually free-running dogs), and other animals may also pose certain dangers in an urban environment.

Decisions about whether to destroy individual animals in conflict situations are made on a case-by-case basis following the general principles discussed above, particularly those related to black bears: 1) if the conflict represents an isolated case, or the damage/harm is minor, the situation will only be monitored; and 2) if a pattern of conflict is documented, the individual animal will be destroyed.

Bird Conflict Response Policy

At certain times during the year, certain species of birds may act aggressively toward humans to protect territory, nests, young, or food sources. Birds may also establish nests in, on, or near human structures and become nuisances to the people that live or work there. Federal and state laws protect native wild birds, limiting the responses available in these bird conflict situations. The U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game implement these laws to solve conflicts. The USDA Wildlife Services program offers advice and assistance to the public and government agencies to minimize conflicts, and under permit from the other two agencies, may kill birds in conflict situations.

Federal and state laws do not permit native wild birds to be harmed for nuisance behavior alone. In natural settings, including areas along recreation trails, agencies will not move or destroy nuisance birds. Instead, the focus is on increasing public awareness of the potential conflict and attempting to educate people on how to avoid the problem (e.g., a swooping goshawk) by keeping away from the nest, territory, and so on.

In some cases, of course, the bird may pose a significant public safety hazard, or prevent use of a house or building. When there are clear threats to public safety, authorities will attempt to relocate or harass the bird away from the area; if these measures fail, they will then consider destroying the bird(s). Although federal law allows birds to be taken for damage to agriculture, livestock, or other interests under certain circumstances, current Alaska state law issues permits for birds to be killed in response to the damage they cause, including agricultural or property damage. In all situations, education and awareness are held as the key to addressing bird conflicts, which usually are short in duration.

Bird conflicts also occasionally result in injuries to birds. Federal and state laws limit who may possess wild birds. Only permitted bird rehabilitators may care for injured wild birds, although anyone who finds an injured bird may possess it for the time it takes to carry it to a rehabilitator. There are facilities in Anchorage (Bird Treatment and Learning Center) that treat injured birds, and the proposed Potter Marsh Nature Center (see next chapter) would upgrade these as well as provide educational opportunities focused on Anchorage bird life, human-bird interaction, and the treatment of injured birds.

Some Final Notes on Wildlife Conflicts

The above discussion on human-wildlife conflicts focuses primarily on responses to minimize consequences for people. However, it is also obvious that conflicts also have consequences for wildlife as well – and not just from human responses to those conflicts. Whenever people interact with wildlife, there are impacts (Knight and Gutzwiller, 1995). In many wildland settings, these impacts are often small and may not endure; in urban settings, because of the potential for more interaction, they may be larger.

Living with wildlife in Anchorage may require certain behavior changes among the people who live here. Residents and visitors should recognize their potential impacts, and work to control both their pets and their children (particularly adolescents) who may not understand how wildlife harassment might affect the health of wildlife.

Similarly, ethologists (animal behavior specialists) increasingly recognize the ability of many wildlife to learn complex behavior from their direct experience (Whittaker and Knight, 1998), and some studies show that higher species may transmit learning across generations (Bonner, 1980). It thus becomes important to behave consistently around wildlife, so that both people and animals know what to expect. For example, if some people feed a moose, while others throw snowballs at it, and a third party lets their dog chase it, the potential for conflict increases. The moose doesn't know how people will behave, and its own behavior is similarly unpredictable.

Several actions in the next chapter address these issues, encouraging increased education about pet control, how to prevent and respond to interaction situations, and how to store garbage so that dangerous wildlife are not attracted to human areas. Taken together, the goal is to have the best informed urban population in the country about how to behave around wildlife, in the hope that conflicts will be minimized.

Chapter 6: Priority Actions

This chapter describes 40 actions designed to enhance wildlife benefits in the community or to minimize human-wildlife conflict situations. These actions are divided into 25 high priority actions, and 15 supported actions as shown below. They are also organized into four general groups that address plan goals and objectives, although many actions are designed to address several objectives. The chapter also includes a list of actions considered but currently rejected.

Habitat and Species Conservation Actions

Top Priorities:

1. Wildlife Habitat Assessment
2. Key Species Population/Capacity Assessment
3. Conservation Tax Incentive Education
4. Habitat Conservation Ordinance Review
5. Acquisition Options for Conserving Habitat
6. Habitat Consequences Review Program
7. Stream Restoration Projects
8. Critical Habitat Reserves

Supported Actions:

Browse Improvement on Public Land.
Habitat Awards Program
Bicentennial Park Development Concern

Conflict Prevention Actions

Top Priorities:

9. Recreation Trail Design Guidelines
10. Road Improvements to Prevent Moose Collisions
11. Urban Wildlife Position/Program
12. Wildlife Encounter Safety Program
13. Bear Attractant Ordinance/Education Program
14. Moose/Bear Conflict Response Training
15. Wildlife Feeding Education Program
16. Pet Control Education Program

Supported Actions:

Avian/Small Mammal Predator Enhancement
Injured Bird and Bird Conflict Program
Trailhead Bear Warning Program
Neighborhood Moose Warning Program
Moose Accident Prevention: Education Options

Wildlife Recreation and Education Actions

Top Priorities:

17. Anchorage Wildlife Festival
18. Anchorage Watchable Wildlife Guide/Video
19. Expand Wildlife Education in Schools
20. Expand Visitor Center Interpretation Programs
21. Potter Marsh Nature Center
22. Potter Marsh to Girdwood Planning
23. Girdwood Nature Center

Supported Actions:

Coastal Trail: Kincaid to Potter Marsh
Campbell Creek Interpretive Trails
Greenway Interpretive Stations
Eagle River Viewing Tower
Eagle River Campground Interpretive Trail
Glen Alps Interpretive Stations
Middle Fork Campbell Creek Interpretive Trail

Other Actions

24. Habitat Planning for Military Lands (if those are relinquished)
25. Formalize Interagency and Wildlife Interest Group Cooperation

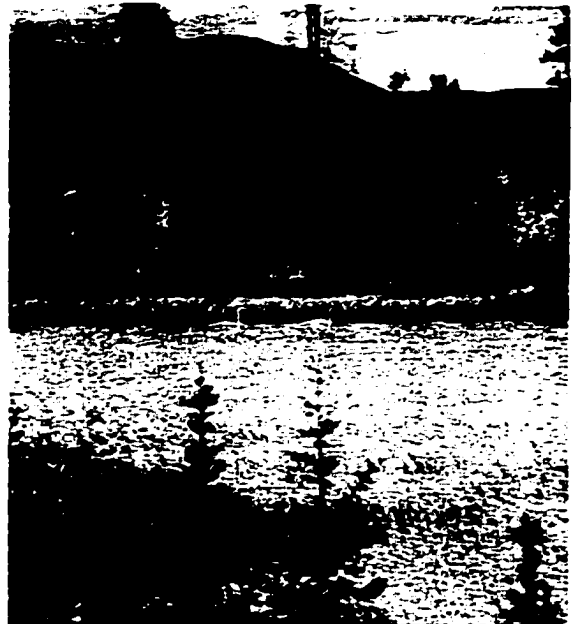
Habitat and Species Conservation Actions

As human population and development increase in Anchorage, wildlife habitat is often lost or changed. The following eight priority actions have been identified to address the need to protect, enhance, or restore the remaining quality wildlife habitat in Anchorage, and are discussed in greater detail in subsequent pages. The overall goal is to avoid net losses in functional habitat types and abundance. Taken together, these actions are designed to both identify important habitat in the Municipality and then ensure those lands are recognized and managed appropriately.

This goal begins with two research and inventory actions designed to develop better scientific information about Anchorage's wildlife habitat and key species. Although biologists have studied many aspects of wildlife in Anchorage, there is a lack of comprehensive information about the type, abundance, and functional quality of the city's habitat and the numbers of wildlife it supports. As part of both this wildlife plan and the Municipality's Parks, Recreation and Greenbelt Plan, we have made an initial assessment of habitat and population levels. But this effort has clearly suggested the need to learn more. Urban areas are complicated settings for measuring ecological health and potential, and there is more to learn about the optimal size, shape, and characteristics of habitat needed to support Anchorage's wildlife. This information may also prove useful in developing a consensus about optimal population for certain species such as moose (see previous chapter).

As Anchorage population and development increase, preventing the net loss of wildlife habitat will be challenging.

The Habitat and Species Conservation actions are designed to identify important habitat and ensure those lands are managed appropriately.



WILLIAM GOSSWEILER

Upon completion of these research and inventory efforts, we have identified three actions to help encourage private landowners to protect, enhance, or restore wildlife habitat on their lands. An incentives education program is one approach, and is designed educate landowners about existing tax or other incentives that encourage habitat protection. The development of land use ordinances that protect specific types of habitat is a second approach, and could be applied if the habitat assessment efforts can identify land use practices that offer clear benefits for wildlife at reasonable costs to the landowner. A final option is to have government purchase or otherwise acquire (i.e., through land trades) private lands with important habitat qualities.

This plan does not identify specific properties or habitats that need to be protected. The Municipality's Parks, Recreation and Greenbelt planning effort is poised to begin this process, and other existing Municipal planning documents also address this issue. This plan supports those efforts and documents. However, we also believe that habitat assessment information may suggest the need for additional protection efforts in the future. The hope is that the actions described here may be able to be applied toward that end.

Similarly, this plan does not identify specific tax incentives or land use ordinances needed to protect specific types of habitat, or to prevent specific types of land uses. The Open Space Plan and other portions of the Anchorage Bowl Comprehensive Plan revision will include identification of immediate needs in this area, but additional incentives and ordinances focused on wildlife are likely to be necessary in the future. This plan sets up a process for identifying these actions, but political bodies (e.g., the Municipal Assembly or State Legislature) are the authorities responsible for implementing them. In this plan, we are outlining the possibilities and an initial course of action.

Another action in the habitat conservation group is a "habitat implications review program" to ensure that public land decision-making considers wildlife. With multiple public agencies managing public lands for a variety of purposes, it is possible for one government entity to work at cross purposes to another without even knowing it. With this action, a specific review program coordinates government actions so we can avoid the simple errors.

The final two priority actions in this group identify the need to restore streams in Anchorage, as well as to protect particularly sensitive wildlife habitat areas. Riparian, or streamside, corridors have been identified as providing the links between many species and habitats, and have been degraded in some parts of the city. Similarly, protecting specific sites, such as nesting areas, are central to the notion that some wildlife areas in Anchorage deserve priority over human uses, at least at some times of the year.

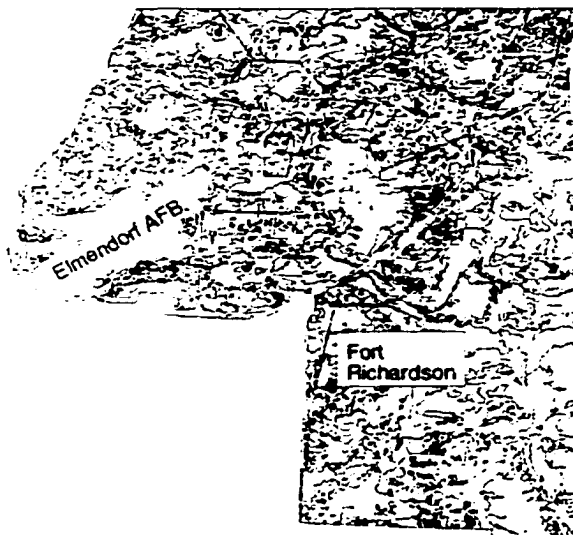
1. Wildlife Habitat and Corridor Assessment Project

Description: This project is a scientific effort to learn more about wildlife habitat in Anchorage. It involves development of detailed habitat maps that will help us understand what habitat exists and has been lost through the years, as well as identify areas of critical habitat, and the wildlife movement corridors between them. This action will also develop measures of ecosystem health for various habitat types, allowing agencies to conduct cost-effective monitoring of habitat trends over time.

Initial habitat surveys and maps for over 100 wildlife species in the Anchorage Bowl have been completed by the Great Land Trust, an Anchorage-based private non-profit land conservation organization. The Trust used a "key informant" method to interview more than 21 local scientists who provided information on critical wildlife habitats, wildlife corridors, sensitivity during different life stages, interdependence of species, current status within the Anchorage Bowl and sensitivity of species to disturbance. This information was then coded into a Geographic Information System (GIS) database.

With the completion of this project, the Municipality has its first baseline survey of critical habitat lands for numerous wildlife species, including regionally rare species. While the Great Land Trust project provides a good initial assessment of Anchorage resources, additional research could enhance scientific knowledge of existing habitat and wildlife requirements. Ongoing research projects at Alaska Pacific University, for instance, appear to be addressing some wetlands habitat issues.

The proposed project is a major research effort that will focus on vegetation and other habitat indicators throughout the municipality. We recommend a modified version of the methods used by the military in 1995-1998 to map and evaluate habitats on Fort Richardson, with adjustments in the size and scale of the project to assess the entire Municipality at a reasonable cost. Those methods included aerial photo interpretation coupled with field work, the creation of a GIS database, and statistical analysis for validation. Color aerial photos of the Anchorage area taken in 1997 at a 1:500 foot scale could be used in a hierarchical evaluation that would delineate along a continuum from vegetated areas to non-vegetated areas. Next, the vegetated areas would be selected for a finer scale evaluation of habitat type, use by wildlife species, and wildlife species preferences. Like the habitat evaluation of Fort Richardson, we recommend the Anchorage project be based on *The Alaska Vegetation Classification* (Viereck *et. al.*, 1992) but with modifications to make the classification suitable for urban and semi-urban habitats.



As Anchorage population and development increase, preventing the net loss of wildlife habitat will be challenging. This action is designed to identify important habitat and ensure those lands are managed appropriately.

Example of vegetation classification map courtesy of Fort Richardson Natural Resources Office

Rationale: Wildlife habitats in Anchorage have never been evaluated in a holistic fashion, yet understanding the types, amount, and connections between habitats are key to understanding wildlife population dynamics and making informed land use and management decisions. This habitat assessment will provide the basis for identifying prime habitat lands for conservation protection (Action 3), for targeted tax incentives (Action 4), for targeted habitat conservation ordinances (Action 5), and for assessing Heritage Land Bank lands for potential withdrawals from disposal (an issue related to Action 3).

Responsibilities: ADF&G, USFWS, and the Municipality should co-lead this action, which will require additional inter-agency cooperation from Chugach State Park, the military reservations, BLM, and the University of Alaska –Anchorage. The project could be contracted with researchers from universities or independent firms with the capability to do the work.

Schedule: After funding is secured and a contractor selected, the project will take an estimated 18 to 24 months to complete. For greatest efficiency, the project should be started in the late summer to allow at least two full summer seasons for data collection.

Costs and Funding Sources: Assessments of this type can cost in excess of a million dollars, but may also be scaled back with more limited sampling and field work. Discussions with researchers suggest a high quality assessment as outlined here would range between \$150,000 and \$200,000. Funding sources have not been identified, but could include funds from the Conservation and Reinvestment Act (CARA). State appropriations to ADF&G or the Municipality are unlikely to cover the costs of a project this large, but might assist to some degree.

Constraints: The high cost of the project is the primary constraint: environmental compliance issues are unlikely to be a problem as most of the work would occur on public land and be short in duration. Some permission to conduct fieldwork on undeveloped private lands may also be a constraint.

2. Key Species Population and Capacity Assessment Program

Description. This action is designed to develop improved information about key wildlife populations and trends, their biological carrying capacities, and public "social acceptance capacities." It would involve 1) periodic scientific efforts to assess wildlife population levels and 2) periodic public surveys (similar to the 1997 effort associated with this plan) to determine tolerance levels for impacts caused by key wildlife. Key species of concern (based on an assessment of management issues) include moose, black and brown bears, Canada geese, wolves, lynx, snowshoe hares and loons. Additional indicator species for assessing biological health might include particular songbirds (for assessing boreal habitats), shorebirds (for assessing wetland or coastal habitats), or macro-invertebrates (for assessing water quality in aquatic habitats).

Rationale. As discussed in Chapter 5, wildlife populations have biological carrying capacities, which are typically defined as the maximum number of individual animals that the existing habitat can support from year to year. Urban wildlife populations also have a "social acceptance capacity," which is the maximum number of individual animals that a community can tolerate given the impacts those species have on city life. Social acceptance capacities may be higher or lower than the biological capacities for different species, with either case having important implications for management.

For example, a 1997 survey of Anchorage residents suggest that moose populations in Anchorage are probably below social acceptance capacity, while ADF&G biologists suggest they are probably at or above the area's biological carrying capacity. In contrast, survey results suggest Canada geese populations have exceeded Anchorage's social acceptance capacity, while they appear well below the area's biological carrying capacity. In both of these cases, however, biologists do not have all the information required to make definitive statements about these issues. This action addresses this shortcoming with a program of periodic population and capacity estimates for key species.



KAREN LAING

Accurate estimates of wildlife populations are a starting point for understanding biological carrying capacity issues

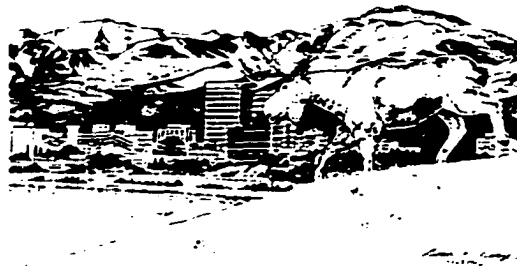
Responsibilities. The Alaska Department of Fish and Game has the authority and expertise to census wildlife populations and determine biological carrying capacities, but funding is limited. Appendix B summarizes current monitoring efforts. This action endorses additional funding to support additional work by ADF&G. The recommended periodic social survey could be conducted by ADF&G, or contracted to universities or consultants. Experts from other wildlife agencies in Anchorage would be encouraged to review and help design any survey efforts.

Schedule. Increased scientific research in these areas would not need to occur on an annual basis. However, major efforts for these key species should be made periodically (i.e., every five years). A systematic rotation of population studies would be optimal, but this depends on a stable funding source. Public surveys that explore social acceptance capacities are probably needed at least every ten years, but might be conducted more efficiently as part of a local university's research program on natural resource issues.

Costs and Funding Sources. Estimating population size and assessing the biological carrying capacity for a single species in the Anchorage area ranges from \$5,000 to \$25,000, depending upon the species and precision required. In this plan, we recommend an annual budget of \$50,000 per year to be used on a rotating basis for the key species listed above. Existing wildlife management funding for Anchorage does not cover the cost of these more extensive efforts. CARA is one potential funding source, because state legislative appropriations are less likely to be available for this purpose. Studies of social acceptance capacities similar to that conducted in 1997 are estimated to cost about \$50,000 to \$80,000, although a single study can address several species. It may also be possible to conduct such social science efforts on a more limited scale or in cooperation with local universities' existing research programs, in which case costs may be reduced by half or more.

Constraints. It is difficult and often expensive to count wild animals under the best of circumstances, although new technologies and methods may lower costs in the future. Similarly, new technologies may help identify other indicators of biological carrying capacity for various species, but these have yet to be tested in Anchorage.

Living with Wildlife in Anchorage A Survey of Public Opinion



Periodic assessment of public attitudes toward wildlife can help determine "social acceptance capacities" in Anchorage

3. Conservation Tax Incentives Education Program

Description. This action is designed to increase awareness of existing tax incentives available to private landowners for conserving or restoring wildlife habitat on their land. There are several existing or potential incentives for landowners to consider, but many people may be unaware of them. Potential incentives vary in the effort required for qualification, the strength of the protection they provide, and the strength of the incentive. Incentive options include voluntary agreements (registration, cooperative management agreements), but typically focus on the establishment of conservation easements. Alaska statutes require local authorities to recognize conservation easements in their tax assessments.

This action would fund one additional position in ADF&G or a local land trust organization to: 1) utilize habitat assessment information to identify appropriate lands for protection; 2) review incentive options for protecting important habitat, and 3) work with landowners to implement options. The position will focus on education of, and assistance to, landowners so they can understand the needs, options and rewards of habitat protection on their privately-owned lands.

The education effort will focus on specific protection options. Non-binding voluntary agreements could recognize landowner participation by listing their names or properties on "wildlife registers" or in "wildlife count" lists. Conservation easements on private property may offer landowners financial incentives in at least three ways: 1) reduced property tax assessments offered by the Municipality of Anchorage; 2) charitable income tax deductions; and 3) estate tax deductions. Upon the grant of a conservation easement, the assessed value of the land affected could be reduced in proportion to the value of the easement, because the landowner is surrendering development potential and therefore the "highest and best use" of the property. The level of restrictions on easements vary depending upon the specific conservation values that are being protected, and could be determined in part by the information collected in the habitat assessment project (see Action 1). The program could also provide education about funding sources available to private landowners for fish and wildlife restoration (see Action 7).

Establishing and taking advantage of these incentives can be challenging. Various requirements exist for different types of tax incentives. For example, the donation of a conservation easement for federal tax purposes is a tax-deductible charitable gift only if the easement is perpetual and donated for conservation purposes to a qualified organization or public agency. For estate taxes, a conservation easement that reduces the fair market value of property will reduce the total value of the estate and the resultant tax owed by heirs of the property, decreasing the likelihood of land subdivision to pay for estate taxes. For property taxes, conservation easements generally reduce development potential and the fair market value of properties. To establish a reduced value and reduced tax assessment, landowners need to specifically apply for a reduction and justify the amount of the claimed reduction with an appraisal.

Rationale. This action is important because most of the land in the Anchorage Bowl is privately owned and not protected for wildlife habitat. Tax incentives provide landowners with a financial reason to protect or restore habitat, but many landowners are unaware of the options available to them. With this action, government and wildlife organizations can target information toward landowners with important habitat.

Responsibilities. This position should ideally be located within not-for-profit land trusts such as the Great Land Trust or The Nature Conservancy, but could also be housed within city or state government. The habitat assessment proposed in Action 1 is obviously a precursor to this effort, because it would identify important habitat.

Schedule. This action could be initiated quickly after funding. After identifying and prioritizing parcels for protection/restoration, contact with possible landowners could occur periodically. Because landowners themselves are the final decision-makers about whether to take advantage of these incentives, the ultimate schedule for positive action is unknown and long-term in nature.

Costs and Funding Sources. Annual costs for a habitat protection education specialist are about \$50,000 per year, including salary, benefits, and support equipment. Potential funding sources include monies from the Conservation and Reinvestment Act (CARA), appropriations from the state legislature, the municipal assembly, or from dedicated trust monies.

Constraints. Some funding sources may not be able to support staff positions, as agencies may be reluctant to hire positions on soft money. Continuity of the program will be important to its success, however, particularly in regard to the weaker protective measures, education and voluntary registration/participation.



MARK SCHROEDER, USFWS

Grant programs to restore habitat are only one of the financial methods available to help and encourage conservation efforts of private property owners

4. Habitat Conservation Ordinance Review and Modification

Description. A number of local ordinances or land use and development regulations should also be applied to protect, enhance and connect wildlife habitats within the Municipality. The Municipality of Anchorage Title 21 Land Use Code currently includes few ordinances or regulations that *directly address* wildlife habitat, although many Municipal land use decisions commonly *affect* wildlife habitat. None of these are actually presented in the context of wildlife habitat and there is little coordination of land use planning efforts that link these ordinances to wildlife habitat conditions or preservation.

This action recommends modifying Anchorage's Land Use Code to reference wildlife and the conservation of important wildlife habitat features or functions. By changing language and statements of intent, a modified Land Use Code would empower the Municipality to target wildlife habitat conservation through land use planning tools such as subdivision and zoning regulations, land use and building permit reviews, and site-specific land use planning documents. While specific ordinance changes have not been identified in this plan, this action identifies the need to review the Land Use Code for regulation modifications that encourage private landowners to maintain natural landscape features. These changes could also help guide how Municipal departments manage public lands and facilities.

The timing of this new focus on wildlife habitat within the Municipality fits with the on-going revision process for the Anchorage Bowl Comprehensive Plan. In the early stages of this revision, public comment clearly suggested that Anchorage's wildlife, wildlife habitats, and other natural areas are an important part of life in the city. The Municipality has also been directed through the community visioning process to address urban wildlife issues and the protection of natural areas. The formal representation of this vision has been embraced in the Comprehensive Plan's goals and objectives, which direct actions in the Plan's strategies and implementation sections. In addition, the Municipality's Parks, Recreation and Greenbelt Plan may also suggest ordinance amendments that address wildlife issues and habitat protection. This plan endorses those processes as the appropriate forum for ordinance changes, which would eventually require Assembly approval (see below).

Rationale. This action is also important because most of the land in the Anchorage Bowl is privately owned and not necessarily protected for wildlife habitat. The options that could be applied under this action would encourage landowners to protect some of the beneficial habitat features of their land, and could help guide future development to minimize impacts on wildlife species and ecosystem function.

Responsibilities. The Municipal Department of Community Planning and Development is the lead agency that makes modifications to Anchorage's Land Use Code. With the assistance of ADF&G wildlife biologists, planning department staff will identify sections of the Municipal Title 21 where wildlife habitat and wildlife management issues and actions can be added or incorporated. Depending upon the section of the code, planning staff will draft wildlife conservation revisions and forward the packet of changes to the Planning and Zoning Commission. The Commission then makes changes to the ordinances and forwards the packet, with amendments, to the Municipal Assembly and Mayor for final approval and formal incorporation into Title 21. This ordinance revision process incorporates the participation of the public via the Community Councils, as well as extensive Municipal agency review. Comments from these reviews become part of the record and are incorporated into the Planning Department's recommendations. Public Hearings for ordinance changes are also required in formal changes to Title 21.

Schedule. If it becomes possible to merge all wildlife habitat-related changes to Title 21 into one packet, the process for formal adoption via Assembly approval would take approximately three months. As a

preliminary exercise, this ordinance revision action will require an analysis and identification of pertinent code sections. This review will begin upon adoption of this plan, while development of the ordinance changes are expected to occur as the Open Space Plan and Phase II of the Anchorage Bowl Comprehensive Plan are completed. Based on current schedules, ordinance revisions for wildlife habitat are expected to be developed during the winter of 1999-2000. Once Title 21 changes are formalized, it typically takes a few additional months to be reviewed and packaged for consideration by the Assembly and Mayor.

Costs and Funding Sources. At this time, there does not appear to be a need for additional funding for this exercise. State and Municipal staff would likely do the work required for ordinance review and revision as part of their Open Space and Comprehensive Plan activities.

Constraints. Because the Title 21 revision process is done via Municipal ordinances, the entire process is subject to public hearings before the Planning and Zoning Commission and the Municipal Assembly. Both of these forums, but particularly at the Assembly level, may feature politically-driven review processes, and review boards have the ability to modify both the original language and the intent of ordinance revisions as forwarded by staff.

5. Acquisition Options for Conserving Prime Habitat

Description. A wide variety of property acquisition options could be used to enhance, maintain, or restore prime habitats and wildlife corridors in Anchorage. This action recommends more focused efforts to apply these options upon conclusion of the Municipality's Parks, Recreation and Greenbelt Plan, the revision to the Municipality Comprehensive Plan, and wildlife habitat assessment described in Action 1. The idea is to protect high priority habitats on private land through purchase, land trades, or other acquisition mechanisms with willing landowners. This action also identifies the need to take advantage of endowments, gifts, and other lesser priority acquisitions as these opportunities become available. While conservation organizations such as the Great Land Trust can manage donated lands, government can play a similar role, particularly if they manage adjacent lands. Ideally, the best way to preserve important habitat is fee-simple acquisition that places parcels into public ownership.

Rationale. This action addresses the critical need to preserve, re-establish, and acquire crucial components of the wildlife habitat in Anchorage in order to maintain the long-term integrity, diversity, abundance, and distribution of Anchorage's wildlife habitat resources. Anchorage is rapidly depleting the connections, quality and quantity of wildlife habitats in the face of increasing population and development. This action plays a crucial role in identifying and protecting lands that would otherwise be developed and lead to a net loss of important habitat.

Responsibilities. Several agencies and wildlife groups participating in this plan could play roles in acquiring important habitat in Anchorage. While land trust organizations such as The Nature Conservancy and Great Land Trust are particularly adept at raising funds and applying these options for smaller properties, government participation may be necessary with larger parcels. As a result of Anchorage's Open Space Planning efforts and the Anchorage Bowl Comprehensive Plan revision, the Municipality may initiate new habitat and natural open space acquisition efforts. These purchases would likely include expansion of the city's greenbelt program managed by the Cultural and Recreational Services Department, BLM, ADF&G, and Chugach State Park also manage land tracts in Anchorage and have the capacity and ability to add to those.

Schedule: The action should be initiated after priority habitat areas have been identified by the habitat assessment or through the Parks, Recreation and Greenbelt Plan, but could be implemented for certain properties at any time. Once the assessment is complete, a tracking system of donations, endowments, gifts, exchange properties, and potential acquisitions needs to be developed by a multi-agency working group. Finally, a comprehensive mapping effort should be created to identify current habitat in conservation ownership status, determine how ongoing acquisition efforts are proceeding, and how future acquisitions might compliment protected habitats. This mapping effort would overlay with the habitat assessment project and help identify habitats that need greater acquisition attention.

Costs and Funding Sources: Many of the funding sources are already in place with conservation organizations or governmental programs like the Land and Water Conservation Fund. Congressional, State legislative, or local governments may also participate through general appropriations, or through new programs such as CARA. Once the Municipality finalizes the Open Space Plan, and identifies acquisition implementation measures in the Comprehensive Plan revision, Municipal funding mechanisms will also be formalized, and may include bond packages, Capital Improvement Projects (CIP) and other similar actions. Individual community councils and organizations could also play a key role in proposing acquisitions in localized portions of the community. Again, a working group would be needed to focus and centralize Anchorage efforts by a number of parties.

6. Habitat Consequences Review Program

Description. This action recommends the creation of a cooperatively-funded program to review draft public land use decisions and public works projects for wildlife habitat and conflict consequences. While ADF&G and USFWS habitat biologists regularly review major capital improvement projects in the city for significant environmental impacts on wildlife habitat associated with wetlands and fish-bearing waterways, this action envisions more extensive review efforts for projects and actions that do not normally receive attention from a habitat specialist.

The program would involve at least one staff person who would form a coordinating link between local, state and/or federal offices and contractors involved in development projects. The program would also provide comments on any decisions that include road landscaping, public park and open space landscaping, public facilities landscaping and trail design. These projects have a direct and significant impact on human-wildlife interactions across Anchorage, but are not currently reviewed for these impacts.

This review process is distinct from a legal review as might be required under changes in the Anchorage Land Use Code (Title 21). With this review program, we are concerned with some of the more subtle details of a development project, and alternative ways to achieve development goals while still protecting important habitat or minimizing the potential for human-wildlife conflict. For example, projects would be reviewed for their ability to 1) maximize viewing opportunities when appropriate; 2) provide/enhance habitat for certain species; 3) attract particular species away from conflict areas (i.e. to help minimize wildlife-vehicle collisions, bird-window and bird-wire strikes, or destruction of costly plantings); 4) discourage certain species from other areas; and 5) consider or retain wildlife corridors where appropriate. Habitat functions that attract wildlife include providing food, shelter, and cover for movement from place to place, and habitat for breeding and the rearing of young. Affected wildlife may include songbirds, water birds, raptors, moose, bear, small mammals, and fish.

Additionally, this program would contribute to cooperation and comprehensive, cost-effective, long-term visions for land use planning. For example, various utilities and road construction agencies plan their development projects separately, and one parcel of land may face repeated and costly impacts over time with each construction project. This program would encourage awareness of all planned projects, a cooperative planning process, and construction and landscaping methods that would reduce adverse habitat impacts and maximize habitat improvements to degraded areas.

As an illustration of how this action could be implemented, consider a proposed road landscaping project. A habitat review staff person would be consulted to determine whether the landscaping was appropriately designed to minimize automobile-wildlife conflicts, and whether there would be impacts on wildlife use and movement in the surrounding area. The staff person would familiarize him/herself with any related adjacent or future projects and any potential methods of improving cost-effective cooperative planning related to habitat issues. Potentially dangerous areas would be delineated, and plants would be chosen for their ability to avoid attracting moose. Structural components of the project may be designed to discourage unsafe wildlife crossings or which would allow for safe passage. Impacts on other wildlife species in the area would also be considered. For instance, shrubbery that provides appropriate shelter for songbirds without obscuring driver vision might be considered for an area where increased bird-automobile collisions are unlikely.

This staff person would be available to be a member of project planning teams, or could simply be consulted as a regular part of the review process. Coordination between funding, planning, design, and maintenance agencies and contractors would be organized to jointly consider a variety of wildlife, conflicts, cost, and future planning considerations. In addition, this staff person would work with the Municipality's Cultural and Recreational Services Department and other appropriate maintenance personnel to ensure that wildlife issues are considered in the maintenance of landscaping and open space.

Rationale. Maximizing opportunities for positive human-wildlife interactions and minimizing opportunities for human-wildlife conflicts are two important goals of this plan. Despite the direct and significant impact of the development, landscaping, and maintenance projects described above on human-wildlife interactions across Anchorage, there has been no formal and regular process to address these issues, and they are often overlooked. Awareness of wildlife issues affected by proposed projects, coordination, and accountability are lacking. The emphasis of this program would be on awareness, communication and cooperation.

Development projects in wetlands and adjacent to anadromous fish creeks are already reviewed for their effects on fish and wildlife; this action is not intended to duplicate those processes. However, other habitat-related issues generally do not receive detailed reviews. Recent development projects which might have benefited from this kind of review program include the landscaping choices on Northern Lights Boulevard (where birch planted in the median attracts moose and creates a safety hazard) and the proposed site of a new elementary school (which became controversial because initial designs did not adequately consider impacts on wildlife habitat and adjacent recreation areas). Through this action, we are simply endorsing a more comprehensive review process by qualified biologists.

Responsibilities. The planning team did not reach consensus on which agency should house and support this type of position. There are both advantages and disadvantages to having these responsibilities in either state or municipal government, not to mention the usual political, institutional, and funding barriers. Regardless of where this position is located, the planning team agrees that the person who fills it will need to work across agency boundaries to become familiar with a variety of local, state, and federal road and public facilities projects, as well as large scale private and utilities development. Because of their knowledge and jurisdictional responsibilities for wildlife, as well as the necessary coordination on projects involving state and federal funding, ADF&G and USFWS would be major cooperating agencies even if this position is located within the Municipality.

Schedule. This action could be implemented within six months after funding (time required to advertise and fill the position). It would take about two months after hire for the review program to develop coordination procedures for various types of public works projects.

Costs and funding sources. Annual costs for the program, which is currently envisioned as a single staff biologist position, is about \$50,000 per year, which includes salary, benefits, and support equipment. Potential funding sources could include CARA, state legislative appropriations, or city appropriations.

Constraints. Funding sources may be difficult to secure during a period of fiscal austerity, and agencies may be reluctant to hire positions on soft money such as likely to be provided by CARA. As discussed above, there are also significant institutional hurdles in developing such a program, which might be cooperatively funded by city, state, and federal monies, and would be working across all those agency boundaries. However, the program as envisioned could be parallel to municipal wetlands or state habitat review programs which are already in place, and which also work across those boundaries.

7. Stream Restoration Projects

Description. This action endorses stream and riparian restoration projects for Chester Creek, Campbell Creek and Ship Creek. Specific restoration efforts will be coordinated with projects being planned or considered by Alaska Waterways Council, ADF&G, US Fish and Wildlife Service, Army Corps of Engineers, and the Municipality. In all cases, projects are expected to be developed within stream watersheds in cooperation with local community councils.

Specific stream restoration projects are being developed by three "watershed" groups, and are expected to be available in late 1999. Those groups are in the early stages of their work and project details have not been completed. These groups are expected to identify specific locations and major actions to be taken, estimate costs (if available), and identify participating agencies. One project which has been developed and is expected to be completed this year provides an example:

- **Westchester Lagoon "Duck Walk" Project.** This \$80,000 project will restore degraded bank area with shrub transplants, coir logs, and sedges, as well as additional tree and shrub plantings in adjacent grassy areas to Chester Creek and Westchester Lagoon. It also includes developing light penetrating walks and a gravel trail to prevent future vegetation impacts from wildlife viewers at this popular waterfowl area. The vegetation in the area is designed to minimize waterfowl congregations on shore, where they, too, may also cause erosion and create safety hazards as they move across Spenard Road. Finally, interpretive signage at the site will focus on geese management issues in Anchorage and an anti-feeding message (see Action 16). This project is being led by the Municipality Parks and Beautification Division, in cooperation with ADF&G, Anchorage Waterways Council, USFWS, and the U. S. Army Corps of Engineers.

When the natural riparian vegetation of stream and lake shores is degraded, water quality is affected.

This portion of Campbell Creek has lost the erosion control and filtering properties of the shrubs that were once present.



MARK SCHROEDER, USFWS

GARY WHEELER, USFWS



Restored native riparian (streamside) vegetation also provides many essential habitat functions. For example, it lowers water temperature (important to salmon); slows water velocity and provides shelter for young fish and waterfowl; and provides habitat and movement corridors for many songbirds and small mammals.

Summary of Actions

Rationale. Collectively, these actions are necessary to conserve and restore critical riparian habitat in Anchorage. These three major streams in the Anchorage Bowl are the key corridor links between the large undeveloped habitat tracts east of town (the military lands, Campbell Tract/Bicentennial Park, and Chugach State Park) and the coastal areas. In addition to the aquatic and bird species that live along these riparian corridors, many wildlife species use them as travel routes. The streams have also been degraded by development and pollution. These actions address some of this degradation, and attempt to restore functioning riparian corridors.

Costs and funding sources. Several funding sources are available to assist both public and private landowners with habitat restoration programs. Examples include tax incentives (see Action 3), the Wildlife Habitat Incentives Program (WHIP) administered by the National Resource Conservation Service (NRCS), and the Partners for Fish and Wildlife Program administered by USFWS.



MARK SCHROEDER, USFWS

Restoration projects along Anchorage's streams can help improve riparian habitat as well as minimize wildlife conflicts, provide improved viewing and education opportunities, and beautify the area

8. Critical Habitat Reserves: Education/Regulation Protection Options

Description. Certain bird species native to Anchorage have apparently declined concurrent with increased human populations, activity levels, and habitat losses over the past thirty years. Examples include loons, sandhill cranes, arctic terns, and olive-sided flycatchers and other songbirds. Other wildlife species of high local interest (e.g., nesting bald eagles) are also susceptible to human disturbance, and may benefit from efforts to protect their nesting areas from human approaches or other activities. Many people are also unaware that a large number of local songbird and other small land species nest on the ground, increasing their vulnerability to cats, dogs, and humans. Finally, certain bird species are very protective of nesting areas (e.g., goshawks, great horned owls) and present a safety hazard to humans. In essence, this action would establish an education program and "critical habitat reserves" around nesting areas during sensitive time periods.

The first part of this action involves developing recommendations for appropriate distances and timing windows for distancing people appropriately from known nesting areas of various species. These will be based on existing research, and will be explored via a thorough literature review. The literature review will also examine alternatives that other natural resource managers may have used to help mitigate human impacts on nesting wildlife.

The second part of this action involves identifying sensitive bird species based on the literature review, identifying sensitive nesting sites in Anchorage, and implementing educational strategies to help residents and visitors recognize and avoid approaching them. While the Open Space planning process has already identified several important nesting areas through the "key informant" approach, some "ground-truthing" will also be necessary. If needed, this component of the action may include increased enforcement of existing federal and state regulations to back-up the educational strategies. The primary educational effort is likely to focus on posting known nesting sites, or certain trail segments, with warning signs.

Sandhill crane chick and pipping egg.

Many bird species are sensitive to human activity or approaches. This action would help develop education and regulation efforts to prevent disturbances during sensitive times.



CAL LENSINK, USFWS

Rationale. This action is needed because high human activity levels around sensitive nesting species can prevent them from being successful. It is important to protect nests not only from nearby development, but also from wildlife viewers, anglers, or others who may approach birds at sensitive times.

Responsibilities. Co-lead agencies for this action are ADF&G (which has been active in developing similar informal education program for loons) and USFWS (which has primary responsibility for migratory bird management as well as expertise in managing bird nesting areas). In addition, support is expected from various conservation groups (e.g. Anchorage Audubon Society, Alaska Center for the Environment, National Wildlife Federation).

Schedule. Once funding for this effort is developed, the first phase of the effort could be completed within six months. Identifying known nesting sites and developing educational materials would take an additional year. If regulations need to be developed, these are also likely to take about a year to be adopted. Note: Some existing efforts, specifically targeted at loon nesting areas, already occur without the benefit of formal regulations. Similarly, education efforts could begin at known sites upon completion of this plan.

Costs and Funding Sources. This action would cost approximately \$60,000 in the first year (half-time for a wildlife biologist (\$35,000) and half-time for an education specialist (\$25,000)). In subsequent years, costs would be about half this level as nesting sites become recognized and educational materials have been developed. These costs include salary, benefits, and support equipment. The federal Conservation and Reinvestment Act (CARA) and similar bills are a possible funding source.

Constraints. No permitting is anticipated for this project. If regulations are deemed necessary, there is an established Municipality process for developing them. Final approval of these regulations would be required by the Municipal Assembly.

Other Supported Habitat and Species Conservation Actions

Browse improvement on public land. This action applies specifically to the military installations and BLM's Campbell Tract; they have existing plans to improve moose browse on public lands to entice moose to remain in those undeveloped areas. The planning team supports these efforts.

Habitat awards program. This could be developed as part of the Anchorage Wildlife Festival (Action 17) a priority action in the wildlife recreation category. It would honor private landowners who conserve, enhance or restore habitat. It also has similarities to potential incentive options (Action 3). These should ideally be organized by non-profit organizations, but might involve judges from wildlife agencies such as ADF&G and USFWS.

Bicentennial Park/Campbell Tract development concern. The planning team has particular concerns about public land development in the Tudor Road lands adjacent to the Bicentennial Park/Campbell Tract area, which has lost considerable habitat in recent years to public facilities. The large tracts of forested habitat in this complex are considered crucial to the long term sustainability of Anchorage wildlife populations. The planning team recommends that the Open Space Plan and Anchorage Bowl Comprehensive Plan revision recognize the importance of this property and protect it from future development.

Conflict Prevention Actions

These eight priority actions (and five supported actions) are designed to minimize the potential for wildlife conflicts. Many are designed to modify human behaviors that lead to human-wildlife conflicts, hoping to minimize the number and severity of conflicts that require responses described in Chapter 5.

The first two actions focus on “technical fixes” to wildlife conflicts. Both trail and road design can affect the probability of certain kinds of human-wildlife interactions (e.g., moose-vehicle collisions, encounters between recreationists and moose or bears on trails); these actions simply require trail and road designers to consider these issues as new projects are developed.

The remainder of the priority actions in this group focus on education efforts to modify human behaviors that can lead to or exacerbate conflicts. These start with the development of a more substantial urban wildlife program to systematically monitor and develop education efforts to prevent wildlife conflicts. ADF&G currently takes responsibility for conflict prevention in the Anchorage area, but the number and frequency of conflicts in recent years has led the agency to operate in a reactive/response mode rather than a proactive/prevention mode. This plan recommends additional efforts to help wildlife authorities direct more attention to the latter.

The additional actions in this group help define the activities of this expanded program. Recommended actions include developing bear and moose safety education materials and workshops, developing education materials and ordinances to encourage residents to secure bear attractants such as trash, and expanded conflict response training for public safety officers. This program will also enhance education efforts to minimize the impacts of human-wildlife conflicts on wildlife (e.g. programs to limit wildlife feeding and minimize harassment of wildlife by pets).

Other lower priority but supported actions in this group include enhancing small mammal and avian predators to control certain nuisance wildlife species, an education program focused on addressing bird conflicts and injuries, an organized bear trailhead warning program, and the development of a moose-vehicle accident reporting system to heighten awareness of this particular problem.

Readers should note that both moose and bears are expected to be the focus of individual “step-down” planning efforts expected to be initiated by the Alaska Department of Fish and Game in the winter of 1999-2000. While the focus of moose management planning is likely to be on biological carrying capacity and associated population issues, the focus on bears is more likely to be on conflict prevention and responses. Several of the actions suggested in this plan are designed to work collectively to change both bear and human behaviors that appear to contribute to the increasing level of conflicts.

9. Managing Recreation Use Impacts on Trails: Design Guidelines

Description. This action recommends development of Anchorage trail design guidelines that address potential impacts of recreation use and facilities on wildlife habitat, wildlife recreation quality, and the risk of human-wildlife conflicts. These guidelines would address three central issues:

- Paved multi-use trails (e.g. Chester Creek Trail, Coastal Trail) encourage faster trail travel but also have limited sight distances in certain areas, thus increasing the potential for surprise encounters with wildlife.
- Wider and straighter trails may change the type of wildlife viewing opportunities available and upgrading walking trails to multi-use trails may destroy trailside habitat. Some wildlife viewers (particularly birders) prefer more primitive, narrower trails.
- Wider and more developed trails may have other ecological impacts (e.g., may impede water drainage, cleave contiguous habitat, create impacts that prevent songbird nesting).

This action recognizes that there are different types of recreation trails in Anchorage, and does not advocate wholesale trail re-construction to address the problems outlined above. However, the planning team would like to see a task force develop a short list of wildlife-oriented guidelines that could be used when new trails are being developed (or old ones reconstructed because of maintenance needs).

Responsibilities. The guidelines would be developed with a task force of trail design and trail advocate individuals from a variety of agencies and groups. ADF&G and USFWS habitat biologists and Municipal planners would form the core members of the group, but to be successful the guidelines would also need to be developed in cooperation with trail designers and trail advocacy groups. The National Park Service's Rivers and Trails Conservation Assistance Program and Anchorage Trails Coalition are possible participants.

Schedule. These guidelines would require a series of meetings over a relatively short period (probably less than six months). Assuming that agency participation is available, the action could begin shortly after this plan is finalized. The task force would be expected to produce a "guidelines" document a few months after the meetings have ended, and distribute them to Anchorage trail managing agencies for consideration as trails are developed or reconstructed.

Costs and funding sources. Few direct costs are expected to be needed to complete this action, assuming that agencies are willing to donate some staff time to attend the series of meetings and write sections of the guidelines document. It might make sense to have one agency (or a consultant) lead and coordinate these meetings, in which case \$5,000 to \$10,000 might help compensate for staff time dedicated to the action. In addition, it might cost about \$2,000 to professionally edit, print and distribute the final guidelines. This funding may be available from the participating wildlife or trail agencies; the NPS Rivers and Trails Assistance program specializes small, cooperative projects and has annual funding available on a competitive basis.

Constraints. Chief constraints are associated with developing multiple agency commitments to the project, although the level of commitment is relatively small.

10. Road Improvements to Prevent Moose-Vehicle Collisions

Description. This action involves two phases. First, it would convene a task force from relevant agencies to review known information about moose-vehicle collisions in the Anchorage area and identify priorities for roadside improvements that might reduce their number. Potential improvements include lighting, passive and active warning systems, fencing, or the creation of parallel moose trails to discourage moose crossings in certain areas.

Second, it would integrate task force recommendations into the on-going road reconstruction projects being led by the State Department of Transportation through the Anchorage Metropolitan Area Transportation Study (AMATS) Transportation Improvement Program (TIP). Potential upcoming projects include several roads where ADF&G has documented repeated moose-vehicle accidents, including:

- DeArmoun Road (Westside to Hillside Road).
- O'Malley Road (New Seward Highway to Hillside Road).
- Old Glenn Highway (North Eagle River Interchange to Peters Creek).
- Eagle River Loop Road (Old Glenn to Eagle River Road).
- Abbott Road (Lake Otis to Birch Road).
- Eagle River Road (MP 5.3 to MP 12.6).
- Huffman Road (Old Seward to Lake Otis Parkway).

These projects are in various phases of development, with the earliest on-the-ground construction planned for 2002, while other projects may be five to seven years from preliminary engineering to construction. All of these projects involve Federal Highway Administration (FHWA) funds, which have well established planning, design, and construction procedures. Integrating options designed to reduce moose-vehicle accidents is possible, but needs to occur early in the process. In past years, ADF&G review of these projects has been generally limited to habitat impacts (particularly regarding wetlands and effects on aquatic resources); under this action, additional expertise developed during the first phase of the action will be integrated into the planning and design efforts.

Rationale. Moose accidents are a considerable problem in Anchorage. In the survey of residents (Whittaker and Manfredo, 1997), while 69% reported that moose populations were not too high, majorities nonetheless reported that there were too many moose deaths from accidents (60%) and too many moose-vehicle accidents (54%). Survey results also showed that many residents (54%) were willing to pay a \$10 dollars per year per vehicle increase in registration fees for highway improvements to address this problem. While these fees were not actually being proposed (they were included in the question to suggest a realistic payment format for people to use in weighing the financial costs of these improvements), support for the fees indicates significant interest in spending public money on these kinds of remedies.

Responsibilities. The first phase of this action would be led by ADF&G, but would require participation from DOT and other city and state public works experts to be successful. The second phase of the action is ongoing and long term, and would require additional ADF&G staff resources to participate more intensively in road reconstruction planning and design. It is possible that these staff resources could be integrated with the staff requirements of Action 6 (habitat review program), and the position could be cooperatively-funded through the Municipality's planning department.

Schedule. ADF&G envisions a series of 4-5 short meetings over the course of a six month period to complete the first part of this action. Pilot programs and continued monitoring of accidents would then be considered over the next several years, with perhaps a single annual meeting to review whether certain options appear to be successful. Implementation of useful options would then be integrated into more extensive projects that follow from established DOT project schedules.

Costs and funding sources. Task force costs would be minor, but it does require commitment of staff time from the relevant agencies. Federal Highway Administration (FHWA) funding cannot be used to implement pilot projects or planning, although costs to implement improvements may be covered by FHWA reconstruction funds if those were integrated into planning and design efforts programmed through the AMATS Transportation Improvement Program.

Constraints. There is considerable environmental compliance work involved with any major reconstruction project, and this would also apply to possible moose accident prevention remedies such as increased lighting, fences, active warning systems, or even passive warning signs. The task force would focus on developing a list of possible issues, which could then be explored in subsequent pilot projects. Note: Implementing moose accident prevention projects on roads that are not being reconstructed is also possible in Anchorage, but would face both funding and environmental compliance hurdles because of the well-established procedures for road development through FHWA.

11. Create an Urban Wildlife Specialist Position

Description. This action would create and fund one or more urban wildlife specialists within ADF&G or the Municipality. This specialist would oversee a series of conflict prevention education efforts and be able to help ADF&G respond to conflict situations. Examples of tasks include promoting positive aspects of wildlife in the city (including wildlife viewing areas and education), training school administrators and school children in moose safety, educating residents about bear/garbage problems and enforcing the recommended bear attractant garbage ordinance (see Action 12), coordinating Canada goose and non-native/feral animal control programs (see Chapter 5), educating residents and visitors about habitat-friendly landscaping and available funding for habitat restoration, and coordinating with the Habitat Consequences Review Program (Action 6).

Rationale. Anchorage is like many other cities with growing populations of Canada geese, pigeons, and other nuisance birds. Anchorage is unique in that it also has several species of large, potentially dangerous mammals – moose, brown bear, black bear, and wolves – that frequent residential areas. However, local government has no staff dedicated to wildlife education or conflict prevention and response. Some similar-sized cities in the Lower 48 and Canada have urban wildlife specialists to focus on these issues; this action is needed to provide much-needed, similar levels of public service.

Responsibilities. The State or the Municipality could employ an urban wildlife specialist. If employed by the state, the position would be a Wildlife Biologist I or II under the supervision of the Anchorage Area Biologist. If employed by the Municipality, the position could be assigned to the Cultural and Recreational Services department; however, the person's duties would also include planning, enforcement, and coordination outside of city park boundaries. A municipal wildlife biologist would also be expected to serve as a liaison with state and federal wildlife biologists with jurisdiction in Anchorage. While financial and political barriers complicate the creation of this position in either state or local government, the planning team re-emphasizes the need for it.

Schedule. This action could be implemented within a few months of funding, and would be on-going. In future years, this program might need to be expanded to two or three positions in response to workload demands and community support.

Costs and Funding Sources. Annual salary, benefits, and support equipment for a Wildlife Biologist I costs about \$50,000. Potential funding sources might include CARA, state or local appropriations.

Constraints. As noted above, even aside from funding for this type of position, considerable jurisdictional/institutional issues need to be resolved concerning the location of the program. There are advantages and disadvantages to housing it in either the Municipality or ADF&G; in either case, cooperative agreements and recognition of joint wildlife responsibilities are necessary for the person to be able to successfully complete the varied and cross-boundary tasks.

12. Moose & Bear Encounter Safety Program

Description. Anchorage's relatively high turnover rate of its human population present a challenge to the task of public wildlife safety education. However, if Anchorage is going to "live with wildlife," the public must learn more about how to respond to wildlife encounters. A program to educate Anchorage residents and visitors on how to avoid and respond to wildlife interactions is the focus of this action, which would coordinate existing education efforts, and develop new materials and programs. Elements of this action include:

- ***Distribution of existing information.*** Products such as ADF&G's *Bear Facts* pamphlet, State Park's *Playing the odds in bear country* poster, British Columbia's Ministry of Forestry's *Bear Aware* video, and other existing products need to be made more readily available to the public in an economically feasible manner.
- ***Work with the media.*** Agency representatives, biologists, park rangers, Anchorage police officers and others need to cooperate with the media (print, TV, radio) to increase awareness of wildlife safety issues. Talking points include: treatment of food and refuse, recognizing signs of animals and their emotional states, avoiding animals, proper response in encounter situations, and respect for wildlife.
- ***Special programs.*** Special programs on wildlife safety given by biologists, researchers, or park rangers are generally well-attended and reach the critical audience of outdoor recreationists. These programs should be held each spring when the public is thinking about upcoming summer outings, but is kept in town by breakup. Weeknight programs may have the highest attendance. Program locations could include the Wilda Marston Theater, REI, Eagle River Nature Center, Campbell Creek Science Center, Rabbit Creek Rifle Range, the Anchorage Convention Center, or the Alaska Public Lands Information Center (APLIC). These programs could also be coordinated with the Anchorage Wildlife Festival (see Action 17).
- ***Teach wildlife safety in the schools.*** Continue and expand efforts to teach school children about "living with wildlife." Develop special tools for teachers; these could be coordinated with expanded wildlife education efforts for schools, some of which already exist through state and cooperative (APLIC) programs (see Action 19).
- ***Community warning programs.*** The community of Girdwood has independently convened interested publics in an informal bear warning program to help residents recognize when bears have been active in certain neighborhoods. They have a "bear log book" in the community post office, and developed signs to be posted in areas where bears have been recently seen. While this model may be less applicable in areas with larger populations, increasing awareness of bear conflict potential is likely to be useful in any case.

KAREN LAING



Educating Anchorage residents and visitors about how to interact with potentially dangerous wildlife is a critical plank in any conflict prevention program

Responsibilities. Wildlife safety education efforts are not currently coordinated among Anchorage wildlife agencies; under this action the Urban Wildlife Specialist (see Action 11) would organize and integrate these and other agency efforts.

Costs and funding options. Aside from the salary costs associated with the urban wildlife specialist (covered in Action 11), there are few additional specific costs associated with this action. There are likely to be some costs associated with developing and printing additional brochures and posters, or renting locations for workshops, but these could be cooperatively distributed among the several agencies that would use these materials. Corporate or non-profit contributions are possible sources of funding for some of these materials.

13. Bear Attractant Ordinance and Education Program

Description. Anchorage currently has an ordinance to deter people from attracting bears into residential areas and city parks, but it is rarely enforced. This action recommends amending the existing ordinance to include all sources of bear attractants (such as summer bird feeders and outdoor pet foods), and increasing both enforcement and education efforts to help establish city-wide behavior norms for securing bear attractants. The ordinance would likely recognize geographic areas where bear attractant issues are more and less severe, and thus require correspondingly more and less stringent regulations.

Rationale. The Municipality has an ordinance that requires residents to keep garbage away from wild animals and state law prohibits bear feeding. However, the ordinance is seldom, if ever, enforced and the state has not prosecuted violators unless they have been personally warned not to feed bears by public safety officers. Many Anchorage residents are careless about storing garbage and pet food. Bears are entering residential areas in increasing numbers to eat garbage, pet food, and birdseed, and are becoming bolder. Black bears only recently learned to eat birdseed in the Anchorage area. Since 1995 this has become one of the most common bear attractants.

At least 250 black bears live in the Anchorage area. Perhaps one-third of these bears spend at least part of the summer in or adjacent to residential areas. Subdivisions are also expanding into bear habitat. Many Anchorage residents tolerate, or even enjoy, having a few black bears in the neighborhood. However, about one-third believe there are too many bear encounters on trails and in neighborhoods, and a majority believe too many bears are getting into garbage (Whittaker and Manfredo, 1997). In discussions with wildlife staff, they express concern about pets and livestock as well as the risk to human safety, especially small children playing in yards. Black bears also kill several dogs and many domestic rabbits, chickens, and ducks each year. The risk to human safety is low, but not unfounded. Black bears have stalked people, even in Anchorage, and people in other places have been occasionally attacked and killed by black bears.

Bears may be legally shot in defense of life or property, including livestock and pets. An increasing number of black bears are shot in Anchorage every year, mostly by homeowners. From 1991 to 1994, 13 black bears were shot, about 3 per year. From 1995 to 1998, at least 38 black bears were shot, about 10 per year. Some of these shootings were not justified, and missed shots have endangered neighbors.

The most important factor in reducing dangerous black bear-human encounters is to stop attracting the bears into town. Other communities with similar problems have enacted ordinances to encourage residents to store garbage properly. A focused public awareness program may also decrease problems, at least to a point, but education coupled with enforced regulations offers the best hope of changing this human behavior.

Responsibilities. Any bear-attractant ordinance must be introduced and passed by the Municipality Assembly and signed by the Mayor; it would have to be enforced by city public safety officials. A bear awareness education program could be led by ADF&G, although current staff levels within wildlife education sections are insufficient. In order to carry out this action, funding of the Urban Wildlife Specialist described in Action 11 would also need to occur.

Schedule. An amendment to the garbage ordinance was drafted in 1996, but was never enacted due to a combination of public apathy and some active opposition. A new amendment would have to follow the Municipality's ordinance process, which takes three months to a year, depending upon its complexity and public support. As with any action that requires approval from a political body, predicting a precise schedule can be difficult.

Costs and Funding Sources. Under this action, homeowners and businesses would pay costs, if necessary, for rental or purchase of adequate garbage storage containers on their property. (Anchorage Refuse rents proper garbage enclosures for \$10/month.) Municipal parks contain hundreds of garbage receptacles without lids that might also need to be replaced, in areas likely to be visited by bears. These would have to be purchased by the city (\$50,000 - \$200,000 depending on number and type), suggesting that there are also significant government costs associated with this action. Innovative funding sources might be used for these purchases, however, with receptacles sponsored by organizations or businesses (similar to groups that have volunteered to clean-up road segments). Additional costs for education efforts under this alternative might run between \$5,000 and \$10,000 per year for developing printed materials, bumper stickers, and so on. Increasing city wide awareness and compliance will be challenging and not inexpensive.

Constraints. New laws and increased enforcement will receive resistance among some people in the community, particularly homeowners and businesses in bear areas where the ordinance/education efforts would be directed. While general public support for this action appears likely, specific support for an ordinance might be less. Education efforts, without supporting regulations and enforcement, are unlikely to be effective.

14. Moose/Bear Conflict Response Training

Description. A variety of public safety and other officials have responsibilities to interact with wildlife in conflict situations. The Anchorage Police Department (APD) and State Troopers may often be the first to arrive at a situation, while airport police, military base officials, city parks and recreation officials, and school officials may also be required to respond quickly and appropriately to wildlife problems. This action would provide training so that when these individuals respond, they know what to do, and when to call for help from ADF&G or the proposed Urban Wildlife Specialist.

This action envisions two half-day training sessions annually that allow members of a variety of organizations to take advantage of the program. Certification would be provided. The ultimate goal is to have all on-the-ground public safety officers in the city receive periodic conflict response training.

Rationale: Decision-making by untrained public safety officers can lead to less-than-humane wildlife conflict responses, or may increase public safety risks. There is the potential for lack of consistency in how situations are handled, which may add to the difficulty of communicating to the public how to respond to wildlife conflict situations.

Responsibilities. ADF&G, or the proposed new Urban Wildlife Specialist, would organize and conduct the training, while target agencies would be cooperators in requesting their staff to attend. The list of agencies which might benefit from these kinds of training workshops include: APD, state troopers, airport police, Elmendorf and Fort Richardson military police, Chugach Park rangers, Municipal Parks and Recreation race officials, and representatives from Anchorage schools.

Costs and funding sources. Training costs would be relatively small, but would include staff time to prepare and conduct efforts. However, the time that participating agencies would need to dedicate to have their staff participate may be considerable, depending upon the number that attend. Training facilities would also need to be determined: the hope is that those may be available through existing training infrastructure at APD or the troopers.

Constraints. Public safety officers already undergo considerable training, and must make choices in how to budget their training hours. Although this training effort is likely to be short, there will be challenges in developing police and trooper cooperation and support for these efforts.

15. Wildlife Feeding Education and Regulations

Description. This action envisions the development of multimedia materials on the problems caused by human feeding of wildlife. It also recommends the development of city or state regulations that prohibit certain kinds of wildlife feeding, or increased enforcement of existing regulations.

The contemplated education campaign could be coordinated with the goose outreach plan that has thoroughly considered target audiences, messages, themes, and sources. Persuasion campaigns of this type are most effective when they utilize multiple channels, come from multiple sources, and target multiple groups.

Enforcement efforts could also be improved, but regulations associated with education efforts are more likely to establish new behavior norms. It is obvious that residents need to "police" each other for this to work. The development of volunteer efforts to warn and tell people about the problems with feeding wildlife are an additional possibility.

This education effort may also include information about habitat-friendly landscaping in contrast to landscaping that may encourage wildlife nuisance problems.

Rationale. While some wildlife feeding ordinances exist, few are seriously enforced, and there is no significant education campaign to discourage feeding aside from some passive signs at popular feeding areas. This action recognizes that considerably more could be done to discourage a behavior that generally works to decrease wildlife diversity, may harm individual animals (who eat less nutritionally-rich foods, may lose their ability to secure natural food, and may alter their natural migration patterns), and attracts wildlife concentrations that can become a nuisance or affect natural wildlife behavior.

Responsibilities. This action would be co-led by ADF&G, USFWS, and the Municipality (particularly if the wildlife specialist is housed there).

Costs and Funding Sources. Costs should be relatively small and could be associated with the proposed Urban Wildlife Specialist position. Materials and signage are estimated to run about \$10,000 per year.



JULIE WHITTAKER

Feeding wildlife needs to be discouraged in Anchorage through a coordinated education/regulation program.

Feeding may decrease general wildlife diversity, harm individual animals (who eat less nutritional foods and lose normal migration patterns), and attract animals into concentrations that increase the potential for conflicts.

16. Pet Control Education and Enforcement

Description. This action recommends development of a public education campaign and multimedia materials focused on the problems that loose dogs and cats create for wildlife. This action would be coordinated with the Municipal Animal Control to distribute information about existing regulations, as well as consider further opportunities for expanding education efforts. This campaign could also involve coordination with the Anchorage School District to develop optional curricula materials which address skill development under the theme of pet responsibility and wildlife stewardship.

Some of the conflicts that will be addressed in these materials and programs include: free-roaming cats killing birds, effects on overpopulation of cats and dogs caused by unaltered free-roaming pets, dogs harassing moose calves and other wildlife, attraction of animals like magpies and bears to open pet food, effects of dogs and cats on ground-nesting birds, and the effects of trampling and pet waste to sensitive wetlands and streams. Methods to protect birds, wildlife, and their habitats from the adverse effects of uncontrolled pets will also be covered, as well as adverse effects on pets and humans (e.g. aggressive moose encounters) caused by failure to control pets, and alternative methods of exercise and confinement for pets.

Possible materials include a slide show or video for use in schools, community council and other civic meetings; regular television, radio, sign (e.g., People Mover buses), and print media announcements; news media stories; brochures; and school curricula materials. Ball caps, t-shirts, and other attractive ways to involve the public would also be considered, as would fair booths and other similar participation in public events. This campaign may be coordinated with other Living with Wildlife Plan actions, such as the Anchorage Wildlife Festival (Action 17).

Rationale. This action addresses several of the goals of the plan, including conserving optimal populations of native wildlife and their habitats, minimizing human-wildlife conflicts, and fostering a sense of stewardship for wildlife and their habitats among the public.

As human population size grows, so do the pet population and the number of pet-wildlife conflicts. These conflicts can pose dangers to pets, humans, wildlife, and wildlife habitat. Each year in the United States hundreds of millions of birds are killed by free-roaming cats. Millions of small mammals are similarly killed, causing the loss of important food sources for such wildlife as weasels, owls, and lynx. Anchorage's sensitive wetlands and fish-bearing streams also face increasing adverse effects from pet waste and trampling.

Anchorage has more than 50,000 dogs and 35,000 cats. Most are not a problem, but unsupervised dogs and cats can affect wildlife. Dogs chase moose, injuring adults and sometimes killing calves. Many cat owners also let their pets run free, and yet they are unaware of the true extent of killing. Others may mistakenly assume that only "common" bird species are affected, or be unaware that if one mate is killed, it can mean the entire nest fails. A study of cat predation in a rural area of southern Sweden found about 100 cats killed about 40,000 voles and mice, 3,500 rabbits and hares, and hundreds of birds in an average year.

Responsibilities. This action would allow the widest possible opportunity for education on these issues by taking the form of a coordinated campaign. Lead agencies would be ADF&G and USFWS, in cooperation with the Municipality (perhaps including public service announcements by city officials such as the Mayor), Animal Control, and possibly the Anchorage School District. Officials or staff from

APLIC, ANHA, Campbell Creek Science Center, and other facilities with wildlife education responsibilities may also want to be involved.

Schedule. This action would take at least six months to implement once funding is secured and depending on other duties of staff. Implementation involves choosing staff, research, coordination among agencies and offices, creation of materials, and distribution to or sharing with the public.

Costs and Funding sources. Assuming that some staff time could be donated by agencies, initial improvement in educational efforts might cost about \$20,000 per year. Depending on the scope of the campaign and the level of integration and coordination with other agencies, additional salary, materials, and media costs could range as high as \$40,000 per year. Potential funding sources may include C.A.R.A.

Constraints. Funding sources may not be able to support staff time. Agencies may not be able to dedicate staff time.

Other Supported Conflict Prevention and Response Actions

Avian and Small Mammal Predator Enhancement. This idea reflects planning team interest in maintaining population levels of small mammal and avian predators (e.g., wolverines, martens, hawks, owls, peregrines) in Anchorage, which help reduce populations of some nuisance wildlife such as feral rabbits and pigeons. Enhancement options generally focus on habitat protection which is expected to be developed from the habitat assessment effort (Action 1).

Injured Bird and Bird Conflict Program. This action calls for increased funding for injured bird treatment and education programs to be utilized by existing non-profit organizations and USFWS programs. These programs are chronically under-funded, but have the potential to offer important dividends for individual birds, bird populations, and residents and visitors who are interested in avian wildlife.

Trailhead Bear Warning Program. This action would develop a simple “bear hazard” information system at area trailheads. The planning team envisions a system similar to fire hazard warnings used in National Forests across the country (“the fire danger today is...low, medium, high”). Although trail managers have concerns about suggesting that bear dangers are ever “low,” there is little question that trail users would be interested in knowing whether there have been recent sightings in the area. This action cannot be implemented unless there is an Urban Wildlife Specialist for Anchorage who can coordinate such a system, as well as volunteers to make it work. This action is not a priority action because of these and liability concerns. Additional discussions among Chugach State Park officials, ADF&G, the proposed Urban Wildlife Specialist, and trail users groups will be needed to implement it in the future.

Neighborhood Moose Warning Assistance. Moose occasionally become stubborn and obstinately block the use of school bus stops or walking routes in neighborhoods. This program could help neighborhoods organize systems for warning families of the presence of these hazardous animals and arrange for developing alternative places for kids to be picked up. These programs will always need to be neighborhood-based and staffed by residents as volunteers, but the proposed Urban Wildlife Specialist could develop guidelines for organizing such groups.

Moose Accident Prevention: Education Options. In addition to road improvements, it may also be possible to increase awareness of moose-vehicle accident risks on certain roads by disseminating information about where accidents tend to occur and how often. For example, newspapers on the Kenai Peninsula habitually provide moose accident statistics for the area, although these are not broken out by road. Although the planning team believes the effectiveness of such efforts will be limited (most moose accidents occur on commuter roads by people who drive them every day and can easily become complacent about the hazard), any increased awareness might help.

Wildlife Recreation and Education Actions

These seven actions address the need to increase opportunities for residents and visitors to learn about wildlife and participate in wildlife-oriented recreation. These actions are designed to improve facilities, promote wildlife opportunities, and increase staff in interpretive and education programs. If these actions can be accomplished (and some are admittedly longer-term projects), Anchorage will have one of the best wildlife recreation education and learning opportunities of any large urban area in the country.

These actions recognize that residents and visitors are interested in a diversity of wildlife-related recreation and learning opportunities. Accordingly, these actions address the needs of the young and old, the active and less active, and those with an intense or more transitory interest in wildlife.

These actions begin with the development of an Anchorage Wildlife Festival to promote the variety of benefits that wildlife bring to the community, and a paired Anchorage Watchable Wildlife video and guide to suggest wildlife-recreation and learning opportunities in the city.

The next two actions address the need to more fully staff existing wildlife education programs in Anchorage's schools and visitor centers, while another two actions identify demand for two additional visitor centers, at Potter Marsh and Girdwood, which would complement the existing nature/interpretive facilities downtown (APLIC), in Eagle River, and in BLM's Campbell Tract. A final high priority packages a series of actions along the corridor from Potter Marsh to Girdwood, which has unparalleled diversity of wildlife viewing and learning opportunities.

Finally, this section identifies a series of supported (but lower priority) wildlife recreation facility actions in Chugach State Park, along city greenways, and on BLM land. Many of these proposals are in existing plans or have been previously proposed. This plan simply endorses those projects for their wildlife components.

17. Anchorage Wildlife Festival

Description. This action would provide for a variety of wildlife education opportunities, encourage wildlife volunteerism, and generally promote the benefits of Anchorage's wildlife. It might also include a wildlife count effort and could be integrated with a habitat awards program as described earlier. Moose, bear, lynx, loons, geese and songbirds are among the many animals that could be highlighted. This event would be the first of its kind in Anchorage. It will provide an opportunity for residents to learn more about preserving and enjoying the diverse and unique wildlife of Alaska's largest city.

This action could include displays and educational materials from wildlife-related agencies, conservation organizations, businesses, tourism interests and others. An "Anchorage Wildlife Week" could be proclaimed, during which a one-day festival, daily workshops and wildlife awareness could all be promoted. This action could also serve as the foundation for promoting the Municipality as a premiere wildlife viewing destination for tourists coming to Alaska.

This action might also be coordinated with existing wildlife-related public events, including the International Migratory Bird Day (which is typically celebrated with festivities in Kincaid Park in mid-May), the Alaska Loon Festival (also held in May), the Alaska Bear Festival, or the U S Fish and Wildlife Service Open House (held every three years in the fall, drawing over 1,000 people).

Rationale. This action would provide the public forum for advocating several goals and actions of the Anchorage Wildlife Plan. For example, guidelines and agency experts would be available to answer specific questions from participants on human-wildlife conflicts. A GIS map of wildlife habitat in and around the city would be on display for residents and developers alike. A wildlife count would aid in population assessment and monitoring. An Anchorage Wildlife Viewing Guide could be effectively distributed.

Responsibilities. The lead organization could be the Alaska Wildlife Alliance, a non-profit dedicated to protecting Alaska's wildlife. Wildlife conservation groups would be invited to co-sponsor the event, along with ADF&G, USFWS, BLM, the Municipality, and the military installations. The multi-agency Watchable Wildlife Committee, the Alaska Visitors Association, and other municipal/community leaders would also be encouraged to participate. Materials, events, and networking would be of interest and use to a wide range of adults, children, residents, tourists, businesses, and schools.

Schedule. An Anchorage Wildlife Festival could be scheduled as early as the spring, summer, or fall of 2000. A summer date may prove more beneficial in that tourists could attend, and allow for a large-scale outdoor event. The disadvantage to a summer date is that a wildlife festival would compete in a crowded summer events schedule. As an alternative, a spring or fall date could be coordinated with the existing wildlife events, but may be more focused on residential wildlife issues.

Costs and Funding Sources. The costs of a wildlife festival would depend on the size of the event. A recent festival for Alaska's bears cost \$4,000 and was held in the Loussac Library with approximately 500 participants. Organization and input was mostly voluntary. The Anchorage Summer Solstice Festival sponsored by AWAIC draws thousands of people and costs \$30,000 to produce. An urban wildlife festival could start small and be allowed to grow to a full-scale municipal, tourist, and possibly school event. Potential funding sources for this type of event are almost limitless. Immediate possibilities are wildlife conservation foundations. Corporate sponsors, local businesses, and national urban wildlife interests might also be explored as funding sources.

Constraints. The constraints for this action would depend upon the scale of the event. Organization, funding, and marketing are the greatest challenges. Of course, an outdoor event's success can also be weather-dependent.



ANN RAPPOPORT, USFWS

An Anchorage Wildlife Festival would be a fun event where people could share information about local wildlife and wildlife issues.



ANN RAPPOPORT, USFWS

18. Anchorage Watchable Wildlife Guide and Video

Description. Produce a twenty-minute narrated video tape and accompanying booklet/guide that would:

- Introduce the viewer to a number of popular wildlife viewing sites and scenic places within the Greater Anchorage Area.
- Provide guidance on how to behave around different wildlife from both an ethical and safety standpoint.
- Develop the theme that Anchorage is a special city with abundant wildlands and wildlife at its doorstep. Anchorage without its "wild" would lose the charisma and charm that makes it an exciting place to live and visit.

The video should emphasize that the conservation of wildlife and natural resources require attention and commitment from both residents and visitors.

Rationale. A tape and booklet would have many uses. They could be used in schools to create interest in wildlife, instill appropriate wildlife ethics and values, and provide safety information that could prevent potential conflicts. They could be used by hotels, local businesses and tourist enterprises as a service to the public. Scouts and other youth groups and organizations might also find them beneficial. They could be used at conventions and business meetings. The video could be made available to public TV and the outdoor channel so it could potentially reach a wider audience.

Responsibilities. The lead on this action is likely to be ADF&G, which should at least have a major technical role in providing factual information. Chugach State Park would also be an informational contributor, as the video is likely to focus on many opportunities in the park. However, there are many options regarding the writing of the script and actual production. For example, Colorado State University has produced several excellent videos and other public information materials for the military in Alaska regarding training and environmental/natural resource subjects. One of these productions received a "Telly Award" in 1998, a prestigious international award for documentary productions. They have excellent writers, production expertise and familiarity with Alaska and the Anchorage area. There is also the possibility of contracting with one of the several local video production companies.

Costs and Funding Sources. Production estimates for a high quality 20-minute video approach \$45,000. The cost of duplicating tapes after the initial production costs should be in the neighborhood of \$3 to \$4 each. Cost for production of a brochure can vary widely (\$3,000 to \$10,000) depending on style, size, paper type, use of artwork or photos, maps etc. Costs of running copies after the initial design can vary between \$1 and \$3.50 each depending on level of detail and sophistication.

Potential sources of funding include federal CARA funds, the Anchorage Chamber of Commerce, Dept. of Tourism, federal, state, and municipal agencies, and local businesses and organizations.

19. Expand Wildlife Education in Anchorage Schools

Description. This action would increase funding of wildlife education in Anchorage public schools. There are several existing programs (e.g., Project Wild, Alaska Wildlife Curriculum, Project Learning Tree, Anchorage Committee for Resource Education, Alaska Natural Resource and Outdoor Education Association) that provide teacher training and materials on wildlife education issues. In addition, programs at the Alaska Public Lands Information Center (APLIC) also provide age-appropriate information and facilities for up to 6,000 school children visits per year. However, these programs are generally short-staffed and are unable to meet recognized demand from schools and other groups who would like their help in implementing wildlife education efforts. This action would expand these programs in the Anchorage area (while recognizing that this is a problem state-wide as well).

Many states fund these programs at higher levels. In Colorado, for example, students in the sixth grade attend a six-week environmental education field camp. In Alaska, training is typically provided for less than 200 teachers per year, and staff have a very limited ability to participate in actual wildlife education opportunities with teachers. In general, the problem is a lack of staff, not the lack of materials.

This action would fund two additional positions to coordinate and staff existing programs. One position each would be located in ADF&G and USFWS. They would focus on teacher training and conducting some wildlife education classes themselves. They could also help coordinate curricula changes that focus on Anchorage wildlife.

Rationale. This action addresses the need for additional wildlife education in Anchorage, a major planning goal. Schools and other youth organizations have demonstrated high demand for more training and activities; this action would allow area agencies to fulfill that demand. This would not detract from other subjects because wildlife education can be a *theme* used to teach basic skill development in English, math, science, or other subjects.

Responsibilities. Lead agencies are ADF&G and USFWS, both of which operate wildlife education programs. Anchorage school district is a major cooperating agency, as it would be the chief beneficiary of specific work. Officials or staff from APLIC, ANHA, Campbell Creek Science Center, and other facilities with wildlife education responsibilities may also want to become involved. Cooperation with Anchorage School District is also important, although actual demand tends to be driven by teachers on an individual basis.

Schedule. This action could be implemented very quickly if funding were secured. Both ADF&G and USFWS have the ability and expertise to hire and supervise potential positions.

Costs and Funding Sources. Annual costs for a wildlife education position are about \$50,000 per year, which includes salary, benefits, and support equipment. Total cost for two positions is thus \$100,000 per year. Potential funding sources include CARA, or other appropriations through Congress or the state legislature. Anchorage wildlife education programs would be beneficial even if staff were assigned statewide responsibilities because roughly half the state lives in the Anchorage area.

Constraints. Funding sources may not be able to support staff positions. Agencies may be reluctant to hire positions on "soft" money developed through grants or one-time legislative appropriations.

20. Expand Wildlife Education/Interpretation Programs at Area Visitor Centers

Description. This action would increase funding for interpretive positions at the variety of Anchorage nature centers (including the Alaska Public Lands Information Center, Eagle River Visitor Center, Campbell Creek Science Center, and the proposed nature centers at Potter Marsh and Girdwood). The intent is to cooperatively fund these positions and rotate interpreters through the various visitor centers in the Anchorage area. This will increase cooperation and integration of interpretive efforts among the various centers, as well as help meet latent demand for interpretive activities.

Rationale. This action would also address the need for additional wildlife education in Anchorage, a major planning goal. In this action, however, the focus is on area interpretive visitor centers, particularly in the summer. There are several visitor centers that provide wildlife information to Anchorage residents and visitors, but some have chronic funding shortfalls. This action would provide funding for additional positions so that operating hours can be extended, and more activities and programs produced.

Responsibilities. The three existing visitor centers have funding structures in place through Alaska State Parks, BLM, and the Congressionally-mandated but cooperatively funded APLIC.

Schedule. This action could be implemented immediately upon funding. As discussed above, demand for interpretive programs and longer visitor center hours is during the summer months, so positions could be seasonal.

Costs and Funding Sources. Interpreters cost about \$3,000 per month and could be hired on a seasonal basis. As a starting point, we envision the need for approximately two positions to be rotated among visitors centers over a seven-month summer season (April – October). Possible funding sources could include CARA, or other state and federal legislative appropriations.

Constraints. Developing multi-agency cooperative positions (so interpreters can rotate their efforts at several interpretive facilities in Anchorage), and establishing funding sources.

21. The Alaska Bird Center at Potter Marsh, and Potter Marsh Boardwalk Expansion

Description: The Bird Treatment and Learning Center (Bird TLC) is developing the Alaska Bird Center at Potter Marsh (Center), a joint-use educational facility and bird rehabilitation clinic. Bird TLC is a non-profit group dedicated to treating injured wild birds and providing education about wild bird conservation, but it does not have a permanent, consolidated facility for these services. Bird TLC has purchased a 4.3 acre building site overlooking and adjacent to Potter Marsh, a state wildlife refuge.

The Center's mission is the conservation of Alaska's birds and their habitats through public education, and rehabilitation of injured and orphaned wild birds. Educational exhibits, programs and activities will be developed around the theme that Potter Marsh is part of a network of valuable wetlands and wildlife habitats and that its conservation depends on human actions. A market study in 1998 predicted the Center could attract 218,000 residents and visitors per year at a \$12 admission price.

Potter Marsh is one of the most popular fish and wildlife viewing areas in Anchorage, featuring nesting bald eagles, spawning salmon and a variety of nesting and migratory water birds. Current facilities include a 1,550-foot boardwalk with interpretive signs accessible from a small parking lot off New Seward Highway. The ADF&G estimated nearly 45,000 visitors used the Potter Marsh boardwalk during the summer of 1997. ADF&G has obtained federal highway funds to design parking lot improvements and an extension of the boardwalk to link to the Center site.



Rationale. This project helps meet several wildlife education and recreation goals outlined in this plan, as well as treat injured birds. It most directly serves the goal of providing for wildlife education and recreation opportunities in an area with abundant summer wildlife.

Responsibilities: Bird TLC has developed a partnership with the ADF&G (which manages Potter Marsh), Alaska State Parks (which manages nearby Chugach State Park), the U.S. Fish and Wildlife Service, and the non-profit Friends of Potter Marsh (FOPM) to develop the Center and cooperate on educational services. ADF&G is responsible for coordinating the boardwalk link to the marsh.

Estimated Schedule. Design and environmental review of the boardwalk and Center is on-going and will be complete when construction begins in 2001. The Center is expected to open in 2003-04.

Costs and Funding Sources. Phase II/Planning would cost \$475,000; Phase III/Construction and Start-up is estimated at \$13 million. Both public and private funding is being solicited.

Constraints. The Center and boardwalk development are subject to local, state and federal government permitting, and obtaining adequate funding.

22. Wildlife Recreation Planning for Potter Marsh to Girdwood Corridor

Description. This action envisions a coordinated planning and development effort to improve and integrate a series of wildlife-oriented recreation opportunities along a corridor from Potter Marsh to Girdwood. The state Department of Transportation (DOT) is involved with significant highway re-constructions along this corridor, and a multiple-use trail is expected be built in conjunction with them. This action recommends beginning a planning effort to coordinate those projects and ensure they include several related wildlife recreation and learning opportunities. In addition, this type of planning could ensure that the provision of these opportunities minimizes adverse impacts on the wildlife and natural resources that draw people to the area.

Specific projects likely to be considered and recommended during this planning effort include:

- Viewing improvements and interpretive stations at Beluga Point.
- Viewing improvements, parking, and interpretive stations at Windy Corner.
- A beaver pond overlook and interpretive trail at Bird Point.
- A tidal marsh overlook and interpretive station at Girdwood Marsh.
- The Alaska Bird Center at Potter Marsh (see Action 21).

The ultimate vision is of a series of connected recreation and learning opportunities, along with nodal infrastructure (on private lands) so that visitors may be able to step out of Anchorage hotels and connect with trails that will take them 40 miles to Girdwood. The combination of scenery and wildlife viewing (along with some history) is compelling. With planning, we have the chance to conserve and enhance these opportunities.

Rationale. The area between Potter Marsh and Girdwood captures some of Alaska's most spectacular views. It provides a landscape that intersects land and sea, mudflats and tundra, and caters to colorful horizons. With the exception of Dall sheep at Windy Corner, beluga whales, and free-ranging bald eagles, wildlife currently plays only a supporting role.

Visitors and Alaskan residents more often travel the corridor to get somewhere – a string of places and activities that symbolize Alaska during its frenetic warmer months. In fall and winter months, even fewer travelers focus on the road, with its brooding, majestic, powerful, dangerous, and reflective landscapes. Both automobile and train travelers are removed from this environment and its wildlife inhabitants, steered by internal clocks and insulated by glass – they don't step far afield.

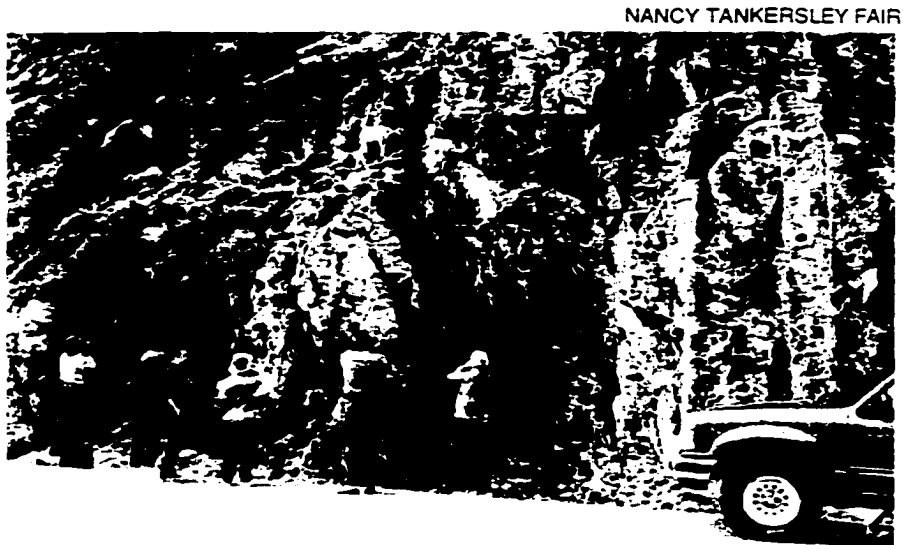
Wildlife recreation planning could help shape an alternative. It is by definition more invasive and yet can also allow greater subtlety. Unless carefully planned, the incremental loading of bicycles and recreational hikers will wear out its welcome. The issues are challenging: when to encourage interface and when to build imaginary fences to prevent unacceptable impacts; how to support access, but discourage exploitation. In order to meet this challenge, a public planning effort based on "limits of acceptable change" and other visitor impact planning frameworks is crucial.

Responsibilities. Alaska State Parks is the lead agency for these projects, but will need assistance from other governmental agencies and local conservation and trail advocates. The Department of Transportation is also a critical player, as it oversees the major road reconstruction that opens the door for many of these other possibilities.

Schedule. Some of these site projects and the longer multiple use trail are already being planned and developed. This action envisions additional planning to coordinate these projects and develop an overall vision for wildlife-related recreation in the corridor. This action could begin upon completion of this plan, if funding can be found. A one-year planning effort is envisioned. Some of the projects being proposed will likely be developed in the next two or three years; others are longer term efforts and would involve substantial government and private sector interest.

Costs and funding sources. An overall planning effort of this nature would require at least one full-time planner to organize over a one-year period at about \$50,000. Additional agency participation might also cost significant amounts. CARA and Land and Water funding are possibilities for specific projects, as is ISTEA funding associated with road reconstruction. Planning money is less easy to secure.

Constraints. Finding funding for additional planning is a chronic problem, particularly when some of the projects under consideration are already in progress. However, it is increasingly important to coordinate these projects to fit with a larger vision of regional opportunities.



The corridor from Potter Marsh to Girdwood features a diversity of wildlife viewing and learning opportunities. This action recommends a coordinated planning effort to develop and integrate both public and private facilities to enhance these opportunities.

23. Girdwood Nature Center

Description. The development of a nature center on public or private land in Girdwood would showcase a diverse northern rain forest ecosystem and provide a node for exploring the wealth of nearby local trails as well as links to trail systems in Chugach State Park and Chugach National Forest. The addition of a fifth visitor center in the area (after the proposed Alaska Bird Center at Potter Marsh joins the existing downtown APLIC, Eagle River, and Campbell Creek nature centers) would also ensure that there are wildlife and natural resource education opportunities in all corners of the Municipality.

A future Girdwood Nature and Historical Center must differentiate itself from the Forest Service Begich-Boggs Visitor Center at Portage. In addition to Girdwood natural areas, a visitor center can reach out to Turnagain Arm and explore its rich diversity. Girdwood boasts the farthest extension of the Northwest temperate rainforest, local creeks support small populations of all five salmon species, beluga whales ply the waters of the Arm, and landscape-scale changes (including sunken trees) wrought by the 1964 earthquake offer additional thematic opportunities.

Rationale. The combination of geography, climate, and location makes Girdwood the ideal place for a nature and historical center. The juxtaposition of the northernmost temperate rainforest, Glacier, Virgin, and California creeks, and an extensive wetland ecosystem support a range of plant and animal communities. Girdwood is a hotspot for birders and botanists. Visitors and "Birdathon" fund-raisers have long raked Girdwood trails and bird-feeders with their binoculars, while plant ecologists and fungi experts comb the forest for species closely associated with both Turnagain and Prince William Sound ecosystems.

The Iditarod Trail draws history buffs and romantics, and Crow Creek Mine (an historic gold mine) draws recreational gold panners. Large, now silent, steam boilers associated with mining at higher elevations along the Crow Creek Trail await those seeking a physical challenge. Crow Creek Trail also returns the prepared hiker and camper to Eagle River and Anchorage through Chugach Mountains and valleys. The trail offers regular black and brown bear viewing, river crossings, and the Eagle River Visitor Center at trail's end.

Tourism and recreational use continue to expand in southcentral Alaska. Girdwood has a world-class hotel and ski resort and is a natural stopping point for travelers going between Anchorage, Portage Valley, and the Kenai Peninsula. Within a short time, the Alaska Railroad is slated to reopen a station in the lower region of the valley.

Finally, new and planned bicycle and walking trails suggest a future for those visitors choosing to walk the planned Turnagain Trail from Anchorage or points on the Kenai Peninsula. A Girdwood Nature Center would enhance and partner well with this trail system.

Responsibilities. A lead agency or organization needs to emerge: cooperators could include Chugach National Forest, Chugach State Park, the Municipality, or the community of Girdwood. Conservation organization support appears crucial, as might corporate or visitor industry support.

Schedule. This is a longer term project. It is a relatively new idea that needs to gain momentum before funding, design, and construction can begin. This plan is formal endorsement of this project, which should receive additional attention after the Alaska Bird Center at Potter Marsh is completed.

Costs and funding sources. It is difficult to estimate costs when a clear vision of the size and scope of the center have yet to be defined. This is a large project that could cost several million dollars.

Constraints. Location and property options are one constraint, as will be funding and environmental compliance. As noted above, this is a long-term project that requires additional planning to be realized.

NANCY TANKERSLEY FAIR



A Girdwood Nature Center would enhance many recreational and educational opportunities in a key location rich with wildlife



ALASKA DEPARTMENT OF FISH AND GAME

Other Supported Wildlife Recreation and Learning Actions

Coastal Trail Connection: Kincaid to Potter Marsh. The planning team supports the idea of extending the Coastal Trail to Potter Marsh, a high priority among Anchorage trail advocates. The team also supports the idea of having that trail connect, in places, to overlooks on the bluffs above the Anchorage Coastal Wildlife Refuge. However, the team did not find consensus on whether the trail should travel through the Refuge, where a multiple-use trail might have negative habitat impacts and encourage wildlife-human conflicts. There is clearly a need to develop more information and consider more public comment about these trade-offs before the trail is designed and constructed.

Interpretation Stations on Campbell Creek Science Center Trails. The BLM has identified and plans to build interpretation kiosks and stations along some trails near the Campbell Creek Science Center, which is supported in this plan.

Interpretation Stations on City Greenway Trails. The planning team believes there are excellent interpretive opportunities along the city's multi-use trails (e.g., Chester Creek, Coastal Trail, Campbell Creek), and that a few coordinated kiosks or other interpretive stations might be able to reach many Anchorage residents and visitors. These projects were viewed as a lower priority because, although these areas are important wildlife corridors, the primary focus of most of these trails are not wildlife-oriented. The Municipality would be lead on any projects.

Eagle River Viewing Tower. The salmon viewing area along Eagle River (below the Visitor Center) has occasionally been an area with high bear and moose populations. An adjacent viewing tower would offer residents and visitors the opportunity to see these animals more often (because vegetation in the area is thick), as well as provide a "safe haven" if a bear moves directly into the area. Alaska State Parks has proposed and expects to complete the planning for this action.

Eagle River Campground Interpretive Trail. This action would develop a short interpretive trail along the river from the campground. It would feature several overlooks and interpretive stations that would focus on riparian wildlife and ecology. Alaska State Parks is lead.

Glen Alps Interpretive Stations; Middle Fork Campbell Creek Loop Interpretive Trail. Both of these actions would develop interpretive stations along popular trails on the Hillside in Chugach State Park. In both cases, Alaska State Parks is the lead and has planning in place to develop these if funding could be found. CARA may be able to provide funding.

Other Actions

The final two priority actions in the plan are associated with future planning and the need to continue to integrate wildlife management activities among the various local, state, and federal agencies and interest groups. The first identifies the importance of the habitat on the military installations, which could be jeopardized in the future if those bases are relinquished and developed. This action identifies the need for cooperative wildlife and natural resource planning in such an eventuality.

The second identifies the need for wildlife agencies and groups in Anchorage to continue to meet and integrate expertise and resources, and share information even after this plan is finalized. Integrating agency information and activities is not something that just happens on its own: it requires leadership and some level of institutionalization. While the planning team recognizes that the creation of another bureaucracy is less than useful, everyone wants to see the existing ones working together. There is good evidence that many members of the public cannot distinguish between land managing agencies, but they still remain interested in the decisions those agencies make. With this action, we recommend that agencies meet at least annually to review accomplishments and share information, and thus explicitly support a cooperative management paradigm.

24. Planning for Wildlife Habitat on Future Excess Federal Property in Anchorage

Description. Fort Richardson and Elmendorf Air Force Base contain large land areas with significant wildlife habitat value. In the event any of these lands are no longer needed for federal military purposes, several agreements, as authorized by Congress, are in place to determine the future ownership of these lands. The agreements include the North Anchorage Land Agreement (authorized by Section 1425 of ANILCA) and the Cook Inlet Land Exchange.

The North Anchorage Land Agreement identifies a greenbelt along Eagle River, the Eagle River Flats and key moose habitat east of the Glenn Highway for state ownership to protect fish and wildlife values. The agreement also directs the Municipality of Anchorage (MOA) and Eklutna, Inc. to prepare a generalized land use plan for any remaining land in the two military reserves. This action recommends that ADF&G and other wildlife agencies assist NALA parties by defining additional public interest lands for fish and wildlife habitat purposes.

The Cook Inlet Land Exchange directs the disposition of any excess or surplus military lands south of the east-west running line separating Townships 13 and 14 North. ADF&G and other interested wildlife agencies should also be prepared to assist the DNR and MOA in defining fish and wildlife habitat or other natural resource concerns on these lands.

No specific action is required if the installations continue to be actively managed by the U.S. Army and Air Force. If these lands are surplus, however, we believe that a natural resources assessment should be completed before any lands are transferred or disposed. While a NEPA process is required before any Base Realignment and Closing (BRAC) action can be taken, it is unclear whether this would include any examination of public interest in habitat conservation issues. A natural resources assessment is therefore recommended in concert with any BRAC NEPA effort. This assessment should consider wildlife, fish, and other ecological resources, as well as recreation opportunities associated with those resources and environments.

Rationale. Together with Chugach State Park, the two military installations play a critical role in maintaining the ecology, watersheds, and wilderness character of greater Anchorage. These large land tracts, which remain relatively undeveloped and contain large portions of the Ship Creek, Chester Creek, and Campbell Creek watersheds, act as "ecosystem reservoirs" from which many wildlife flow. Military control of public lands adjacent to Anchorage, especially Fort Richardson, has resulted in the retention of healthy functioning ecosystems full of thriving wildlife. In general, the military mission has been compatible with these ecosystems, and recent environmental directives require maintenance of biodiversity and viable ecosystems to ensure natural training settings and scenarios.

The fate of these military lands has been the source of considerable concern in recent years. Although the Army has not announced any intention of relinquishing these lands, Congressional authorization of land agreements suggest that some local development is inevitable if the land is surplus. This action simply urges careful planning to ensure that any development does not substantially impair the wildlife habitat and function which is currently provided on these lands.

Responsibilities. The lead organization would be ADF&G. Any wildlife or ecological assessment of these lands should also involve Chugach State Park, the Municipality, the US Fish and Wildlife Service and local wildlife interest groups. If the military is relinquishing these installations, their planners and environmental experts may not be in a position to be decision-makers, but could provide valuable

expertise. Given the development potential of the area, those interests would also play critical roles in the process.

Schedule. At this time there is no schedule or intention to close or surplus lands from either of these military installations. The North Anchorage Land Agreement directs the MOA and Eklutna, Inc. to prepare a generalized land use plan and to meet annually to review and update the plan. To date, the parties have not prepared this generalized land use plan.

Costs and Funding Sources. No action is currently proposed. Conducting an ecological assessment of the installations would be a substantial cost, but might be covered as part of base closing costs.



WILLIAM GOSSWEILER



WILLIAM GOSSWEILER

Fort Richardson and Elmendorf lands are vital to the health of Anchorage's ecosystem, including its creeks and wildlife

25. Formalize Interagency and Wildlife Interest Group Cooperation

Description. This action would recognize the need for continued coordination and integration of agencies and organizations with wildlife responsibilities or interests in Anchorage. It would formally establish annual meetings to review wildlife management actions being undertaken in Anchorage.

Over time, it is hoped that this group would be respected as an entity with special broad knowledge and expertise on wildlife issues in the greater Anchorage area. If this were to occur, the group might be able to help influence and direct development and natural resource decisions in the city.

Rationale. This cooperative planning effort is the first step in coordinating and integrating wildlife management responsibilities among a number of agencies and interest groups. In order to continue the process, however, there needs to be some formalization of the effort into the future. Annual meetings to review actions and successes urged by the plan are a simple mechanism to keep this momentum going.

Responsibilities. Every agency, organization and interested individual that has been involved in this planning effort or who would like to commit to future cooperative planning work would be welcome to participate. However, special responsibilities fall to the lead agencies in this effort, including ADF&G, USFWS, State Parks, BLM, and the Municipality.

Constraints. The press of daily work is a chief constraint.

Actions Considered but Rejected

Large Mammal Predator Enhancement. While additional large predators in Anchorage might help naturally reduce populations such as moose, the planning team recognized that increasing the numbers of bears and wolves in Anchorage is probably not desirable for most residents.

Moose Sterilization Research. Although recent contraceptive technology improvements suggest that some ungulate populations (particularly white-tailed deer) can be reduced through sterilization programs introduced into wildlife feed, the planning team did not think this expensive technology should be pursued for Anchorage's moose.

Trail connections from Bicentennial to Chugach State Park: convert Tour of Anchorage Trail for summer use. These two suggestions from the public would create additional trails in the Bicentennial Park/Campbell Tract area, but were not supported by the planning team for wildlife purposes. There are extensive existing trails in this area for hikers, and the general concern was that upgraded trails that would encourage additional multiple uses and reduce available habitat would have habitat impacts that would not be offset by the increased wildlife recreation opportunity.

Twin Peaks Overlook Interpretive Station. While the planning team supports the existing trail and overlook on this mountain, they did not feel that additional expenditures on an interpretive station that would increase development levels on this low-use trail were appropriate. The trail currently provides excellent sheep viewing opportunities, but they are primitive in nature.

Trailhead moose warning program; neighborhood bear warning program. Both of these options were rejected as likely having little utility because of the difficulty in providing up-to-date information in a cost effective manner.

Appendix A

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