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An ecosystem approach to wildlife management in wilderness areas: A case study of the greater Kluane region

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An Ecosystem Approach to Wildlife Management in Wilderness Areas: A Case Study of the Greater Kluane Region

By

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B.A. (Hons), Wilfrid Laurier University,
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Thesis

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Abstract

This research examines the implications of an ecosystem approach to planning and management for sustainable wildlife populations within a wilderness setting. Kluane National Park Reserve and the surrounding region are the focus of the study, providing a relatively unaltered ecosystem in which to explore certain questions regarding ecosystem-based wildlife management.

The ever increasing human population and constant surge of development are placing more and more pressure on remaining natural resources. Wilderness areas and wildlife habitat are disappearing rapidly, and the north is receiving unprecedented activity in the search for remaining resources. Management strategies must be created which will be capable of addressing these and many other issues. This research investigates the effectiveness of an ecosystem approach in dealing with these issues. Data relating to the social, economic and ecological aspects of the study area were obtained from a variety of sources. This study will not be a management plan per se, but will compare existing management plans and how they affect wildlife in the study area. A Wildlife Management Model will serve as a guide to examine the data. The interactions of these management plans will then be compared using a Wildlife Management Matrix. The matrix examines the processes (management plans) on one axis and the characteristics of the management model on the other axis. I will then be able to evaluate current management activities on a comparative basis.

This research concentrates on providing guidelines for more effective wildlife and wilderness management, rather than on the functional or spatial characteristics of ecosystems. In the final analysis, an ecosystem approach proved to be a valuable method for planning and managing these resources.

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Table of Contents

List of Figures

List of Tables

CHAPTER ONE INTRODUCTION

1.1 Introduction and Objectives

Northern regions have been receiving vast amounts of attention as the demand for natural resources escalates in North America. Wilderness areas are increasingly sought after, and the ownership and management of these lands have subsequently become highly controversial issues. Conflicts are also occurring among the many different users of wilderness areas. On-going native land claims leave the administration of many areas unsettled. In addition, potential uses of the resources within these areas have also become uncertain.

Of particular concern in the north, are the wildlife resources. Many inhabitants still rely on wildlife for subsistence as well as wildlife-related activities for their livelihood. There are many different administrative bodies responsible for the management of wildlife, each with their own perspectives, aims, and approaches. Their jurisdictions often overlap, and conflicting regulations result, leaving vagueness or confusion for users in these areas. In an attempt to deal with these concerns, this thesis will investigate the effectiveness of planning and management for sustainable wildlife populations within a wilderness setting from the perspective of an ecosystem approach. A case study which focuses on the greater Kluane region in the Yukon Territory will be presented to illustrate how an ecosystem approach can be utilized.

A number of objectives must be achieved in order to properly address this

question: 1) Establish a framework illustrating an ecosystem approach.

2) Provide a desciption of wildlife in the wilderness area to be studied. Wildlife will be shown to be a multi-valued resource, and as such subject to a variety of different uses. The many conflicts that arise among the users must also be examined along with the resultant pressures placed upon the wildlife.

3) Achieve an understanding of the various stresses on wildlife population and habitat in the study area. Even with all of the essential resource values recognized, wildlife and wilderness areas are becoming scarcer. As demands increase, many natural resources are becoming depleted and many of the wildlife habitats are disappearing.

4) The final objective is to determine what management activities affect wildlife. By using an ecosystem approach, I will develop a wildlife management model which will be shown to incorporate existing management activities, yet may go beyond it to be more efficient in sustaining wildlife populations within wilderness settings.

1.2 Background

Throughout the world today environmental degradation is occurring at unprecedented rates and human populations are ever increasing. These trends have combined to produce a rapidly deteriorating global environment, as our resources have become strained. In many areas around the world, both renewable and non-renewable resources have reached their limitations, and in some cases,

beyond to the point of elimination. However, growing threats to natural systems around the world are slowly being recognized, and concerns about the earth's capability to support life have been voiced.

In an attempt to deal with this global environmental crisis, age-old concepts such as 'conservation' and 'preservation' are being redefined. In the past there have been many different interpretations of these terms, and a vast array of perceptions and attitudes have resulted. In response to the growing threat of environmental crisis, conservation strategies have arisen. Due to the growing realization that humans must ultimately take action against further environmental deterioration, conservation strategies were created to define basic problems and paint a broad picture of appropriate objectives. The World Commission on Environment and Development (WCED) was established by the UN General Assembly in 1983 to address the many issues involved in current global environment and development, and subsequently produce a report. The final report, *Our Common Future*, introduced the term 'sustainable development' to the world. The WCED viewed sustainable development as a strategy which would address many of the main global concerns, namely poverty, population growth, and resource use, so as to strive for a sustainable future by and beyond the year 2000 (WCED, 1987).

Sustainable development was introduced to Canada in 1984 by Environment Canada. It was felt that conservation for the sake of sustainable development "will ensure a more efficient use of all resources to contribute to a

more durable, resilient, internationally competitive and sustainable pattern of growth" (Environment Canada, 1984, p.15). By 1990, the Government of Canada had released *Canada's Green Plan*, a national strategy for attaining sustainable development through a "philosophy, not an action plan" (Government of Canada, 1990 p.5).

The principles behind sustainable development may be most easily understood in the context of renewable resources. When managing for renewable resources the principles are used to allow harvesting of a particular resource up to the point where the rate of take equals the rate of renewal or replenishment (O'Riordan, 1971). Sustainable development holds the idea that limitations on resource use are imposed by the state of technology and social organization and the environment's ability to meet present and future needs (WCED, 1987). One problem with this theory is that it puts the current economic system before ecology by suggesting that the ultimate limits to global development will manifest themselves in the form of rising costs and diminishing returns, rather than in the form of any sudden loss of resource base (ibid, p.45).

By using the basic theories behind sustainable development and a slight variation of the philosophies, sustainable activities were introduced as a means of safeguarding our natural resources. The guiding principles of sustainability or sustainable activities are that humans must take no more from nature than nature can replenish (IUCN/UNEP/WWF, 1991). The earth's resource supplies are viewed as limited rather than unlimited. Sustainability accepts that although the

alteration, management and use of resources cannot be prevented, their right to continued existence in a natural state is affirmed (Leopold, 1966 p.404).

It is this theory of sustainability that has become predominant in many aspects of resource management today. The loss of species is acknowledged as having great significance, not only in our ability to measure it, but in that species have inherent values and the limits are often unknown. The growing threats of a loss of biodiversity have also been recognized by resource managers and biologists alike, and adds another dimension to attaining sustainability through resource management.

Achieving global sustainability appears to be an enormously difficult task at present. It involves changes in values and attitudes toward resources to occur, as well as a shift in consumptive patterns, material expectations and altered lifestyles. In order to do so, different areas around the globe will have to be treated separately, and yet as one entire system.

Northern regions have certain characteristics which when trying to achieve 'sustainability' set them apart from other areas around the world. The circumpolar region is found to contain fragile systems which are vulnerable to human-induced changes, and indirect damage may be reversible only over long periods of time (Karpowicz, 1987). Largely as a result of their isolation, many of the more northern areas had until recently, experienced very little exploitation of their resources. The people inhabiting these regions lived sustainably. If they expanded beyond their available resource limitations, they would have starved or

would have been forced to migrate.

For centuries, people have depended on Canada's renewable and non-renewable resources in many different ways. Recently however, the north has been experiencing unprecedented activity as the search for non-renewable resources escalates in this area. The well-being of people, communities and businesses are threatened when wildlife populations and vital ecosystems are put in jeopardy by non-sustainable forms of development. The Government of Canada realized the need for action in the North, and developed the *Arctic Environmental Strategy* (1991) "to preserve and enhance the integrity, health, biodiversity, and productivity of our Arctic ecosystems" (Canada, DIAND 1991 p.2). The *Arctic Environmental Strategy* is a component of the *Green Plan* which addresses the environmental stresses that affect the Canadian North.

In Canada, the north is often politically defined as the vast expanse of land lying north of 60°N latitude, but in many cases the boundary may extend considerably southward beyond this. The north is generally characterised by a harsh climate, including systems of polar and non-polar glaciers, icefields, and continuous and discontinuous permafrost. These features of the arctic and subarctic induce a low rate of biological productivity, and in comparison with more temperate zones, have a notably sparse flora. The areas that can be considered to have high productivity are few and localized making them susceptible to environmental damage (Bone, 1992). It has been noted that structurally simple northern ecosystems, tundra and boreal, have survived due to

their large geographic scale (Dunbar, 1973). As such, the northern environment is frequently described as 'fragile' which makes the wise use of resources mandatory if human activity increases in this area.

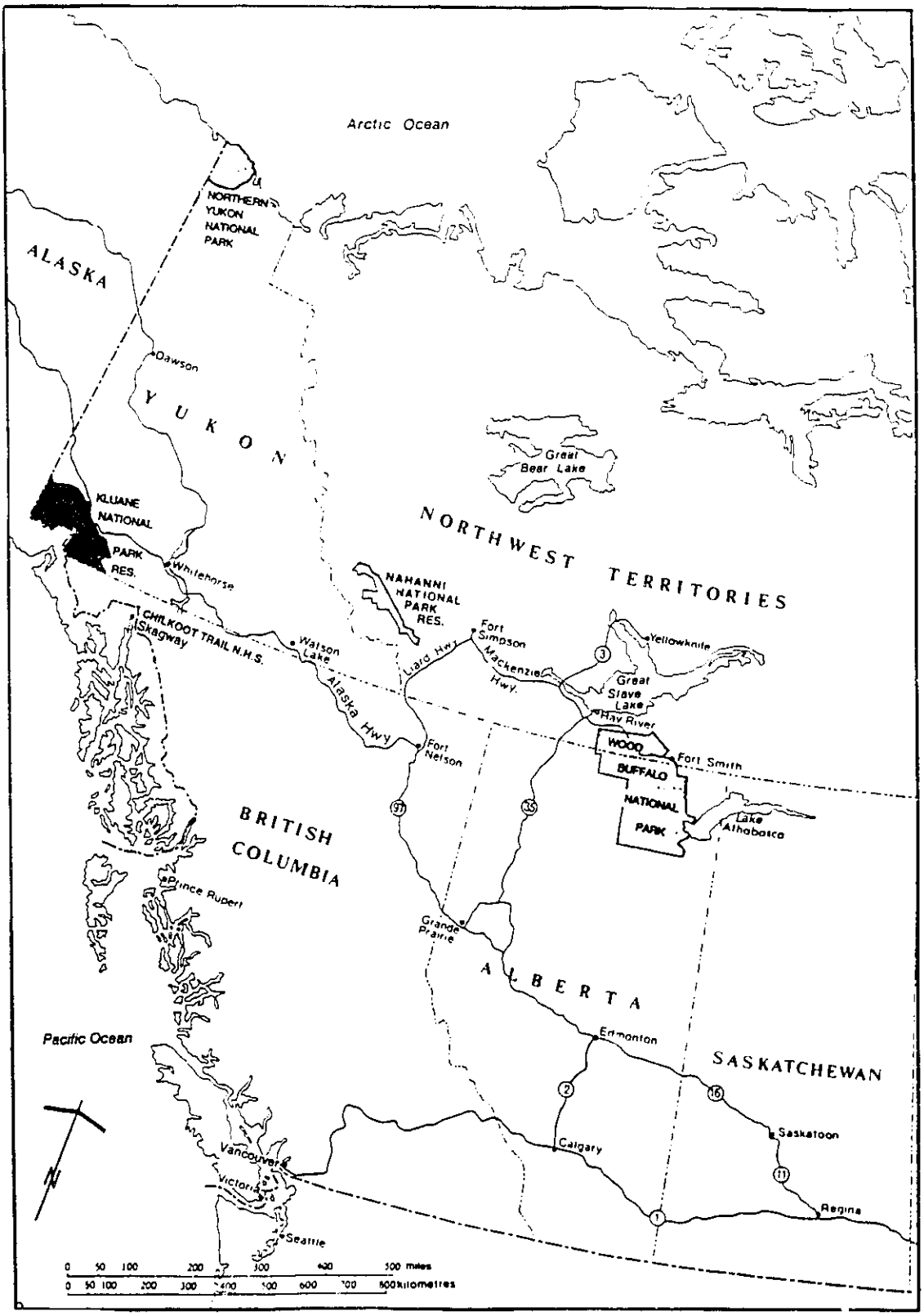
Trends in use and exploitation of northern resources presently include fishing and hunting, trapping, mining, water diversions, hydro-electric power development, thermonuclear projects, oil and gas, transportation, tourism and wilderness travel, and scientific research (Fuller, 1974). One very important resource for many northern regions is wildlife. There are many users of this particular resource and there is often much controversy concerning different uses and management of wildlife. Wildlife is crucial to the economic base of many communities in the North, and is also critical for subsistence uses. More and more conflicts have recently arisen surrounding this particular resource, which has in turn led to management problems, especially in the north.

Modern technology has replaced traditional methods of harvesting wildlife in a great number of northern communities. High powered rifles, snowmobiles and helicopters are able to access previously unreachable areas. Access roads and improved highways lure considerable numbers of tourists and recreationists to wilderness areas for hiking, camping, wildlife viewing, and many other activities. These advances combine to produce increasing pressure on wildlife populations. Along with advances in demand for, and technology to utilize these resources, there should also be a subsequent accompanying advance in the management techniques.

The north is one of the world's last frontiers, and as such it is imperative that we understand how development is affecting northern ecosystems and what subsequent mitigation measures must be undertaken. Until the *Arctic Environmental Strategy* was released in 1991, most of the conservation efforts in northern Canada had been directed at the establishment of protected areas. The majority of these protected lands are National Parks, National Park Reserves, or wildlife refuges. As protected lands, national parks are indispensable since almost all of the remainder of the land in North America consists of environments that are dominated by man, maintained by man, or have been altered in some significant ecological way (Theberge, 1979). If managed properly, a National Park may cause less disruption of ecosystems than any other land or resource use, thereby allowing research to be carried out in a somewhat unaltered environment.

With this in mind, the Kluane region, including the Kluane National Park Reserve (Figure 1) serves as one of the few places to study wildlife and ecosystems in a relatively unexploited northern environment while at the same time providing examples of different approaches to and institutions for wildlife management. Wildlife resources in the Yukon are unique, and Kluane National Park Reserve is one of the richest wildlife areas in the Yukon. Both the diversity and the density of its large mammals are high for a northern region (Theberge, 1980 p.72). The areas adjacent to Kluane National Park Reserve include many different jurisdictions, each with their own perspectives, aims, and approaches to management.

Figure 1 *Location of Kluane National Park Reserve*



source: Env. Can., Parks 1990

1.3 Components of An Ecosystem Approach

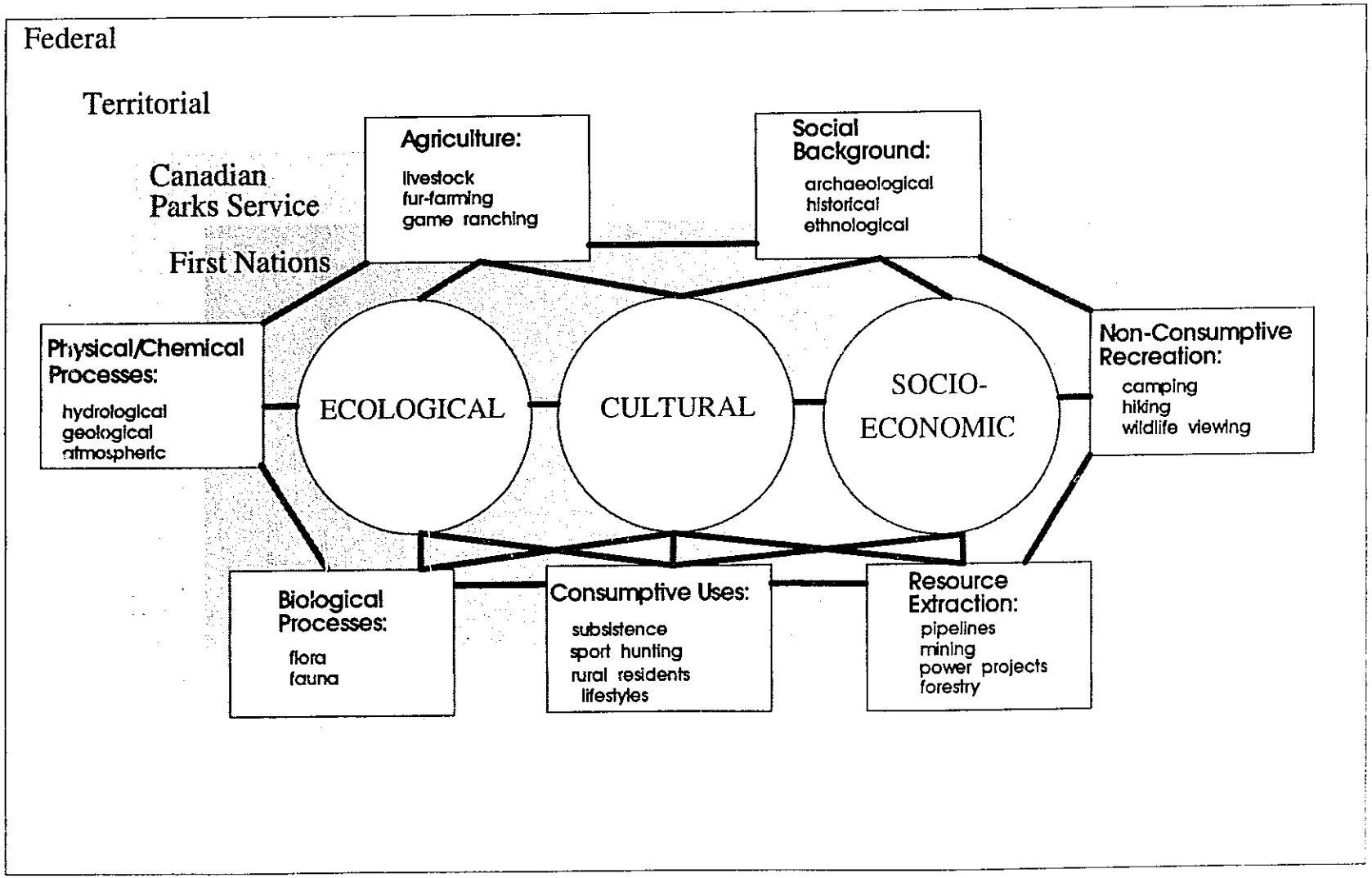
There are various factors affecting wildlife in the north, but the overriding concern of this study is sustaining wildlife populations within wilderness areas. By employing the framework which is provided when using an ecosystem approach, current management activities will be examined. The effectiveness of utilizing an ecosystem approach to wildlife management will then be evaluated.

The most simplified definition of an ecosystem could be the interaction of a community with its physical/chemical environment. Thus, when employing an ecosystem approach, we will be looking at the various parts that make up the ecosystem and the various factors that are influencing it. Slocombe (1992, p.4) suggests that ecosystem approaches use "an holistic, interdisciplinary systems perspective, seeking to place the system of primary interest in larger context". The system in this thesis will be wildlife in a particular wilderness area, and the ways this system interacts with its environment will be investigated. When examining wildlife management from an ecosystem perspective there are many components which must be considered. In the model I have developed for this study, the key components I will be looking at include Ecological, Cultural, and Socio-Economic. There are also many sub-components which are equally as important (refer to Model 1), these components will be looked at in further detail in chapters 3 and 4. By using an ecosystem perspective, a framework is provided which considers all direct users, as well as flows in and out of the system. This approach will be applied to the planning and management of a specific wilderness

Model 1

WILDLIFE MANAGEMENT MODEL

(Greater Kluane Region)



area and allow for the integration of future research and findings, which in turn will be shown to be imperative to resource management today.

Model 1 - Wildlife Management Model

An ecosystem approach encourages us to look at resource management from a broader perspective than has been traditionally taken. As we will see in chapter 2, wildlife management has, in the past, often focused on a single objective such as increasing trapping and hunting or totally restricting hunting, without considering other factors that may be involved. Othertimes, wildlife management has centred on a single species at a time, disregarding the impacts any decisions might have on other species. Today, however, these types of management activities are unacceptable. There are too few wilderness areas and wildlife resources left for continuing ad hoc approaches to resource management. An ecosystem approach may be an answer as it allows the incorporation of many activities and considers all of the elements in a wildlife and wilderness ecosystem.

The Wildlife Management Model (Model 1) was developed to be used as a guide for wildlife management in a wilderness area. After researching a case study area, most of the components of the wildlife system were identified. The three main components of the ecosystem, ecological, cultural and socio-economic, are central to the healthy functioning of the system and as such are found at the core of model 1. These key components would remain constant even if a different case study area was assumed. The sub-components which surround the core are inter-linked and function together in the system. These sub-components

are characteristics derived from a specific case study. They are unique for every area and may change over time, should new information arise or a different focus taken. The sub-components help to guide the case study to ensure that all elements are considered. There are also four managerial bodies listed which administer the statutes pertaining to wildlife and wilderness resources for the case study area. Together all of these various components form the ecosystem which will be discussed throughout this study.

1.4 Methodology and Definitions

This study will examine the Greater Kluane Region to gain insight into the management techniques of sustaining wildlife populations within a wilderness setting. The special sensitivities of northern regions when managing wildlife will be considered. This study will not be a management plan per se, but will compare existing management planning activities and how they affect wildlife in the study area. The four main management agencies that will be compared are the Federal Government, Kluane National Park Reserve, the Yukon Department of Renewable Resources, and Native groups. The interactions of these processes will be compared by using the wildlife management model described above. I will develop a matrix which will examine the processes (management plans) on one axis and the characteristics of the management model on the other axis. I will then be able to evaluate current management activities on a comparative basis.

Species-specific case studies, which include bear, wolves and migratory

birds, will be used to illustrate ecosystem-based management in the study area, or the lack thereof. By employing an ecosystem approach to resource management, a framework will be provided, "for organizing and integrating research, planning, and management for protected and other areas" (Slocombe, 1992 p.5).

Since the Kluane ecosystem includes institutions, people and their activities, the methods that were used when conducting this research included significant literature reviews, site visits and interviews with a variety of people. Much of the data was gathered through the Yukon Archives, the library at the Kluane National Park Reserve Warden Station, offices of the Yukon Territory Government, and the Department of Indian Affairs and Northern Development. From the literature review, a standard set of questions was compiled to provide a framework for interviews (see Appendix A). Interviews were held with park rangers and federal and territorial wildlife managers. A variety of other people, based on staff availability in these offices were also helpful in supplying pertinent information (see Appendix B for a list of interviews). Other informal interviews were conducted with native and non-native residents of the area, many of whom presently, or at some time in the past, took part in such activities as hunting, trapping, outfitting and guides. Additional groups included those involved in non-consumptive uses of wildlife such as recreationists, tourists and researchers.

While the term 'wilderness' itself is a subjective concept that connotes different things to different interests, historically we see that wilderness has been viewed as wild land that must be conquered for the ease of human survival. Even

today, Webster's New Dictionary (1990) defines wilderness as "a wild or waste place". However, in this study wilderness will be loosely defined as an area that has been more or less untouched by modern technology and advanced development with minimal human alterations to the original flora and fauna.

Wildlife is defined in this study as free-ranging vertebrates and includes small and large mammals, waterfowl and other birds, which occur in their naturally associated environments. Domesticated animals, and those in game farms were not classified as wildlife in this study, but were examined as separate issues in section 3.3.

1.5 Overview of Thesis

Chapter one provides the introduction, background, and methodology of the research. The pertinent theoretical literature is reviewed in chapter two, covering a short history on Northern National Parks, wilderness areas and wildlife management in northern Canada. In addition, chapter two will introduce ecosystem approaches. Chapter three is concerned with the study area and some key wildlife-related topics are examined including: background information on wildlife population trends, habitat, use, native concerns, human population history, management history, current status, and the current pressures of the greater Kluane region. Chapter four takes a more detailed look at wildlife and management activities, and examines the four main management plans which affect wildlife in the area. The effectiveness of looking at these plans from an

ecosystem approach will then be considered in chapter five. Chapter five also includes an in-depth discussion of the results with examples and opportunities for more effective and wide-ranging ecosystem management. How an ecosystem approach may be applied elsewhere is also considered in chapter five, followed by a summary and conclusion.

CHAPTER 2 LITERATURE REVIEW

2.1 Wilderness

The term 'wilderness' itself was defined in Chapter 1, and while it is not within the scope of this thesis to argue the meaning of wilderness (ie. 'rightness' of wilderness, or what exactly constitutes wilderness, or whether we should or should not manage wilderness), there are a few issues that need mentioning.

Wilderness is a resource that encompasses many other specific resources and values. Each person has their own interpretation of wilderness, and their own idea of what elements must be present in order for an area to qualify as wilderness. The concept of wilderness management is equally as complex, and subject to as many views and interpretations. For Gaston (1982) it is viewed as "once our master, then our enemy and now, finally it has become our pensioner". It is "not just scientific, not just educational, not just scenic, not just for old-growth dependent wildlife...and it's not just managing the people who use an area" (Peterson, 1985 p.49). Today, wilderness is a "scarce commodity" which must be "cherished for its naturalness and for its ability to preserve ecological systems" (Allin, 1982 p.276). In addition, wilderness areas "offer excellent opportunities for health-giving, leisure-time pursuits" (Brockman et al, 1979 p.15).

When attempting to manage a wilderness area, these different ideas and interpretations of what a wilderness area should be comprised of, become major obstacles. In the vast literature that exists on wilderness, oddly enough, one of

the few things the authors agree on, is the incongruity of the meaning of term (Nelson, 1990; Keiter, 1988; Allin, 1982; Brockman & Merriam, 1979; Marsh, 1979). However, the discrepancies over the definition are merely one small argument amongst the many concerns over wilderness or wild lands.

There are fewer and fewer areas left in the world today which qualify as wilderness, due to the increase in human population and the subsequent decrease in available lands, as well as a number of other factors which were discussed in Chapter One. The remaining areas that have been deemed wilderness experience conflicts between the users of these wild lands. Studies have been carried out to determine who the users are, and what aspect of wilderness is important to them (Brockman, 1979; Frome, 1985).

When attempting to establish a wilderness area, competition for use of natural resources with logging, mining, oil and gas interests will often arise. Since there is a direct relationship between the degree of public support and the success of a wilderness proposal, managers strive to settle conflicts early on and compromises usually result (Carruthers, 1990).

However, problems arise again even after a wilderness area is designated, as competing threats re-surface. Industries seek to extract resources from protected areas, while environmentalists protest the intrusion. Tourism developers also seek to increase profits, attempting to expand facilities in protected areas and the struggle for wilderness continues (McNamee, 1989). As we move to the 21st century, more flexible, cooperative tactics will be needed to

protect wilderness areas (Carruthers, 1990).

Various attempts have been made at managing wildlands using a coordinated approach between government, public and private to try and reduce these land use conflicts. One example is the Environmentally Significant Areas (ESA) concept, used in northern Canada (Nelson, 1990; Theberge et al., 1981; Grigoriew et al., 1985; Smith et al., 1987). By identifying the most significant cultural and natural features using abiotic, biotic and cultural constraints, an attempt is made to link these features with the most appropriate management techniques (Nelson 1990). A second example of a coordinated approach to wilderness management is the *biosphere reserve*, which is supported by UNESCO (United Nations Environmental, Social and Cultural Organization). It involves treating the protected area as part of a larger land management area, rather than as isolated from its surroundings (Nelson, 1990; Francis, 1985).

More and more we are seeing certain areas in North America set aside to preserve natural ecosystems and this is often accomplished by protecting an area which managers term "wilderness" (Dickenson, 1985). There are also provisions in the Canadian Park Service system for the establishment of Parks or Reserves for the purpose of preserving wilderness. For example, the primary objective of Kluane National Park Reserve is to maintain its wilderness character (Environment Canada, 1990*d*). Hummel (1989) suggests that the largest parks are those that can preserve wilderness, and in Canada the best-administered of these are the national parks.

Protecting wilderness areas has been shown to be critical for ensuring continued biodiversity, as well as for sustaining wildlife populations within their natural habitats (Wilson, 1988; Hummel, 1989). To date, one of the most effective means of overseeing wilderness areas may be through ecosystem-based management. An ecosystem approach can provide a holistic perspective to wilderness areas and impede potential threats and conflicts by taking a broader approach and examining all aspects of a system before making any recommendations. By using an ecosystem approach to the planning and management of wilderness areas, an attempt is also made to coordinate efforts among the various management agencies.

For example, an area of interest may be recognized as wilderness and protected as such through National Park status. Adjacent to this protected zone, there may be on-going resource extraction activities or development of a world-class tourist resort. Employing an ecosystem approach will aid in reconciling these activities and help to recognize that the whole system extends beyond the boundaries of the national park and includes its surroundings.

2.2 National Parks

National parks are "dedicated to the people of Canada for their benefit, education and enjoyment" (Environment Canada Parks Service 1990c, p.35). Since these words were enshrined in the National Parks Act in 1930, many millions of Canadians have visited their national parks.

Today, national parks are relatively large, outstanding areas managed by nationally recognized authorities. They are established in order to protect "the ecological integrity of one or more ecosystems, for this and future generations" (CAD, 1991 p.28). There is to be no exploitation of the resources in the Parks and intensive occupation in these areas is prohibited. National parks serve as large conservation areas which generally support a range of functions, from scientific reserves and wilderness areas to recreation and tourism facilities.

Canada's first National Park was established in Banff, Alberta in 1885. This area was protected in a much different manner than the national parks of today. The federal government set aside 26 square kilometres around the hot mineral springs to be reserved "from sale or settlement or squatting" (Environment Canada 1990*a* p.3). By 1911, there had been five national parks instituted. The establishment of these earlier parks in the mountain and prairie regions of Canada, was based on one major factor, the existence of large areas of undeveloped public lands. These lands were then administered by various branches of the Department of the Interior. The essential requirement for a national park was merely a strong recommendation from the Minister of the Interior to the Governor General in Council, with support from Cabinet colleagues (Lothian, 1987 p. 10).

By 1970, 19 national parks had been established. These parks represented a collection of places that had been set aside for a variety of reasons including: scenic areas for national and international tourist resorts, regional recreational

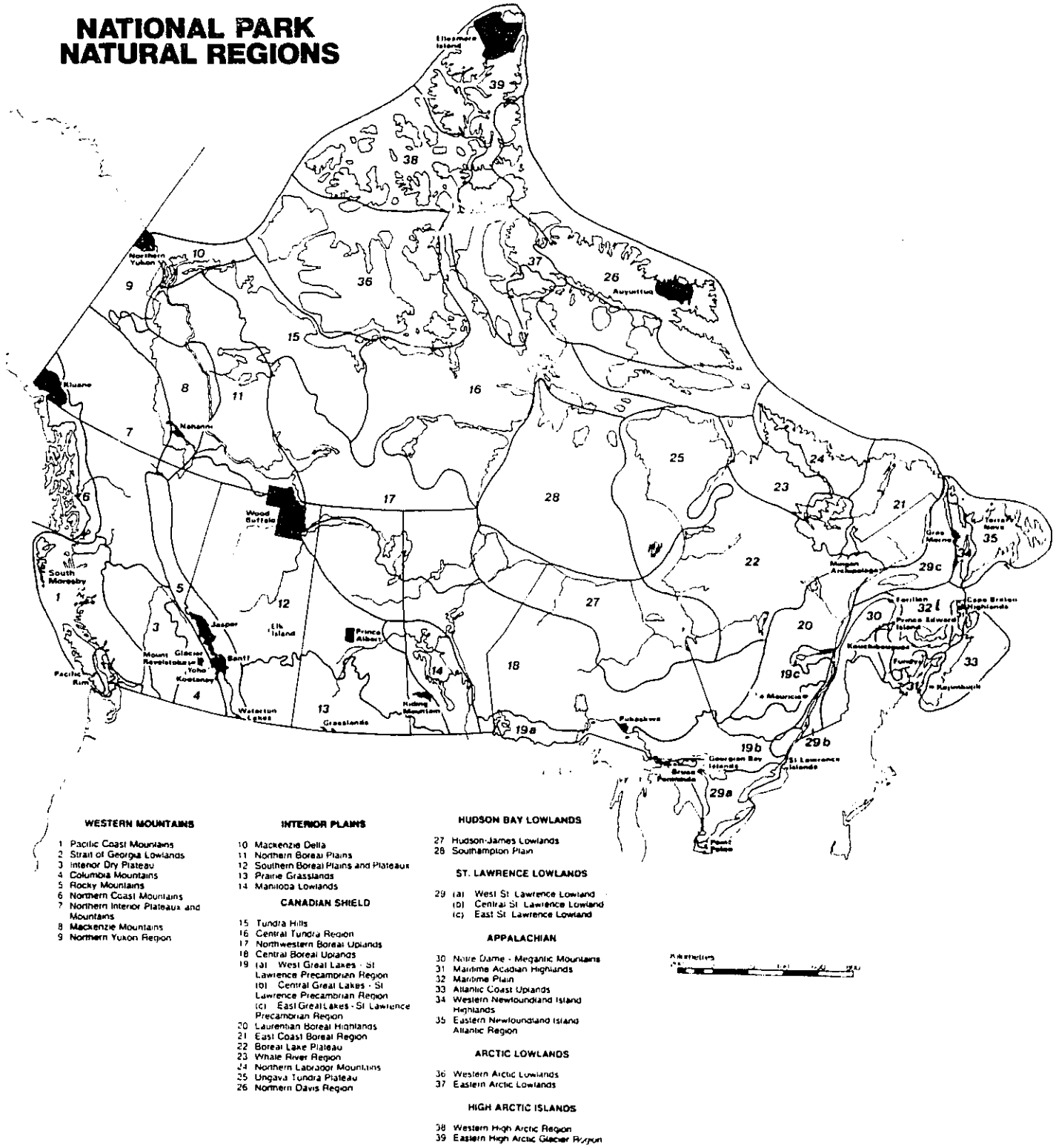
areas, the preservation of habitat for wildlife, and to stimulate economies where there were areas of chronic underemployment (Environment Canada 1990*a*, p.3). Up until this point in time, there had been no long term goal for a system of protected areas or national parks.

In the early 1970's, a national parks systems plan was devised based on distinct 'National Parks Natural Regions' leading to the creation of more parks. The national parks most recent aim has been to represent examples of the Canadian landscape. The Canadian Parks Service has identified 39 terrestrial natural regions across Canada, each of which warrants representation [see Figure 2]. Potential national parks are selected from among these regions to adequately depict "natural areas of Canadian significance" (NACS) (Lothian, 1987 p.29).

NACS are identified, selected and established in consultation with provincial and territorial governments, other federal agencies and with the interested public. The Government of Canada is required to own all land and resources within National Parks. They will, however, make co-operative arrangements with provincial, territorial, and federal agencies to ensure compatibility and management of uses and resources adjacent to the National Park. The revised Parks Canada Policy (1983) allows NACS to be identified regardless of their current projected status or jurisdiction.

In 1988, an amendment to the National Parks Act was made which directs management to consider, as the first priority in national park management plans, the maintenance of ecological integrity through the protection of natural

Figure 2 *National Park Natural Regions of Canada*



source: Env. Can., Parks, 1990

resources. Presently, Environment Canada's Parks Service is responsible for the management of 34 National Parks, 2 National Marine Parks, and 112 national historic sites (Environment Canada 1990*b*). However, of Canada's 39 terrestrial regions identified by Environment Canada, only 21 are currently represented in the national parks system.

In its 1987 report *Our Common Future*, the Bruntland Commission recommended that countries set aside 12% of their land and water resources in order to protect representative samples of the earth's ecosystems.

Government statistics currently report that 6.9% of Canada's land and freshwater area have been protected through the combined efforts of the country's different jurisdictions and conservation agencies (Government of Canada, 1990*a*). The World Wildlife Fund, however, reported that protected areas include only 3.4% of total land and freshwater (WWF, 1991). In either case it is evident that sufficient protection has not been afforded, at least not yet. The questions which remain nevertheless are whether or not 12% is **adequate** protection of our ecosystems and will we find out if its not before its too late to do anything about it.

Increasing development pressures in many parts of Canada are seriously affecting our natural and historical heritage. Wilderness areas continue to disappear. The IUCN has designed an identification guideline to follow when establishing protected areas. From these general guidelines, the constraints for National Parks have been re-evaluated, and more specific criteria have been

introduced. These changes and updates are noted in the 1988 amendments to the National Parks Act, and more recently, in the *Green Plan* (1990).

Commercial exploration, extraction or development of natural resources are required to be terminated prior to the formal establishment of the park. However, certain traditional uses are being permitted:

i) Traditional sustenance resource uses by local people.

ii) Activities which are of cultural value to be used for interpretive purposes.

iii) The treaty right of Natives and the rights recognized in native land claims settlements.

iv) Controlled sport fishing of native species which are able to naturally regenerate.

The Canadian Environmental Advisory Council (1991) has also included a new category of national parks termed Equivalent Reserves. These Reserves are outstanding natural areas managed by provincial or territorial governments, tribal councils, foundations or other legal bodies that have dedicated the areas to long-term conservation. In all other respects an Equivalent Reserve must meet the criteria established for national parks.

Since there are restrictions on development and resource extraction in national parks and national park reserves, there may be less ecosystem disruption than in any other land use areas (Theberge, 1979). Wildlife often thrives in National Parks as an indirect result of the extra protection afforded to their habitat. In addition, it is believed that relatively unaltered ecosystems in national

parks may help to unravel the basis of population cycles in wildlife (Theberge, 1979). Many national parks also have separate management plans for wildlife. When all of these factors are considered, it is no wonder that there are increasing amounts of research being carried out on wildlife in National Parks (Brenneman, 1992; Herrero, 1979).

Even with all of the benefits of studying wildlife in National Parks, McCandless (1985) maintains that a new solution to the problem of wildlife preservation must be found for the Canadian North. He feels that the solution must lay the burden of trust on wildlife users and not on professionally-trained managers of northern wildlife refuges and national parks.

2.3.1 Wildlife Management - early legislation

According to Leopold, the dominant preoccupation in the minds of those dealing with wildlife in America until about 1905 was to perpetuate hunting. As it was believed that wildlife stocks in North America originally dwindled because of overexploitation, the first government response was to protect the resource. Protection inevitably took the form of restricting use or harvest. The first legislative actions occurring between 1793 and 1905 in North America consisted of predator control through bounties, regulating harvest, and stocking or introducing certain species to an area [see Table 1]. However, even with the increase in protective legislation, the decline in wildlife populations continued due to the lack of an adequate enforcement system. Moreover, human populations continued to

Table 1 *Early Legislation Dates Reflecting the Beginning of Wildlife Management in Canada to 1900*

DATE	CONCERN	AREA	MANAGEMENT
1793	Wolves	Ontario-Upper Canada	Predator control (bounty)
1821	Deer	Ontario-Upper Canada	Regulatory
1821	Game	Ontario-Upper Canada	Regulatory
1839	Wolf	Newfoundland	Predator control (bounty)
1843	Moose	Nova Scotia	Regulatory (methods of harvest)
1856	Game	Ontario-Upper Canada	Regulatory
1862	Caribou	Nova Scotia	Regulatory
1864	Snowshoe hare	Newfoundland	Stocking (introduction)
1865	Exotic	Quebec-Lower Canada	Stocking (house sparrow)
1867	Resources (wildlife)	Canada	Provincial jurisdiction
1874	Deer	Nova Scotia	Regulatory (closed season)
1878	Moose	Newfoundland	Stocking (introduction)
1884	Game species	Nova Scotia	Regulatory (license required)
1894	Deer	Nova Scotia	Stocking (reintroduction)
1895	Fox squirrel	Ontario (pelee)	Stocking
1895	Game	Ontario	Regulatory-Game & Fisheries Act
1896	Game	Nova Scotia	Regulatory-Game & Fisheries Act
1897	Exotic	Nova Scotia	Stocking (ring-necked pheasants, introduction)

source: (Gilbert & Dodds, 1987)

grow, and wildlife habitat continued to disappear, thus attention turned to the large predators and their control. These animals were competing directly with people for an increasingly limited resource, and mechanisms such as government trapping and bounties were employed to reduce their numbers. These programs were only partially successful. Predator numbers in reality were lowered by the decline in prey species and habitat change associated with agricultural activities and the clearing of forested land (Gilbert & Dodds 1987).

In 1930 the realization of the connection between land and wildlife was voiced nationally at the seventeenth American Game Conference. The American Game Policy was produced by a committee of 14, chaired by Aldo Leopold. It clearly stated the basic requirements of wildlife and its management by recognizing:

a) protection, food, and cover requirements
b) inducements for landowners
c) a classification of game into farm, forest and range, and wilderness
d) the need for facts, skills, funding, and public-sportsman cooperation.

This could have been a major breakthrough in wildlife management. If the American Game Policy had been followed from its inception, many of today's social and land-use conflicts regarding wildlife in North America might have been avoided to a certain degree (Gilbert & Dodds, 1987).

2.3.2 Present Problems

Caughley (1977) considers that there are three problems of wildlife population management: conservation, harvesting, and control. One of these

problems is usually used as the basis of a course of action by a manager. A particular population or area is designated to be either conserved, harvested or controlled, and information is then gathered to support the aim. Knowing the biology of the species and the population's variability, current trends, and composition will allow the manager to make decisions at what level of harvest the population will increase, decline, or provide a sustained yield. With this information the manager should then be able to determine if the best course of action will be to suggest conservation of the species, allow harvesting, or controlled harvesting. Invariably though, the decision of which management practice to apply to the situation is still dependent on available information. All too often this information is inadequate, and ad hoc decisions result.

Some managers believe that the ultimate goal of general wildlife management should be agreed upon, while others ascertain that the goal should depend on individual situations and circumstances. Sustained yield has been used as a management objective by many agencies (Clark, 1976). By operating at maximum sustained yield, many managers feel that the maximum output of individuals is reached and maximum hunter satisfaction is sustained through higher harvests (Gilbert & Dodds, 1987). Sustained yield is based on the premise that a certain percentage of a population can be removed and still allow the species to reproduce and maintain a viable population. The problem with the Maximum Sustained Yield is that it is hard to specify if exploitation exceeds this value, precipitous population decline is a likely consequence, particularly with low

productivity species.

Cocheba (1987) maintains that "the ultimate goal of wildlife management activities should be to maximize the net benefits that members of society derive from the existence and use of wildlife". The ultimate goal of wildlife management and the orientation of economics coincide with this view. Maximization of society's satisfaction from the existence and use of wildlife requires, once again, the determination of the optimum size and composition of wildlife populations. This can be considered the most basic wildlife management decision of all: it incorporates related habitat acquisition, control, and management decisions as well as harvesting and other species management decisions.

Gilbert & Dodds (1987) suggest that throughout past years, the art and science of wildlife management has been primarily concerned with five major principles. The first was protection, complete or partial, normally applied through regulations and their enforcement. The second was predator control. Third, if neither protection nor predator control was adequate to increase populations, an attempt at establishing an inviolate area for the wildlife to reproduce was made. Fourthly, if none of these approaches worked, maybe raising the creatures we wanted in captivity and releasing them in the wild would do it. This last activity was referred to by sportsman as stocking. The fifth idea to come of age was the concept of habitat improvement.

Habitat is often the factor most limiting to wildlife populations, and many

feel that "the future of the wildlife resource depends on proper stewardship of the land today and in the future" (Miller, 1987 p.99). Wildlife habitat is not merely a section of land, rather, it is an area that must include food, shelter (cover), and water for a vast variety of living organisms. In the past, very few wildlife management strategies included habitat considerations and any habitat alteration that has been done for wildlife, has tended to be very species oriented. An example of this type of alteration might include creating a wetland for waterfowl or fish species.

The vast majority of funding for wildlife management and habitat protection has always come from one main group of beneficiaries: consumptive users of animals. Not surprisingly, the resulting emphasis in wildlife management and habitat protection has been on game species (Loomis, 1991). To date, much of the wildlife management has focused on one individual species at a time, and often the consequences on other species are overlooked. There are many courses of action taken when managing for maximum yield of a species, including control of any competing species, predators, and habitat. Instead of considering the full ecological consequences of habitat manipulation, land is altered according to the need of the target species or community.

Water is one of the most critical habitat requirements for fish and wildlife (Bullis, 1991), and so land alteration to include more or less water in an area has often been a main habitat management goal. More recently however, fisheries and wildlife managers are no longer working in isolation from each other. Rather,

it has been realized, and is now being accepted that wildlife and fish policy cannot be considered as if it is divorced from broader, interrelated natural resource management (Bullis, 1991).

Wildlife management has always been, and will continue to be a very controversial topic. There are many different types of users as well as managers of this particular resource and many conflicts result. One point of view asserts that "there is a general consensus among agency administrators that two of the most ominous threats facing wildlife managers are (1) the continuing loss of habitat and (2) the animal rights movement" (Berryman, 1987 p.5). They suggest that public decisions prompted by the animal rights movement are disrupting sound, professional wildlife resource management programs. The objective of the animal rights movement is to halt or greatly curtail the killing or harvest of wildlife and this conflicts with many of the management techniques for wildlife and habitat. Economic information does not always play a significant role in these animal rights decisions or in decisions that result in the loss of wetlands and other critical habitats (Berryman, 1987). When drastic decisions are made without properly addressing all of the issues (eg. the halting of the harp and fur seal harvest) severe repercussions result.

As the public's perception of the wildlife resource in North America has changed over the past two decades, controversy over the direction of wildlife management has emerged. The wildlife profession is now faced with pressures to allocate resources for diverse and often conflicting purposes. As a result many

managers assert that it has become increasingly necessary to document the "value dimension" of wildlife.

Along with the increased use of cost-benefit analysis in environmental management decisions, considerable debate has arisen concerning wildlife valuation. One result is that wildlife are now thought to produce three types of economic value: (1) "use values" derived from hunting, fishing, and viewing; (2) "exchange values" as wildlife is used for subsistence; and (3) "existence values" accruing to both users and to those not actually 'using' wildlife but who, nevertheless, have an interest in it. Attention has recently focused on the existence category, and preliminary evidence suggests that this might be the most important component of total value (Stevens, et al. 1991). Today, public interest in wildlife and wildlife related activities extends over and above the traditional hunting and fishing activities. Nonconsumptive wildlife recreation enjoys wider participation than all hunting and fishing activities combined and yet it has received comparatively little attention in the literature (Rockel & Kealy, 1991). Some argue that participation rates for various recreation activities tell us little, if anything, about the value of wildlife. They are "noncommensurate and overlapping estimates of economic impacts that do not measure the value of a wildlife population" (Cocheba, 1987 p.283).

Bullis (1991) perceives values as the overarching criteria people use to make decisions, thus values are often placed upon wildlife to justify management objectives. To date, wildlife values have been measured on a variety of different

levels including ecological values, economic values, philosophical values, the aesthetic experience of wildlife, and educational and recreational benefits of wildlife. Henning and Mangun (1989) have emphasized the importance of values as they guide decision-making in environmental policy choices. They pointed out the importance of acknowledging the underlying values so that long-term consequences of actions may be better understood.

As already mentioned, traditionally, the focus of wildlife management has been on the benefit of game animals to consumptive users such as hunters and anglers, and so the recreational value of wildlife was measured according to this scale. In the last two decades however, this narrow view of the recreational value of wildlife has been expanded in two directions: a) inclusion of viewers/ photographers of game wildlife, and b) inclusion of viewers/photographers of nongame wildlife such as shorebirds, raptors and endangered wildlife. In the last few years the focus has broadened even further to include off-site enjoyment of wildlife by people who simply derive satisfaction from knowing that wildlife exist, even if they never plan to see them in the wild (Loomis, 1991).

By considering wildlife values, managers are now broadening their strategies to include communication with the general public and wildlife viewers and have begun modifying wildlife management goals as well. Rather than manage solely to produce the largest harvestable surplus of game animals, wildlife management that provides a diversity of watchable wildlife is also needed (Loomis, 1991).

2.4 Ecosystem approaches and Modelling

An ecosystem approach can be applied to any type of resource management concern, as it is simply a more expansive method of looking at a problem. It encourages decision makers to view the whole system as comprised of inter-linking components rather than as separate entities. This approach can be taken to meet the many demands resource management is facing today, by not only considering all components of the system but incorporating them into the management plan.

Complex funding issues, overlapping jurisdictions, and conflicting political philosophies have clearly demonstrated the need for a more integrated approach to wildlife policy implementation across political jurisdictions (Mangun, 1991). However, as Johnson (1988) points out, politically defined boundaries frequently do not contain all the ingredients (resources, people, etc.) necessary to resolve resource management issues. Although many jurisdictional conflict issues can be prevented or resolved through carefully designed cooperative agreements (Mangun, 1991), these agreements often fall short in other areas. In an attempt to deal with these complex problems, alternative theories and models of resource management are being increasingly considered, many based on a systems approach (Segerstedt & Nilsson, 1974; O'Riordan 1971; Clawson, 1983; Osherenko, 1988).

Before progressing any further, the systems approach should be explained in more detail. Odum (1971) suggests that the study of systems is simply a study

of nature and man, but Dickey & Watts (1978) further defines a system as an organized or connected set of objects, principles, or ideas related by some common function or belief. There are usually social or natural elements in a system, as well as behavioural and physical connections between the elements (Johnson, 1988).

A term frequently used to describe a system which includes living organisms is an 'ecosystem' (ibid). The concept of an ecosystem provides the basis for a conceptual model which can be used in decision making related to park and wilderness management (Slocombe, 1992; Soule, 1989).

Johnson (1988) describes ecosystems as having arbitrarily defined boundaries, and different ecosystem components may have different boundaries, which implies that there is a set of overlapping and interacting systems. For example, a wildlife management problem may influence and be influenced by adjacent land uses and social values, and thus the boundaries of the ecosystem for that issue would encompass those adjacent lands (Johnson, 1988).

Agee (1988) affirms that ecosystem management in parks and wilderness must exhibit multiple, measurable goals which should consider socio-economic concerns as well as environmental conditions. "These goals should acknowledge the fact that social values, political pressures and biological knowledge maybe different 10 to 20 years from now, and that park and wilderness management should be responsive to such changes within defined legal limits" (ibid p. 229). Present management goals of any plan should be flexible enough to allow for

future findings. Resource managers are reminded that "the value of modelling...has not been to make precise predictions, but rather to provide clear caricatures of nature against which to test and expand experience" (Walters, 1986 p.45).

There are natural resource professionals, however, who believe they can focus on a biological or ecological study apart from social, economic or other influences in an ecosystem (Gilbert & Dodds, 1987). Although it may be true that without the understanding and knowledge of the limitations and requirements of individuals within wild populations, a manager is operating with a severe handicap (ibid), Gilbert & Dodds maintain that attempting to manage wild populations without first acquiring an adequate knowledge of the environmental constraints, ecological interactions, and zoological realities of the situation can often cause more harm than good. Cocheba (1987) also argues that since a knowledge of wildlife biology is indispensable for population studies, wildlife biologists should have the primary responsibility for doing this research, and in turn, economists should probably take the lead in using the population data to generate cost information.

Talbot (1987) asserts that the ecological component of the ecosystem is of primary importance. The ecological processes are essential for agriculture, forestry, and fisheries and for other endeavours necessary to human life since "they maintain environmental quality by degrading or otherwise removing pollutants and preventing waste accumulation" (Talbot, 1987 p.179).

In spite of all the disparities of managing an ecosystem, it must be clarified that this is different from an *ecosystem approach* to managing resources. An ecosystem can be loosely defined as a natural system in which organisms interact with their environment. An ecosystem *approach* is an organizing principle used by resource managers and decision makers that expands the environment of the resource in question (eg. wildlife, wetlands, forests) to include other elements such as social or economic. Slocombe (1992) states that ecosystem-based management goes beyond the redefining of management units and employing 'the best ecosystem science' for the planning and management of them. Ecosystem approaches use an "holistic, interdisciplinary systems perspective, seeking to place the system of primary interest in a larger context" (ibid, p.17). Slocombe also suggests that ecosystem approaches expand the concept of an ecosystem to include people and their activities.

During the last two decades, these human dimensions have emerged as a subdiscipline of resource management (Gigliotti & Decker, 1992). This area of interest developed among wildlife professionals who were concerned with how people's values affect and are affected by decisions about the management of wildlife populations, habitat, and other people's use of these resources (Gigliotti & Decker, 1992; Gilbert & Dodds, 1987). The beliefs, values, attitudes, behaviours, and socioeconomic and demographic characteristics of wildlife users are the areas which have been typically studied, and the emphasis has been placed on incorporating such information into wildlife management decisions (Gigliotti,

1992; Gilbert & Dodds, 1987).

While adapting to the framework in learning to consider people in resource decisions, wildlife biologists have, at the same time, remained committed to using an ecosystem approach to management (Bullis, 1991). "This biocentric view continues to differentiate them from the more dominant, anthropocentric view" (Bullis, 1991 p.551). Awareness of values, value differences, and the continuing influences among subcultural groups is essential to implementing wildlife policy (ibid). Nevertheless, "perhaps the most important lesson that we have learned...is the value of deliberately looking at the system more broadly, and in somewhat more detail, than initially appears worthwhile" (Walters, 1986 p.49).

Adaptive environmental assessment is a method currently used to address many of the problems mentioned when devising theories and models for management (Holling, 1978; Walters, 1986; Johnson, 1988). This method is based on a systems approach. Using another example of a systems approach, Holling (1978) summarized four biological and social system properties that underlie successful environmental assessment: 1) ecological systems are continually changing, 2) there may be substantial spatial heterogeneity in impacts from a particular action, 3) systems may exhibit several levels of stable behaviour, and 4) there is an organized connection between parts, but everything is not connected to everything else. In summary, the ecosystem concept, with its biological and social components, can be applied to any geographical area (Johnson, 1988).

After examining the pertinent literature, it becomes evident that a

conceptual model of ecological elements, interactions and boundaries would be helpful when managing resources. Using an ecosystem approach, I have developed a basic wildlife management model (see model 1). This model is based on needs shown from past management plans and incorporates concepts from current management plans. The model will be explored in greater detail after the study area has been presented.

2.5 The North

Traditional use of wild animals for food and shelter is as old in Canada as it is elsewhere in North America, but in Canada it has remained a steadfast practice in much of the North. For this reason, among others, general wildlife management theories and plans can not always be directly applicable. Special considerations must be given to the situations found in the northern regions.

For one, the northern population is the fastest growing in Canada, and through increased resource development we are seeing the productive capacity of natural ecosystems being reduced (Karpowicz & Harrison, 1987). It is inevitable that economic development will occur using northern Canada's renewable and non-renewable resources. French (1987) points out that "there is no doubt that natural resources development...will be the major 'stress' imposed upon northern Canada in the next thirty years" (p.154). The combined effect of this points to the need for greater conservation measures, and updated management plans.

Another situation occurring in the North is the increasing amount of

reorganization. Northern Canada is seeing rapid social, economic and political transformations. The Territories are experiencing a period of change due to political devolution, native claims, settlement, and transfer of power from the federal government to territorial governments (Karpowicz & Harrison, 1987). All of these changes are producing both direct and indirect effects on natural resources.

Natural resources play very important roles in the lives of northern inhabitants. Many people are still dependent to different degrees on the direct utilization of wildlife. Both natives and non-natives may rely on hunting, trapping and fishing for food, and to a lesser extent, for clothing. In addition to subsistence use, there has also been an increase in the commercial utilization of wildlife due to "governmental initiatives to buffer the economics of settlements from the boom and bust cycle frequently associated with non-renewable resource exploitation" (Cooch et al, 1987 p.102).

The wildlife management system in the North has often created strong animosities and distrust between the managers and the users, and hence poor management of wildlife. Most of this distrust stems from misunderstandings between native people and managers as Euro-Canadians have attempted to manage northern wildlife via their own belief systems based on the scientific method and certain political overtones (Riewe & Gamble, 1988). The inhabitants of the North, however, manage wildlife according to need and using traditional knowledge, hence, many conflicts arise between them.

Osherenko (1988) proposes that there are two types of resource management systems in the North, the state system and the indigenous system. The state system features written laws, rules, and regulations made and administered by governments to manage common property resources. This system was created from the need of non-Native cultures to maintain wildlife populations, and in addition it was needed to allocate wildlife resources among different groups of users. Agencies have found it difficult, however, to apply the state system in the far North. In some cases, "application of laws and regulations is relaxed, and authorities make few attempts to enforce the written rules" (Osherenko, 1988 p.92). This system is also criticised in the north because managers are distinct from harvesters, and separate units are designated to manage individual components of the environment, rather than as a whole. "The state manages for certain levels of abundance on a technical basis, and then allocates shares of this abundance to users on an economic and political basis" (Usher, 1986).

The second system, the indigenous system of wildlife management, is an assortment of unwritten rules or social norms that dictate Native hunting, fishing and trapping. These rules have been passed down orally and by example for generations. Generally, the native people comply with these "rules", due to their cultural values, ethics, and even taboos. Problems with this system have arisen when rules, once widely followed, are no longer passed down to the younger generation (Osherenko, 1988). Biologists and mangers have often accused the

indigenous people of the North of over-harvesting and wasting different species of wildlife (eg. caribou) since the introduction of the rifle (Kelsall, 1968; Riewe & Gamble, 1988). There is no doubt that there has been wastage and it is likely this may continue in the future; however, the Inuit, among others, have demonstrated their concern about this wastage and applied pressure in order to control the problem (Riewe & Gamble, 1988).

There is no one solution to the planning and management of wildlife and ecosystems in the north, neither the state system nor the indigenous system alone offers protection to northern resources, much less generate efficient and impartial wildlife management. Government agencies cannot protect the resources without Native cooperation, Natives cannot protect the resources nor guarantee access to those resources without cooperation of government agencies.

It is also imperative to any form of protective or wildlife management plan to remember that the wildlife itself is unique in the North. Cooch et al. (1987) point out that if northern wildlife and natural ecosystems are to be managed wisely, it is necessary to consider their special characteristics- long life, prolonged or deferred reproduction, carefully rationed biological energy, etc. The distinctive survival strategies developed by arctic animals to enable them to live in the harsh and changeable natural arctic conditions also make them particularly vulnerable to disturbance or over-harvesting by humans (Cooch et al, 1987). Unlike their counterparts in lower latitudes, northern wildlife has not, as a rule, developed any behavioural avoidance or survival response to these kinds of disturbances (ibid).

Osherenko (1988) maintains that only by involving indigenous user groups in management decisions "will co-management alleviate the programs associated with the clash of indigenous and state systems and meld the two into a single ecologically sound, efficient, equitable, and enduring system" (p.92). It was as a result of these very concerns that the *Arctic Environmental Strategy* was created by the government of Canada to join the two systems together for future environmental planning. Nevertheless, while this may be a step in the right direction, there are still many on-going controversies in the North.

Throughout this section, a need has been demonstrated for a form of management to ensure a continued healthy functioning and survival of northern ecosystems. It has been shown that in order to afford continued long-term protection to a northern ecosystem, it is critical to set aside large areas. It has also been argued that a national park provides the best form of protection for wilderness areas. In keeping with this, Kluane National Park Reserve and surrounding area was chosen as a case study to examine the effectiveness of planning and management for sustainable wildlife populations in wilderness areas from the perspective of an ecosystem approach. The special considerations of northern regions will also be taken into account with this approach.

CHAPTER 3 STUDY AREA

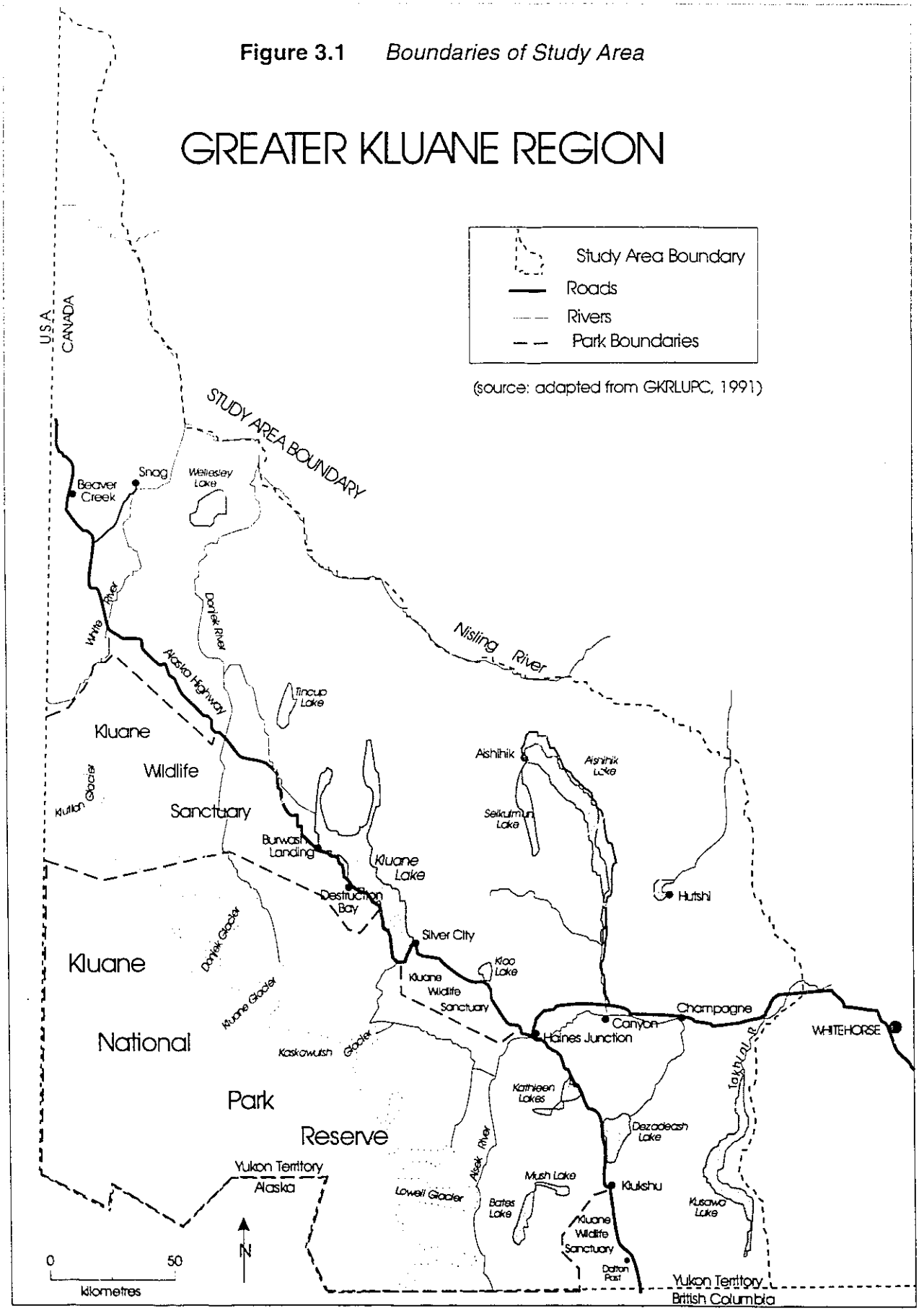
3.1 Background description

The focus of this study is the Greater Kluane Region, which covers an area of approximately 66,000 square kilometres as delineated by the Greater Kluane Land Use Planning Commission (see Figure 3.1). The Region encompasses Kluane National Park Reserve, and extends westward to the Alaska-Yukon border, southward to the British Columbia-Yukon border, northward to the Nisling River, and eastward to Kusawa Lake.

Mount Logan, the highest mountain in Canada, is found in this region, reaching a height of 5,951 meters (YTG, 1992). This area is also home to the most extensive non-polar icefields in the world, as well as the largest lake in the Yukon, Kluane Lake. In addition, Theberge (1980) suggests that this area contains the highest density of large mammals, and one of the widest diversities of plants and birds, north of the 60th parallel. The wilderness areas and wildlife habitat found here, along with that of neighbouring Wrangell-St. Elias National Park and Preserve in Alaska, are recognized as globally significant. In 1980, they were jointly designated by UNESCO as a World Heritage Site.

There are two major watersheds: the Yukon, which drains northwest into the Bering Sea, and the Alsek, which drains south into the Pacific. The various characteristics that make this area unique have been forming for millions of years through tectonic activity, earthquakes, major drainage reversals and the periodic

Figure 3.1 *Boundaries of Study Area*



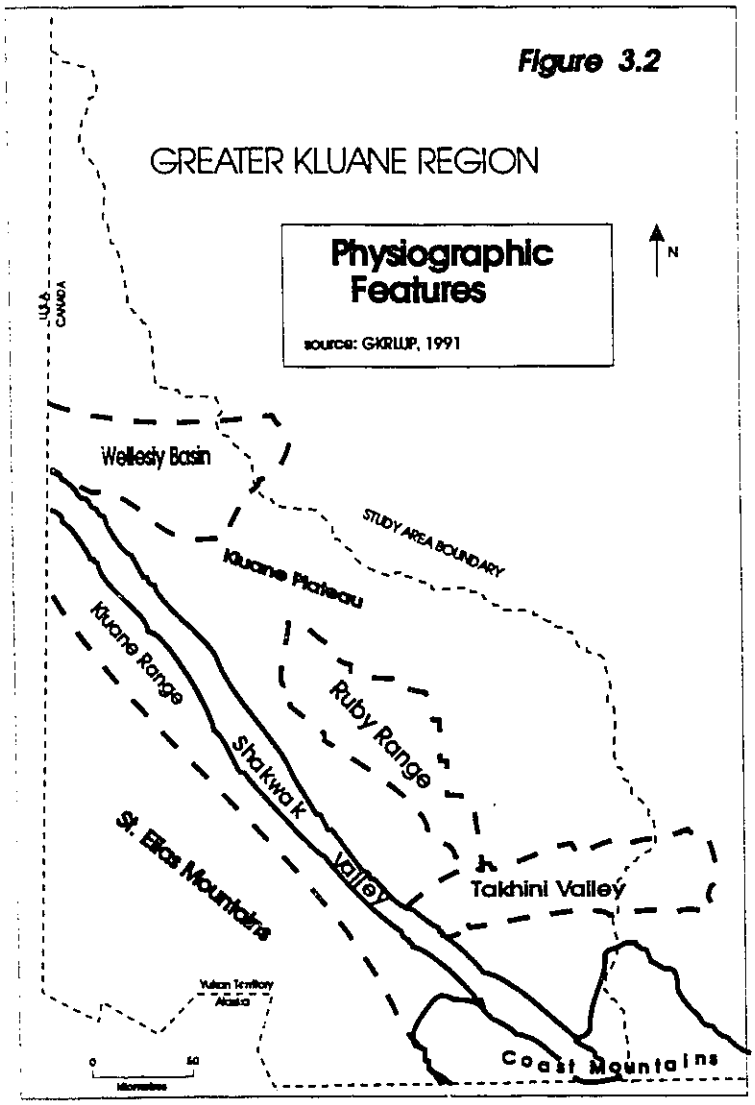
advances and retreats of glaciers. Even though these processes have formed the highest mountain range in Canada, the St. Elias Mountains are also the youngest. The area is one of the most seismically active in North America today, and many believe that the mountain range is continuing to rise.

Although the exact amount of time Greater Kluane has been occupied by humans is uncertain, there is evidence to suggest that people were present in the Yukon at least 30,000 years ago (Theberge, 1980). However, the glaciers which advanced about 20,000 years ago would have erased any evidence of people inhabiting the area during this time. The oldest known human artifacts are those of the Little Arm people who occupied the Aishihik and Kluane areas about 8,000 years ago (Theberge, 1980).

Other cultures have come and gone since the time of the Little Arm people, nevertheless the most recent, the Bennett Lake Culture, have lived in the Kluane area for roughly 2,000 years. The Tutchone, Tlingit, and Tanana people from this culture have inhabited the region for many generations, existing off the land, but also incorporating modern practices as the opportunities arose. The Gold Rush in the late 1800's brought a great influx of non-natives, as did the construction of the Alaska Highway in 1942. Change came rapidly to the area and its inhabitants as many non-natives moved northward seeking gold and trade. Today, just over half of the population of the Greater Kluane region is of non-native ancestry (GKRLUPC, 1991).

3.1.1 The physical base

There are five major physiographic features in the Greater Kluane Region: the Icefield Ranges of the St. Elias Mountains and the Kluane Ranges. These two are separated by the Shakwak Valley (also called the Duke Depression). To the south are the Coast Mountains; and in the northeast, the Kluane Plateau (see Figure 3.2). Glacial scouring and erosion, along with seismic activity combine to give this region a varied terrain including steep slopes, cliffs, rivers, and lakes.



Vegetation varies dramatically among these areas according to elevation, soil and bedrock type, and climate. The vegetation communities range from wetlands and grasslands in the montane zones, to shrub and lichen dominating in the alpine and sub-alpine zones. Forests are confined to the lower valleys and slopes while the south facing slopes and valley bottoms find grasslands and small pockets of wetlands. Only 18% of Kluane National Park Reserve is vegetated, however the remaining 44,000 km of the study area is covered by approximately 80% vegetation (YTG, 1990).

3.1.2 Climate

The climate in the northern and eastern portion of the region varies from continental to sub-arctic, while the south receives a maritime influence. The winters are generally cold and dry, while the short summers are warmer and wet. Although the moist Pacific air moves inland over this area, the air mass is intercepted by the St. Elias Mountains, and enormous quantities of snow continue to accumulate on the icefields. Some St. Elias Mountain coastal sites have been measured as receiving over 3,000 mm of precipitation, while the inland side of the mountain range received less than 300 mm (GKRLUPC, 1991).

Mountain climates are said to be among the most complex in the world as a result of drastic changes in elevations over short distances (Bone, 1992; Theberge, 1980). The close proximity of the Ocean also has a considerable effect on climate. The differences between marine and continental slopes was examined

in May 1965 and it was discovered that on the marine slope, 5,800 mm of snow accumulated, while at the same latitude on the continental slope only 1,645 mm of snow accumulated (Theberge 1980).

Generally, an arctic climate prevails above the tree line in Greater Kluane. These areas receive extremely long winters and brief cool summers, with the average mean temperature for the warmest month remaining below 10°C. A subarctic climate dominates most of the areas below the treeline.

The lowlands also experience many variations in temperature, as shown in Table 3.1. The temperature range at Haines Junction averaged from an extreme high of 32.8°C to an extreme low of -53.9°C (averaged over thirty years, YTG Statistics 1992).

TABLE 3.1 *Average Temperatures, Precipitation and Frost for Lowlands*

	Beaver Creek	Burwash Landing	Haines Junction
Temperature (°C)			
January	-29.2	-27.7	-22.9
July	13.0	12.2	12.5
Year Average	-6.3	-5.0	-3.2
Frost Free Period (Days)	50	30	21
Annual Precipitation (mm)	377.8	316.0	292.5
% rain	67.4	62.0	53.9
% snow	32.6	38.0	46.1

source: YTG Statistics 1992

Permafrost occurs throughout the Greater Kluane region due to the low mean annual temperatures. Except for the areas of continuous permafrost found

in the icefields, the remainder of the region consists of zones of discontinuous permafrost.

3.1.3 Flora and Fauna

The flora in this region is extraordinarily diverse. Douglas (1980) identified 18 forest community types, 34 montane shrub and herb communities, and 32 alpine communities in Kluane National Park Reserve, and YTG Statistics (1992) estimates that there are over 1,300 plant species in the Yukon.

The vegetation can be classed into three zones, the montane, sub-alpine and alpine. The white spruce that is characteristic of the montane zone is combined with a number of other species and forest communities, namely balsam poplar and trembling aspen. These forest communities cover valleys and slopes up to an elevation of 1,100 metres. The white spruce dominated communities have common species in the understory. The south end of the region finds buffaloberry and scrub birch while the northern portion consists of hypnum moss, red bearberry and barren-ground willow. This type of mixed forest community is generally found on well-drained glacial till deposits, mostly along the Haines Road. Throughout the rest of the montane zone, the well-drained sites are vegetated with either shrub communities or balsam or aspen dominated forests. The associated undergrowth here includes bearberry, buffaloberry and silverberry. It should also be noted that there are a few communities of wet, poorly drained lowlands in various valleys and the Slims River delta. These areas are especially

significant for wildlife habitat.

The sub-alpine zone reaching up to 1,400 metres, is dominated by tall shrubs (2-4 metres), primarily varieties of willow species. Sub-alpine meadows are also located throughout the zone as the downward movement of moisture from higher elevations created moist soils along the mountain slopes. Permafrost is also found in this region, particularly on east or north facing slopes. The moist well-drained slopes in the southern end of the region supports many vascular plants such as fireweed and broadleaf lupine.

The vast alpine zone which exists above 1,400 metres is dominated by low shrubs, grass, dwarf vascular plants, and lichen. Permafrost occurs widely throughout this zone which helps to ensure soil moisture for the duration of the growing season.

The protection of the alpine and sub-alpine zones are particularly important, not only because of the fragile vegetation communities, but also because of the need to preserve critical habitat for many wildlife species.

The unique variety of habitat is a result of diverse flora and physical characteristics of the region. In turn, this habitat supports many wildlife species. Over 170 bird species have been identified in the region, including rare species such as the peregrine falcon, bald and golden eagle, and great grey owls (KNPR, 1990). Of these, 118 species are known to nest here (GKLUPC, 1990). Over 20 species of small mammals and 14 species of large mammals have also been identified as inhabiting the region.

Table 3.2 Managed Wildlife Species & Habitat

	Scientific Name	Common Name	Habitat
BIG GAME	*Alces alces*	Moose	-subalpine shrub zone, recent burn and waterway edges
	Ovis dalli dalli	Dall Sheep	-dry alpine and subalpine meadows and steep slopes
	Bison bison athabascae	Wood Bison	-aspen and coniferous forests
	Oreamnos americanus	Mountain Goat	-cliffs & ledges of mountainous terrain
	Odocoileus hemionus	Mule Deer	-aspen-prairie & recent burn areas
	Cervus elaphus	Elk (wapiti)	-lowland river valleys
	Rangifer tarandus	Barren Ground Caribou	-extensive migration between tundra and boreal forest
		Woodland Caribou	-shorter migration between boreal forest and open mountain areas
	Ursus arctos	Grizzly Bear	-open terrain throughout subalpine boreal forest
	Ursus americanus	Black Bear	-widely distributed in treed areas of boreal forest
FUR BEARERS	*Canis lupus*	Wolf	-almost all areas except alpine
	Erethizon dorsatum myops	Porcupine	-boreal forest
	Canis latrans	Coyote	-various, from montane to alpine
	Vulpes vulpes	Red Fox	-montane and subalpine areas, prefers edges of lakes or meadows
	Gulo gulo	Wolverine	-wooded & mountainous wilderness
	Lynx lynx canadensis	Lynx	-mature coniferous-deciduous forests, burns and natural forest clearings
	Martes americana	Marten	-climax spruce and fir
	Castor canaensis	Beaver	-ponds, lakes, rivers & streams from lowland to subalpine
	Ondatra zibethicus	Muskrat	-wetlands south of timber line
	Lontra canadensis	Otter	-low-elevation streams in major river basins
	Lepus americanus	Snowshoe Hare	-aspen and coniferous forests
	Spermophilus parryii	Ground Squirrel	-subalpine and alpine meadows
	Tamiasciurus hudsonicus	Red Squirrel	-coniferous forests, prefers mature spruce
BIRDS	Birds of Prey		
	Falco peregrinus	Peregrine Falcon	-raptors generally prefer lake and river habitat
	Falco rusticolus	Gyrfalcon	
	Aquila chrysaetos	Golden Eagle	
	Haliaectus leucocephalus	Bald Eagle	
	Bubo virginianus	Great Horned Owl	-late succession after fire, mature spruce
	Strix nebulosa	Great Grey Owl	
	Upland Game Birds		
	Order Galliformes	Grouse (various)	-widley spread throughout entire area, from grasslands to tundra
	Family Tetraonidae	Ptarmigan (various)	
	Waterfowl	Swan	
	Order Anseriformes	Ducks	-lower wetland areas
	Family Anatidae	Geese	

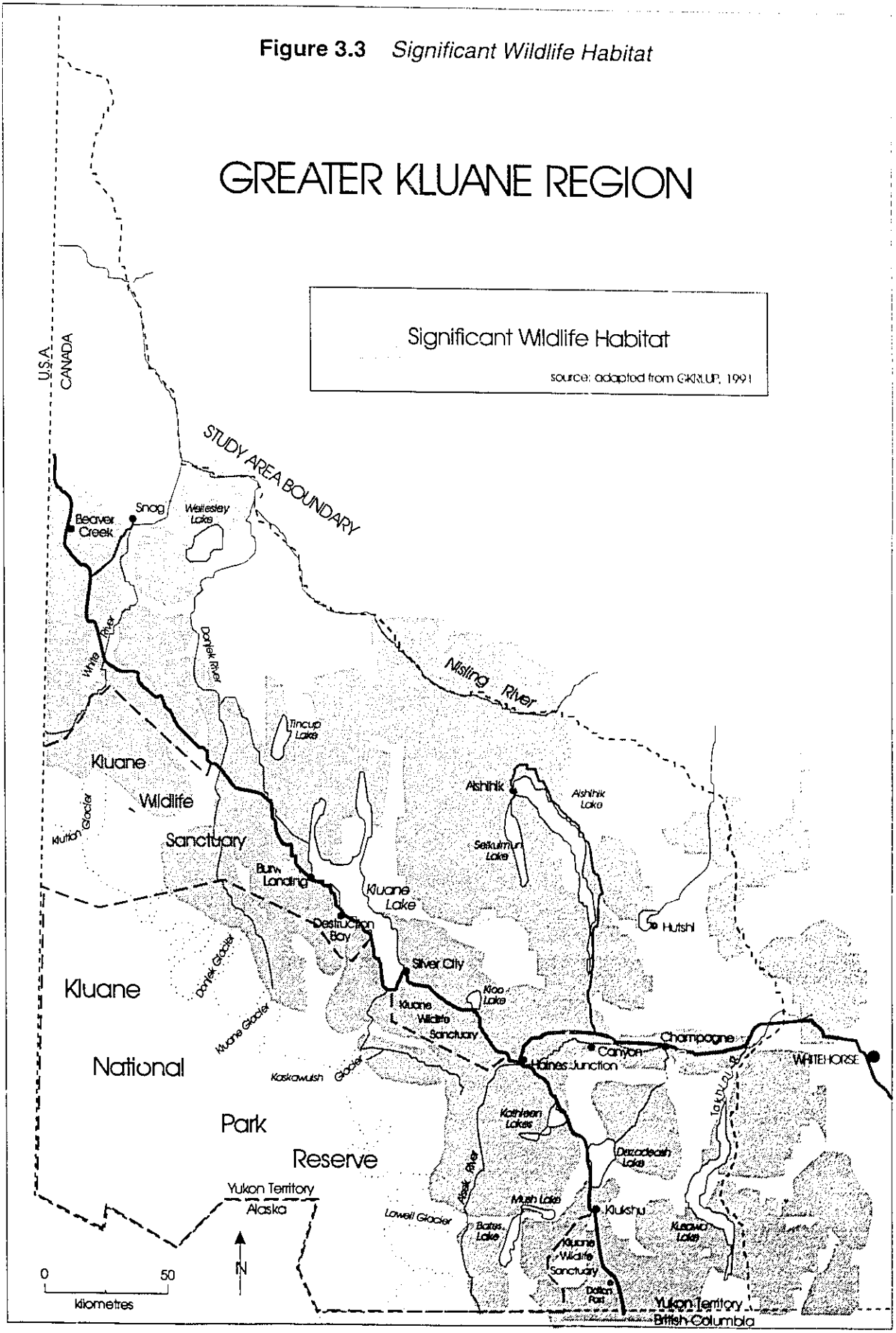
Sources: YTG, 1987; Env. Canada, 1987

For management purposes wildlife is often divided into categories of fur-bearers, big game or birds. Although there are a great number of species present in the area, there are only a handful which the government qualifies for these categories. Species are generally classified if they are desired for hunting; if they are a predator of or they conflict in some other way with a population desired for hunting; or if they are a recognized endangered species. Each of these categories is afforded separate types of protection, and separate harvesting regulations. Table 3.2 lists the "significant" species by category and their general habitat associations.

3.2 Habitat

For wildlife, habitat is a critical component of their ecosystem. Without food, cover and water, existence would be impossible for most species. Critical habitat areas include nesting, rearing and staging areas for waterfowl and other birds, migrating and calving areas for moose and caribou, denning areas for bears, and rearing areas for some other animals (Hardy, 1990). Significant wildlife habitat areas are delineated on map 3.3. The importance of habitat should never be overlooked when managing wildlife, but it is often the case when managing other natural resources. Wildlife habitat may be consciously or unconsciously destroyed because of other resource development. The dangers of habitat destruction are far-reaching and greater than might be expected at first glance. This is especially true in the north, where short growing seasons and cold

Figure 3.3 *Significant Wildlife Habitat*

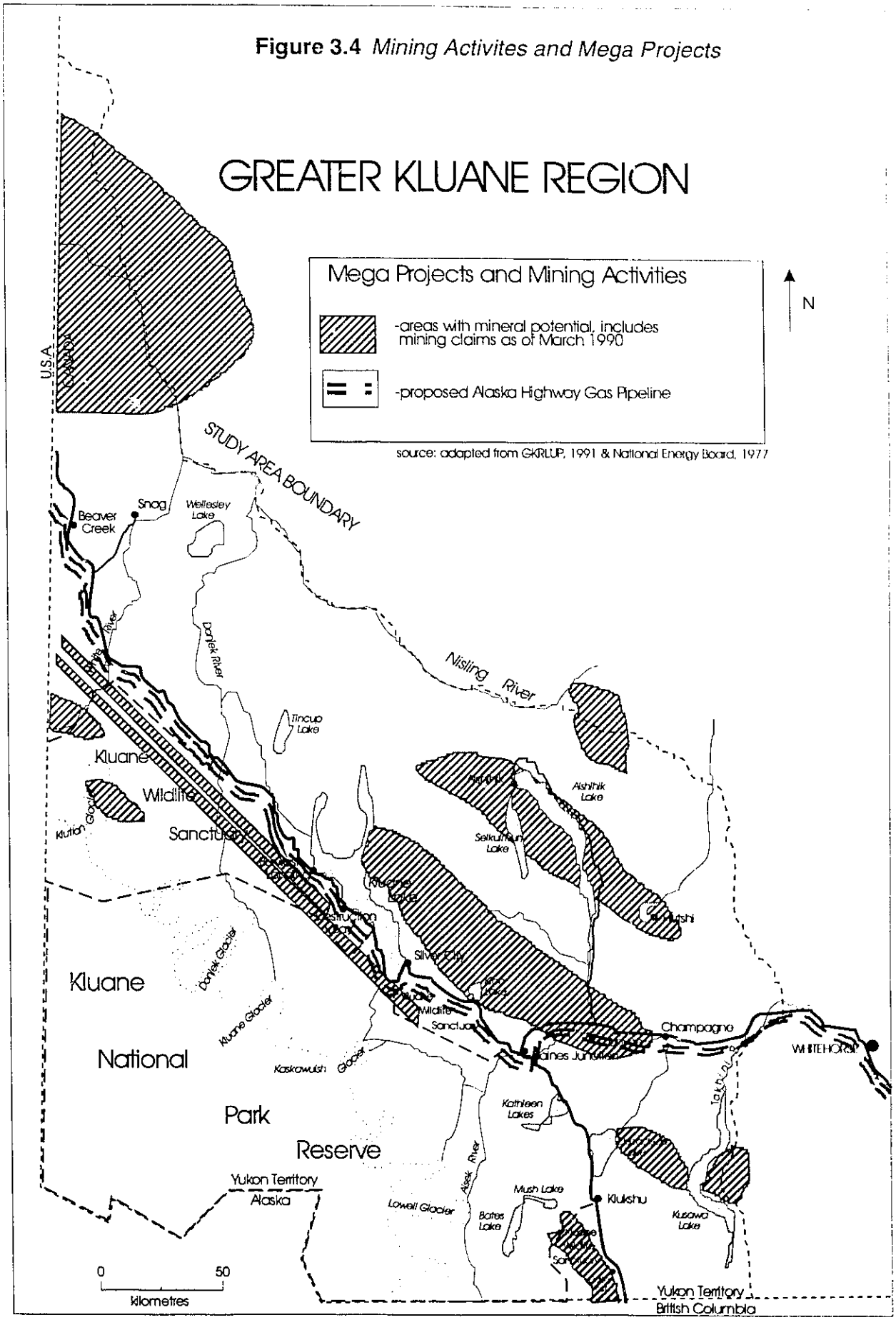


temperatures create low biological productivity. Migratory species are abundant in the north as a result of this low productivity and the distinct seasonal climatic changes. "However, these migratory species have more complex habitat requirements than non-migratory species" (Theberge, 1980).

As we have seen in chapter 2, northern ecosystems possess certain characteristics that distinguish them from the south. Besides the obvious geographical differences the north has seen much less development that the south. However, northern development is rapidly increasing. The ever-present search for natural resources that have yet to be exploited has made its way to areas north of the 60th parallel. Present trends in the search for, and use of natural resources in the north include mining, fishing and hunting, hydro-electric power development, oil and gas, transportation, tourism and wilderness travel, and scientific research (Fuller, 1974). All of these uses affect habitat in one way or another. Specifically in the study area, habitat is threatened by all of the above uses as well as agriculture (including fur-farming) and forestry.

Mega-projects and mineral extraction activities occur throughout the Greater Kluane area. Their locations are shown in Figure 3.4. Mineral, oil and gas exploration and exploitation impact directly on wildlife habitat through competition for land use. Once these activities commence, wildlife habitat is destroyed, and their range is degraded. Adjacent developments and activities also displace wildlife. Construction of pipelines will not only destroy habitat directly but will also create corridors which further fragment habitat, and by allowing

Figure 3.4 *Mining Activites and Mega Projects*



easier access for hunters, additional pressures are placed on wildlife itself.

Water diversions and hydro-electric power development impact habitat in at least two ways. Dams are often built for these projects which greatly reduces water flow downstream, while at the same time, flooding areas above the dam. These activities directly affect fish and waterfowl habitat, and indirectly affect areas required for other wildlife and birds. Hydro-electric development also poses serious threats to moose habitat by destroying critical lowland winter ranges on major rivers.

Forests figure prominently in the overall ecology of the region. The trees provide a direct food source for many small mammals. They also help to maintain water quality and fish habitat by regulating drainage and stabilizing river channels (GKRLUPC, 1991). Forestry practices put all of this at risk. Removing trees promptly eliminates cover and shelter, as well as potential nesting sites for many bird species. Even though there is no large-scale forestry in the region, trees are removed periodically on a small scale for construction and other development purposes.

Agricultural practices are also found to conflict with wildlife by contributing directly to habitat destruction and range degradation. One major problem exists as a result of open ranging horses and cattle on public lands. Domestic stock compete directly with wild ungulates, mostly moose, for habitat. The Yukon Wildlife Branch (1987) estimated that at a *minimum*, for each head of domestic stock one wild ungulate would be displaced. Current data is unavailable,

however in 1976, Hoefs estimated that 1500 horses roamed the Territory but the total ranged cattle was unknown. There are currently two stock owners ranging horses in Kluane Game Sanctuary. Indirectly, habitat is also affected by pollution caused from agricultural practices. Environmental pollution increases from the use of fertilizers, pesticides and herbicides through surface runoff and contamination of groundwater.

Any form of construction in this area also runs the risk of damaging the permafrost. This damage indirectly affects wildlife habitat when the organic layer loses stability. Zones of discontinuous permafrost are found within the perimeter of the study area, and are sensitive to changes in ground and air temperature. If the insulative layer is disturbed, the permafrost will thaw creating slumping, sliding and other forms of soil erosion. As the soil erodes, vegetation is lost.

Numerous big-game species which rely on habitat in the study area are sensitive to any type of disturbance, regardless of how minute it may seem. Even if there is no large-scale alteration of the land through direct use of other natural resources the animals may still be adversely affected by other activities. Although not to the same extent as projects such as mining, recreational and tourist activities may have similar negative repercussions on habitat. Obvious activities are hunting and fishing which consume wildlife directly. Less obvious ones include hiking and camping, which when left unregulated can cause severe environmental impacts. An incident which occurred at Sheep Mountain illustrates this point quite clearly. Sheep Mountain, located in Kluane National Park

Reserve, is a critical habitat area for Dall Sheep. The Alaska Highway runs adjacent to the mountain, and provides motorists with a good chance to view the sheep. As there is an information station located at the base of Sheep Mountain, many people take the opportunity to hike up the side of the mountain for a closer look at the sheep. Undue stress was placed upon the sheep by the increasing human contact, in addition to the destruction of vegetation through trampling. Through uncontrolled excess use of this area, several trails were created. These trails led to further erosion and land slides, thus destroying many of the sheep trails and food, which in turn, forced them out of this section of their habitat. Today, hiking is restricted to the base of the mountain, and telescopes were installed to allow more people to view the sheep but with less stress on the wildlife and habitat (McIntyre, pers. comm.).

While recreational day use of the Park Reserve area is now monitored to avoid further problems such as Sheep Mountain, other recreational activities are not as easily dealt with. Aircrafts, boats, snowmobiles and other motorized vehicles allow people access into areas which were previously unreachable. The results are increased pressure on certain "wilderness species", such as Dall Sheep, Grizzly Bear, etc., plus the added stresses on the land.

3.3 Wildlife management history

McCandless (1985) suggested that the way in which the Yukon Territory has managed its wildlife has given it a certain history which has set it apart from

other northern regions. Even though the Territory's wildlife history does not begin with the Gold Rush, there is little written evidence prior to this time The Native people, however, have maintained an oral history which helps to fill in the gaps and aid in understanding the development of the Yukon's wildlife policies and laws both before and after the Gold Rush (McCandless, 1985).

When looking at the written history of wildlife management in the north, the Yukon is distinct in that it was the first to gain responsibility for its wildlife. Neighbouring Alaska and Northwest Territories had their wildlife laws drawn up by federal governments who may or may not have been directly familiar with the areas. The laws governing Alaska's wildlife were devised by politicians in Washington who were subject to pressures from a powerful conservation lobby. Similarly, wildlife laws of the Northwest Territories were created in Ottawa. It has been less than twenty years since Ottawa gave up this task in the Northwest Territories. On the other hand, the Yukon was granted powers over its wildlife resources in 1900. The Yukon has thus had total control over its wildlife management practices and legislation.

The history of wildlife management in the Yukon is split between two themes, big game and fur bearers. McCandless (1985) described the differences as:

> "Trapping provided the main source of income for Indian people for decades, while big game guiding affected a smaller number of people and was concentrated in the southern Yukon. The industries overlapped only in the sense that they were complementary in their seasons, guiding in the summer and fall, trapping in the winter and spring, so the same individuals often participated in both industries.

> But the perception of the wildlife resources in the two industries was quite different. From the earliest times, the trapper was the owner, prime user, and manager of the animals along his trapline. In comparison, big game guiding was a free-for-all."

The first written wildlife management laws were passed in 1901 with the creation of *An Ordinance for the Preservation of Game*. The main concerns which were addressed included preventing wastage of wildlife resources. A fine up to $500 was set for anyone caught wasting meat. As well, certain bag limits (the number of animals any one hunter may kill) were imposed. Annual limits of six caribou, two moose, two sheep, and two goats per hunter were established (McCandless, 1985).

The economic value of wildlife for trophy hunting and trapping was also recognized at this time. Non-resident hunters were required to purchase an expensive $100 license. Other restrictions included no female animals to be taken by big game hunting, in addition to selected sections of the *Ordinance* applying to Natives which requested that they record their harvest, and restrict harvesting in preservation areas (McCandless, 1985).

Minor changes and amendments were made to the *Ordinance* periodically during the next forty years. Many of these modifications reflected changes in people's attitudes towards certain wildlife species, or wildlife in general. For example, it has been noted that there are distinct wolf hate cycles which have occurred throughout history which have greatly influenced subsequent management practices (Krebs, 1991). Bag limits of various species were also increased and decreased as the Government felt it necessary, as were the amounts

of penalties and fines.

From 1900 to 1940 wildlife in the Yukon provided considerable government revenue and employment, as well as food (McCandless, 1985). The Yukon government imposed taxes on any animal taken out of the Territory in an attempt to curtail the trafficking of trophy heads and horns. Even though the Yukon's production of furs was small compared to other jurisdictions, the value of the furs together with the export taxes and other game licenses provided nearly 1/4 of the Territorial Government's direct revenue up to 1940 (McCandless, 1985).

Strangely enough, little was ever mentioned about wildlife management, neither the hunting practices nor the legislation, in either of the Yukon Territory's two newspapers until the 1940's. McCandless (1985) believes that the few thousand adults living in the Yukon at the time virtually ignored the game laws and "bag limits, seasons, and restrictions were forgotten by Indians and non-Indians because they could avoid detection".

Then, along with the Alaska Highway came many changes to the Yukon and to the wildlife. Until this time natives and non-natives were almost equal in numbers and were interdependent on each other in many ways. Both of the communities saw wildlife as an endless resource if used wisely, as they had done for decades. However, there was an unusual degree of dependence of white people on natives since the Indians were the main producers of fur and meat (McCandless, 1985).

Once construction of the Alaska highway commenced in the early 1940's thousands of non-natives came into the area bringing with them new attitudes towards natives and wildlife. The population increased dramatically and severe hunting pressures were placed on wildlife as roads cut into habitat and allowed access into previously unreachable areas. The need soon arose for no shooting zones to be established on either side of the through-ways.

In 1945 the Yukon Fish and Game Association was founded by a group of recent arrivals. The Fish and Game Association's intentions from the beginning were to influence government policy. In 1945, a letter was received by the Yukon Commissioner George Jeckell which stated that "the organization should be of value and assistance to the Yukon government in the enforcement of game laws and the study of wild life problems" (YRG1, 1945). This association soon proved to be a powerful force in the setting of wildlife management policies and enforcement. New game laws were drafted with lower bag limits, and enforcement was increased.

The members of the Fish and Game Association had several main objectives upon the group's inception. They wanted all trapline locations plotted on government maps and individual users registered. They also wanted to introduce several species from Alberta, namely buffalo, elk and mule deer. One of the main intentions of the Fish and Game Association was to "limit competition in the Yukon Big Game industry" (McCandless, 1985). There were severe restrictions placed upon people who wanted to become guides or outfitters

in an attempt to keep out foreign competition and to dissuade further Indians from becoming independent operators. At this point it should be noted that the Indian people did not hold any administrative positions (McCandless, 1985). Natives were prevented from partaking in any wildlife management activities whatsoever. Thus the Indians received a double blow to their economic strength as they lost their influence on wildlife policy at the same time as fur prices dove to one of the lowest points during that time.

3.4 Native concerns

Most native groups in Canada are demanding an active role in the management of natural resources, and as a result we see Natives playing a bigger role in managing wildlife. With the many land claim negotiations and settlements, this Native involvement in wildlife management is becoming more and more significant.

As there are 14 First Nations in the Yukon, each with their own language and culture, a single land claim agreement would have great difficulty in accommodating all of their different needs. The general concerns could be addressed however with a general guideline the Government could follow when negotiating claims. Thus, an Umbrella Final Agreement (UFA) was reached in March, 1990 which is being used when negotiating self-government for each specific First Nation. Chapter 10 of the UFA makes provisions for Special Management Areas which include National Parks, and special wildlife areas. A

Fish and Wildlife Management Board will also be established and used as the primary instrument of Fish and Wildlife Management in the Yukon. The Board will be comprised of six nominees of Yukon First Nations and six nominees of Government. To date, four First Nation final agreements have been negotiated, Na-Cho N'Ya'K Dun, Champagne and Aishihik, Teslin, and Old Crow, all have a similar formula for sharing wildlife among native and non-native people. Each allows the Native people to continue their traditional harvest of wildlife for their subsistence food needs and the remaining harvest is open to other hunters. If the government needs to apply conservation measures to protect the wildlife populations, then the Native harvest can be restricted to 75% of the total allowable harvest.

The Umbrella Final Agreement also made provisions to set up a three-million dollar joint government-first nation trust. This is to be established under the direction of the Fish and Wildlife Management Board "to restore and enhance wildlife populations and habitat in the Yukon".

Of the many traditional native lands that are found throughout the Yukon there are portions of three participating Yukon First Nations' territories found within the study area. The Kluane First Nation and the White River First Nation have yet to finalize certain issues such as a land claims settlement or a working self-government. However, Champagne and Aishihik First Nations have reached an agreement on both of these issues with the Government of Canada and the Yukon Territory (1992).

There are many issues and concerns central to Aboriginal people which must be considered during land claim negotiations and the setting up of a self-government. Nevertheless, only issues pertaining to wildlife will be looked at in this study. Concerns regarding hunting, fishing and trapping for subsistence or economic pursuits are examined. In addition, issues that have been raised in the area relating to the destruction of the environment are noted, and the indirect effects this has on wildlife.

Traditional lifestyles of Native people have included a dependence on subsistence pursuits. Harvesting, processing, distributing and trading local resources such as game, fish and plants are integral components of the subsistence system (GKRLUPC, 1991). These components are used for domestic consumption as well as commercial activities. While meat is consumed, furs may be sold or traded, and other artifacts or handicrafts created using the remaining animal parts. Berries are also consumed, but may be gathered and sold commercially, as is done similarly with the fish resource. Indian subsistence can be defined as "a social and economic system of production and distribution, property rights and land tenure, households and extended families, mutual obligations and sharing, and is guided by traditional laws, customs and cultural beliefs" (GKRLUPC, 1991). Subsistence is viewed as the inherent right of native Yukon people, as this has always been part of their lifestyle.

The past has seen little, if any, government support for Native subsistence activities. Until the Umbrella Final Agreement was drawn up in 1990, individual

government departments and agencies were unable to accommodate the wide ranging social, cultural and economic system of subsistence. Even with government acknowledgement the system is still threatened by competing uses for the resources. Mining, dams and diversions are a few examples of incompatible land and water uses which negatively affect habitat as well as fish and wildlife directly. Loose and unenforced harvesting regulations for natives and non-natives alike are creating mounting problems for wildlife population numbers.

For the Government, one of the main problems regarding harvesting, is the lack of written precedent. In the past, the native wildlife harvest has not been well documented. Section 17(3) of the Yukon Act reads that "no territorial ordinance shall restrict or prohibit Indians or Eskimos from hunting for food on unoccupied Crown Lands, game other than game declared by the Governor in Council to be game in danger of becoming extinct". Natives have thus been allowed to hunt for food without a licence which, in turn, has restricted the amount of recorded harvesting information. When a licence was not required, there was no system in place which measured, or documented, the amount of wildlife taken.

It was not until a shortage of game was noticed that change occurred. Due to significant declines in several species' populations, the Yukon Department of Renewable Resources undertook the task of compiling native harvesting statistics (Quock, 1988). Beginning in 1987, data was collected from Indian bands where wildlife management projects were either planned, underway, or had just been

completed. Several gains were made through the surveys that were conducted. The Natives were able to supply information to fill in the gaps for more accurate wildlife population estimates, as well as harvesting statistics. Native concerns regarding the management of wildlife were also voiced.

One survey, conducted in 1988 by the Department of Renewable Resources found that common concerns held by the native bands included:

1) Arranging a system to utilize the knowledge of Indian elders in game management,

2) Establishing a renewable resource specialist training program for Indians,

3) Ensuring that all outfitters follow a quota system,

4) Creating a system for organizing the collection and distribution of meat from outfitter hunts,

5) Closing the moose and caribou season be closed after October 1st,

6) Organizing a training program for young Indians to teach them traditional Indian hunting and modern conservation practices, respect for wildlife and nature, proper meat handling, current game management, along with a complete outline of problem areas and emphasis on the need for hunter co-operation in order to properly manage wildlife.

7) Banning hunting with All-Terrain Vehicles, and

8) Establishing no hunting corridors on roads. (YRR, 1988)

Many of these concerns that have been expressed by natives are also central concerns for many non-natives as well. There have been several conservation groups formed in the Greater Kluane Region and surrounding areas, such as the Yukon Conservation Society, which actively voice their opinions and suggestions on wildlife and other resource management.

3.5 Current pressures

Many of the current pressures found in the Greater Kluane Region stem from conflicts between different user groups. Even if the conflicts do not originate from direct competition for the same resource, competition from different land uses will indirectly affect many resources.

Land use conflicts are not new within the Kluane region. Since as early as the turn of the century, different users, ranging from Native and non-Native hunters to gold seekers and business people in extractive industries, have competed for the natural resources of the region. These conflicts have intensified as a result of the impacts created by a greater demand for the land resources, enhanced access and technological change. A summary of the current issues in the greater Kluane region are listed in Table 3.3.

Table 3.3 *Current Issues in Greater Kluane Region*

- Native Land Claims
- Wilderness Recreation - Consumptive vs. Non-Consumptive Uses
- Wilderness Recreation - Mechanized vs. Non-Mechanized (eg. boats, planes, helicopters).
- Tourism - Consumptive vs. Non-Consumptive Uses
- Tourism - Mechanized vs. Non-Mechanized (eg. boats, planes, helicopters).
- Use of public access roads
- Mining
- Hunting & Trapping
- Alaska Highway Gas Pipeline Project
- Overuse by Park Visitors - hiking, mountain biking
- Depletion of wildlife resources

All of these conflicts can either directly or indirectly affect wildlife and/or habitat as was explored in section 3.2. The following chapter will provide a more

in-depth look at the species found in the Greater Kluane Region. It will also examine the current wildlife management framework and approaches to identifying and resolving conflicts.

CHAPTER 4 MANAGEMENT

4.1 Introduction

This chapter begins with a detailed discussion of the wildlife found in the greater Kluane region. Each species is given only a short introduction to set the stage for a management discussion. An overview of the management activities which are currently affecting wildlife follows. Four different wildlife management plans will be examined to illustrate how wildlife is affected. Frameworks for identifying and resolving wildlife management problems will be explored through these four plans, in addition to non-government organizations and on-going research projects occurring in the area. This chapter will conclude with three case studies of separate species to demonstrate the effectiveness as well as the short-comings of the current management plans.

By using an ecosystem approach, I developed a basic wildlife management model (refer to model 1), which was briefly introduced in Chapter 1. The various characteristics of the model determined which areas of the case study were examined in detail. The model suggests that the three fundamental components, ecological, cultural and socio-economic, are of equal importance, and the various characteristics associated with each component must be explored. A brief background to these components and characteristics was given in Chapter 3, as the study area was introduced. In this chapter I will use the model as a guideline for exploring the existing wildlife management activities in greater Kluane in

greater detail.

Boundaries of this model can be delineated in various ways. The processes (management plans) that are active in the area are important in determining these boundaries. I have chosen four processes for this study, however the number may vary for other areas according to the study site. If there are greater or fewer numbers of legislative bodies active in the chosen area, the number of processes may change. In addition, the degree of specificity will be determined by the number of management plans surveyed. With more processes, the study area or ecosystem can be expanded to include all of the North, or Canada, or even broadened to examine the ecosystem in a global context. Thus through the inclusion of additional processes, a more complex and farther reaching analysis will result. Fewer management plans examined will enable a more specific study.

After the components of the model are identified and explored, it is necessary to review the various management plans or processes involved. Section 4.3 provides an overview of these activities. Chapter 5 will then explain in greater depth, how a conceptual model such as the wildlife management model can be helpful when managing resources.

It should be noted that the terms "Resident" or "Licensed Resident" will refer to people who reside in the Yukon Territory and have purchased the appropriate required big or small game hunting license. The term "guided non-resident" will refer to non-Yukoners hunting big game through the use of a licensed outfitter, as is required of them by law.

4.2 Fauna

Of the 34 species of mammals found in the greater Kluane region, 14 are large mammals and 20 are small mammals. The large mammal category can be further divided into two categories, ungulates and carnivores, with seven species of each. Table 4.1 lists the major species of mammals and identifies their most recent population estimate, in addition to bag limits, and average known harvest estimate. Over 150 species of birds have been identified in the region. Although individual species of birds will not be examined in detail, trends in migratory birds will be looked at, as well as endangered or threatened species.

Table 4.1 *Managed mammal species in the Greater Kluane Region.*

Species	Population estimate	Harvested by: Licensed resident	Guided non-resident	Bag Limit
Caribou:				
Chisana	1000 (1986)	2	6	1
Burwash	400	3	9	1
Aishihik	1500	24	26	1
40 Mile	14,000 (1986)	1	0	1
Elk	100 (1992)	Protected from harvesting		
Mule Deer	500 (1992)	Protected from harvesting		
Dall Sheep	11,600 (1991)	61	83	1
Goat	1,160 (1991)	no data recorded for Kluane area		1
Moose	*160/1000 km^2 (1989)	154	42	1
Wood Bison	130 (1992)	0	0	0
Coyote	no data	46	1	no limit
Wolf	*4.6/1000 km^2 (1987)	70	22	no limit
Wolverine	no data	5	8	1
Black Bear	no data	94	33	2
Grizzly	1,000 (1991)	91	96	1

* Yukon average

source: YTG Statistics, 1986-1992

4.2.1 Large Mammals - ungulates

The most common of the ungulate species which inhabit the area are caribou, Dall sheep, and moose. Three resident woodland caribou herds (Aishihik, Burwash, and Chisana), and one resident barren ground caribou herd (the Fortymile herd) inhabit portions within the greater Kluane Region. Caribou are used for meat as well as trophy heads. In the past, the meat value of caribou has been considerable, and local use is still made of the Burwash and Aishihik herds. The woodland and barren ground caribou are also an important trophy species which attract residents and non-residents alike. Currently, the Burwash and Aishihik caribou populations are at an all time low. The Fortymile herd population has been brought up from its all time low of 5,000 in 1973 to 14,000 in 1986 (YTG 1986 Statistics). However, an estimate done in 1927 suggests that there had been a Fortymile caribou population of 568,000. In just 30 years, over harvesting, habitat destruction, and the construction of the Alaska Highway combined to reduce the population to 45,000 in 1953 (YTG, 1986).

Moose are the most frequently hunted big game in the Yukon. They are widely sought after by resident hunters for meat and hide. However, moose have also maintained a high demand as trophy species for many non-residents. The sub-species of moose found in Kluane National Park Reserve are among the largest in North America with bulls weighing up to 817 kilos (1,800 ponds), and cows 20 to 30 percent lighter (Theberge, 1980). There is no accurate estimate of current moose population for the greater Kluane area, however Larsen (1991)

approximates the density of moose per thousand square kilometers in the Aishihik area to be 82 and in the Haines Junction area to be 223 moose/1,000 km^2. The Yukon Wildlife Branch (1987) claim that predation and harvest are not the major concerns of moose management. They feel population declines are habitat-related. Destruction of critical bottom land winter ranges on major rivers, and the immense problems resulting from open ranging horses and cattle are primary concerns for moose management.

Dall Sheep are one of the most important trophy animals for the Yukon. They are popular for their meat and large horns. Unfortunately, these sheep are highly susceptible to overhunting. Harvest statistics show that in most outfitting areas the combined harvest of non-residents and residents exceeds the sustainable yield of trophy rams (Yukon Wildlife Branch, 1987). In addition, there are no other big game animals that are as adversely affected by new roads and trails and aircraft disturbances as the Dall sheep. Even though guided non-residents take about three times as many sheep each year as resident hunters, this figure is averaged throughout the Yukon. Unlike guided non-residents whose sheep hunting is widely dispersed throughout the entire Territory, residents do almost all of their sheep hunting in the zones found within the greater Kluane region. Therefore, most of the hunting pressure is on the Dall Sheep population directly adjacent to the Park.

Mountain goats are relatively uncommon in the Yukon since they occupy the northern extremities of their total range, and the habitat available to them is

of poor quality in comparison with that of the Alaska panhandle, B.C., and Alberta (Yukon Wildlife Branch, 1987). The majority of the Yukon goat population are found within Kluane National Park Reserve and, ironically, they are considered to be the second most abundant large mammal in the Park (Theberge, 1980). Mountain goats also occupy the southern portion of Kluane Game Sanctuary, and Alsek ranges. Mountain goats are seen as having little value for their meat, due to its inferior quality but hunters do see value in their horns and hide, and for this reason the goats are managed as a trophy species. However, many problems are encountered in the management of this species. There have been no detailed studies on the population, distribution or abundance of the goats. In addition, the number of goats occupying territories outside of the reserves are so small that even a slight change in harvest seems dramatic. The goats may be easily overhunted, and as such are regarded as a species which is greatly affected by man's activities. Very restrictive quotas were set in 1979, and are still currently in place. The three hunting zones adjacent to Kluane National Park Reserve (zones 7, 9, & 11) have been closed to non-residents since 1980 (Smith, 1988). By 1988 only two Outfitters in the entire Yukon still offered goats hunts. Another problem is the fact that their range invariably coincides with mineral formations, thus heavy exploration activity will have further detrimental effects on the species survival.

Wapiti (elk) were introduced to the Yukon from 1951 to 1954. They are found to be able to live in close approximation to humans, and are not directly

affected by man's activities. The general aim of the introduction of elk was to provide another huntable big game species in the Yukon. This was an attempt to make the area more appealing internationally for people who enjoy hunting and thereby to increase tourism. There are currently two herds in the Kluane Region but their numbers have not increased much from the time of introduction. This may be partly due to poaching (Yukon Wildlife Branch, 1987) and partly to low calf births. While the elk population is currently stable, it has not been able to increase sufficiently to huntable numbers. It is still a viable option to manage this species for future hunting, if they are protected until their numbers increase. The wapiti are fortunate that the only other big game species with similar habitat preferences are the mule deer. This reduces conflicts for suitable habitat and may allow the wapiti a greater chance at increasing their population. However, there are still conflicts with cattle ranging which compete for the same land use.

The mule deer is presently classified as rare and endangered. They concentrate in habitat with successive vegetation, usually recent burns and trail areas. Unfortunately, this makes them susceptible to disturbance and poaching. The mule deer are therefore not likely to become a legally hunted species in the foreseeable future, but protection must be afforded to them nonetheless.

Wood Bison are also currently listed as an endangered species. The bison which do exist in the Kluane region are a reintroduced species. Native oral history tells of extensive past occupation by the bison, however it was believed one of the last remaining was killed in 1939 (YTG, 1984). In the fall of 1984, 30

wood bison were released into a fenced meadow along the Nisling River in an attempt to re-populate the species. Today the population has grown to over 50 bison, and is now free-ranging. The re-introduction has been successful with the increase in numbers, however conflicts are occurring as competition for land use increases in this area.

4.2.2 Large Mammals - carnivores

As already discussed in Chapter 3, mammals are classed into categories of big game, small game or fur-bearing animals for management purposes. Generally though, an animal or bird is only classed into one of these categories if they are a desired hunted species. Coyote, wolf, wolverine, and lynx are all classed as fur-bearers, however, wolf, coyote and wolverine may be taken on a big game hunting license. The lynx, in addition to many small mammals which are classed as fur-bearers, may not be taken except under a license to trap.

There is a healthy coyote population found throughout Greater Kluane whose numbers fluctuate with the availability of prey. Coyotes adapt easily to new surroundings and readily inhabit areas close to human settlements. They also range over a variety of habitats from alpine to montane zones. Management strategies for the coyote are limited to including them in hunting and trapping regulations. There are no bag limits set for the coyote whose hunting and trapping season extends from August 1 to March 31 (YTG, 1992). The only restricted zones are the parks and game preserves, which do not allow hunting or

trapping of any animal.

The wolf is similar to the coyote in many respects. It is also a fur-bearer which may be hunted as big game, and the wolf is highly adaptable to a variety of habitats. Many people see the wolf and coyote as 'nuisance' animals which should be eliminated. The wolf is unique, however, in that there are many conservation groups whose sole aim is to protect the wolf. At one time, it had the largest natural range of any living mammal except humans (Young, 1970). Unfortunately it was also one of the most feared and hated species, making it susceptible to extirpation. Thus it has disappeared from much of its former range. Today, wherever healthy populations of wolves are found, there is sure to be much controversy over the management thereof. In the Greater Kluane Region, the distribution of wolves is closely linked to the presence of their main prey - caribou, moose, and sheep. Similar to the coyote, there are no bag limits set for the wolf, nor are there any protected zones, save for the Kluane National Park Reserve and Wildlife Sanctuary. The wolf season runs from August 1 to June 15, but 'problem' wolves are eliminated at any time. A more in depth analysis of wolf and caribou in section 4.3.3 will examine how complex the management of this species can be.

The wolverine is, again, a fur-bearer which may be taken on a big game hunting license. Trappers' returns have provided the only source of population data for the Yukon, and virtually no information exists on the life history of the wolverine. The Yukon Wildlife Branch (1988) gives the wolverine the ignoble

distinction of being the most poorly known carnivore. Present management strategies focus on collecting more data on the wolverine and, for the time being, limiting its harvest.

Lynx are found throughout the Kluane area. They are a fairly common species whose range extends from forested areas to the Icefields, and on to the Lowell Glacier (Environment Canada, Parks, 1987). Lynx population numbers follow a fluctuating cycle with their main prey, the snowshoe hare. In the cycle, the lynx numbers are at their peak one year after the snowshoe hare population crashes (Slough, 1990). They are an important species for the fur trade, as they are easy to trap and access and transportation methods are constantly improving over much of their range (Slough, 1990). These factors have combined to generate concern that the lynx may become over-exploited, and thus affect the amplitude and timing of the lynx-hare cycle (Slough, 1990). Management problems may arise in jurisdictions where the trap line season lengths, quotas, and closed areas do not follow the timing of the cycle.

A new concept for wildlife law was introduced in the Yukon in 1981 which recognizes certain species as highly v[illegible]able and requiring unusual protection. These "specially protected" wildlife species include both birds and animals with either an endangered status in Canada, or with an extremely high market value, or others still that are freely hunting throughout Canada but for some reason require the additional protection in the Yukon. Some of these species have been introduced to the region such as bison and elk, while others are native to the

region, such as mule deer, peregrine and gyrfalcons. Cougars also receive "specially protected" status because of their particular circumstances.

The cougar is extremely rare throughout the study area, however several sightings have been reported in the last 20 years (Environment Canada, Parks, 1987). The cougar once ranged over a variety of habitats throughout southern Canada, but have been extirpated from most of their former territories. There is little information on current distribution and population numbers except that most sightings have been reported in the Haines Junction area.

Black bears are widely distributed throughout the forested areas of Greater Kluane, and most of North America. However, black bears are one of the least understood large mammals in northern interior ecosystems (MacHutchon, 1990). Until 1990, population status and distribution had never been assembled, thus creating great difficulties in black bear management for the Yukon. This species had been managed by default with the managers assuming that their population numbers could withstand the harvest pressure (MacHutchon, 1990). The only information that was known, was that black bears avoid areas utilized by grizzly bears, and that they make up the bulk of the "problem " bears (Environment Canada, Parks, 1987). Black bears can become "problem" bears when they become accustomed to human food and garbage. The bears will then frequent campgrounds, garbage dumps, and even residential back yards in hopes of finding food. Today, one of the biggest management concerns stem from the black bears' ability to live in close association with man. As the garbage dumps have

become a big attraction to bears, they are also becoming conditioned to human presence. As bears have the ability to be dangerous and very destructive to property, people tend to overreact to them, causing more problems.

Another management concern involves the on-going poaching problem for bear paws and gall bladders. The oriental market actively pursues these parts of bears offering considerable sums of money. The paws and gall-bladders are said to be key ingredients for certain ancient 'health' recipes. In North America prices for gallbladders currently range between $100 to $300 (Brenneman, 1992 pers. comm). In the Yukon, it is illegal to offer to buy wildlife or parts thereof without a permit. Even so, a gallbladder buyer was recently charged in Teslin (Brenneman, 1992 pers. comm.).

Unlike black bears, there have been numerous grizzly bear studies completed. Fairly accurate population estimates suggest that there are roughly 1,000 grizzlies in the Greater Kluane Region (GKRLUPC, 1991). Grizzlies are recognized internationally as rare and endangered by the World Conservation Union (formerly the International Union for Conservation of Nature and Natural Resources), however viable populations exist in national parks throughout B.C., Alberta, the N.W.T., Yukon, and Alaska. The grizzly bear is seen as a wilderness indicator species with the presence and vitality of the species signalling the "health" of wilderness (Environment Canada, Parks, 1987). The grizzly is also an important big game species, with an average of 85 taken each year by hunters (YTG, 1988). Similar to the wolf, grizzly management strategies within and

around Kluane National Park Reserve and surrounding the park provide many conflicts. The difficulty of creating one management strategy for a species such as the grizzly bear will be further explored in section 4.4.1.

4.2.3 Small Mammals

The 20 small mammals that have been identified in the region can be placed into three sub-categories: fur bearers, small game and others. Muskrat, beaver, marten, mink, fisher, otter and fox are all considered fur bearers which may be taken only under a trapping license. There are currently 68 trapping concessions in the Greater Kluane Region. Of these, 58 concessions are held by Natives and three are government-held areas around Haines Junction, Champagne, and Silver City. The government held concessions are meant to reduce conflicts in populated areas, but may be used in special circumstances (GKRLUPC, 1991).

Small game in the region include snowshoe hare, ground squirrel, and porcupine. There are no set bag limits for small game, nor are there any closed seasons. The only exception is the closed zone 6 which is Kluane National Park Reserve. Woodchucks, marmots and all other small mammals that were not mentioned in either of the aforementioned categories are protected species, and may not be hunted or trapped.

Of these small mammals, the Yukon Government has identified three priority management species: beaver, marten and muskrat. The beaver is

significant not only for fur harvest, but also is socially and culturally important in the Yukon. Historically, beaver have been harvested for food and clothing long before the late 19th century fur-exploitation era and still play an important role in native tradition. A spring beaver hunt has maintained its popularity as an annual social activity in the Yukon. However, beavers may be vulnerable to human over-exploitation. They have strict habitat requirements, and any activity that does not "preserve the integrity of a watershed will affect the distribution and abundance of beavers" (Yukon Wildlife Branch, 1988). Beavers are also easily trapped because of their predictability, thus necessitating a regulated quota system.

The distribution of beavers is analogous to that of the muskrat which have similar habitat needs. The muskrat inhabits areas with an abundance of aquatic vegetation, and where water levels are stable throughout most of the year except for spring flooding. Their dependence on aquatic vegetation makes the muskrat more susceptible to disturbances through sedimentation than the beaver, and they therefore are a more sensitive indicator of watershed disruption. The muskrat should be closely monitored to determine the health of the watershed areas.

The third priority management species is the marten. They are one of the most valuable fur bearers in the Yukon, but they are also very vulnerable to disturbance due to their specific habitat requirements. They prefer mature spruce forests with a greater than 30 percent canopy cover, and open patches or corridors of more than 100 feet in width will act as barriers and isolate marten populations from critical habitat (Yukon Wildlife Branch, 1988). Marten are also a highly

curious species which are easily trapped. They have been regularly harvested throughout recent history and as such are seen as a valuable heritage resource that may be prone to over-trapping.

4.3 Overview of Management Activities

There are four different levels of government operating in the Greater Kluane region. Jurisdictions often overlap among these legislative bodies, creating difficulties when managing wildlife. Of the various management levels active in greater Kluane, I have identified four main areas which will be explored: Native, Canadian Parks Service, Federal and Territorial Governments.

4.3.1 Canadian Parks Service

The federal government withdrew land for the establishment of Kluane National Park Reserve in 1972. In order to develop a park management plan for this area, Canadian Parks Service (CPS) adopted a public consultation process (MacPherson, 1987). The Kluane National Park Reserve Management Plan was then approved by the federal Minister of the Environment in 1980. This Management Plan functioned to outline the general character of Kluane and to describe its role within the national parks system. The plan also provided detailed guidelines on how to reach the objectives which were set up for Kluane. The planning framework was formulated by considering four factors. The first factor was the legislation as it existed in the National Parks Act and the Parks Canada

Policy. This legislation defined the limits within which the plan could be developed. The second factor was to consider the specific natural resources that are found in Kluane. The sensitivities of the flora and fauna were examined, and how they function together as an ecosystem. Thirdly, CPS considered the relationships which had resulted from Kluane's establishment and operation, on both a national and regional scale. Nationally, Kluane National Park Reserve's identity and purpose were assessed in the light of the entire national park system (Parks Canada, 1980). Regionally however, the importance of its relationship to local people, businesses and land uses also needed to be acknowledged. The final factor included pubic participation and exchange of information. When the Park Plan was finally approved in 1980, the wilderness character of Kluane was named the most outstanding feature. The interpretive programs focused on the coastal mountains and icefields, the mountain valleys with their variety of wildlife, and the glaciers and meltwater rivers (MacPherson, 1987).

In 1989, the Parks Service began a public review of the 1980 management plan to see if revisions were required, and it was found that certain modifications were indeed necessary. As management of the Park is the responsibility of the federal government, the Government of the Yukon worked with the Canadian Parks Service to redefine Kluane's management objectives. Concerns had been raised about increasing access within the park, and also about policies for archaeological research inside the park boundaries (MacPherson, 1987). However, since the primary objective of the park continues to be "the

maintenance of Kluane's wilderness character", the Wilderness Management Plan was created to ensure a compromise between resource protection and visitor use and satisfaction (Environment Canada, 1990*d*). The Wilderness Management Plan suggests that the real goal of wilderness management is to maintain the qualities of naturalness and of solitude (Parks Canada, 1987). This plan points out that wilderness is threatened by human-induced changes both inside and outside the park boundaries. The Wilderness Management Plan then summarizes resource management strategies that are appropriate to Kluane's resource protection objective, but take into account various user demands. One of the major components of this plan is regular monitoring. The aim is to help measure the progress of certain management actions, and allow for feedback to be incorporated into future planning. In an attempt to incorporate the input from the public forums and action plans that had been developed and reviewed, a revised Park Management Plan for Kluane National Park Reserve was subsequently approved by the federal Minister, and released in May, 1990.

As there are comprehensive land claims being negotiated between the Council for Yukon Indians, the Government of the Yukon, and the Government of Canada, drastic changes may have to be made to the Kluane National Park Reserve Plan to reflect any new attitudes or direction. Annual reviews of the Plan were thus scheduled for the foreseeable future.

In order to address issues of conflict among users of the various resources in the parks, the Canadian Parks Service uses a zoning system. This system

consists of five zones which classify land and water areas according to their need for protection and their capability to sustain visitor use (Environment Canada, Parks, 1990). The five zones are set up using the classifications in Table 4.2.

Table 4.2 *CPS Zoning System*

Zone I - Special Preservation Specific areas or features which deserve special preservation because they contain or support unique, rare or endangered features or the best examples of natural feature. Access and use will be strictly controlled or may be prohibited altogether. No motorized access or man-made facilities will be permitted.
Zone II - Wilderness Extensive areas which are good representations of each of the natural history themes of the park and which will be maintained in a wilderness state. Only certain activities requiring limited primitive visitor facilities appropriate to a wilderness experience will be allowed. Limits will be placed on numbers of users. No motorized access will be permitted. Management actions will ensure that visitors are dispersed.
Zone III - Natural Environment Areas that are maintained as natural environments and which can sustain, with a minimum of impairment, a selected range of low-density outdoor activities will be preferred. Access by public transit will be permitted. Controlled access by private vehicles will only be permitted where it has traditionally been allowed in the past.
Zone IV - Outdoor Recreation Limited areas that can accommodate a broad range of education, outdoor recreation opportunities and related facilities in ways that respect the natural landscape and that are safe and convenient. Motorized access will be permitted and may be separated from non-motorized access.
Zone V - Park Services Towns and visitor centres in certain existing national parks which contain a concentration of visitor services and support facilities as well as park administration functions. Motorized access will be permitted.

Source: Environment Canada, Parks, 1990

Currently, the majority of Kluane National Park Reserve is Zone I - special preservation or Zone II - wilderness. The zoning plan helps to reflect the park's primary objective of preserving its wilderness character.

4.3.2 Territorial

Since the Yukon is a territory rather than a province, it does not posses the

same powers of legislation that the provinces are awarded under the Canadian Constitution. Unlike the provinces, the Yukon is given exclusive power to legislate "for the preservation of game", and there is no comparable power under the Constitution for provinces. The *Yukon Act* thus sets forth the legislation, and distinguishes the legislative heads of power. In subsection (q) of s.16 of the *Yukon Act*, the Commissioner-in-Council is awarded the power to legislate for game in the territory, and even though "game" may only include wildlife that is hunted or trapped, the convention in the Yukon has been to regard "game" as synonymous with general wildlife. The following table 4.3 summarizes relevant territorial statutes that affect wildlife and their habitat.

Also under s.16 of the *Yukon Act* the powers of legislation are given "subject to any other Act of the Parliament of Canada". This limits the Yukon's legislative powers where there is conflict with other federal laws, and occasionally may even result in the Territory's legislation being rendered ineffective (Thompson et al, 1988). The need for inclusion of this subsection suggests that there are occasions of overlapping legislative provisions. Frequently, these overlaps in jurisdiction result in conflicts and double-bind situations (Parkinson, pers. comm). However, new laws are being created and changes have been proposed to certain existing ones to alleviate some of the problems that have been pointed out with the recent release of the *Yukon Conservation Strategy* (1990).

TABLE 4.3 *Current Territorial Statutory Framework for Wildlife Habitat Protection*

STATUTE	PURPOSE	COMMENTS
AREA DEVELOPMENT ACT (1986)	-to regulate development in areas designated under Act.	-development areas are obviously not created to protect wildlife habitat, although restrictions in development areas could pertain to habitat protection.
HIGHWAYS ACT (1986) updated (1991)	-to provide for development, use and designation of highways. -allows roads to be closed for environmental or conservation reasons.	-this could be used independently or in conjunction with protected habitat areas established under the Wildlife Act to regulate the construction of roads in or near critical habitat areas.
LANDS ACT (1986)	-disposition (sale,lease) and designation of "Yukon Lands", defined as lands appropriated to and controlled by territorial legislature.	-this Act could be used to withdraw Yukon lands from disposition in conjunction with establishing protected habitat areas under the Wildlife Act.
PARKS ACT (1986)	-designation and management of territorial parks.	-the usefulness of park designations depend on the purpose of the park and intent of restrictions therein.
WILDLIFE ACT (1986) updated (1991)	-provides for management and taking of wildlife. -designed to enhance habitat protection and management programs for wildlife resources.	-protected areas can be designated and restrictions imposed on activities within these areas. -increased stricter regulations & ability to designate protected areas.
SCIENTISTS AND EXPLORERS ACT (1986)	-regulates research activities.	-allows the YTG to regulate any research activities that might affect habitat physically, or disturb animals.
ENVIRONMENT ACT (1992)	-improve environmental protection within the Yukon, also recognizes traditional aboriginal knowledge in resource management.	-regulations on pesticide use and litter may help to improve habitat. -partnerships with other governments & First Nations may help to integrate resource management.
HISTORIC RESOURCES ACT (1991)	-protects and preserves Yukon's historical resources.	-by protecting aboriginal heritage resources, increased habitat protection is also afforded.
FOREST PROTECTION ACT (1986)	-regulates operations in forest areas and fire-related activities.	-limited usefulness for protecting wildlife since areas can be closed or restricted only for fire prevention purposes.

source: YRR 1988 & 1991; YCS 1992

In 1987, the Task Force on Northern Conservation presented a comprehensive conservation policy for the North, as well as a strategy whose goal is to ensure the wise use of all land, water, and other natural resources (YRR, 1990). The Yukon was among the first jurisdictions to act on the recommendation of the Task Force that called for provincial and territorial conservation strategies. The Yukon Conservation Strategy was released in May,

1990 and has a set of goals, objectives and actions which cater to northern use and demand. Specific actions are identified for all levels of government, First Nations, interest groups, industry and individuals.

The main purpose of the Yukon Conservation Strategy "is to secure the economic and social well-being of the Yukon's residents through the wise use and management of the territory's natural resources" (YRR, 1990). Table 4.4 outlines the principles and objectives of the Yukon Conservation Strategy.

Table 4.4 *Goals of the Yukon Conservation Strategy.*

Principles:

- The Yukon's natural resources, both renewable and non-renewable, and its heritage and cultural resources are the subject of the Yukon Conservation Strategy.
- The ideas and knowledge that both the native and non-native cultures have about the conservation of resources are recognized.
- Economic and environmental management go hand in hand
- The criteria for judging the value of a resource can not all be expressed in monetary terms.
- Essential ecological processes and life-support systems will be maintained. The genetic diversity of plants, animals and habitat will be preserved.
- Each person in the Yukon has a responsibility to conserve the resources of the Territory.
- Decision makers must recognize that life and sustained economic prosperity depend on the natural environment and the wise use of our resources.
- Education is the key to changing our approach from one of reacting to problems to one of anticipating consequences and actively planning economic development in an environmentally sound manner.
- The Yukon has a role to play in the national and international community to ensure species and ecosystems are sustained.

Objectives:

To provide for the wise management of **resources**, the Yukon Conservation Strategy aims at achieving:
- Sustainable use of renewable resources
- Development of a range of renewable resource uses
- A stable, healthy non-renewable resource sector
- Active, integrated management of natural resources

To provide for the wise management of the **environment**, the objectives are:
- Protection of a quality environment
- Protection of our natural and human heritage

To support the **needs and values of Yukoners**, the aims are to achieve:
- Benefits and opportunities for Yukoners from the development and conservation of our natural resources
- Community involvement in decision making about resource management
- Understanding of aboriginal resource management practices and knowledge.

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source: (YRR, 1990)

The Department of Renewable Resources was the lead government agency in the development of the Yukon Conservation Strategy, and they are primarily responsible for carrying out the actions outlined in it. Of the commitments that were made in this strategy, the Yukon Government will attempt to pass new laws, in addition to changing some of the existing ones. The government is also planning to develop new legislation in accordance with the transfer of responsibilities from the federal government. Some of the proposed changes that will directly or indirectly affect wildlife include:

- a new Development Assessment Act that aims to provide a formal process for assessing environmental and socioeconomic impacts of development activities.
- a new Forests Act, which will direct the conservation and use of forest resources when this responsibility is transferred to the Yukon government.
- a revised Wildlife Act that will offer more protection to important wildlife habitats and threatened or endangered species of plants and animals and provide more effective deterrents to abuses of wildlife laws.

• changes to the Parks Act to improve the ability to manage lands within territorial parks.
• a new Water Act to direct the conservation and use of water resources after these resources are transferred to the Yukon government's control. (YRR, 1990)

In order to monitor the effectiveness of the Yukon Conservation Strategy, regular reports on the state of the Yukon's economy and environment will be required periodically. The Yukon Council on the Economy and the Environment (YCEE) was set up to coordinate a public review of the Strategy every year. The YCEE has initiated annual workshops, which began in 1989, as a means for these reviews. To date the workshops included representatives from nine sectors: agriculture, Indian economy, mining, small business, tourism, forestry, wildlife industries, public sector/infrastructure and energy, and public sector/non-profit organizations (YCEE, 1990). Each sector conducts separate workshops to deal with three questions: (1) Where are they now? (2) Where do they go from here? and (3) How do they get there? After every annual conference a report will be published summarizing the discussions. Recommendations will then be made on the basis of this report.

Current protected area systems which fall under territorial jurisdictions include Yukon Game Sanctuaries, Yukon Game Preserves and Yukon Territorial Parks. Presently there are two official Territorial Parks in the Yukon, Herschel Island and Coal River Hotsprings, neither of which are found in the Kluane Region. There are however 13 Territorial Park candidate areas, two of which are located in Greater Kluane. Kusawa Lake has been proposed as a Territorial Environment Park and Klutlan Glacier, which may either become an extension of

Kluane National Park Reserve or may be protected as an Environmental Park. There is also the Kluane Game Sanctuary, which is protected on a territorial level through the Yukon Wildlife Act, and is found within the Kluane Region.

Other protected area designations which are administered by the Territorial Government include Ecological Reserves, Wildlife Management Areas, and Special Management Areas. Primrose Lake Area, found in Greater Kluane, is considered a Special Management Area, which does not afford complete protection to the area but rather, the designation acts as an interim measure to control land use.

4.3.3 Federal

As discussed in section 4.3.2, the Yukon government has legislative power over most of the wildlife and habitat. However, the majority of the remaining land and all other resources in the Yukon are owned by the federal government, and are managed by the Department of Indian Affairs and Northern Development (DIAND). Land that has been transferred from the Federal to the Yukon government to manage - Commissioner's Lands - still only comprise about 0.2% of the Yukon's total area (Thompson, 1986). Even though the *Yukon Act* gives the Yukon Territorial Government legislative powers over its wildlife, fisheries, agriculture and lands within municipalities, the lands and resources are technically still federally owned. As mentioned in the previous section, the Yukon government is able to pass laws for environmental protection and pollution

control, as long as they do not conflict with any federal laws in that subject area (Thompson, 1986). Table 4.5 lists the current federal statutes which affect wildlife and habitat.

TABLE 4.5 *Current Federal Statutory Framework for Wildlife Habitat Protection*

STATUTE	PURPOSE	COMMENTS
CANADA WILDLIFE ACT (1973)	-provides for and promotes wildlife research, conservation and policy development.	-could be used jointly with Yukon Wildlife Act regarding protected habitat areas.
FISHERIES ACT (1970)	-to conserve and protect fish and waters they frequent.	-applicable only to fish habitat, but other aquatic habitat incidently protected.
MIGRATORY BIRDS CONVENTION ACT (1970)	-provides for protection of migratory birds in accordance with Convention with U.S.	-can be used with protected habitat areas identified under the territorial Wildlife Act though limited to migratory birds.
NATIONAL PARKS ACT (1970)	-preserves areas of national significance.	-habitat protection is not an explicit objective but can be an incidental effect.
NORTHERN INLAND WATERS ACT (1970)	-protection and conservation of waters in Yukon and NWT.	-terms and conditions can be attached to water licences to protect aquatic habitat.
OIL AND GAS PRODUCTION AND CONSERVATION ACT (1970)	-to promote conservation and regulate production of oil and gas.	-the liability cause acts as an incentive not to damage wildlife habitat that is important to native people.
TERRITORIAL LANDS ACT (1970)	-to govern the disposition, protection and use of federal lands in the Yukon and NWT.	-this is currently the major source of regulation of general land use activities that affect wildlife habitat. Protected areas can be created and withdrawn under this Act.
YUKON PLACER MINING ACT (1970)	-neither this Act nor the Yukon Quartz Mining Act contain provisions for regulating these activities in the interests of wildlife habitat or environmental protection.	-if the government wishes to withdraw lands from staking and development, it is necessary to pass an order of prohibition under one or both of these statutes in addition to withdrawal under the Territorial Lands Act.
CANADA PETROLEUM RESOURCES ACT (1986)	-to promote and regulate exploration and production of oil and gas.	-may prohibit interest holders from starting/ continuing any work in case of environmental problems. This can be related to the destruction of critical wildlife habitat.

source: YTG, 1988

The Government of Canada has been responsible for releasing a number of northern conservation and sustainable development strategies. Both the report from the Task Force on Northern Conservation and the *Arctic Environmental Strategy* were released by the federal government, and made recommendations

which concern wildlife. They have both been examined briefly in chapter 3 of this study.

Within the federal government, the Department of the Environment has been the key administrator of natural heritage and resource programs and legislation. The nationally recognized protected area systems include the following: Archaeological Sites, National Parks, National Park Reserves, National Marine Parks, National Historic Parks, National Historic Sites, National Wildlife Areas, Canadian Landmarks, Canadian Heritage Rivers, Canadian Heritage Trails, and Migratory Bird Sanctuaries. Several of these types of protected area systems are found within the Greater Kluane Region and many more have been proposed but are on hold pending the finalization of the Native Land Claims Settlement. Under the *Umbrella Final Agreement*, First Nations will manage any and all heritage sites found on settlement lands. There have been a vast number of heritage and archaeological sites already identified in the Greater Kluane Region although none have been officially appointed to be nationally protected.

To date only one river in Greater Kluane, the Alsek River, has been designated as a Canadian Heritage River. However, a portion of the Tatshenshini River has been recently nominated a potential candidate for inclusion in the Heritage Rivers System. The only other nationally protected area found in Greater Kluane is the Kluane National Park Reserve. There are plans to develop Migratory Bird Sanctuaries throughout the Yukon, and several potential sites have been named in Greater Kluane, but these are merely in the development stage

(see section 4.3.4).

4.3.4 Native Involvement

The participation of Yukon Indian people in the management of land and resources was outlined in the *Umbrella Final Agreement.* This Agreement was reached in March 1990 between the Council for Yukon Indians, the Government of Yukon, and the Government of Canada, and sets the stage for the negotiation of individual agreements for each of the 14 Yukon First Nations.

The importance of wildlife resources to the Yukon Indian people was recognized in the *Umbrella Final Agreement*, and many provisions were set up to ensure Native rights over these resources. It is specified that Yukon Indians will be allowed to harvest wildlife for subsistence purposes throughout their traditional territory. On any land which has been deemed Category A Settlement Land, the Yukon Indians will also have exclusive harvesting rights. A territory-wide fish and wildlife management board is also being set up to advise on the management of fish and wildlife. This board will include equal representation from Yukon First Nations and government. Special management regimes and native harvesting restrictions may be imposed, however, in certain Conservation Areas. These Conservation Areas may be identified because of their critical habitat for flora and fauna; aquatic and riparian values, including fish habitat and watershed significance; inclusion of significant natural features and their overall Conservation values (YRR, 1988*b*). Conservation Areas may include territorial

and national parks; national wildlife areas; biosphere reserves; migratory bird sanctuaries; watershed protection areas; and other areas as may be agreed to by the parties (YRR, 1988*b*).

There are portions of three participating Yukon First Nations' territories found within the study area who are still negotiating final settlement agreements. In all likelihood, they will follow the guidelines set up by the *Umbrella Final Agreement*, thus giving each Yukon First Nation the power to enact laws of local or private nature on their Settlement Land. The laws may be different for each First Nation and may potentially have separate direct and indirect effects on wildlife. These laws may be set up with respect to the following: gathering, hunting, trapping or fishing and the protection of fish, wildlife and habitat; planning, zoning and land development; caring and keeping of livestock, poultry, pets and other birds and animals; licensing and regulating of any person carrying on any business, trade or other occupation; control or prevention of pollution and protection of the environment; the use, management, administration and protection of natural resources under the ownership, control or jurisdiction of the First Nation (UFA, 1991). By allowing each First Nation the right to create and enact these different laws, there runs a risk of future conflicts between adjacent lands and the differing legislation which will apply on them. Perhaps in order to avoid some of these potential conflicts, the *Umbrella Final Agreement* asserts that renewable resources councils will give input on furbearer/trapline management. The Yukon First Nations will also accept and comply with, the *Migratory Birds*

Convention Act and the *Porcupine Caribou Management Agreement*. The minister's ultimate responsibility for fish and wildlife is also recognized.

4.3.5 Other Management Activities

For over ten years UNESCO has been promoting an approach to cooperative park management that the Yukon government now believes will work in the Kluane region. This is called the *biosphere reserve*. It involves treating the protected area (Kluane) as part of a larger land management area, rather than as an area isolated from its surroundings. Alaskan agencies are interested in cooperating on transboundary biosphere reserves in the Kluane-St. Elias-Glacier Bay area and between the Arctic National Wildlife Refuge and the Northern Yukon National Park (Yukon Department of Renewable Resources, 1990).

Another cooperative approach to resource management was commissioned by the Yukon Government, the Government of Canada and the Council for Yukon Indians to develop regional land use plans. Originally, eight planning regions were proposed with the initial work focusing on the Kluane Region. The Greater Kluane Regional Land Use Planning Commission was established in 1988 with the intent of producing a plan that would "assist decision-making related to the conservation, development and use of land and resources" (INAC, 1989). Other regional land use plans had also been proposed, however upon review at the end of 1989, all regional planning was terminated due to financial constraints. In spite of this decision, an exception was made and the Kluane Plan was allowed

to continue to completion.

In August 1991, the Greater Kluane Regional Land Use Plan was released and made recommendations for land management policies and practices. In addition, the report describes the social and economic conditions of Greater Kluane and outlines areas where recommendations should be specifically applied (GKRLUPC, 1991). The Plan was developed through an open forum process and actively involved federal and territorial governments as well as First Nations. Recommendations were made to the various agencies with jurisdiction for management, such as DIAND, INAC, Parks Canada, Yukon First Nations, et cetera. While the Plan does offer suggestions, it does not have any legislative powers on its own.

There are other organizations active in Greater Kluane which do not have any legislative power, but may influence wildlife management nonetheless. The Yukon Conservation Society, is one such organization. The object of the Society "is to secure the wise use, protection and preservation of scenic, scientific, recreational, educational, wildlife and wilderness values of the Yukon" (YCS, 1992). The Yukon Conservation Society (YCS) is an active participant in the planning and consultive processes of resource management in the Yukon, and attempts to monitor and participate in decision making at local, territorial and national levels. The YCS is a non-profit association and provides services and programs to help develop ecological awareness, understanding, and conservation to the Yukon public, as well as federal and territorial governments. In the

Greater Kluane Region, the YCS is currently active in many aspects, from running guided nature events to protesting unwarranted use of predator control.

There are also several projects underway in the Greater Kluane Region which, upon completion, may provide useful information or insight to better manage the natural resources. The Kluane Boreal Forest Ecosystem Project is a long term project currently in the seventh year of a ten year study on ecosystems. This study identifies the basic ecological requirements of a northern ecosystem. The Kluane Project is being researched by different groups of people from a variety of Universities in an attempt to analyze how the major components of the trophic levels are affected by each other. The components being studied include all species of vegetation, herbivores (grouse, snowshoe hares, ground squirrels, red squirrels and other small mammals), predators (lynx, coyotes, and raptors) (KBFEP, 1992). The emphasis of this study is to examine the consequences of different stresses on the components of the ecosystem, and understanding the causes of population cycles. The effects of one trophic level on another are measured by the changes in soil nutrients, plant biomass, herbivore biomass, and predator biomass. From these findings the researchers will be able to determine the major parts which hold the system together, their interactions, as well as those components which are most sensitive to change. The results of the project may then be utilized by wildlife managers when making decisions concerning habitat and population management. This type of information is critical to ensure that all pertinent ecological and biological requirements are met in any management plan.

4.3.6 Comparisons and Discussion

The Kluane National Park Reserve (KNPR) and the Yukon Territorial Government (YTG) are the two most active legislative bodies in greater Kluane. However, they have two different approaches to wildlife management, preservation versus sustained yield. By having separate objectives and methods they will in turn, have separate and possibly conflicting results.

Kluane National Park Reserve manages wildlife with preservation as their goal. The park management objectives provide the framework for planning and development, and then the Canadian Parks Service uses a zoning system, as described in section 4.3.1., as well as active research and management to meet their goals. Through this system various demands placed on wildlife and wilderness areas can be accommodated for while still preserving the park's wilderness character. Some areas may prohibit access, while other areas in the park allow people the opportunity to enjoy wildlife viewing or other wilderness activities as they see fit. If human activities begin to have negative repercussions on wildlife or habitat, the damaging activities are controlled. As in the case of Sheep Mountain, access to certain trails may be restricted. Another example of CPS approach to wildlife management can be shown in respect to grizzly bear management. All efforts are made to minimize the likelihood of contact between bears and people. Should an area become a high risk for contact, human use and access in this area will be strictly controlled (Env. Can., Parks, 1990). The CPS approach to wildlife management allows wildlife populations to fluctuate naturally

in a somewhat natural environment. All attempts are made to minimize human involvement in the wildlife ecosystem. The main objective is to avoid significant impact on the grizzlies. The CPS recognizes that the bears can not understand where limits to the park lie, and therefore use lands both inside and outside the park. By cooperating with the Government of the Yukon (YTG) officers, park managers hope to ensure rational management of these bears, outside the park. One of the benefits of this type of management is that by protecting and preserving the entire area, it ensures a variety of species and resources are accounted for, even if only indirectly. A disadvantage is the omission of humans in the system. It has been argued that humans have always played a role in the wildlife ecosystem, and by excluding them the system is not really functioning naturally. As well, there are yet people relying on wildlife for sustenance in the Yukon, and their needs must be considered.

The YTG manages wildlife from a different approach, on a "sustained yield" basis. The primary objective of the Fish and Wildlife Branch is to maintain existing populations of animals (YRR, 1985). Another objective is to improve hunting and wildlife viewing, and increase numbers of various animal populations (moose, caribou and goats). In order to achieve these goals a number of steps are followed. If a decline in population numbers is suspected, a study is done to determine the cause. If a lack of habitat is the limiting factor, an attempt is made to increase the area available by burning (YRR, 1985). If too many predators are the determined cause, an attempt is made to reduce their numbers. The

consequences of these actions are then dealt with accordingly.

To manage species on a sustained yield basis, the YTG relies on available biological information and harvest data. The success of this type of management is then limited by the available data or the knowledge base.

By examining bear management, the different approaches among agencies become evident. In a case of human-grizzly conflict in an area under the YTG jurisdiction, it must first be determined whether or not the bear posed a threat to humans or their livelihood (eg. livestock). If the bear was indeed found to be a 'problem bear', it would be relocated or destroyed. The YTG focuses on the human element in the wildlife ecosystem, and then manages wildlife accordingly.

The activities used to reach the YTG's objective of enhancing wildlife populations often have other consequences. If the YTG attempts to improve habitat by burning, effects on forestry, agriculture, trapping and recreation result. In addition, the ever-controversial predator control solicits objections from people who place different values on certain species. The consequences of this type of management are recognized by the YTG and have resulted in the culmination of three options which may be taken:

- to continue experimental programmes with wildlife enhancement
- to eliminate predator control programmes and allow natural fluctuations to influence hunting success
- to limit expansion of forestry, agriculture and recreation in areas of prime wildlife habitat. (YRR, 1985)

One of the limitations which is still evident is that one component of the ecosystem is dealt with at a time. Little regard is given to the functioning of the rest of the system. Another disadvantage comes from managing wildlife on a cost-benefit basis. If a particular value must be attached to the resource or species which is to be managed, who is to say what is the best value. For example, if the immediate economic value of moose is chosen, or the subsistence value of caribou, there is the possibility that we are perhaps overlooking the not so evident or unknown value of another species or resource at present and eliminating what may be discovered in the future.

Various agencies and plans have been discussed throughout this chapter, each with a different approach, and method for wildlife management. If an ecosystem perspective is employed here, the various agencies will be considered and all plans will be taken into account. The wildlife management model (model 1) includes these various agencies and by doing so acknowledges each plan and its importance in the functioning of the system. Each plan has its strengths and weaknesses which must be recognized. Cooperative management among these agencies may help to ensure consistent management over larger, and perhaps more naturally realistic areas. The following case studies demonstrate examples of cooperative approaches to wildlife management.

4.4 Species Specific Case Studies

4.4.1 Bear

An agreement in respect to Bear Management between Kluane National Park and Department of Renewable Resources, Yukon Territory Government may set a precedent for wildlife management in all National Parks. It is one of the first times that these two government bodies will be working together towards a common goal. Since bears cover large distances and do not respect Park boundaries, it is logical that agencies on both sides of these man-made boundaries have a mutual agreement in regards to managing bears. This is especially true for grizzly bears which have a low reproductive potential and have become significantly reduced in their range in southern Canada and United States. Even though Kluane National Park Reserve and the Yukon Government have different goals regarding the management of bears, preservation versus sustained yield, it is still in both agencies' best interests to cooperate in managing the grizzly and black bear population of the Kluane ecosystem (Brenneman, pers. comm). This agreement has also made provisions to include increasing interest group involvement such as the Department of Indian and Northern Affairs, and local Native bands.

The main product of the Bear Management Agreement was the creation of Bear Working Group, a technical body which functions to review programs and make recommendations to managers regarding policy changes. This working group is modelled after the Federal/Provincial Polar Bear Technical Committee,

and employs the signed Agreement as the group's mandate. Annual meetings are scheduled to allow the exchange of information on any bear related issues, and outside group involvement is encouraged. However, there is no legal obligation by any party to undertake any projects or expend resources. It functions mainly to "assist each agency when possible to ensure dialogue takes place in regards to bear management" (Brenneman, pers. comm). The primary area which is covered in this Agreement includes KNPR, a buffer zone of 50 km, as well as the Kluane Game Sanctuary.

This type of agreement is a step in the right direction for wildlife management since it recognizes that wildlife may not always respect legislative boundaries, and do move freely outside of protected areas. By including many different agencies in the agreement, presumably more information may be generated regarding the species in question, and more effective management will result. Unfortunately there are also severe limitations, as this agreement holds no actual legislative powers. The entire area defined in this agreement, while acknowledged as the bear's natural range (or ecosystem), is recognized as one system, but is still subject to more than one different governing body with more than one different set of rules.

4.4.2 Wolves

The subject of wolf management is almost always surrounded by controversy. The case of wolves in the Greater Kluane Region is no exception,

and managing this species has become a complex problem. Historically, wolves have been hated and feared, and at best considered a pest to be eliminated at first sight (Young, 1970). They have been regarded as a threat to domestic livestock, and having value only to trappers for their hides. For these reasons, in addition to loss of habitat, the wolf has been extirpated from most of its original range.

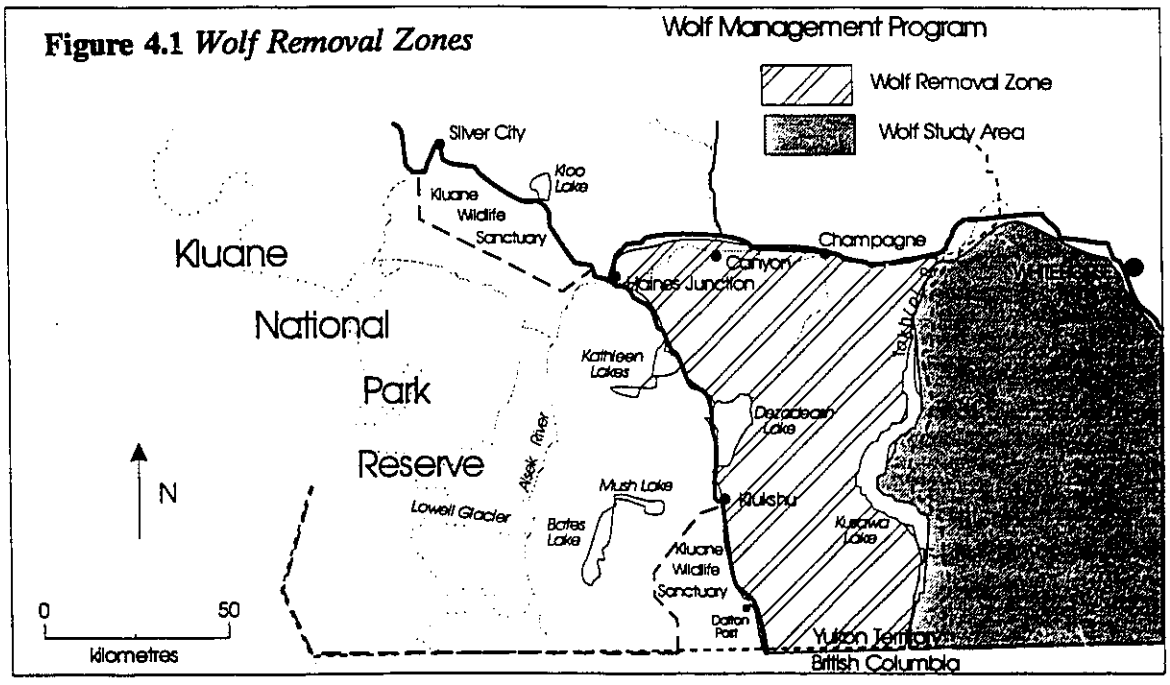
Recently, human attitudes towards the wolf have begun to change. Over the last several decades, people have shown an interest in photographing and listening to wolves, and a desire to protect these animals has been sparked. In areas where healthy wolf populations still exist, many people protest the harvesting of them, and maintain that they should be allowed to exist in their own right without interference. And so the debate began.

In the Yukon, hunting and trapping are still important for subsistence, recreation and the economy. The Umbrella Final Agreement outlined the importance wildlife plays in Native lifestyles, but there are also many non-Natives relying on moose, caribou and other wildlife species for their food and recreation. Operations such as guiding and outfitting also require healthy animal populations.

In the Yukon, the primary prey species of the wolf are moose, caribou and sheep (Pelchat, pers. comm.). The survival of the wolf is directly dependent upon healthy populations of these prey, and wolf numbers will fluctuate according to their availability. In the same respect, ungulate populations will fluctuate with the number of wolves preying on them.

The debate for or against managing wolves began to heat up as early as the 1950's, when reports surfaced suggesting that poison baits were routinely dropped in Kluane Wildlife Sanctuary to control wolf populations (Environment Canada, Parks, 1987). Then in 1983, following a 20% decline in the moose population, a wolf control program began in the Kluane area (Environment Canada, Parks, 1987). The Yukon Department of Renewable Resources began an effort to reduce wolf numbers by 70% over a 13,000 km^2 portion of the southern Yukon, bordering the Kluane National Park (YRR 1984) [see Figure 4.1]. Many people were outraged that this type of a program was carried out in such close proximity to a National Park. National Park regulations specify that there is to be no hunting or trapping of any species in a National Park. Before the debate accelerated, the wolf removal program was terminated early as the moose population apparently stabilized (Environment Canada, Parks 1987).

Figure 4.1 *Wolf Removal Zones*



The controversy heated up once again in late 1991 when the Yukon Fish and Wildlife Management Board met to discuss the recent and rapid decline of the Aishihik caribou herd. Complaints had been voiced by the Champagne and Aishihik First Nations that the caribou were at critically low levels, and a wolf control program was in order to stabilize the population. The Board recommended an aerial wolf kill to remove 150 wolves in 1993, 50 the next year and 50 each year after to a maximum of eight years. The goal is to double the Aishihik herd size to 1,200 by 1998 (anonymous, 1993).

The growing public sentiment seems to be that wolf reduction should not be conducted at all since it represents an unnecessary and unacceptable manipulation of a natural system for the benefit of hunters. "Particularly distasteful to many people is the notion of killing wolves to generate more ungulates for hunters to shoot because managers allowed the population to reach critically low levels" (YCS, 1992).

Yet, a priority item in the Yukon Land Claim acknowledges that the consumption of wildlife represents a crucial cultural and subsistence requirement for First Nations. Since the Champagne-Aishihik band rely on caribou, and even though the causes may be overhunting, low calf survival, and a lack of monitoring and regulations, caribou populations are still dwindling at a rapid rate.

At the same time, World Wildlife Fund Canada suggests that the wolf control program may "contravene an international agreement signed by Canada" (anonymous, 1993). Monte Hummel, president of WWF Canada asserts that the

wolf kill nullifies Canada's commitment to protect natural habitat in Kluane National Park, which is a world heritage site.

As the protests became greater against the program, a Yukon Wolf Conservation and Management Plan was developed. The Yukon Conservation Society published a report which produced recommendations to be adopted by the Yukon Territorial Government, the Yukon Fish and Wildlife Management Board, the Council for Yukon Indians, and the Local Renewable Resource Councils which will be established as a result of the separate First Nations land claim agreements and other similar cooperative management boards. Yukon Conservation Society is a non-government organization but has a great influence on policies dealing with wildlife and wilderness areas. To date, the recommendation had been accepted, however, the debate is still on-going. Nevertheless, organizations such as the YCS are vital to wildlife management today. They are able to act as a catalyst between the public, conservation groups, and the government. By encouraging involvement by all concerned parties, conflict may be avoided. In addition, there will be fewer instances of rushed ad hoc management decisions, as has been so often the case in the past when managing resources.

4.4.3 Migratory Birds

Currently, waterfowl are the only class of migratory birds in the Yukon which have a management plan. The responsibilities for managing waterfowl in the Yukon are carried out by the Canadian Wildlife Service (CWS) under the *Migratory Birds Convention Act.* Recently the CWS has been involved in the development of the *Yukon Waterfowl Management Plan 1991-1995* (1991) which considers all waterfowl found throughout the wetland and watershed areas of the Yukon Territory, and focuses on three main waterfowl activities - migration, staging and breeding.

The known major migration corridors are found to occur primarily in the southern and mid-Yukon. Thousands of birds (sandhill cranes, swans, geese, and a variety of ducks) use this route annually. One of their courses transverses south-east through the Greater Kluane Region.

Breeding occurs throughout most wetland areas but, comparatively, the Yukon does not produce ducks and other waterfowl at as high a rate as more southern regions. However, there are certain populations which nest only in the Yukon (eg. one subspecies of the Canada Goose [Thompson et al, 1988]) and the trumpeter swan which is rare elsewhere, rests here. Therefore, breeding habitat can be considered significant (Thompson et al, 1988).

As is often the case with wildlife management, species may only be managed if they can be shown to have some sort of value attached to them. The waterfowl in the Yukon is said to have aesthetic value as well as harvesting value.

Waterfowl are easily visible, and along with their bright plumage make them a valuable resource for aesthetic reasons. In addition, waterfowl shooting is a sport enjoyed by many people, and native harvesting for food and feathers has long been a common activity.

Waterfowl populations and management are linked to the management of wetlands and watersheds as this is their main habitat requirement. In the Yukon, wetland habitats are found in small patches or narrow bands. Due to these limited areas in the Yukon, the priorities relative to watershed management must be established early to avoid habitat degradation or destruction.

Many waterfowl species winter in Mexico, migrate in the spring and fall through the United States and Canada, and breed in northern Canada and Alaska. In such a case where a resource is shared through many jurisdictions, special management plans must be created. Cooperative waterfowl management has been recognized as a necessity in North America since the signing of the *Convention for the Protection of Migratory Birds* in 1916 by Canada and the United States (CWS, 1991). However, an increase in habitat loss from agriculture, industrial and urban developments have caused a decline in the status of waterfowl (CWS, 1991).

Canada and the United States have recently decided to reassess their cooperative activities and develop a North American Waterfowl Management Plan, which had been initiated in 1986. Annual monitoring and reviews by the Canadian Wildlife Service and the U.S. Fish and Wildlife Service took place, with

an updated progress report released in 1990. The aim was to establish sanctuary and refuge systems throughout North America (to date none have been set up in the Yukon). Then in 1991, the Canadian Wildlife Service, the Yukon Department of Renewable Resources and Ducks Unlimited Canada developed the *Yukon Waterfowl Management Plan*. This plan was created to "chart the course of Yukon waterfowl and wetland management" from 1990 to 1995, in coordination with the *North American Waterfowl Management Plan 1986*. Critical habitat areas in the Yukon will be identified during this time. The intended results are to develop protection plans in cooperation with Yukon First Nations as soon as land claims final agreements are met.

The management plan for migratory birds that was described above illustrates how management activities can be administered using an ecosystem perspective. There were many components which had been considered upon the formation of such a plan. Different government bodies had management plans in effect prior to the development of the *Yukon Waterfowl Management Plan*, but instead of attempting to change the various legislations, the *Plan* hopes to incorporate them and make provisions to allow future changes in management (ie. land claim settlements) to also be included. The *Plan* also considered the various ecological components of the birds' ecosystem. Social, economic, and cultural components were also considered with the formation of the *Plan*. It must be noted, however, that this is still only a plan, and a plan is only as good as it can its implementation.

In this chapter we have seen how wildlife management can be explored from a variety of different angles. Very broad or general management strategies that are applied over large areas and affect many different species of wildlife were examined in the federal section. Very specific management plans were also looked at with examples from three case studies. Furthermore, the case studies helped to illustrate various cooperative management approaches currently at work.

CHAPTER 5 DISCUSSION, SUMMARY & CONCLUSIONS

5.1 Ecosystem Approaches and Modelling

In the last two chapters the greater Kluane region was utilized as a case study to investigate the effectiveness of an ecosystem approach to wildlife management in wilderness areas. A conceptual model was designed to illustrate the workings of an ecosystem approach based on previous ecosystem modelling for resource management (Slocombe, 1989 & 1990; Burch, 1988; Agee & Johnson, 1988). The wildlife management model (model 1) was created to be used as a guideline when conducting an investigation using an ecosystem approach.

An ecosystem approach allows a different way of examining wildlife management, and while it does not directly offer a set of solutions, it allows the manager to take a different perspective when examining problems. Presenting a broader context in which to see current wildlife management may encourage the formation of new ideas and solutions by the managers.

By using an ecosystem approach to wildlife management in wilderness areas, the various parts that make up the system were examined, in addition to the various factors which influence it. Agee & Johnson (1988) suggest that "a systems approach will also identify social systems as critical components...helping to legitimize the role of culture and values in problem identification and solution". In the wildlife management model three key components were recognized, ecological, cultural, and socio-economic. However, the analysis was

not broken down into three separate and distinct components. Instead, the various characteristics associated with these components were examined throughout chapters three and four. The reason is that we are operating at a level of whole systems, and not reducing the analysis to separate classes, thus the interactions and linkages among these components is very important. Looking at wildlife, wilderness areas and management as one interacting system with its particular geographic area is the essence of an ecosystem approach.

As in all ecological studies, we are dealing with collectivities rather than individual organisms or their component parts (Burch, 1988). Designing and using a model such as the wildlife management model (model 1), encourages an holistic perspective to be applied to wildlife management. The ecological elements, interactions and boundaries are linked to social and economic components in the model, and as such, are incorporating a human element into resource management. Including a human dimension in wildlife and wilderness ecosystems is what differentiates ecosystem-based management. "Ecosystem approaches focus on interactions and systems behaviour, taking an ecological approach to changing patterns of structure and organization" (Slocombe, 1992) and how people and their activities interact with the other dimensions in the system is an essential part.

In order to analyze the various management aspects of the system in greater depth, the model may be taken one step further by setting up a matrix to examine the characteristics of the model with current management plans. By

taking this extra step, current management plans which affect the area of concern are displayed in a matrix format. From this, current gaps or overlaps in legislation which influence flows in model 1 are visible. In addition, the matrix can be updated in the future if changes in legislation occur or increases in research findings for any of the components are discovered, and easily incorporated into the model.

5.2 Matrix Modelling

The wildlife management model which was devised to illustrate the workings of an ecosystem approach also outlined various legislative bodies active in the study area. Four main administrations were identified from the model, and their activities were presented in chapter four. In order to evaluate these current management activities on a comparative basis, I developed a matrix to be used in conjunction with the wildlife management model. This matrix (Figure 5) examines the management plans on one axis, and the characteristics of the management model on the other axis. Since each of the characteristics of the model was identified as important to the healthy functioning of the ecosystem, they can be used to assess the effectiveness of current wildlife management plans from an ecosystem perspective. Each management plan will be examined using these criteria. The matrix will then provide the opportunity to see where certain jurisdictional gaps and/or overlaps occur in wildlife management for the area in question.

Figure 5 *Wildlife Management Matrix*

	MANAGEMENT PLANS				
Characteristics	Federal (DIAND)	Territorial (Yukon Renewable Resources)	CPS (KNPR Management Plan)	First Nations (Umbrella Final Agreement)	Total
Agriculture:					
livestock	0	0	1	0	1
fur farming	0	0	1	0	1
ranching	0	0	1	0	1
Social:					
archaeological	1	1	1	1	4
historical	1	1	0	1	3
ethnological	1	1	1	1	4
Non-consumptive Recreation:					
camping	0	1	1	0	2
hiking	0	1	1	0	2
wildlife viewing	0	1	1	0	2
Resource Extraction:					
pipeline	1	1	0	0	2
mining	1	1	0	0	2
power projects	1	1	0	0	2
Consumptive Uses:					
subsistence	1	1	1	1	4
sport hunting	0	1	0	1	2
rural resident lifestyles	1	1	0	1	3
Biological Processes:					
flora	0	1	1	1	3
fauna	1	1	1	1	4
Physical/Chemical Processes:					
hydrological	0	0	1	0	1
geological	1	1	1	0	3
atmospheric	0	0	0	0	0
Total	10	15	13	8	

LEGEND:
Do the management plans consider a characteristic in relation to wildlife:
Yes 1
No 0

Since the main purpose of this thesis was not to critically judge current management operations but rather to illustrate how an ecosystem approach can be used for wildlife management, the matrix scale should not be considered steadfast.

A matrix provides an opportunity to incorporate an ecosystem approach to wildlife management with existing management plans. The federal management plans that were examined included all documents made available to me through DIAND which discussed current statutes for any of the characteristics from the Wildlife Management Model. Similarly, the territorial management plans examined in the matrix consisted of a multitude of documents made available by the YRR concerning the same characteristics. Scores were assigned based on provisions made for wildlife in each component. If wildlife itself is considered directly in a management plan, a score of 1 is obtained. It should be noted that this is suggesting neither positive nor negative consideration, a score is given if it was determined that wildlife was discussed in a plan. A score of 0 would occur in a situation where either the characteristic itself is not included in any management plan, or wildlife is not considered at all.

A score of 1 in the matrix might be attained, for example, by the Yukon Territorial Government for game farming in a case where regulations were set up to restrict game farming in an area that is considered to be prime habitat for elk. Wildlife was considered directly in the management plans which affected game farming in certain areas. If regulations exist to consider the effects on wildlife for

any of the characteristics listed, a score is given. Often, even though many of the characteristics may be mentioned in a certain plan, there are no provisions set up for their impact on wildlife. In a case where wildlife is not considered directly a score of 0 is given. For example, Parks Canada restricts mining in National Parks, but it is based on policies against resource extraction rather than protection of wildlife. Similarly, no score is given to DIAND under "flora". While the importance of vegetation is discussed, I was unable to find mention of its connection to sustaining wildlife, nor any regulations. These examples illustrate the workings of the matrix, and from them it becomes clear that the matrix provides a quick summary of the various agencies and their management plans as they may or may not pertain to wildlife.

The Wildlife Management Matrix operationalizes the Wildlife Management Model by assigning values to the various administrative bodies identified in the model, based on the characteristics also identified in the model. When the assigned characteristics scores are totalled across the matrix, a summary of the degree to which the components are considered in management plans is presented. A total score of four in this column suggests that the characteristic has been widely considered in the management plans. Perhaps cooperative management among the administrators would benefit such a component, which in turn may help to avoid instances of conflicting regulations across various jurisdictions.

When the management plan scores are added downward, the totals suggest

the degree to which a particular administrative body manages wildlife based on an ecosystem perspective. The score of 15 for the Yukon Renewable Resources might suggest that their management plans consider wildlife more extensively than First Nations, whose score is 8.

The matrix also offers a different way of viewing the management techniques, from a holistic perspective. Managers are given the opportunity to see where their agency is proficient or deficient in wildlife management in relation to other agencies. In a case where the impact of game farming on wildlife has been addressed only by YRR, it can be pointed out to the other agencies who might then choose to include this component in their plans. Or in a case where all four agencies include the same component in each of their plans, a cooperative effort might be suggested to avoid conflicting legislation. Because the matrix is based on an holistic approach to wildlife management, and all components are considered interconnected, by coordinating the various agencies a larger system will be protected. Managers will be kept informed of developments in other agencies and the resulting increase in communication can only be seen as beneficial. It must be noted however, that the rankings in the Matrix do not measure an agency's ability to manage wildlife. The rankings are based on the actual legislative documents, and are rated according to what is written rather than what can be assumed or is inferred from these plans.

The matrix can easily be updated as legislation changes and it can also be expanded to include non-government organizations. An example of a non-

government organization which may be considered for inclusion is the Yukon Conservation Society (YCS). The YCS has a powerful influence over decisions concerning wildlife in the greater Kluane region, and is often consulted before major management activities are undertaken. While the YCS does not have any actual legislative power, it does release guidelines concerning what it deems appropriate actions and activities involving wildlife and wilderness. Its approval is often sought in connection with controversial issues, as we have seen with the wolf management. If the matrix were to be expanded, using the guidelines released by the YCS are one example of the way in which it could be done.

The characteristics of the matrix can also be expanded if the inclusion of other components is desired. At present in the greater Kluane region there are no large scale forest harvesting activities. However, should logging become an issue in the area, this characteristic could be included in the matrix, and would also be covered under *Resource Extraction* in the model. Similarly if a more in-depth analysis of any one characteristic is preferred, the matrix can again be expanded. For example, if water supply was the desired subject, *Physical/Chemical Processes* and *Biological Processes* could be extended to examine rivers, lakes, wetlands or other associated characteristics.

It becomes clear that the matrix is a way of summarizing the management framework in a given area. The matrix also helps to link the various concerned groups and administrators.

Altogether, this study has illustrated the workings of an ecosystem

approach and how this type of framework functions effectively for wildlife management. The greater Kluane region served as a case study area in which to explore from an ecosystem perspective. Model 1 was designed to serve as a guide, and examples of the principles suggested by the model were then examined.

5.3 Future Management Opportunities

This type of modelling allows for the inclusion of future research findings and management plans. It can be expanded or reduced to incorporate new ideas, as well it can be used to point out areas where cooperative management would benefit if there are large overlaps of jurisdiction. A system can be modelled at different levels, depending on the desired result. If a more extensive analysis is desired, more components may be explored in the model. The actual size of the area being investigated may also change according to need. Each level of the system has its own appropriate amount of detail, and different levels have different data requirements. Thus, by expanding or reducing the model, it can be altered for the desired outcome.

A generic template of the matrix may also be created which can be used for other areas or for other resources. Once the ecosystem boundaries for the desired study area have been defined, characteristics specific to the area would be added to, or would replace the sub-components in the matrix. The various institutions active in the area can then be listed across the top. The management plans to be compared can include government as well as non-government

organizations which operate in and around the region. Values are then assigned based on the set criteria (in this case, I considered whether or not the various components were considered directly in each of the wildlife management plans).

Starfield (1981) suggests that the results that are discovered in a model are predetermined by the way it is constructed and the assumptions that have been made en route. Depending on the objectives that are established, results will vary. A simple model, such as the wildlife management model, is not designed to impart specific remedies, but rather, used to yield results of general principles. They direct managers to think about a certain problem, establish objectives, and possibly form decisions of broad policy (Starfield, 1986).

Managers can use an ecosystem approach to integrate existing plans with up-to-date findings. Slocombe (1992) maintains that ecosystem-based management offers specific advantages to protected areas.

> "It encourages research and monitoring of socioeconomic and biophysical dimensions; it facilitates consideration of entire, functional ecosystems; permits incorporation of goals into analysis and planning; requires representation and learning from all actors; and highlights the importance of innovative and broad-based institutional and administrative design" (Slocombe, 1992).

However, this concept is not limited to just protected areas. Ecosystem approaches can be applied in virtually any geographical area. An holistic perspective can be offered to a region that might otherwise have management plans only in place for separate components, and lack an integrated process.

5.4 Summary

The purpose of this thesis was to investigate the effectiveness of an ecosystem approach for planning and management of sustainable wildlife populations within a wilderness setting. In order to reach this goal, a number of objectives were outlined. A review of the objectives and how they were achieved follows. The objectives:

1) Establish a framework illustrating an ecosystem approach.

2) Provide a description of wildlife in the wilderness area to be studied.

3) Achieve an understanding of the various stresses on wildlife population and habitat in the study area.

4) Investigate which management activities affect wildlife.

These goals were accomplished by:

1) Interviewing a variety of people from the case study area which were connected with wildlife and management. Significant literature reviews were also completed to gain an in-depth understanding of the study area at present, as well as in the past and for future planning. From the information attained, an ecosystemic model was designed for wildlife management in the study region. This model, which was introduced in chapter two, served as a guide for examining wildlife management.

2) Chapter three introduced the greater Kluane region and provided a background on the study area. Upon investigating the region, gaps in current available information were noted, and thus we were able to see areas where

future research may be required. For example, accurate wildlife population figures were often unattainable. These figures, however, are vital for wildlife management, especially when implementing harvesting quotas. Chapter four went into greater detail examining wildlife and the management thereof. The current statutes which affect wildlife and wilderness areas were presented.

3) Throughout chapters three and four, the various stresses in the system were recognized and discussed with particular emphasis on the effects on wildlife. A complete understanding of these stresses was shown to be imperative when coordinating an ecosystem-based management plan. The importance of maintaining a healthy and productive habitat was also recognized.

4) The management activities affecting wildlife were examined in chapters four and five. Three species specific case studies were presented which illustrated current cooperative and integrated management approaches. Through these examples, ecosystem-based management was explored, illustrating many of the principles discussed. Unfortunately, the management plans limited themselves to species-specific cases, rather than considering the entire system as is proposed in this study. Four of the main governing bodies were also examined in detail. The matrix, introduced in chapter five, compared these four administrative bodies active in greater Kluane. This matrix offered a brief managerial overview, and pointed out gaps and overlaps in current plans.

Together, the matrix and the wildlife management model function to gauge existing management plans using an ecosystem perspective. Decision makers are

then able to use this approach to evaluate plans and submit suggestions for future updates, inclusions, or coordinated efforts among managers. By employing an ecosystem approach as in this study, the system is placed in a larger context and a different perspective is offered.

5.5 Conclusions and Recommendations

With the constant surge of development and the ever increasing human population, more and more pressure has been shown to be placed on remaining natural resources. Competing uses of wilderness areas are no exception. Conflict among users of this resource has created an urgent need for different approaches and institutions to resource management. By employing an ecosystem approach to wildlife management in wilderness areas, this study examined its effectiveness in meeting the more demanding requirements of resource management today.

The greater Kluane region in Yukon Territory was chosen as a wilderness area, and as such, the special sensitivities connected with a northern region were also considered. The criteria used to define a wilderness area was presented, as well as the problems associated with the planning and management thereof.

Many significant issues which have developed in the Kluane region were also examined. These issues are important to planning programs since they are the basis which make planning a necessity, and against which decisions are measured. Some of the most pressing issues include: the Native land claim, use of the public access roads, wilderness recreation and tourism, mining, hunting and

the depletion of wildlife resources, as well as the construction of the Alaska Pipeline. An overview of these controversies examined the main social, environmental and political aspects of each.

One of the most important resources for many northern regions was shown to be wildlife. As such, wildlife management and the ability to sustain wildlife populations is vital to the healthy functioning of northern communities.

Habitat is one of the key factors in sustaining populations of wildlife. The destruction of habitat is a very real and pressing concern among northern regions, in addition to many other areas globally. Continuing resource explorations, diminishing natural resources and technological advances allowing access to areas previously inaccessible are all seriously affecting northern habitat. Escalating development and the ever-growing human populations are also taking their toll. Since in all probability, development will not subside in the future, resource management plans must make provisions for its inclusion.

A management regime which focuses on sustaining wildlife within wilderness areas, while at the same time considering the various other issues and concerns of the surrounding environment would be beneficial to Kluane as well as many other northern communities. An ecosystem approach to wildlife management was shown to meet these requirements. By employing an ecosystem approach in other areas world-wide, global sustainability may be achieved.

Recommendations

Through the use of the matrix, we were able to analyze various management plans which were administered at the time of the study. Implementation, and the effectiveness of these various plans over time was not considered here. The management plans are generally mere statements of intent, and they should not be confused with actual conservation action. In order to determine just how effective the plans are, perhaps subsequent matrices could be completed at regular intervals to monitor changes, and the resulting effects on wildlife.

The ability to successfully manage wildlife populations for sustainability or to conserve biological diversity, increases with the level of biological and ecological information available. The more that is known about particular species and their habitat, the more qualified we are to make decisions on their behalf. Thus, accurate and up-to-date information on wildlife species needs to be an on-going concern. Long term ecosystem studies and monitoring are also necessary to gain insight into the intricacies of wildlife and wilderness ecosystems.

There also has to be a heightened communication between decision makers and the public on wildlife issues. More and more it is evident that greater public involvement is required for successful resource management in the complex northern ecosystems. The relationships and dependencies of the people vary among the regions, and thus the knowledge of the local people should be incorporated with the formation of any new plan. Scientific and traditional

knowledge must both be considered when managing resources.

In order to achieve cooperative management among various disciplines and jurisdictions, we need updated legislation and policy changes. This may also help to eliminate conflicting mandates. A policy framework is required for wildlife management that will focus on entire ecosystems, not just a part or certain species. Legislation is also required to offer protection to critical habitat areas, and to enhance protection of wilderness areas. However, without better enforcement of the legislation little can actually be accomplished, and in order to increase enforcement, additional funds need to be set aside.

Most importantly, it is evident that we need actual implementation of ecosystem approaches to wildlife management. There have already been many instances of applying ecosystem approaches to watershed management, but insofar as wildlife management is concerned, we need less theorizing and more action taken to put ecosystem approaches into practice.

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Appendix A

Questions

- Who is responsible for managing wildlife within the Kluane region?
- How is the managment and planning decided?
- Are there many co-operative efforts between jurisdictions on wildlife managment?
- Does forestry management take wildlife into consideration? If so, what species?
- Is there room or provision for public participation in resource planning and management?
- Are there planning processes which identify land and resource capabilities and limits?
- What plans are there, and are goals set as to their use?
- How are priorities chosen for resource use and management? Is it necessary to choose priorities?
- What are the approximate ranges for big-game and fur-bearers?
- Are there managment strategies for specific species? Habitat?
- Are the impacts of major projects (ie. dams, pipelines) assessed for wildlife?
- Land use permits - land use planning - habitat considerations when approving land use permit? If so, for which species?
- What are the major conflicts between wildlife resource users in the greater Kluane region today?
- Where are the important mineral deposist and mining ocurring?
- Locations and frequency of subsistence hunting, in Park? buffer zones? Kluane region?
- Background information on wildlife population trends, use, human population growth, management history.
- Hunting regulations, resident and non-resident.
- Tourism - numbers, frequency, impact, special programs, regulations.
- Recreation - in Park, zoning.
- Non-consumptive uses of wildlife - viewing.

Appendix B

Interviews conducted July & August, 1992:

Ray Brenneman. Assistant Chief Warden, Kluane National Park Reserve. Environment Canada, Canadian Parks Service. Haines Junction, YT.

Bruce Chambers. Director, Renewable Resources, Northern Affairs Program, Indian and Northern Affairs Canada. 200 Range Road, Whitehorse, YT.

Mark Eikland. Youth Representative, Kluane Tribal Council. Burwash Landing.

Steven Fuller. Director, Policy & Planning, Renewable Resources, YTG.

George Johnson. Chief, Kluane Tribal Council. Burwash Landing, YT.

Dave Ladret. Park Management Planner, Planning Section. Parks and Outdoor Recreation Branch. Renewable Resources, YTG.

Dave Latoski. Head, Placer Mining Section, Chief Claims Inspector, Mineral Resources, Northern Affairs Program, Indian and Northern Affairs Canada.

Jim McIntyre. Chief, Parks and Outdoor Recreation Branch. Renewable Resources, YTG.

Alan Parkinson. Supervisor, Resource Planning, Policy, Planning and Assessment Branch, Renewable Resources, YTG.

Brian Pelchat. Chief, Big Game Management. Wildlife Management. Renewable Resources, YTG.

Kirstie Simpson. Manager, Environment and Conservation, Northern Affairs Program, DIAND.

Andy Williams. Manager, Arctic Institute of North America. Kluane Lake Research Station.

Additional information also gratefully obtained through a telephone interview with **Doug Yurich** from National Parks, Ottawa.