Wolves
Ecology, Conservation, and Management: An Annotated Bibliography

Compiled and Annotated by:
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Wolves

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Canadian Circumpolar Institute
Northern Reference Series #6
MacLaren, E. (Eli)
Wolves
(The Northern Reference Series, ISSN 1192-5620; no. 6)
Includes index

ISBN 1-896445-06-3


Keywords: Wolf — abundance, behavior, computer modelling, conservation, control, dispersal, ecology, historical evidence, genetics, management, movements, pathology, predator-prey dynamics, recovery, introduction, status, survival, taxonomy, wolf-human relationships

Cover illustration Isabel Levesque
Cover design by Art Design Printing Inc.

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The compilation of this annotated bibliography was prompted by an expressed interest by researchers from university and government for offprints of the Literature Cited section of the publication *Ecology and Conservation of Wolves in a Changing World*, published by the Canadian Circumpolar Institute in late 1995. At 65 pages in length, the Literature Cited section was already a substantial work in itself. Further, it was felt that this important document could be made even more useful as an annotated bibliography, supplemented with references that do not appear in the Literature Cited section of the book, and material published since 1995.

The annotated bibliography is aimed at those individuals who require an understanding of concepts and current issues related to wolves — researchers, academics, and students, conservation and renewable resource managers, wildlife officials, etc. whose primary areas of interest is the study of wolf ecology, conservation, and management.

The literature referenced includes published documents (especially journal papers and conference proceedings contributions), and “gray” literature. Examples of gray literature documents referenced include government records, commission reports, as well as position papers and proposals from wildlife and government organizations. Journal literature, conference proceedings, theses, and chapters and papers from monographs make up the largest portion of the bibliography. Newspaper articles and editorials have been referenced where appropriate.
This bibliography was produced with financial contributions from the Canadian Circumpolar Institute and the Canadian Circumpolar Library of the University of Alberta Library System. The assistance of Elaine Simpson (References Assistant, Science and Technology Division, UA Library System) is gratefully acknowledged for her advice and assistance with searches of numerous databases, CD-ROM products, and other catalogues. The compiler and editors are indebted to the many individuals and organizations who provided information for the bibliography, and access to specialized or personal collections. Especially, Dr. Ludwig N. Carbyn is thanked for his advice and assistance with the annotations, and for access to his extensive personal collection. Technical assistance with indexing was provided by Herb Ratsch of Art Design Printing Inc. We also thank Cindy Mason for assistance with proofreading of the manuscript.
Introduction

Hardly a day goes by that I am not contacted by someone — professional biologist or wolf “aficionado”, looking for information on wolves. The wolf, once persecuted and maligned, is now the subject of much reverence — certainly intense interest. This species has been the subject of some of the most involved and longest on-going research projects of any large mammal on earth. Much is known about the wolf — but there is yet much to learn. Consequently, the thirst for knowledge for this species is great, as is the continued effort to obtain more information.

In the last 10 years or so, the wolf has occupied the headlines of major newspaper, radio, and television newscasts. It continues to be the subject of intense debate, particularly in those areas where the species is making a comeback, through restoration programs and protectionist policies. As media exposure and research interest activities increase, so does public opinion increasingly influence wildlife policy — to the point where it now reflects an evolution of sentiment from “kill the wolf” to “protect the wolf”.

In Canada, the number of research studies on the wolf have increased in protected areas, National Parks, and elsewhere since the first studies began in Algonquin Provincial Park in the mid 1960’s. From 1980 to 1991, nineteen projects were registered using radio-telemetry for tracking of wolves. Nine major projects were conducted in the western mountain ranges of Alberta, British Columbia, and Yukon. Others were carried out in the Northwest Territories, Ontario, and Quebec. Our American neighbours are conducting ongoing research on wolves in Alaska, Wyoming, Idaho, Montana, Minnesota, and Michigan (Isle Royale). In Europe too, studies are being undertaken on the few small populations that remain, or those areas that are being newly colonized. In most cases, efforts to learn more about the ecology of the species have replaced an earlier human drive to eradicate them.

Wolf control methods and programs have taken many forms — from hunting, trapping, running down on snowmobile, poisoning, to shooting from aircraft.
Ethical concerns varied, too. Animal activists reject exploitation of any kind, while those in favor of protection might support ethical, responsible, and "reasonable" uses of animals, including lawful hunting and trapping, provided that sustainability of the species is a priority. One of the most widely contested issues of wolf management resides in efforts to increase wolf populations to provide game for humans to hunt.

Recent debates in North America have taken on new dimensions, now that the effects of wolf restoration programs are being known for wilderness areas of the Great Yellowstone ecosystem. An area teaming with prey, having lost its native wolf population some sixty years ago, is suitable wilderness area for reestablishing the species. Ranchers quite rightly have raised their concerns about the potential effects wolf predation may have on cattle, in areas where the two coexist.

Where does or will this lead? The inevitable process for the moment appears that wolf populations will expand in most areas of the world — either through natural dispersal or through active reintroduction programs. In either scenario, wolves, and man, will continue to compete for some of the same resources — be they hoofed prey or livestock. A major factor that now plays such an important role in wolf conservation is the "psychological" impact. Wolves are no longer what they used to be. What was once subjugated, is now an emblem of wilderness, "goodness" and worthy of protection, even propagation.

Eli MacLaren undertook an ambitious projet to collect, compile, and annotate many of the references that deal with several aspects of wolf biology, conservation, and management. A number of bibliographies are already available dealing with various aspects of wolf ecology, distribution, and biology research. This bibliography is a useful addition to the collection. There are references in this compilation that I have not found elsewhere. It is an invaluable resource for anyone wanting a "starting point" from which to learn more about wolves and their prey.
The following annotated bibliography represents the results of extensive searches of the catalogues of several major collections for relevant literature and other materials on ten major issues or themes related to the study of wolves. Several approaches were adopted in the construction of this reference work. Starting with the Literature Cited section of the publication *Ecology and Conservation of Wolves in a Changing World*, the compiler annotated the references, and then used the keywords gleaned from this exercise to locate other references pertaining to the issues. These secondary materials were then accessed directly, relevant material was annotated, and added to the bibliography. This accounted for approximately 60% of this work, with the remaining 40% being derived from a variety of different sources. First, extensive keyword searches were made of the University of Library holdings, including those in the Canadian Circumpolar Library. Secondly, keyword searches were made of selected CD-ROM products and databases including the GATE, the Environmental CD-ROM, the Arctic and Antarctic CD-ROM, and others. In addition to the above efforts, various wildlife organizations as well as federal, provincial, and territorial government departments were contacted to gain access to relevant material and the specialized library collections held by these institutions (e.g., the Department of Renewable Resources, the Canadian Wildlife Service of Parks Canada, and the ERIC Wildlife Database in the U.S.A.). Bibliographic material sought out at this stage was material published since 1992 (year of the *Second North American Symposium on Wolves*), to include those references that were not cited in the proceedings. Further, the compiler consulted professional biologists to secure references from their private collections. The bibliographies of accessed titles were also consulted from time to time for additional direction. Relevant titles were subsequently identified, and an attempt was made to access selected sources using call numbers. Interlibrary loan requests were submitted to other universities and institutions for titles not held locally, while recalls were made for relevant titles out on loan. The criteria for inclusion of a particular reference was that the source was held in a facility or in a collection that would be accessible to the reader.
In order to assist the reader, the annotated bibliography is divided thematically into ten sections, including: Status and History; Recovery, Restoration, and Reintroduction Programs; Predation, Food Habits and Wolf-Prey Interactions; Behavior, Physiology and Social Interactions; Taxonomy and Genetics; Diseases; Research Techniques; Management Techniques; Coyotes and Other Canids and Wolf-Coyote Relations; and, finally a "Miscellaneous" section. Where individual sources address more than one major issue or theme, entries have been duplicated and annotations cross-referenced as to section and code, with the abstract appearing in the first occurrence.

Individual sources are annotated separately. Annotations are generally two to three lines in length and describe in general terms the content and theme of the source.
Overview of Annotation Sections, Index, and Appendices

This section explains the general arrangement of the bibliography, gives advice to users, and provides some specific information relevant to the annotations. For the coded citations, the first number in the code refers to the chapter number, and the second is the number of the reference within the chapter. This system was used to facilitate cross-referencing and indexing.

1 Status and History — includes:
   - historical documents pertaining to wolves
   - first assessment of wolves in a specific locality
   - wolves’ recolonization of an area

2 Recovery, Restoration, Reintroduction Programs

3 Predation, Food Habits, and Wolf-Prey Interactions — includes:
   - abstract discussions of predator-prey theories

4 Behavior, Physiology, and Social Interactions — includes:
   - general information on the nature of wolves themselves

5 Taxonomy and Genetics — includes:
   - comparative anatomy
   - encyclopedic lists

6 Diseases

7 Research Techniques — includes:
   - field methods, density estimators, mathematical models,
   - pharmacological experiments
8 Management — includes:

- techniques, including anti-predator tactics
- conservation and conservation theory
- parks and hunting
- wolf-human interactions

9 Coyotes and Other Canids, and Wolf-Coyote Relations

10 Miscellaneous — includes:

- theoretical biology
- deer, elk, caribou, goat, sheep, grizzly bear articles
- general discussions of wilderness, wolf appreciation
- fiction, and personal writing about wolves
- animal rights literature
- fur trade and exploration literature
- children’s books about wolves

The index is arranged alphabetically by author’s last name or keyword. The numbers in the index refer to the citation numbers that appear next to each reference included in the bibliography. Most indexed items have more than one citation number, as they appear in more than one citation, or the same citation appears in more than one section of the bibliography.

Several periodical abbreviations occur in the citations in this bibliography. An alphabetical list (by abbreviation) of these periodicals is provided in Appendix A because of their limited currency and frequently specialized use.

Most of the material included in this bibliography can be located through the University of Alberta Library System; however, some may be available only through the specialized libraries mentioned in the section on Methodology. Appendix B provides addresses for specialized libraries consulted.
   A handbook describing both the appearance and behavior of North American fur-bearing animals, and methods of hunting and trapping them for profit. Includes a list of American game laws.

   Reports 200 places in England that are named after wolves. Suggests that wolves were still prevalent in England during the time of its colonization by the Anglo-Saxons.

   A brief summary of methods of trapping, poisoning and hunting predators in order to decrease destruction of livestock.

   A history of predator control in Quebec, 1905-80.

   Presents information on wolf population trends, status, distribution, depredation, interactions with dogs, and mortality caused by humans.
Chapter 1


Summarizes population, distribution, depredation on livestock, extent of hybridization with feral dogs, and mortality of wolves in Spain, 1987-88.


Describes the numbers, distribution, and population dynamics of wolves (*Canis lupus*) in Italy, 1972-89. Discusses wolf conservation, touching on agriculture, public opinion, the threat of interbreeding, and competition with feral dogs.


A history of the persecuted and largely extinct gray wolf (*Canis lupus*) populations of Arizona, New Mexico, Texas and Mexico. Discusses destructive predator control methods 1890-1950, the life history of a wolf, and famous wolves, including “Old One Toe.”


Reports an observation of two wolf (*Canis lupus*) cubs accompanied by a pair of adults, made on the evening of 18 July 1990, near Badlanddal, Hold with Hope, northeast Greenland.


A precise, expository synthesis of modern wolf biology. Introduces and comprehensively discusses the evolution, taxonomy, distribution, anatomy, physiology, behavior, conservation and human perceptions of wolves worldwide. Includes a glossary, photographs, a list of wolf conservation organizations, and copies of the Endangered Species Act of 1973 and the I.U.C.N. Manifesto on Wolf Conservation.


   Discusses the controversial status of the wolf (*Canis lupus*) in Canada. Comments on range, protection, livestock depredation, wildlife management, caribou populations, and conservation strategies.

   A compilation of the proceedings of the Wolf Symposium held in Edmonton, Alberta, 12-14 May, 1981, addressing the status, biology and management of wolves (*Canis lupus*).

   Discusses the gradual increase of wolf (*Canis lupus*) numbers in North America. Touches on range, management, Yellowstone and New Mexico reintroduction, depredation, and political perspectives.

   Maps and tabulates all recorded observations of wolves (*Canis lupus*) in Yellowstone National Park, 1930-71.

   A bulletin describing the history, behavior, food habits and economic value of wolves (*Canis lupus*) and coyotes (*Canis latrans*). Surveys the problem and methods of predator control.

   Portrays the current and historical status of the wolf in North and East Greenland National Park. Maps a hypothetical immigration route from Canada, as well as all recorded wolf sightings in this area, 1871-1984.

   Discusses the historical population dynamics of wolves (*Canis lupus*) and brown bears (*Ursus arctos*) in this area, based on a study of over 3000 records of bounty payments. Relates data to human population density, forest concentration, and the Napoleonic wars.
   Describes the density, distribution and numbers of wolves (Canis lupus lycaon) in Minnesota since 1950. Features a presentation of data using maps.

   An investigation into wolf (Canis lupus) biology, predation, disease and control in Wood Buffalo National Park, 1951-52.

   Chronicles the history of the antitrapping movement. Includes charts and maps of legislative actions, and an overview of different strategies used throughout the history of antitrapping.

   Outlines the physiography, history, classification, physical characters, behavior, habitat, distribution, population, faunal association, movements, prey relationships, parasites and mortality of wolves (Canis lupus) in Banff National Park, 1944-50.


   A vivid history of the activity, management and ideological signification of wolves in American culture, 1600 to the present, emphasizing times of European colonization, extreme extermination practices, and modern conservation efforts. Includes a number of photographs representative of human attitudes towards and interactions with wolves.
   A history of the period 1886-1918, during which the American National Parks were administered under the authority of the military.

   A compilation of research articles describing aspects of the biology of wolves throughout the world. Regions studied include northcentral Minnesota, Vancouver Island, Alaska, Wood Buffalo National Park, Riding Mountain National Park, Russia and the former republics of the USSR, Karelia, Sweden, Italy, Israel, and Iran. Concludes with discussion of future wolf conservation.

   Takes issue with the claim that there is little information published about reproducing wolves in Greenland by touring the extant literature, particularly that published by Dawes.

   An encyclopedic inventory of the wildlife of Banff and Jasper National Parks, 1974-81. Provides information on status, distribution, existing records and habitat for each animal listed. Includes a history of the park areas, 1800-1980.

   Summarizes the population dynamics, demography, hunting, mortality, poaching, mean litter size, pack size, predation, biogeography and history of wolves in Białowieża Primeval Forest (BPF).

   Assesses the number of wolves (Canis lupus) in two areas of India to be about 500. Postulates recommendations for conservation, including public education and a compensation system for livestock owners.
Chapter 1

Outlines the population dynamics of wolves in the Kievka valley, 1930-1993. Traces recent declines to hunting, environmental deterioration, and trophic competition with tigers. Written in Russian, with an English summary.

Discusses the Wisconsin glaciation, and its effect on the distribution of mammals, including bears, wolves, black-tailed deer, moose, caribou, elk, mountain goats, and mountain sheep, along the southern coast of Alaska.

A compilation of essays and reports dealing comprehensively with wolf ecology, behavior, and management. Discusses the status of wolves in Michigan, Montana, the Northwest Territories, central Europe, and Finland; describes territoriality, vocalizations, social hierarchy, predation; reports on translocation and reintroduction efforts; and touches on the nature of the endangered red wolf (Canis rufus).

A report of the results of an aerial strip survey conducted to determine the quantities and qualities of wolf (Canis lupus) and Peary caribou (Rangifer tarandus) populations of southern Banks Island, March 1993. Maps population densities of the animals studied.


Documents a 1988 observation supporting the supposition of wolf reproduction occurring in Greenland.
   A collection of case studies of European mammals, commenting on their status, description, habitat, behavior, diet, breeding, population, distribution, and conservation.

   A zoological report of thirteen species of mammals observed or inferred to be resident on Banks Island, Canada, 1952-53. Comments on previously unencountered races of *Lepus arcticus* and *Lemmus trimucronatus*.

   A historical survey of the wildlife of North America, divided according to region, and a commentary on the effects of European civilization’s incursion into it.

   A report on the abundance and location of extant red wolf subspecies, based on vocalization, trapping and helicopter-capture data, Texas and Louisiana, 1972-77.


   A comprehensive study of the wolf (*Canis lupus*) in North America. Discusses wolf society, communication, reproduction, movement patterns, food habits, predation, relations with non-prey species, and conservation.
Chapter 1

   A brief account of the history, distribution, and conservation of the wolf (Canis lupus) in North America.

   Reports results and methods of calculating the size of wolf (Canis lupus) populations in the Superior National Forest, Minnesota, 1968-73.

   Summarizes results and methods of calculating the size of wolf populations in the Superior National Forest, Minnesota, 1967-85.

   Suggests, based on a radiocarbon dating technique, that wolves were active at a site on Ellesmere Island over 700 years ago.

   A compilation of data about, and tentative assessment of, wolves (Canis lupus arctos, C.l. bernardi, C.l. manningi) on the arctic islands of Canada.
   Calls for continued research on wolves of the Canadian Arctic.

   Offers a rough census of wolf (Canis lupus) populations in the Canadian archipelago, based on a questionnaire sent to research teams, 1967-1991.

   Discusses the likelihood of the recolonization of parts of Michigan and Wisconsin by wolves (Canis lupus), using a multiple logistic regression model, geographic information systems (GISs) and spatial radiocollar data. Judges Michigan to be a better candidate for wolf conservation than Wisconsin.
   Discusses trends in the geographic distribution of wolves (Canis lupus) in Sweden, as well as the consequences for wildlife management and conservation. Written in Swedish.

   A compilation of reports surveying wolf population numbers and trends in Game Management Units (GMU) 1-3, 5, 7, 9, 11-14, and 19-26, Alaska, 1987-88.

   Describes type, distribution, general characters, colour, skull, and general measurements of a Mexican wolf classified Canis nubilus baileyi.

   Describes the history, distribution, and conservation of the red wolf (Canis lupus) in the southern United States.

   Extrapolates from data on wolves (Canis lupus) killed by hunting to an estimation of current numbers, conditions and distribution of wolves in Poland.

   Outlines the historical and present status and distribution of wolves (Canis lupus) in Poland, where they are a threatened species. Notes that wolves occur most frequently in southeast and northeast corners of the country.

   Maps the domain, and outlines the plight of the endangered and misunderstood red wolf (Canis rufus) in Arkansas, Louisiana and Texas.
Chapter 1

Compiles descriptions of Alaskan mammals, including shrews, bears, foxes, wolves, martens, ermines, weasels, minks, otters, wolverines, lynxes, hares, marmots, squirrels, lemmings, voles, beavers, muskrats, moose, caribou, and sheep.

A catalogue of wildlife encountered by the First and Second Northern Land Expeditions under the command of Sir John Franklin, 1819 and 1825 respectively, as compiled by the expedition’s naturalist.

Constructs a general history of wolves (Canis lupus) in the Central Valley, the Sierra Nevada foothills and the Coast Ranges of California, using fossil evidence. Relates trends in the wolf populations to those of ungulates and coyotes (Canis latrans).


Characterizes eleven different regions in the USSR according to the distribution of wolves (Canis lupus), foxes (Vulpes vulpes), corsac foxes (V. corsac) and raccoon dogs (Nyctereutes procyonoides) in each. Discusses rabies epizootics in each region.

Systematically accounts for the forms, habitats, status and breeding patterns of the mammalian species thought to reside within Jasper National Park, Alberta. Includes a brief history of the park.

A history chronicling and mapping the distribution of wolves in Alberta, 1800-1969.
A study addressing the history, distribution, range, density, population, dens and litter sizes, food habits, social and predatory behavior, and control of wolves in Minnesota, 1946-53. Includes discussions on white-tailed deer (Odocoileus virginianus).

Discusses the plight of the gray wolf (Canis lupus) in Canada, touching on vulnerability, range, numbers, taxonomy, bounty, and conservation, and the role that Canada should play in wolf management. Maps wolf ecotypes in Canada.

Uses evidence from observations, howling, winter tracking and scat analyses of wolves (Canis lupus) in Wisconsin, 1968-75, in order to comment on their status in this state.

A history of wolves and wolf management in Wisconsin, 1634 to the present. Moves from an introduction about general wolf biology to detailed commentary on human attitudes and wolf populations during the settlement and development of Wisconsin, in order to characterize the extermination and subsequent recovery of wolves in Wisconsin. Includes appendices listing specimens of Wisconsin wolves, wolf ranges, related canids, and prominent wolf biologists.


Reports observations of wolf (Canis lupus) cubs and adults, made in late July 1988 at Hold with Hope, northeast Greenland.
Chapter 1


An exhaustive account of the behavior, economic status, control methods, history, taxonomy, and cranial measurements of the North American wolf (*Canis lupus*).


A pamphlet outlining what is known about wolves (*Canis lupus*) in the Yukon. Summarizes wolf biology, aboriginal interactions with wolves, history of wolf control, and modern conservation efforts.

Surveys the public of Idaho, Montana and Wyoming on the issue of wolf restoration. Includes analysis of variance across the three states on attitudes toward the wolf, wolf knowledge, and willingness to reintroduce the wolf.


Surveys citizens of Wyoming on the issue of reintroducing wolves to Yellowstone National Park. Assesses how factors such as distance from restoration area, education level and attitude towards wolves correlate with survey data.


An anecdotal history of the reintroduction of wolves to Yellowstone National Park, and the public controversy leading up to and surrounding it. Moves from a summary of early twentieth century wolf extirpation practices to dramatic descriptions of the scientific and legal events experienced by proponents of wolf conservation. Includes a timeline of relevant occurrences, 1872-1995, and photographs.
Chapter 2

A comprehensive account of wolves (Canis lupus) in the Beltrami Island State Forest. Studies and discusses population dynamics, territoriality, dispersal, pack formation, scat analyses, and predation activities.

Reviews the problem of wolf (Canis lupus) conservation in North America. Explains failings of previous theoretical approaches to wolf recovery and management, lists factors that affect wolf resiliency, and remarks on the role of human attitudes towards wolves.

Prepresents results of a survey of Michigan public attitudes towards wolf (Canis lupus) restoration. Identifies anti-predator attitudes with rural populations and anti-authority attitudes with local communities.

See section 1.

Reports on the attitudes of groups of hunters and naturalists in New Brunswick towards the idea of wolf reintroduction. States that the groups opposed wolf reintroduction. Discusses reasons for this opposition, and educational strategies to combat it.

A diary-style, day-by-day narration of the restoration of wolves to Yellowstone National Park, 1994-96. Chronicles the challenges that the relocated wolves faced in the first years of their new lives. Includes maps of the Greater Yellowstone Ecosystem.

Presents results of a survey of visitors to Yellowstone National Park on the issue of the wolf (*Canis lupus irremotus*) restoration project.


Outlines the history of wolf (*Canis lupus*) range and conservation. Argues that the practice of management zoning could reestablish wolves to more of their former range, and dispel the myth that wolves exist only in extreme wilderness.


Compares Yellowstone National Park to Denali National Park, Alaska, to resolve some of the controversy over reintroduction of wolves (*Canis lupus*) to the former. Outlines public benefits of wolves in Yellowstone.


Comments on the amended section 10[j] of the American Endangered Species Act, which protects restored populations under the designation “experimental.” Uses red wolves (*Canis rufus*) in Alligator River, North Carolina, as an example.


Presents results of a mail survey of Colorado residents on the issue of wolf (*Canis lupus*) reintroduction. States that public attitude favours wolf reintroduction. Notes that urban communities are generally more supportive of wolf reintroduction than rural ones are.


A review of methods and problems of reintroducing wolves in North America. Analyses biology and status of various wolf varieties in Canada and the United States, as well as social attitudes towards restoration projects.

Views various historical and contemporary informed opinions on the issue of wolf reintroducton to Yellowstone National Park.


A compendium of historical, scientific, legal and journalistic documents centered on the controversial issue and subsequent fact of wolf reintroduction to Yellowstone National Park, based on the premise that the most accurate account is the one that preserves the voices of the original participants.


Collects data from pre-existing literature and Park records in order to predict the ways in which ungulates and park visitors would be affected by the proposed restoration of wolves (Canis lupus) to Yellowstone National Park.


A discussion of wolf (Canis lupus) recovery in the Rocky Mountains of the contiguous United States. Addresses the wolf as an endangered species; the story of wolves in Minnesota; proposals for recovery in Montana, Yellowstone and Idaho; the historical and current range of the wolf; and reasons for the recovery program.


Surveys public attitudes on the new population of gray wolves (Canis lupus) along the North Fork of the Flathead River, Montana, 1987, both generally and with respect to potential restriction of recreational activities in that area.

Addresses the question in predator-prey models of the relation between prey population size and the average number of prey killed by a single predator. Researches the functional responses when the amount of time spent foraging by a predator changes with prey density in an adaptive manner.


Examines causes and qualities of caribou (Rangifer tarandus) calf mortality, 1984-87. Cites grizzly bears (Ursus arctos) and wolves (Canis lupus) as the main predators.


Discusses wolves, moose, and the unique ecosystem which was produced when these two came into contact on Isle Royale, Lake Superior sometime after 1949. A study of predator-prey relationships.


A study of the population, movements and diet of wolves (Canis lupus) in relation to the Western Arctic caribou (Rangifer tarandus) herd, Alaska, 1987-92. Employs and evaluates such technologies as radio-tracking, line-intercept track sampling, and satellite telemetry.
Chapter 3

Documents mortality in a radio-collared sample of 123 moose (Alces alces gigas) in south central Alaska, 1977-78. Citing brown bears and gray wolves as the main predators, the report addresses ungulate-carnivore relationships.

A study of the population, spatial relationships, and predation of wolves (Canis lupus) with respect to the Western Arctic caribou (Rangifer tarandus granti) herd, 1987-89. Reports on success of telemetry and census techniques.

Compares the digestibility, protein content, metabolizable energy, and resultant fecal consistency of different diets for captive maned wolves. Suggests that a more delicate variety of less proteinaceous foods may help prevent gingivitis and cystinuria in captive populations.

Investigates the hypothesis that caribou (Rangifer tarandus) continue to range in central Ontario, despite populations of moose (Alces alces) and wolves (Canis lupus), only because their habitat has escape features, which provide protection against wolves from calving time through summer.

Chronicles the history of the Nelchina caribou (Rangifer tarandus) herd from 1950 to 1984, during which time the gray wolf (Canis lupus) population was reduced twice. Correlational evidence suggests that predation is the main limiting factor in the dynamics of the Nelchina herd.
Defends the theory that wolf predation is the main limiting factor in the dynamics of the Nelchina herd, in the light of opposition from Van Ballenberghe.

Studies the question of which limiting factor, wolf (Canis lupus) predation or winter starvation, affects caribou (Rangifer tarandus) populations more. Experiments with wolf control in B.C. to explain fluctuations in numbers of Spatsizi-Lawyer and Level-Kawdy caribou populations.

Discusses annual variation in caribou (Rangifer tarandus) calf survival, effects of snow, caribou tactics for the reduction of encounters with predators, tactics to reduce detection, and tactics to reduce capture success.

Examines moose (Alces alces) populations inhabiting ranges with and without wolves (Canis lupus) to determine both population density and population limiting factors.

Studies calving behavior of caribou (Rangifer tarandus) in Spatsizi Provincial Park, to test the hypothesis that cows seek high south slopes in mountains as calving locations to avoid wolves (Canis lupus) and bears (Ursus arctos).

Surveys moose (Alces alces) and gray wolf (Canis lupus) populations in Pukaskwa National Park, Ontario, to determine the limiting role played by the latter on the former. Presents a model to explain differences in moose population density.

Describes the population increase in the Avalon Peninsula caribou (Rangifer tarandus) herd from 720 animals in 1967 to 3000 in 1979. The evidence presented agrees with the notion that predation is an important natural limiting factor.


Develops a theory of herbivore population regulation in forested ecosystems, using the spruce bark beetle ( Ips typographus ) as an example. Discusses “tight” and “loose” adherence to equilibrium, metastability, and management.


Describes and explains ways in which social behavior affects predator-prey relationships. Examples vary from fish to mammals.


Describes wolf ( Canis lupus ) density, numbers, territory size, lone wolf range, oversummer increase, overwinter loss, consumption rates, prey selection, and predatory impact, for wolf populations in northwestern Alberta, 1975-81.


Theorizes on the relationship between wolf ( Canis lupus ) productivity and ungulate biomass available per wolf, based on evidence from various wolf reproductive tracts.


Objects to the widespread acceptance of predation as the major limiting factor on moose ( Alces alces ) populations. Wolf ( Canis lupus ) predation is not more important than hunting or bear ( Ursus arctos, Ursus americanus ) predation.

Finds that wolves (Canis lupus) colonizing northern Montana select mainly juvenile and old white-tailed deer (Odocoileus virginianus) and elk (Cervus elaphus) as prey, and that their predation does not therefore compete with hunting in the area.


Describes the history of the red deer (Cervus elaphus) in Vogtland, Germany. Remarks on the effect that the extermination of wolves has had on red deer populations. Written in German, with an English summary.


See section 1.


Describes winter food habits of gray wolves (Canis lupus), based on a study in Riding Mountain National Park, 1978-79. Prey includes elk (Cervus elaphus), moose (Alces alces) and white-tailed deer (Odocoileus virginianus).


Studies predation by wolves (Canis lupus) on bison (Bison bison) when calves are young and defenseless. Reports on bison cow-calf interactions, calf pod formation, and wolf predation attempts.


Monitors wolf (Canis lupus) predation on bison (Bison bison) after calving season, Wood Buffalo National Park, Alberta, 1980, 1986, and 1987. Describes defense strategies used by bison to protect calves.
Chapter 3


An historical review and extended field study of the bison (Bison bison) and wolf (Canis lupus) populations of Wood Buffalo National Park, and their interactions, 1972-91.


A report compiling studies of predator-prey relations in Riding Mountain National Park, 1985-86. Addresses predation by wolves (Canis lupus) and coyotes (Canis latrans), interactions between these predators, interspecific canid scent marking, and behavioral-ecology of coyotes.


Chronicles the history of moose (Alces alces) distribution and abundance north of the Brooks Range, Alaska, 1890-1970. Graphs moose population dynamics in this period against numbers of both wolves (Canis lupus) and Nunamiut hunters.


Discusses the roles of wolves (Canis lupus) and forage availability in limiting populations of moose (Alces alces) and caribou (Rangifer tarandus) in the Quebec-Labrador peninsula.


Develops and implements a technique of wolf stomach and scat analysis that can distinguish between food consumed as whole prey, and food obtained by scavenging prey remains. Lists ungulates, chickens, pigs, lagomorphs, arthropods and fruit as items in the diet of wolves in Spain, 1970-1985.

Investigates the intricacies of predator-prey relations in the context of caribou (Rangifer tarandus) population dynamics. Discusses functional response of wolves (Canis lupus), numeric response, regulation, and density-dependent predation by bears (Ursus arctos).


Approaches the analysis of type-III functional responses from an energetic perspective. Examines optimal foraging velocity, food density, the movement cost function, and community stability.


Reevaluates data and conclusions on the population dynamics of the Nelchina caribou (Rangifer tarandus) herd of southcentral Alaska, citing Bergerud, Van Ballenberghe and Ballard.


A study of mountain caribou (Rangifer tarandus) in Alberta, 1987-89. Discusses calf survival, migration, fidelity to calving sites, summer habitat, effects of winter severity and snowfall, and antipredator tactics such as dispersal.


Notes that a number of healthy adult caribou (Rangifer tarandus) were killed and not entirely consumed by gray wolves (Canis lupus) along Alaska’s Copper River, March 1979.

Describes mountain goat (*Oreamnos americanus*) reproduction in west-central Alberta. Mentions predation by wolves as a limiting factor in young goat recruitment.


Studies scat content of captive wolves (*Canis lupus*) in order to relate remains of prey found in the scat to wolf feeding habits.


Researches the predator-prey relations among wolves (*Canis lupus*), moose (*Alces alces*), deer (*Odocoileus virginianus*) and beaver (*Castor canadensis*) in Algonquin Park, 1987-92, by means of radio-tracking, and track, pellet, and aerial surveys. Concludes that the wolf population responds primarily to the availability of deer.


Reconstructs six incidents of predation by wolf (*Canis lupus*) packs on white-tailed deer (*Odocoileus virginianus*), based on interpreting tracks, 1968-70. Includes photographs, diagrams and maps of Algonquin Park.


Observes that the winter activity, sociality, movement patterns, and feeding habits (predation on white-tailed deer (*Odocoileus virginianus*)) of wolves (*Canis lupus*) in north-central Minnesota change with respect to varying snow depths.


Describes population studies carried out on wolves (*Canis lupus*) of northern Alberta between October 1975 and June 1978. Touches on numbers, distribution, reproduction, mortality, prey relationships, winter predation rates, summer food habits and impact of disturbance.

Uses scat analysis and food marks analysis to generalize about the food habits of wolves. Judges wolves to be decidedly opportunistic. Written in Chinese, with an English summary.


Studies moose (Alces alces) population status, and discusses the role of predation in maintaining a low-density dynamic equilibrium, well below the environment’s carrying capacity for moose. Postulates conservation recommendations.


Reports on an attempt to determine the relationships among wolves (Canis lupus), moose (Alces alces), and caribou (Rangifer tarandus) in central Alaska, 1990-91. Investigates whether more caribou reduce predation pressure on moose.


Describes predation of wolves on elk and maral. Averages times spent and distances travelled in the chases. Written in Russian, with an English summary.


Furthers the study of predator-prey interactions, using a mathematical time model to better characterize the role of age-dependent predation. Discusses the age of senescence of the prey as a powerful stabilizing factor.
Chapter 3


Investigates whether or not wolf (Canis lupus) predation primarily limits recruitment in black-tailed deer (Odocoileus hemionus columbianus) populations on Vancouver Island, 1980-82. Discusses management implications.


Discusses the population dynamics of black-tailed deer (Odocoileus hemionus columbianus) on Vancouver Island, 1970-90, with the help of a mathematical model of the influence of wolf (Canis lupus) predation. Proposes that juvenile survival has the largest impact on recruitment.


A presentation of an experiment designed to determine whether and how wolves (Canis lupus) play an important limiting role in the population dynamics of caribou (Rangifer tarandus) and moose (Alces alces) of the southwest Yukon, so that Aishihik and Burwash ungulates can be better understood and preserved.


Describes the geographic pattern of wolf (Canis lupus) den distribution on migratory caribou (Rangifer tarandus) ranges, with respect to the hypothesis that wolf den-density and reproductive success are greatest near the tree line.


Describes selection and consumption of prey by the Alaskan wolf (Canis lupus pambasileus), as determined by application of the fallout radiocesium method.

Theorizes factors relevant to predation, based on a study of *Neodiprion sertifer* in southwestern Ontario. Discusses predator and prey densities, functional and numerical response, prey characteristics, and alternate foods.


A general account of vertebrate and invertebrate predation, touching on learning, rate of successful search, time of exposure, time of handling prey, and hunger. Discusses prey defenses, such as Batesian or Müllerian mimicry.


Addresses migration, ranges, social grouping, survival rates, mortality factors, and deer-wolf interactions of a group of radio-tagged white-tailed deer (*Odocoileus virginianus*), which were tracked 1973-74 in NE Minnesota.


Relates depth of snow to wolf (*Canis lupus*) predation on elk (*Cervus elaphus*) in Banff National Park, Alberta. Finds that kill rate is proportional to snow depth, that more calves are selected when snow is of intermediate depth, and that more adults are selected when snow is very deep. Discusses the significance of such a density-independent variable in predator-prey models.


Explains the preference of wolves (*Canis lupus*) for elk and deer over bighorn sheep and mountain goats as a function of encounter rates, which are in turn affected by habitat overlap. Presents a simple model for functional response that incorporates habitat overlap.
Chapter 3

Records the ages and conditions of elk (Cervus elaphus) killed by wolves (Canis lupus) in Banff National Park, Alberta. Contrasts measurements of elk killed by wolves with those of elk killed accidentally on road or railway, thus demonstrating the selective predation of wolves.


Compared the pristine and exploited parts of Bialowieza Primeval Forest, Poland, on the points of tree populations, ungulate populations, and wolf (Canis lupus) activity.

Studies predator-prey relations between endangered blackbuck antelopes (Antelope cervicapra) and endangered wolves (Canis lupus pallipes) in a region of India. Discusses biomass consumption rates, alternate food sources for the wolves (including rodents and hares), food sources for the antelopes (Prosopis juliflora), and management of the two species.

Summarizes the history and comments on the status of black-tailed deer (Odocoileus hemionus columbianus) in the Nimpkish Valley, 1967-83. Relates population trends, winter range, hunting and predation.
   Documents an unsuccessful attack on a group of elk (Cervus elaphus) by three wolves (Canis lupus) along the lower Athabasca River in Jasper National Park, Alberta, 26 March, 1980.


   Discusses nutritional constraints, energetics in foraging in snow, efficiency of locomotion in long migrations, and fleetness of escape from predation as factors bearing on the variable leg length of caribou (Rangifer tarandus).

   See section 1.

   Examines mortality of white-tailed deer (Odocoileus virginianus) fawns caused by wolves (Canis lupus) and black bears (Ursus americanus), Minnesota, 1989-1990. Remarks on the reliability of serum urea nitrogen (SUN) measurements in predicting which fawns will survive, and which will perish.

   Studies the feeding behavior and ecology of wolves (Canis lupus) in the Thelon Game Sanctuary, Northwest Territories, 1960-68. Graphs average daily food consumption, and mean growth curves.
Chapter 3

Reports winter diets of wolves (Canis lupus) in the Keewatin District, as indicated through analysis of carcass stomach contents, 1987-88. Prey species specified include caribou (Rangifer tarandus) and moose (Alces alces).

Assesses proximate causes of calf and adult female moose (Alces alces) mortality, 1983-85. Touches on predation by grizzly bears (Ursus arctos), wolves (Canis lupus), black bears (Ursus americanus), as well as human influences.

Prepares a mathematical model of territorial pattern formation of wolves (Canis lupus), based on data from northeastern Minnesota. Discusses scent-marking, and the use of buffer zones between territories as refuges by white-tailed deer (Odocoileus virginianus).

Synthesizes information on population dynamics and predator-prey relationships of wolves and red deer in Voronezh National Park, Russia, 1930-1980. Written in Russian, with an English summary.

An analysis of the accuracy of contemporary predator-prey theories, such as those based on hyperbolic and sigmoid models of functional and numerical response, in describing existing predation data for wolves (Canis lupus) and moose (Alces alces). Advocates more extensive use of linear models to explain wolf-moose dynamics.

Examines predation of wolves (Canis lupus) on roe deer (Capreolus capreolus), red deer (Cervus elaphus) and wild boars (Sus scrofa). Analyses wolf scats collected 1988-1992.
Predation, Food Habits, and Wolf-Prey Interactions

   Illuminates a relation between predator-prey dynamics and dendrochronology in Isle Royale National Park, Michigan. Shows that trees grow faster when wolf (Canis lupus) predation limits herbivore activity. Suggests not only that density of tree rings is proportional to wolf predation in a given year, but also that the forested ecosystem is subject to top-down trophic (food chain) control.

   A study of the ecology of wolves (Canis lupus) and moose (Alces alces) in Isle Royale National Park, Michigan, 1959-61.

   See section 1.

   Reports a tendency of white-tailed deer (Odocoileus virginianus) to inhabit the margins of wolf (Canis lupus)-pack territories, where wolves face intraspecific conflict, and discusses it as an evolutionary strategy for predator-prey equilibrium.

   Presents data on the activity of two adult wolves and three yearlings, observed in July 1993, on Ellesmere Island. Remarks on the use of a rendezvous site, predation on Arctic hares, and division of labour between the alpha male and female.

   Studies the decline in white-tailed deer (Odocoileus virginianus) numbers in northeastern Minnesota from 1968-75, and the possible role of predation by wolves (Canis lupus) in causing it. Includes map of study area.
Chronicles and discusses a 20.8 km pursuit of a white-tailed deer (Odocoileus virginianus) by a young wolf (Canis lupus) in Lake County, Minnesota, 25 November 1977.

Measures relation between winter severity and wolf (Canis lupus) depredation on domestic animals, 1979-86. Hypothesizes that severe winters make wild prey more vulnerable to wolves, thus reducing depredation on domestic animals.

Relates vitality of white-tailed deer (Odocoileus virginianus) fawns to an inverse nutritional index (based on snow-depth) of maternal nutrition during gestation. Discusses effects of nutrition through first- and second-generations.

Analyzes scats from wolves (Canis lupus) in areas of different ungulate concentrations in Italy, 1987-92, in order to test whether or not ungulates are the favourite food of wolves. Records alternative prey.

Describes types of land, such as pastures and bushy areas, used by wolves in the northern Apennines of Italy, 1987-1989. Lists fruit (Rosaceae), livestock and wild boar (Sus scrofa) among the major food items.

Presents data on population density and related behavioral attributes of wolves (Canis lupus) at two different moose (Alces alces) densities. Reports on mortality and reproduction, social organization, and spatial distribution.

3-90. Messier, F. 1991. The significance of limiting and regulating factors on the demography of moose and white-tailed deer. J. Anim. Ecol. 60: 377-393. Discusses the roles of wolf (Canis lupus) predation, animal abundance, annual and cumulative snow accumulation, animal density, and nutrition in moose (Alces alces) and white-tailed deer (Odocoileus virginianus) population dynamics.


Determines that the prevalence, mean number and mean weight of *Echinococcus granulosus* cysts in the lungs of moose increases with moose density, and links this finding to increased wolf predation and transmission of the parasite.


Determines causes of mortality for caribou (*Rangifer tarandus*) carcasses found in the Northwest Territories, 1981. Lists wolf predation, atelectasis, abandonment, pneumonia, patho-physiological effects, and trauma as causes.


Monitors predation strategies of wolves (*Canis lupus*) in the presence of large numbers of newborn caribou (*Rangifer tarandus groenlandicus*). Attributes surplus killing to high calf densities and vulnerability on calving grounds.


Finds rodents, birds and fruits of *Solanum lycocarpum* to account for most of the biomass consumption of maned wolves in central Brazil, based on scat analysis. Discusses the wolves' opportunistic feeding habits in connection with the conservation of savanna ('cerrado') and grassland ('campo') ecosystems in Brazil.
Experiments with hand-reared black-tailed deer (Odocoileus hemionus columbianus) and droppings of various predators, to determine whether or not predator odors may serve as deer repellents.

Researches the factors necessary for predator “switching” to occur, using predatory sea-shore snails and their prey, mussels and barnacles, as examples.

A treatise on predator-prey interactions and their effects in stabilizing or upsetting the balance of natural populations. Discusses density-dependence, refuges, spatial heterogeneity, invulnerable age-classes, functional response, and learning.

Clarifies the meaning of the term “density dependence” in studies of population dynamics. Argues that the ambiguity of the term results in part from its use when theories of competition would be more accurate.

Monitors the survival of 203 white-tailed deer (Odocoileus virginianus) from January through April 1975-85. Researches the correlation among deer mortality, gray wolf (Canis lupus) predation and depth of snow.

Examines rates at which deer (Odocoileus virginianus) are killed by wolves (Canis lupus) relative to migration, yarding behavior, and dispersal. Touches on changing weather and unfamiliar terrain to explain higher fall predation rates.

Records incidents in which wolf packs attacked but could not subdue white-tailed deer (Odocoileus virginianus) and moose (Alces alces).
Chapter 3


Documents a case in northeastern Minnesota in which a deer (*Odocoileus virginianus*) stood its ground against attacking wolves (*Canis lupus*) until the predators retreated.


A discussion of the role of a predator’s functional response in the stability of a prey’s population, suggesting in particular that predation be regarded as stabilizing if the predation rate is increasing, relatively. Relates findings to local stability and structural stability in a modified Lotka-Volterra model and a general multispecies model.


States that, from 1984-88 in southeastern Poland, most of the red deer (*Cervus elaphus*) killed by wolves (*Canis lupus*) were calves or female adults, that the average age of adult prey was 7.2 years, and that femur marrow fat content of prey was generally high.


Synthesizes information on wolf (*Canis lupus*) food habits, from the post-glacial period to the present, with special reference to Białowieża Primeval Forest (Belarus/Poland). Mentions red deer (*Cervus elaphus*), moose (*Alces alces*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), European bison (*Bison bonasus*) and lynx (*Lynx lynx*).


Researches mortality in populations of European bison (*Bison bonasus*), moose (*Alces alces*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*) in relation to poaching, traffic accidents, disease, starvation, climatic conditions and predation by wolves (*Canis lupus*), lynx (*Lynx lynx*) and stray dogs.

A study of predator-prey relations between wolves (Canis lupus) and bison (Bison bison) of Wood Buffalo National Park, 1978-81. Graphs and charts data obtained.


Examines age-specific variation in maternal care traits of white-tailed deer (Odocoileus virginianus). Finds that a doe’s experience (i.e. age) benefits the neonate’s bedsire habitat, movement patterns, social and/or spatial relationships, and evasive tactics.


Discovers goats, sheep, pigs and cows to be major constituents of the diet of wolves (Canis lupus) in Greece, based on a study of 32 wolf stomachs, 1991-1992.


Maps and discusses distribution of wolf (Canis lupus) observations within the Kaminuriak caribou (Rangifer tarandus groenlandicus) range, Manitoba, Saskatchewan, and Northwest Territories, 1966-68.


Researches the natural regulation of moose (Alces alces) population densities. Discusses abrupt environmental change, seral forage availability, habitat stability, and the roles of weather, predation and disease.
Investigates factors affecting wolf (Canis lupus) density, 1976-81. Discusses physical characteristics of the wolves, feeding ecology, predator-prey relationships, population dynamics, and behavior.

A compilation of papers on predator-prey relationships, predator management, behavior and interspecific relations of predators, and predator biology in Central and North America.

Compares wolf (Canis lupus) diet and prey selectivity when deer are scarce (1974-76) and when deer are abundant (1980-84), by compiling data from wolf scat analysis. Assesses “antiregulatory” effects of wolf predation on deer.

Evaluates the impact of wolf (Canis lupus) reduction on beaver (Castor canadensis) population dynamics in Papineau-Labelle, 1983-88.

Evaluates the effectiveness of wolf (Canis lupus) reduction by aerial shooting as a means to control wolf and deer (Odocoileus virginianus) populations. Touches on wolf density, deer numbers and density, buck harvest, and fawn survival.

Examines the components of functional response that are related to variation in the preferabilities of some foods and in the spatial distribution of the food items in an organism’s habitat. Based on a study of Peromyscus maniculatus.

Chronicles a case in which a radio-collared alpha female wolf (Canis lupus) loitered beneath a nesting colony of great blue herons (Ardea herodias) in Wisconsin in order to obtain fish or chicks lost from the heron nest.


Determines diets of wolves in Spain from scat analyses. Discusses seasonal and annual variations in diet, the role of garbage, population estimates, and livestock damages.


An extensive case study of the social and predatory behavior of Panthera leo massaicus, Serengeti Park, Tanzania, 1966-69. Draws conclusions on the dynamics of predator-prey systems.


Records an incident of predation behavior in which three wolves attacked a postcalving herd of caribou, and caused it to retreat in the direction from which it had come, July 1992.


Determines predator-prey interactions among caribou (Rangifer tarandus caribou), wolves (Canis lupus) and moose (Alces alces) in southeastern B.C. Evaluates hypothesis that wolf predation on caribou is greater where there are caribou and moose.


Describes beaver (Castor canadensis) ecology and history on Isle Royale, Michigan. Addresses competition with moose (Alces alces) for food, and predation by wolves (Canis lupus).

Discusses the foraging behavior of Ethiopian wolves. Observes that wolves feed on rabbits (*Lepus starcki*), giant molerats (*Tachyoryctes macrocephalus*), and other rats (*Arvicanthis blicki, Lophuromys melanonyx, Otomys typus*), in that order of preference.


Researches the prevalence of the molerat, its habitat preferences and availability to wolves, in the Bale Mountains, Ethiopia, using direct observation and transect sampling. Discusses predator-prey interactions of wolves and molerats.


Discusses the regulation of large ungulate populations by predators, and the role of environmental productivity in predator-prey interactions. Assesses whether or not existing models adequately predict such interactions.


Discusses the results of a wolf (*Canis lupus*)-control program initiated near Fairbanks, regarding the question of whether wolf regulation benefits declining ungulate populations.


Studies wolf (*Canis lupus*) diet by scatological analysis, southeastern Poland, 1989-92. Lists red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), and wild boar (*Sus scrofa*) among prey consumed, and notes a higher consumption of wild boar and domestic livestock during winter.


Discusses the processes which regulate animal populations, touching on various theories of control, the essentials of natural control, periodic fluctuation, balance of populations, variation and variability.
Predation, Food Habits, and Wolf-Prey Interactions

   See section 1.

   Discusses strategies, such as calving on small offshore islets, retreat to water or coniferous terrain, or retreat to areas of high human activity, employed by moose (Alces alces) to protect themselves from wolves, on Isle Royale, Michigan, 1972-81.

   Documents a fight between three wolves and a family of moose that included a cow and two neonatal twins.

   Records incidents of wolves feeding on geese or geese eggs, Copper River Delta, Alaska. Discusses the effects of this alternate food habit, such as less predation on moose (Alces alces).

   A study of wolf (Canis lupus) ecology, focussing on the population dynamics motivated by wolf predation on Dall sheep (Ovis dalli dalli) in the west-central Yukon, 1985-86.

   A guide to the important topics in predator-prey interactions. Discusses predation theory, field studies, population limitation, social structures, prey refuges, functional response, spatial relations, patterns and cycles, evolution of interactions, and the role of predation in ecology.

   Explores the theory that physical prey refuges stabilize relations between wolves (Canis lupus) and white-tailed deer (Odocoileus virginianus) in Minnesota. Resultant models touch on Lotka-Volterra interaction, attack-and density-induced movement, and variable boundaries.
Chapter 3

Critiques the use of prey:wolf ratios as simple indicators of the impact of wolf (Canis lupus) predation, by reviewing and introducing factors that complicate the indicative relation.

Considers many possible systems of wolf (Canis lupus)-ungulate relationships in order to systematize the assessment of whether or not wolf control would increase ungulate numbers.


Reviews Bergerud’s theory regarding factors limiting moose (Alces alces) populations at Pukaskwa National Park and Isle Royale. Proposes alternate explanations based on such factors as effects of weather, food, and cohort vulnerability.

Remarks on the suspected role of wolves (Canis lupus) in limiting the numbers of wild Bactrian camels in Great Gobi National Park of Mongolia.

Presents historical and contemporary data on the Fortymile caribou herd of Alaska. Makes comparisons to the Nelchina herd on points of predation, hunting, and other management concerns.

Clarifies the effects of wolf (Canis lupus) predation on the population dynamics of the Nelchina caribou (Rangifer tarandus). Reviews data on calf survival, ungulate:wolf ratios, and winter severity.

Reviews previous data, analyses and conclusions concerning the population dynamics of the Nelchina caribou (Rangifer tarandus) herd of south-central Alaska, to resolve controversy over them.


Reviews literature on moose (Alces alces)-predator interactions, to determine whether moose are limited or regulated by predation. Discusses the distinction between limitation and regulation in population dynamics.


Documents a number of incidents in the activity of wolf (Canis lupus) pack in Jasper National Park, Alberta, 1979. Describes the wolves’ lying on a frozen lake, killing of a bighorn sheep (Ovis canadensis) and killing of an elk (Cervus elaphus).


Relates prey consumed by wolves (Canis lupus) to resultant scat content, mathematically. Discusses mule deer (Odocoileus hemionus), elk (Cervus elaphus) and moose (Alces alces) carcasses. Suggests revisions to the Floyd equation.


Records an incident in which two adult male wolves were dealt fatal blows by an adult female moose, northeastern Jasper National Park, July 1989. Discusses the event in terms of moose distribution in the area, and the danger wolves naturally face in hunting large prey.


Discusses the statistics and techniques of wolf (Canis lupus) predation on marals (Cervus elaphus sibiricus) in a nature reserve in Russia. Suggests an instability in the predator-prey relations that results from human interference. Written in Russian, with an English summary.
   Researches the question of how wolves use water to survive in hot desert climates, such as that experienced by *Canis lupus pallipes* in Israel. Measures metabolic rates, evaporative water loss, mean water turnover rates, total body water and frequency of drinking of captive female wolves.

   Uses captive wolf packs to study the relationship between social and endocrine influences on urinary behavior. Graphs seasonal changes in serum estradiol, testosterone concentrations, and weekly index of urination rate.

   Presents a technique, developed in Minnesota, involving protein-bound iodine for labelling anal-sac secretions of wolves (*Canis lupus*). Charts rates of deposition of anal-sac secretions for a pack of 7 wolves.

   Studies the denning ecology of gray wolves in southcentral Alaska, 1976-81. Reports on den distribution, tunnel measurements, preferred locations, mean elevation of den, and mean distance from water supply.
Chapter 4


Notes a distance of at least 732 km journeyed by a minimum of 2 wolves (*Canis lupus*) from the same pack, from St. Anne’s Creek, Nelchina Basin, southcentral Alaska, to the Brooks Mountain Range of northeastern Alaska, 1978.


Monitors wolves’ (*Canis lupus*) attendance at their den, southcentral Alaska, 1980-81. Graphs various individual attendance probabilities, and discusses roles played by different wolves with respect to den responsibilities.


Discusses the performance of bows by playing dogs, coyotes (*Canis latrans*) and wolves (*Canis lupus*), which are used to explain to their playmates actions such as biting and shaking of the head, which might otherwise be misinterpreted as hostile.


See section 3.


Discusses parental care invested by individual wolves (*Canis lupus*) in their young, based on a study conducted in Montana and southeastern British Columbia. Assesses behavioral flexibility in wolf reproductive strategies.

Documents the killing of a female cougar by wolves. Notes that the wolves did not feed on the carcass of the cougar.


A collection of spectacular photographs portraying the life of a wolf (*Canis lupus*) pack on Ellesmere Island, Canada, supported by a text describing the author’s observations of the wolves and their environment.


   A study of wolves (*Canis lupus*) in Riding Mountain National Park, 1975-79, progressing in its discussion from ecological observations on territory, population, spatial relations, mortality, movements and predation to implications for the management of wolves in this area.

   Presents observations on the territorial behavior of wolves (*Canis lupus*) in Riding Mountain National Park, Manitoba. Discusses an incident of one pack’s trespassing into the range of another pack and displacing it, despite an abundance of prey.

   See section 1.

   Records the giant kidney-worm (*Dioctophyma renale*) to be the most common endoparasite in maned wolves. Assembles data on maned wolf reproductive and alimentary behavior, from a decade of field observations.

   Studies wolf (*Canis lupus*) denning strategies in the Superior National Forest, 1969-88. Observes that denning sites approach the geometric center of the winter territory as the size of the territory increases, such that wolves with large territories minimize the distances they must travel.

   Monitors predation, mortality of adults, procreation, pup survival, pack structure and dynamics, and movements of wolves (*Canis lupus*) in the Western Arctic Study Area, Northwest Territories. Places research in the context of the importance of wolves to Inuvialuit culture.

Describes behavior of young wolves playing in water, using observations taken of wolves in the wild (Banff, AB) and in captivity (central Nova Scotia).


Analyses the acoustical structure of vocalizations of new-born wolf pups according to spectral type, duration, rate of frequency modulation, and spectral bandwidth, through the first six weeks of their lives.


Documents observations about how wolves (Canis lupus) respond to simulated howling, 1980-83. Discusses why the wolves’ responses varied from indifference to eager reply and approach.


Records estimates of wolf (Canis lupus) numbers in the Snake Indian Valley of Jasper National Park, 1965-83. Compares data on colour phase to those of wolf studies at this and other North American locations.


Discusses strategies in the mating behavior of wolves. Argues that females establish monogamous pair-bonding despite the male drive to promiscuity, and that females elicit protection for their young by constructing paternity illusions in other males.


Describes mating competition, partner preference and aggression in captive wolves (Canis lupus) of Burger’s Zoo in Arnhem (the Netherlands), 1977-1985. Shows that male aggression relates specifically to partner preference in mating, while female aggression constantly enforces dominance.

Measures values of PCV, hemoglobin concentration, mean cell volume and RBC counts in captive Mexican wolf (Canis lupus baileyi) pups.


Compares turning behavior in marbled polecats, wolves, and honey badgers.


Discusses olfactory differentiation in mammals, the function of the vomeronasal pathway in sexual behavior, flehmen, and reception of endocrine-derived primer sex pheromones.


Links differences observed in the playful behavior of wolf (Canis lupus lupus), poodle (Canis lupus f. fam.) and golden jackal (Canis aureus) pups to phylogenetic differences in social organization. Argues that communicative play is in canids a vehicle through which social structure is developed and maintained.


Notes an 886-km dispersal by a radio-collared male wolf (Canis lupus) from International Falls, Minnesota to Carrot River, Saskatchewan to be one of the longest recorded dispersals for a terrestrial mammal.


See section 3.


See section 3.


Chronicles an incident in which three wolves attacked a black bear in order to drive it away from the remains of a white-tailed deer (Odocoileus virginianus) fawn.
Behavior, Physiology, and Social Interactions

Examines the dispersal patterns of wolves (Canis lupus). Discusses sex and age of dispersers; time, distance, direction of dispersal; natal philopatry vs. dispersal; effect of weight; predispersal forays; sibling dispersal.

Analyses eight life history traits in carnivores in relation to allometric, phylogenetic, and ecological variation.

Discusses the use of vocalizations in nurturing relations between mothers and pups.

Reports on human influences, both direct and indirect, on wolves (Canis lupus arctos), given observations from a weather station on Slidre Fiord, Ellesmere Island, 1973-74. Characterizes visits of wolves to a garbage dump.

Describes the activity of wolves (Canis lupus) around muskox (Ovibos moschatus) carcasses long after the edible part had been consumed, Polar Bear Pass, Bathurst Inlet, Northwest Territories, 1977. Records range and speed of pups that ventured away from the carcasses alone.

Reports the greatest length and zygomatic width of five big gray wolf (Canis lupus) skulls found in Alberta, 1966-74. The measurements of three exceed previous records.
   A study of social dynamics (especially altruism and role specialization), range, predation, population structure and denning patterns of wolves (Canis lupus) in the Denali area of Alaska. Discusses a related computer simulation.

   Summarizes the natural patterns and forces which limit population size. Refers to both classical density-dependent limitation and interspecific competition, in a discussion of each trophic level.

   Monitors howling sessions at two wolf (Canis lupus) pack homesites. Discusses rate of howling; its relation to seasonal, diurnal and pack factors; and its role in intrapack and interpack contexts.

   See section 1.

   Studies the relationship between the presence of adult auxiliary wolves (Canis lupus) and wolf pup survival based on measurements of litter sizes at 8 months and pup weights at 6 months, Minnesota, 1971-76.

   Tests the hypothesis that the ability of dogs to hear high-frequency sounds increases as the distance between the animals’ ears (functional interaural distance) decreases. Argues that no significant correlation exists between either aural sensitivity and interaural distance or aural sensitivity and size of tympanic membrane.
Maps and discusses the movements of five laboratory-reared wolves (Canis lupus) released near Umiat, Alaska.

Analyses the growth rate of wolf fetuses, by measuring mass, length, cranio-caudal length, humerus length, contour length, and other features of morphology, based on observations of 97 pregnant wolves shot by Inuit hunters, 1987-89. Discusses reproductive and developmental strategies for canids.

Compares male and female wolves according to twenty-two physiological measures. Suggests that the division of labour between the sexes, with males hunting prey and females nurturing young, has naturally selected sexual dimorphism.

Comments on the relation between road density and wolf (Canis lupus) distribution, based on a 1980-81 study.

Studies the influences of light on the locomotor activity and phasing of 16 species of carnivore. Draws conclusions regarding both optimal visual range and behavior.

Records an incident of aggression between a grizzly bear and cub, and a large pack of wolves. Discusses the significance that such interspecific aggression might have for conservation programs that put the two species together.
Chapter 4


   See section 1.


   Compares activity of captive wolves (Canis lupus) enclosed in spaces of different proportions. Suggests that the amount of activity of kenned wolves is not different from that of wolves in larger, natural enclosures.


   Characterizes prolactin (PRL) release in gray wolves (Canis lupus). Reports on circannual PRL rhythm, on alteration of this rhythm, and on opioid, monoaminergic, and endocrine regulation of PRL secretion.


   Records the characteristics and movements of three young wolves (Canis lupus) from the same litter, as part of continuing studies on relationships between wolves and caribou (Rangifer tarandus).


   An introduction to and overview of the ecology and behavior of wolves, presented in concert with an array of photographs displaying the activity of wolves.


   Describes, discusses and compares the howls, whimpers, growls and barks of wild canids, including red wolves (Canis rufus), as recorded in Louisiana and Texas, 1972-75. Features sonograms of red wolf vocalizations.
Correlates measurements of the cortisol:creatinine ratio in urine samples of individual wolves with observations of aggressive behavior, in order to assess the reliability of the ratio as a physiological index of stress. Finds low-ranking females and high-ranking males to have the highest ratios.

See section 3.

Details an episode in the movements and hunting practices of a group of wolves (Canis lupus) in Lake Country, Minnesota, 18 January 1964, as observed from a 90-hp Aeronca “Champ” aircraft.

See section 1.

Presents results from a study of radio-tracked wolves (Canis lupus lycaon) in the Superior National Forest. Discusses population trends, productivity, causes of mortality, social distribution of mortality, and mortality rates.

Records the length of life and some life details of six wolves (Canis lupus) radio-tracked in northeastern Minnesota, 1968-85.

Reports on wolf mortality in, and ingress into, an area in Minnesota where road density exceeds 0.58 km/km², 1969-86.
Chapter 4

   Summarizes existing observations made of wolves (Canis lupus) in north-eastern Minnesota, 1968-89, in order to present time spent by wolves in various activities in statistical form.

   Records an incident in which an alpha male wolf (Canis lupus), joined later by its mate, confronted and chased an alien adult wolf on Ellesmere Island, Northwest Territories. Discusses why the alien was not killed.

   Argues that, contrary to what was previously thought, young wolves (Canis lupus) show a high degree of resiliency towards adverse meteorological events. Based on a study of wolves in Denali National Park, Alaska, and Ellesmere Island, Northwest Territories.


   Records mean summer travel speeds of a number of wolves observed on Ellesmere Island, Northwest Territories.

   Chronicles social structure and reproduction in a wolf (Canis lupus) pack on Ellesmere Island, Northwest Territories, 1986-95.

   See section 3.

An edition of four articles on wolf (*Canis lupus*) biology in Minnesota, addressing movements, behavior, ecology, prey information, effects of snow, and the possible occurrence of Great Plains Wolves in this area.


Describes activities, social structure, and individual histories of members of the Perch Lake Wolf (*Canis lupus*) Pack of northeastern Minnesota, 1973-81.


*See section 3.*


Documents the evidence of a single male wolf (*Canis lupus*) breeding with two females in the one breeding season, in northeastern Minnesota. Includes a diagram of ranges, radiolocations and den sites.


Documents and discusses incidents in which wolves (*Canis lupus*) were killed by their prey, probably white-tailed deer (*Odocoileus virginianus*).


Documents two cases of Minnesota wolves (*Canis lupus*) evidencing reproductive characteristics or behavior, despite being reproductively immature. Discusses pseudopregnancy and adaptive value of unfulfilled reproductive activity.
Documents cases of wolves (Canis lupus) dispersing from northern Minnesota to neighbouring states. Notes that wolves may cross major highways when dispersing.

Tests R.P. Thiels’s theory that the occurrence of wolves (Canis lupus) in Minnesota is limited at a threshold road density of 0.58 km/km². Includes a map of wolf ranges in northern Minnesota.

Records cases of wild and captive wolves digging dens in a year when they did not produce any pups. Hypothesizes that the endocrine cause of denning lies in prolactin, and not ovarian estrogen or progesterone.

Documents vaginal bleeding, estrus, and breeding in female wolves (Canis lupus), and breeding in a male wolf, none of which were above ten months of age. Discusses the importance of nutrition in early breeding.

See section 3.

See section 3.

Discusses the concept of play, from an anthropological perspective. Addresses such topics as the definition of play, the reason for play, and Funktionslust.
Researches the relations between glacio-fluvial habitats and denning patterns of various mammals in the Lac de Gras region of the Central Arctic. Includes maps detailing esker and den concentrations in the area. (Summaries in Dene, Inuktitut Syllabics, and Inuktitut Roman.)

Measures 145 skulls of wolves from the Carpathian Mountains and the Białowieża Primeval Forest, Poland, along 17 selected characters. Analyzes results in terms of sexual dimorphism, and differences between specimens from the two areas.

Describes habitual movements of wolf packs in the Superior National Forest of northeast Minnesota, particularly as concerns predation by and trapping of wolves.

Discusses population dynamics of wolves (*Canis lupus*) in parks in Russia, 1992. Observes an inversely proportional relation between numbers of wolves and numbers of stray dogs. Written in Russian, with an English summary.

*See section 3.*

Advocates a theory of natural regulation, over one of intrinsic limitation, to explain population regulation in wolves (*Canis lupus*). Discusses territoriality, intraspecific strife, dominance behavior, breeders, biders, and dispersal.
Chapter 4

Examines an Ellesmere Island wolf (Canis lupus) pack for signs of conflict between pups and adults during the weaning period. Concludes that behavioral conflict is most evident after weaning, when pups begin to feed on the meat of prey.

Studies behavioral and physiological reasons why some adult wolves (Canis lupus) do not reproduce.

Reports on age structure, sex ratio, body size and condition, and winter diet for wolf (Canis lupus) specimen collected in the range of the George River caribou (Rangifer tarandus) herd, northern Quebec, 1976-84.

Elucidates the organization of somata and dendrites of catecholaminergic (dopaminergic) amacrine cells in the rod pathway of wolves (Canis lupus) and dogs (Canis lupus f. familiaris) by means of an immunocytochemical technique involving tyrosine hydroxylase (TH).

Contrasts distribution of retinal ganglion cells in dogs (Canis lupus f. familiaris) and wolves (Canis lupus). Notes the presence of a pronounced “visual streak” in wolves.

Considers raised-leg urination, squat urination, defecation, and scratching in theorizing on the qualities and functions of scent-marking in wolves (Canis lupus), based on a study in the Superior National Forest, 1971-74.

Reports on peripheral auditory responses measured in 12 species of carnivore. Includes graphs of cochlear microphonic potential sensitivity functions, and discusses the variation of hearing among the specimens.
   Reports on wolf (Canis lupus) population dynamics in Isle Royale National Park, Michigan, 1975-86. Touches on numbers and organization, food supply, reproduction, survival, mortality factors, scent-marking, aggression and dispersal.

   See section 3.

   See section 3.

   A study detailing the population, predation, range, movements, history and management of wolves (Canis lupus) in Ontario’s Algonquin Provincial Park, 1909-65.

   Documents wolf (Canis lupus) ecology, particularly seasonal space-use patterns, in Quebec, 1980-84. Computes survival rates, and presents productivity data.

   Uses preconcentration and derivatization gas chromatography to analyse the volatile components of wolf (Canis lupus) anal-sac secretions. Discusses roles of acids, alcohols, aldehydes and ketones in chemoolfactory communication.

   Relates data on the volatile constituents of wolf urine, such as methyl isopentyl sulfide, 3,5-dimethyl-2-octane, and acetophenone, to gender, time of year, and endocrine status.

Studies the effect of testosterone, estradiol and progesterone on the volatile constituents of urine of castrated male and ovariectomized female wolves (Canis lupus). Hypothesizes on the role of these hormones in chemoolfactory communication.


Maps the movements of a single female wolf (Canis lupus) studied by radio-telemetry in the North Fork Flathead River drainage system, 1978-80.


Presents observations that may be used noninvasively to detect pregnancy in captive maned wolves, based on the study of successful and pseudo-pregnant breeding pairs at 17 institutions in North America, 1988-94. Discusses the significance of the data for improving animal care.


Examines daily activity patterns of red wolf/coyote hybrids (ancestral species Canis niger and C. latrans). Comments on the possibility of the synchronization of diurnal rhythms by means of an internally generated social zeitgeber.


Reports on color discrimination and learning in cocker spaniels.


A general account of the biology and behavior of wolves (Canis lupus). Aims at dismantling traditional prejudices against wolves.

    Plots data from blood samples and physical tests of a colony of gray wolves (Canis lupus) in order to discern circannual metabolic patterns of variation. Discusses hemoglobin, hematocrit, red blood cells, mean corpuscular hemoglobin concentration and thyroxine as metabolic indicators.

    Analyses blood samples from Minnesota wolf (Canis lupus) pups, 1970-72, charting hematology, serum chemistries, serum proteins and hormones of wolf pups, with comparable dog data.

    Studies the January-June estrous cycle of female wolves (Canis lupus) by means of vaginal smears, behavior observations, and chemical (estradiol, progesterone and luteinizing hormone) analysis, in order to relate the observations to breeding success and seasonal timing.

    Records instances of filiative, submissive, playful, sexual and agonistic behavior in a pack of captive Mexican wolves, 1985-86, and relates them to breeding and social structure. Written in Spanish.


Researches whether and how Ethiopian wolves avoid inbreeding when habitat saturation limits the possibility of dispersal. Observes that wolves generally avoid incest even under restricted conditions, but also that canid monogamy may be more sociological than genetic.


Describes changes in hair colour of wolves as observed from 1980-91 in Tuva, Russia. Makes no correlation between hair colour and age or sex. Written in Russian, with an English summary.


*See section 1.*


Discusses the relations among size of wolf (*Canis lupus*) packs, food availability, kill intervals, social relationships and spatial relations in Isle Royale National Park, 1958-1991. Remarks that solitary wolves occasionally engage in cooperative hunting.


Examines wolf (*Canis lupus*) response to highways, secondary roads, gates roads and human settlement, in order to better characterize human influence on wolf distribution.


Uses sound spectrograms and multivariate analysis to analyse the ‘individuality’ of the howling of several captive wolves. Discusses the significance of the uniqueness of vocalizations (vocal signatures) for wolf social organization.

Comments on the nature of extraterritorial forays by wolves (*Canis lupus*), based on a study of four radio-collared packs in the Nelchina Basin of Alaska.


Chronicles an unusual case of two litters being born and reared in the same breeding season by a single wolf (*Canis lupus*) pack in the Nelchina Basin, Alaska, 1976. Discusses conditions requisite to such an event.


Presents descriptions of weights, growth rates, canine tooth lengths, and survival data of 73 wolf (*Canis lupus*) pups live-trapped in Minnesota, 1969-72. Remarks on the variation of the data, even among littermates.


Notes a dispersal of 670 km by a wolf (*Canis lupus*) from Tethul River, Northwest Territories, to Cold Lake, Alberta, to be the longest such recorded.


Surveys a collection of wolf skulls from the Soviet Union for occurrences of anodontia, polydontia, and alveolar resorption. Discusses tooth shape, occlusion, and the role of and selective pressure on the premolars.


Describes strategies of defecation used by wolves to mark territory in northwestern Spain.
   A definitive tract on ocular biology in vertebrates, moving from basic anatomy, through the evolution of vision and ecologic adaptations, to an encyclopedic survey of the eye in sundry species.

   Discusses the resilience of wolves (*Canis lupus*), cougars (*Puma concolor*), grizzly bears (*Ursus arctos*) and wolverines (*Gulo gulo*). Defines resilience as flexibility in foraging behavior, adaptability in the face of exploitation, and proclivity to disperse. Calls for more contiguous refugia.

   Presents a mathematical model to describe and predict territory size and population density, based on observations of the spatial patterns of wolves in northeastern Minnesota.

   A study of the ecology of wolves of the Bluenose and Bathurst barren-ground caribou range, Northwest Territories, 1987-88. Discusses summer diet, and denning habits.

   Monitors population dynamics and activities of wolves (*Canis lupus*) in Isle Royale National Park, Michigan, 1967-70.

   Studies the anatomy and function of Jacobson’s organ of the vomeronasal system in mammals, particularly in the contexts, among others, of reproduction and the monitoring of pheromones.

See section 1.


Constructs a model explaining pack size regulation in wolves (Canis lupus). Discusses the spatial organization of wolf populations, ecological influences on pack size, and social influences on pack size.


An account of the ecology of the wolf (Canis lupus), touching on development, comparison to dogs, social structure, behavior and communication, sexuality, mating, cub rearing, relationships to man, as well as the Abruzzi wolf project. Translated into English by Eric Mosbacher.
   An illustrated encyclopedia of canids, with detailed descriptions of each specimen listed. Supplemented with general discussions of the physiology, behavior, reproduction, evolution, distribution and human perceptions of canids.

   Characterizes distinctive features of the Newfoundland wolf (Canis lupus beothucus, subsp. nov.). Supplies a list of characteristics and measurements, including diagrams of the upper carnassial tooth in crown view.

   See section 1.

   Describes developments in the taxonomy of Canadian wolves, including the Saskatchewan Timber Wolf (Canis lupus griseus Sabine), the Mackenzie Tundra Wolf (Canis lupus mackenzii), the Banks Island Tundra Wolf (Canis lupus bernardi, subsp. nov.) and the Baffin Island Tundra Wolf (Canis lupus manningi, subsp. nov.).

   Presents results from a gross morphological study of the cerebellum in canids. Diagrams, describes, and compares brain structures in Canis aureus, Canis familiaris, Canis latrans, Canis lupus, Canis mesomelas, and Canis rufus.
Chapter 5


   Discusses improvements that gene-phylogeny, drawn from mitochondrial and nuclear DNA data, brings to systematics, population genetics and molecular genetics. Discusses specific phylogeographic patterns.


   Lists the species of mammals encountered during Geological Survey of Greenland expeditions, 1984-5, one of which visited the central northern coast of Greenland. Includes a brief faunal history of the area.


   See section 1.


   Discusses trends in the size, shape and features of Arctic wolf skulls, 1930-1986. Explains variation as a result of differing degrees of hybridization with huskies (Canis familiaris) throughout the period.


   Reexamines phylogenetic relationships of Cervinae and Odocoileinae through mitochondrial DNA analysis. Includes restriction-site maps and charts; postulates cladograms and dendrograms based on findings.


   Assesses intraspecific phylogeography of mitochondrial DNA of North American moose (Alces alces), caribou (Rangifer tarandus), elk (Cervus elaphus), white-tailed deer (Odocoileus virginianus), and mule deer (Odocoileus hemionus). Tests the idea that morphological differentiation is reflected by differentiation of mtDNA.


   Discusses the limitations of molecular genetic methods of systematics, such as mitochondrial DNA analysis. Looks at incongruence between gene and species trees, genotype frequencies vs. sequence divergence, and intrasubspecific variation.
Assesses degrees of genetic differentiation among distinct subpopulations of white-tailed deer (*Odocoileus virginianus borealis*) in Minnesota, and of mule deer (*Odocoileus hemionus hemionus*) in Montana.

Characterizes gene flow between mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) using protein electrophoresis of serum albumin and restriction endonuclease-analysis of mitochondrial DNA.

Assesses mitochondrial DNA variation in black bears (*Ursus americanus*), brown bears (*Ursus arctos*) and polar bears (*Ursus maritimus*). Researches whether bears exhibit high mtDNA haplotype divergence within geographic areas.

Determines phylogenetic relationships among species of minnows, by means of comparison of allozymes and restriction endonuclease cleavage maps of mitochondrial DNA.

Measures skulls of wild canids to determine discriminant values functional in taxonomic discrimination among dogs (*Canis familiaris*), coyotes (*Canis latrans*), gray wolves (*Canis lupus*) and red wolves (*Canis rufus*).

Analyses morphological characteristics of the great Egyptian jackal (*Canis aureus lupaster*). Argues for its classification as a small race of wolf, based on comparison of morphological characters.
Examines genotypes of wolves (Canis lupus) colonizing Glacier National Park, Montana. Argues that the high genetic variability discovered by the examination shows that dispersal and gene flow are essential features of wolf biology, and that management programs in Canada and the United States must cooperate to facilitate them.


Contrasts allele frequencies in some Mexican gray wolves (Canis lupus baileyi) of questionable origin, with those of dogs, northern gray wolves (Canis lupus), and coyotes (Canis latrans), in order to demonstrate the genetic distance between the groups. Shows that the Mexican gray wolves in question are genetically pure enough to be used in a species reintroduction program.

A biogeographical evaluation, in encyclopedic form, of the status of canids throughout the world, prepared with a view to continuing specific international efforts. Comments in general on international trade, captive breeding, reintroduction, predation, predator control, and disease. Concludes with a list of the most endangered species in the world.

Uses multivariate analysis to classify a number of wild canid skulls collected in Arkansas, 1968-71. Draws on this evidence to formulate a hypothesize on the genetic composition of the present wild canid population.
   Examines variation in body size in Canidae, Ursidae, Procyonidae, Ailuridae, Mustelidae, Viverridae, Hyaenidae, and Felidae, and the selective forces which cause it. Discusses taxonomy, ecology, latitude and prey size.

   Argues that the red wolf (Canis rufus), essentially a hybrid between the gray wolf (Canis lupus) and the coyote (Canis latrans), merits neither its status as a distinct species nor the attention of conservationists given worthier projects.

   Describes and classifies the Labrador Wolf, the Alexander Archipelago Wolf, the Southern and Northern Rocky Mountain Wolves, the Texas Gray Wolf, the Mogollon Mountain Wolf and the Mississippi Valley Wolf (all subs. nov.).

   Assesses the phylogenetic identity, extent of hybridization, and genetic variability of wolves of the Ethiopian highlands, by means of mitochondrial DNA (mtDNA) analysis. Calls for immediate captive breeding of Ethiopian wolves, to preserve a pure strain of them.

   Argues that William Bartram’s “Canis niger” is the rightful name for the Florida wolf since it antedates the designation Canis rufus.

   Discusses the phylogenetic significance of the absence of the last molar of the lower jaw (M-3) from a number of wolves (Canis lupus) and bred dogs in Slovakia. Argues that other cases of polyodontia or oligodontia, such as missing front molars, signal a breeding deficiency. Written in German, with an English summary.
A study of hybridization between wolves and dogs, analysing inheritances of coat and eye colour, of hair structure, of external characters, and of skull characters. Discusses physiological peculiarities of wolf-dog hybrids.

An encyclopedic textbook chronicling the names, identifying marks, measurements, distribution, habitat, status and habits of mammals in Wisconsin.

Analyses variation in pelage and skull measurements of wolf (Canis lupus) specimens taken from the Northwest Territories, Alaska, Manitoba, Alberta and B.C. Comments on the value of multivariate statistical techniques in taxonomy.

An encyclopedic listing of mammals found in North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Minnesota, Iowa, Missouri, Arkansas, Texas, New Mexico, Colorado, Wyoming, and Montana. Describes distribution, physical appearance, behavior, habitat and reproduction of each species. Includes an index of scientific and vernacular names, a list of introduced species and species of possible occurrence, and an extensive glossary of biological terms.

Assesses genetic variability in natural populations of the gray wolf (Canis lupus) through the method of starch-gel electrophoresis. Discusses polymorphism, heterozygosity, Hardy-Weinberg expectations, and spatial heterogeneity.

An encyclopedia of larger terrestrial mammals of the Pleistocene epoch, with a focus on Europe. Discusses faunal changes and their significance.
Taxonomy and Genetics

Applies the technique of linear discrimination to cranial measurements of hybrid canids in New England, in order to determine their ancestry. Discusses the influence of Canis latrans thamnos from Minnesota on the New England population.


Analyses mitochondrial genotypes aquired from gray wolves (Canis lupus) and coyotes (Canis latrans). Discusses reasons for and significances of interspecific hybridization.

An encyclopedia of the game birds, and game and fur-bearing mammals of Mexico. Discusses Mexican management practices.

Researches the genetic integrity of the wolf (Canis lupus) in Italy by comparing protein variation (according to electrophoresis), polymorphism of gene loci, average heterozygosity, and allelic frequencies of wolves and dogs. Finds the genetic differentiation between wolves and dogs to be much higher than that between different breeds of dogs.

Traces the evolution of the dog family (Canidae) back through the Pleistocene and Tertiary periods to its common ancestry with other carnivores.
Chapter 5

Discusses the role that taxonomy plays in the status and conservation of
edangered animals, using the tuatara (Sphenodon guntheri, S. punctatus)
of New Zealand as an example. Addresses Vane-Wright's taxonomy of
"sister groups."

An exhaustive encyclopedia of North American mammalian species,
detailing the records, type localities, and ranges of each.

University of Kansas, Lawrence. 424 pp.
A study of the systematic relations among members of the genus Canis,
including Canis latrans, Canis rufus, and Canis lupus, and an encyclo-
dic list of the ancestors through with the genealogy of the modern species
has progressed.

ton, DC) 253: 250-251.
Objects to O'Brien's and Mayr's use of the classification "hybrid,"
particularly concerning the red wolf. Questions the extent to which
O'Brien's and Mayr's evidence is substantive.

An encyclopedia of the mammals of the world, detailing records, descriptions,
and distributions of each. Includes photographs of many of the
animals noted.

Responds to objections of Amato and Nowak regarding "Bureaucratic
Mischief" (Science 251: 1187-8). Defends the Biological Species Con-
cept; grants that available data does not determine whether the red wolf
is hybrid or subspecies.

Defends the status of threatened subspecies hybrids, such as the Florida
panther, wolf (Canis lupus), and red wolf (Canis rufus). Provides an
exposition on the Biological Species Concept, and comments on the
Endangered Species Act.

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Mathematically evaluates the extent to which a phylogenetic tree can representatively correspond to the evolutionary pathway shown in a species tree. Considers methods involving one or multiple alleles at a locus.

Measures and compares cranial features of West Texas coyotes (Canis latrans), East Texas coyotes, and red wolves (Canis rufus). Advocates classification of the red wolf as a distinct species.

Presents and analyses data on the skeletal remains of a wolf discovered in the Fern Cave System, Alabama. Compares measurements to figures for Canis rufus and Canis lupus lycaon.

Discusses the effects that random drift is having on genetic variability of wolves and brown bears of the Italian Apennines and Alps, based on a study of mitochondrial DNA (mtDNA) using restriction site analysis and nucleotide sequencing. Suggests that conservation efforts should promote the growth of populations in both areas.

Discusses the low variability in the population genetics of wolves in north-central Italy, based on an analysis of mtDNA restriction patterns that resulted in the detection of a single mtDNA haplotype. Suggests moreover that interbreeding with the local dog population is rare.

   Presents evidence from analysis of mitochondrial and nuclear DNA of pre-1940 red wolves (Canis rufus) to support the theory that red wolves originated through hybridization of gray wolves (Canis lupus) and coyotes (Canis latrans) and thus do not have a unique, ancient origin.

   Investigates genetic divergence within and among populations of Canis lupus, C. latrans, and C. rufus in North America, using microsatellite loci analysis.

   Presents results of several multivariate analyses which were used to identify morphologically distinct groups of canids in Ontario and suggest their origin.

   Experiments with hybridization between captive wolves (Canis lupus lycaon) and coyotes (Canis latrans thamnos) to test the hypothesis that modern intermediate-sized wild canids are the product of hybridization between wolves and coyotes.

   Employs a gel electrophoresis study of hemoglobin to elucidate systematic and phylogenetic relationships among fissiped and pinniped carnivores.

   A compendium of quantitative and qualitative descriptions of species of cats, wolves and foxes, with a focus on these forms natural to North America.

Elucidates the relationship of 8 groups of gray wolves (Canis lupus) on the grounds of multivariate analysis of morphometric cranial characters. Discusses the relationship between Prince Albert National Park wolves and the Great Plains wolf.


Presents paleozoological analysis of late Natufian fossils of dogs discovered in Hayonim Terrace, northern Israel. Discusses evolution of the dogs in terms of the unconscious selection of commensal wolves in anthropogenic habitats, and distinguishing muzzle morphology of the specimens.


Investigates the convergent evolution of hypercarnivorous adaptations in often distantly related canids, using dentition as an example.


Employs discriminant function analysis in the classification of canid skulls from archeological sites in Wyoming, using Eskimo dogs, Kentucky Shell-heap dogs and wolves (Canis lupus) as standards of comparison.


Provides a brief history of the red wolf, endemic to the southeastern United States. Analyses mitochondrial DNA restriction-enzyme sites in order to assess the status of the red wolf as a distinct species.


Analyses genetic loci by gel electrophoresis in order to construct phenetic trees for a dozen genera of extant canids. Uses results to discuss rate and direction of morphologic evolution; compares results to those of morphologic methods.
Discussion the (slight) variability among a number of known mitochondrial DNA (mtDNA) genotypes of wolves (Canis lupus) from around the world in terms of a population isolation and a geographic fragmentation only recently induced by the growth of modern civilization. Contrast this genetic differentiation to that of coyotes (Canis latrans), which is even smaller, since coyotes have not been so isolated.

Examines the relationship between genetic and morphological diversity, and time since evolutionary divergence from a common ancestor, in sympatric species of canids, to evaluate the role of time in diversification.


Chapter 6


An exposition on the history, distribution, etiology, transmission, signs, pathogenesis, pathology, diagnosis, prognosis, immunity, treatment and control of distemper in carnivores.


Tests the fetuses and kidneys of coyotes (*Canis latrans*), jack rabbits (*Lepus californicus*), and desert cottontails (*Sylvilagus audubonii*) for antibodies indicative of the spirochetal zoonosis *Borrelia burgdorferi*, 1980-86.


Discusses the history, clinical features, pathogenesis, and persistence of canine brucellosis. Cites some examples of immunity to the bacterium.


Determines conditions for and uses of canine parvoviral hemagglutination and hemagglutination-inhibition reactions. Surveys prevalence of the parvovirus in American dogs, 1971-78.


See section 4.


Analyses serum and blood samples of wolves (Canis lupus) from northern Canada for canine distemper, infectious canine hepatitis, and canine herpes virus, 1960-65.

Tests the viscera of 182 wolves (Canis lupus L.) for parasitic helminths. Attempts to determine the extent to which the species composition of helminth communities in wolf differs between boreal forest and tundra.

Discusses rabies as a significant factor in the population dynamics of carnivores, based on a case study of foxes (Vulpes fulva) in the Northwest Territories.

Assembles data on parasites of coast deer (Odocoileus hemionus columbianus), mule deer (Odocoileus hemionus hemionus), whitetail deer (Odocoileus virginianus), elk (Cervus canadensis), moose (Alces alces), bighorn sheep (Ovis canadensis), mountain goat (Oreamnos americanus) and caribou (Rangifer montanus).

A collection of scientific essays, serving as a parasitological handbook of data about ectoparasites, endoparasites and protozoa. Documents synonyms, distribution, transmission, development, clinical signs, pathology, pathogenesis, diagnosis, treatment, and control of each parasite discussed.

Determines the nucleotide sequence of canine oral papillomavirus (COPV), and compares it to the genomic architecture of other papillomaviruses, including human papillomavirus type 1 (HPV-1), human papillomavirus type 63 (HPV-63), cottontail rabbit papillomavirus (CRPV), Felis domesticus papillomavirus (FdPV), and Mastomys natalensis papillomavirus (MnPv).


Reports a high level of occurrence of lesions in mandibles from an Alaskan caribou (Rangifer tarandus) herd. Discusses the significance of lesions to an animal’s health, and compares similar measurements from studies done 1957-77.


Describes parasitological examinations of timber wolves (Canis lupus L.), coyotes (Canis latrans Say) and coyote-dog hybrids, indicating distribution of cestodes and food habits of the hosts.


Documents prevalence of antibodies against canine parvovirus (CPV), canine distemper virus (CDV), canine infectious hepatitis (ICH), Yersina pestis, Francisella tularensis and Leptospira interrogans in adult coyotes, yearlings, old pups and new pups, 1989-93.


Analyses serum samples to evaluate the prevalence of, and resistance to, canine parvovirus (CPV) in wolves (Canis lupus), Minnesota, 1975-85. Describes ecologic aspects of CPV, using antibody titer correlated to age, sex, and weight.

Lists parasites found in Italian wolves, 1987-1993, including nematodes and cestodes: Uncinaria stenocephala, Toxocara canis, Ancylostoma caninum, Trichuris vulpis, Toxascaris leonina, Echinococcus granulosus, Taenia hydatigena, Taenia multiceps, Taenia pisiformis, Taenia ovis, Mesocestoides lineatus, and Dipylidium caninum.


Analyzes the collection of helminths recovered from Alberta wolves (Canis lupus L.) and coyotes (Canis latrans Say), 1959-67. Discusses trematodes, cestodes, nematodes; presents indexes of similarity and diversity across wolf and coyote populations.


Notes a number of ectoparasitic arthropods (and their hosts) encountered in the Bitola district, 1968-79, including Ixodes ricinus, Sarcoptes scabiei, Pulex irritans, and Ctenocephalides canis.


Investigates whether or not, and, if so, how, wild wolves (Canis lupus) are susceptible to Borrelia burgdorferi infection.


Determines prevalence of Leptospira interrogans in Minnesota wolves (Canis lupus), based on a study of antibodies in blood serum, 1972-86.
Chapter 6


Studies arthritic dogs in order to determine a causal connection, if any, between *Borrelia burgdorferi* and arthritis. Discusses implications for human Lyme disease, and concludes with a discussion of epidemiology of the spirochete.


Documents an epizootic of canine distemper, which swept through sled dogs in the Northwest Territories, 1987-88.


Studies cases of canine blastomycosis in Wisconsin, 1960-79, commenting on the trends and distribution of the disease. Discusses the theory that *Ajellomyces (Blastomyces) dermatitidis* can be carried in mist.


Charts the history of reports of rabies in wildlife in the United States. Compares epizootics in foxes, skunks, raccoons, and bats, and concludes with a discussion of the ecology and control of rabies.


Describes an inverse proportion between population increase and pup survival on the one hand, and numbers of wolves (*Canis lupus*) in a population carrying canine parvovirus on the other.
Diseases

Documents information on the role of canine parvovirus (CPV) in limiting a wolf (Canis lupus) population, 1979-1994. Notes the greater severity of enzootic CPV, and estimates that CPV limits a population when its serological occurrence exceeds 76%.

Documents incidence of canine parvovirus in wild and captive wolves of Minnesota, 1977-83, based on tests involving hemagglutination-inhibition-antibody titers.

Monitors the occurrence of dog louse infestation in wolves (Canis lupus) and coyotes (Canis latrans) from Wisconsin and Minnesota, 1968-82. Assesses significance of louse infestation in mortality.

See section 3.

Assesses the degree of hookworm (Ancylostoma caninum) infestation in wild populations of coyotes (Canis latrans) and bobcats (Lynx rufus), and discusses hookworms as an agent in the natural mortality of these animals.

Lists mammals, including wolves, which were found to be hosts of the parasite (tapeworm) Dephyllobothrium klebanovskii.
Chapter 6


   Investigates reproductive failure and other effects of *Brucella suis* type 4 in beagle dogs, gravid wolves (*Canis lupus*), black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos horribilis*), Alaska, 1968-73.

   Studies the susceptibility of striped skunks (*Mephitis, mephitis*) and red foxes (*Vulpes vulpes*) to rabies. Reports on threshold of infection, quantity of virus in saliva and brains, and isolation of the virus from adrenal tissue.

   Analyzes isolates of canine parvovirus. Finds that isolates collected after 1980 differ from earlier ones. Discusses findings in the context of the evolution of viruses.

   Lists parasites found in mammals at the Belgrade Zoo, including *Toxocara canis, Trichurus vulpis, Ancylostoma caninum*, and *Mesocestoides lineatus*. Written in Serbo-Croatian, with an English summary.

   Studies laboratory dogs’ clinical, hematologic and serologic responses to experimental infection with canine parvovirus. Touches on plasma viremia, antibody detection, pyrexia, lymphopenia, leukopenia, length of contagious period, and giardiasis.
Diseases


Describes canine parvovirus (CPV) as a new canine pathogen. Discusses host range, clinical signs, pathology and pathogenesis, immunity, and immunization in the context of continuing research on CPV.


Surveys domestic and sylvatic (foxes, wolves, mustelids) animals of France, Italy, and the Extremadura (Spain) for evidence of trichinellosis, in order to generalize about the nature and distribution of Trichinella parasites in Europe.


Recounts the finding and treatment of a Dirofilaria immitis infection in a group of wolves (Canis lupus) at the Kansas City Zoological Gardens, Swope Park, Kansas City, 1979.


Uses standard fluorescent antibody and mouse inoculation tests to test a variety of submitted animals for rabies, Lethbridge, 1978-84. Reports main reservoirs for rabies, and evaluates the fluorescent antibody test.


Documents the occurrence of rabies in striped skunks in Alberta, Saskatchewan, and Montana, 1963-86. Discusses the cyclic epizootiological pattern of rabies, and attempts to control the spread of rabies in prairie wildlife.


Determines that moose (Alces alces) infected with Echinococcus granulosus are more susceptible to hunting than uninfected animals. Treatment of moose hydatid disease may be amenable to management strategy in selective hunting.
Chapter 6


Discusses outbreaks of rabies in Alaska, 1949-57, in coyotes (Canis latrans), wolves (Canis lupus), arctic foxes (Alopex lagopus), red foxes (Vulpes vulpes) and dogs (Canis familiaris).


Ascends an interspecific relationship of significant importance to the continuity of leptospiral infection. Tests opossums (Didelphis marsupialis), skunks (Mephitis mephitis), red foxes (Vulpes vulpes) and raccoons (Procyon lotor).


Reports incidence of oral papillomatosis in carnivores of Alberta, 1971-76. Includes photographs of mild to severe lesions. Discusses the prevalence of the infection and the possibility of transmission from coyotes to dogs.


Documents cases in which the recognition of canine blastomycosis in a privately-owned dog signified concomitant developments of a blastomycosis infection in the dog’s owner. Discusses the epidemiologic significance of this relation.


Notes cases of infestation of the dog biting louse in canids of southern Alaska. Discusses alopecia, loss of guard hairs, concomitant infestations of sarcoptic mange, and the commercial value of lousy pelts.


Measure incubation periods, morbidity, threshold of infecton, and sali-


An exposition on the history, distribution, etiology, transmission, signs, pathogenesis, pathology, diagnosis, prognosis, immunity, treatment and control of rabies in the United States.


Explains the death of a number of Ethiopian wolves between October 1991 and February 1992 as a result of a variant of serotype 1 rabies virus of African canids, using evidence from brain smears, monoclonal anti-

body tests on inoculated mice, and serologic analysis.


Reexamines the epizootiology of rabies in North America, the Caribbean, and Latin America. Includes a map of the distribution of antigenic variants in the United States and Canada.


Assesses the antigenic character of extracts of rabies virus taken from raccoons of the mid-Atlantic region, using monoclonal antibodies to the nucleocapsid protein of the virus, with a view towards clarifying the epidemiology of recent outbreaks.


Assesses the prevalence and significance of canine distemper and infectious canine hepatitis virus in wild wolves (Canis lupus) the Tanana, Nelchina and northwestern regions of Alaska, 1976-77.


Reports on the locations and frequencies of the occurrences of the tape-worm E. granulosus in humans, wolves (Canis lupus), fishers (Martes pennanti), cougars (Felis concolor), moose (Alces alces) and foxes (Vulpes vulpes, Alopex lagopus).


Documents the history of rabies in Canada, 1819-1972. Maps select epizootics; discusses the spread of rabies from the Arctic, the role of wildlife in the dissemination of rabies, rabies in domestic animals, and human rabies.


Discusses significance of bovine brucellosis (Brucella abortus) and tuberculosis (Mycobacterium bovis) in Canada. Identifies caribou (Rangifer tarandus), bison (Bison bison), and elk (Cervus elaphus) as reservoirs.


Uses and evaluates an indirect fluorescent antibody test to determine the prevalence of *Borrelia burgdorderi* in wolves (*Canis lupus*) from Minnesota and Wisconsin, 1972-1989.


Notes two cases of blastomycosis in wild wolves (*Canis lupus*) of Minnesota and Wisconsin, 1982-85. Includes a micrograph of granulomatous inflammation in wolf lung tissue.


An exposition on the history, distribution, etiology, transmission, signs, pathogenesis, pathology, diagnosis, prognosis, immunity, treatment and control of tuberculosis in wild mammals. Includes micrographs of infected lung tissue.


Uses hemagglutination-inhibition testing to measure the prevalence of antibodies against canine parvovirus-2 in the blood serum of coyotes (*Canis latrans*). Notes rapid increase in prevalence after 1979.


A report and analysis of measurements of baseline concentrations and transfer of uranium decay products taken from the lichen (*Cetraria nivalis* and *Cladina mitis*), wolves (*Canis lupus*) and caribou (*Rangifer tarandus*) of Baker Lake, Snowdrift, and Kasba Lake, Northwest Territories.


Tests the sera of 53 coyotes (*Canis latrans*) for brucellosis, tularemia, viral encephalitis, vesicular stomatitis, encephalomyocarditis, canine herpes virus, leptospirosis, canine distemper and infectious canine hepatitis. Discusses implications of serologic findings.
Chapter 6


Documents and provides photographs of the case of a wild coyote (Canis latrans) suffering from gross lesions of oral papillomatosis, Andrews County, Texas, 1966.


Documents bone fracture, bite and gunshot wound, amputation, embedded foreign body, intestinal accident, arthritis, intervertebral disc degeneration and developmental abnormalities of wolves (Canis lupus), Saskatchewan, 1971-90.


Surveys Saskatchewan wolves (Canis lupus) for the presence of the trematode Metorchis conjunctus. Discusses hepatic cholangiohepatitis with periductular fibrosis, chronic inflammation and pancreatic fibrosis, and the role of fish.


Analyses the infectivity, resistance to freezing, and DNA restriction fragment length polymorphisms (RFLP’s) of a Trichinella spiralis isolate. Discusses the significance of the finding that the resistance to freezing of the isolate is low.

Measures and discusses the effect of modified-live parovirus vaccine in inhibiting growth of canine transmissible venereal sarcoma.


Measures prevalence of *Trichinella nativa* (T2) and *Trichinella spiralis* (T1) in serum samples of the polar bears, wolves, foxes, coyotes, jaguars, tigers, lions, panthers, leopards, lynxes, pumas, yagouraroundi and ocelots of the Mexico City Zoo, using Western blot analysis. Finds wolves to have the highest infection rate.


7. Research Techniques

   A statistics handbook which teaches analysis of cross-classification tables, including those having ordered categories for at least one of the classifications.

   Describes the technique of predicting ages of individual coyotes (Canis latrans) according to the number of cementum layers found on the canine tooth. The authors' evidence does not conform to the system of Linhart and Knowlton, and suggests that the rate of deposition of the cementum annulus may vary according to geographic region.

   Discusses the advantages, disadvantages, and modes of action of various euthanatizing agents for animals, including inhalant agents, noninhalant pharmacologic agents, and physical methods.

   See section 4.

   See section 3.
Chapter 7

Evaluates phenocyclidine hydrochloride with promazine hydrochloride, etorphine hydrochloride, and etorphine hydrochloride with xylazine hydrochloride as immobilization agents to be used in the darting of wolves and wolverines from helicopters.

Present a technology, involving tiletamine hydrochloride and zolazepam hydrochloride, that is efficacious in immobilizing wolves for up to 144 minutes.

See section 3.

Present a method for estimating furbearer abundance based on probability sampling and observation of animal tracks in the snow. Furbearers include wolverine (Gulo gulo) and lynx (Felix lynx).

Reports on wolf (Canis lupus) censuses conducted in the Alphabet Hills, Lake Louise, and Alphabet Hills Two study areas, 1990-91. Describes an estimation technique involving line transects and probability sampling.

Present computer simulations of animal space use in order to relate sample variables, such as locations of individual animals, to general facts about a population, such as its home range.
Evaluates linear discriminant function analysis as a technique for deriving taxonomic relationships from quantitative behavioral data, based on a study done on “Eastern coyotes” (Canis latrans var).

Prepresents a technology for determining behavior of white-tailed deer (Odocoileus virginianus), involving telemetry data from radio collars, that is 96-98% effective in distinguishing active deer from bedded deer.

Mathematically derives statistical formulas for measuring selective predation, from a stochastic model.

Uses five different methods of analysing wolf scats collected from the Northern Apennine Mountains, Italy, in order to discover potential discrepancies in the results they yield. Concludes that scat-analysis data is more reliable when two or more methods have been employed.

Summarizes research carried out by the Office of National Science Studies after 1963, in order to provide a sample of what results from such research. Comments on populations, winter habitat, reproduction, limiting factors, food habits, predators, and conditioned behavior of ungulates.

Details the invention, implementation and evaluation of a basic simulation model to analyse the likely results of control on coyote (Canis latrans) populations.

Presents a technique of identifying individual animals by means of gamma-emitting radioisotopes, which can be subcutaneously implanted in biodegradable discs, and which effectively label an animal’s excreta for at least 6 months.


Evaluates a variety of indices of relative abundance for estimating wolf (Canis lupus) numbers.


See section 3.


Measures carnassial lengths, canine diameters and skull lengths of canids in Israel and North Africa, in order to pass judgement on whether or not canine size expresses character displacement, as it does in felids and mustelids.


Tests the hypothesis that measures of sodium (22Na) turnover can generate accurate estimations of food intake in wolves (Canis lupus), using captive wolves nourished on meat from white-tailed deer (Odocoileus virginianus). Finds the method to be reliable.


See section 3.
Classifies and describes modern methods for conducting and analyzing environmental studies. Techniques discussed include classical approaches, sampling, intervention analysis, observational studies, and descriptive surveys.

Reviews the standard technique of assessing ages of mammals according to cementum annuli layer counts. Offers recommendations concerning both the method and further research, to refine cementum layer analysis.

Describes the extensive movements and migrations of barren-ground caribou (Rangifer tarandus granti), based on a study using satellite telemetry.

Describes, explains and demonstrates the Argos Data Collection and Location System of satellite telemetry. Uses locational and behavioral data on caribou (Rangifer tarandus) and polar bears (Ursus maritimus) as examples.

See section 3.

Summarizes the chemistry, pharmacological actions, absorption, fate, excretion, toxicology and therapeutic uses of strychnine, picrotoxin, pentylenetetrazol, doxapram, ethamivan, nikethamide, fluoroethyl and methylphenidate.

    Presents data from an experiment analyzing fat content in the femur marrow of 181 Alaskan moose (Alces alces). The method allows for comparison of mortality factors and identification of winter-killed (starved) moose.


    Describes the use of ketamine, xylazine, atropine, and promazine in immobilizing wolves (Canis lupus), based on a Minnesota study, 1980-82. Suggests these drugs as replacements for phencyclidine and etorphine.


    Demonstrates and evaluates a simulated howling survey, a technique useful for locating wolf (Canis lupus) packs in relatively small areas. Trials conducted in Minnesota with a known density of radio-marked packs.


    Experiments with telemetry data, to determine how many radiotelemetry are necessary to accurately estimate the territory and density of a pack of wolves (Canis lupus). Data collected in northcentral Minnesota, 1980-85.


    Reports on success of simulated howling in eliciting responses from wolves (Canis lupus) and coyotes (Canis latrans).


    Investigates the reliability and sensitivity of a telemetry technique involving motion sensors used to determine activity of black bears (Ursus americanus) in Tennessee.

A manual instructive in the science of moose (Alces alces) population dynamics. Details methods, programs and formulas for the estimation of population figures, based on such parameters as size, rate of change, recruitment, sex composition, and mortality.


Tests the reliability of mercury tip switch devices and variable-pulse collars as indicators of activity and behavior of black-tailed deer (Odocoileus hemionus columbianus).


Investigates the suitability of several stains and tooth-sectioning methods for counting cementum annuli in wolves (Canis lupus). Favours Harris’ modified hematoxylin stain and longitudinal tooth-sectioning.


Tests the reliability of the technique of age determination by cementum annuli analysis, using wild living red foxes (Vulpes vulpes) of known age.


Analyzes the technique of simulated howling as a useful way of censusing wolf (Canis lupus) packs. Presents recommendations for using simulated howling, and outlines the technique’s limitations.


Summarizes results of two years’ use of the Argos Data Collection and Location system, 1988-90. Assesses the performance of Argos, and presents numerous field studies using satellite telemetry.
Identifies biases in previous methods of determining survival and mortality rates in radio-marked animals, and corrects these biases by presenting a better method for estimating survival and cause-specific mortality rates.

Tests the anesthetic efficacy of combinations of medetomidine, ketamine and atropine in safely immobilizing gray wolves.

Evaluates the precision and reliability of the Argos satellite telemetry system in locating wolves (Canis lupus) and ungulates.

Tests the efficacy of combinations of xylazine, sufentanil, etorphine, and/or carfentanil in anaesthetizing wolves, and that of naloxone hydrochloride, yohimbine hydrochloride and/or saline in reawakening them. Explains the unexpected death of one animal as a result of renarcotization and hypothermia.

Studies the effects that doses of corticotropin, adrenocorticotropin (ACTH), dexamethazone and cortisol have on concentrations of basal luteinizing hormone (LH) and progesterone in intact and neutered wolves.

Investigates the physiological and behavioral effects of Telazol®, which is composed of tiletamine hydrochloride and zolazepam hydrochloride, on Minnesota wolves (Canis lupus), 1988-89. Evaluates the drug as an immobilizing agent.

Charts a positive correlation between the amount of diazepam administered to sated wolves and the intensity of the resultant hyperphagia. Notes that neither beta-CCP nor beta-CCE (benzodiazepine) could reverse the effect of diazepam.


Evaluates the activity meter in the Wildlink Data Aquisition and Recapture System, in observations of captive wolf (Canis lupus) and free-ranging white-tailed deer (Odocoileus virginianus) activity.


Develops a relation between marrow fat values and general bodily vivacity in wolves (Canis lupus), based on the observation that the marrow is the last tissue to undergo fat mobilization before total fat depletion. Compares findings to similar results in ungulate studies.


See section 3.


A summary of the history of wolf research, approached through short biographies and descriptions of prominent wolf biologists. Includes a timeline of important events in wolf research, 1791-1993.


Tests agarose gel electrophoresis as an economical technique for identifying tissue of mammals. Study includes moose (Alces alces), caribou (Rangifer tarandus), white-tailed deer (Odocoileus virginianus) and elk (Cervus elaphus).
   An introduction to the technique of age determination by analysis of cementum annuli. Compiles diagrams and photographs of labelled cementum layers for the teeth of 19 large mammals.

   Discusses the concept of density dependence in theories of population dynamics, from a conceptual and statistical point of view.

   A comparison of two census techniques, the Track Intercept Probability (TIP) density estimator and a traditional aerial reconnaissance survey, for the measuring of wolf (Canis lupus) populations in the geographical area Unit 200 of central Alaska. Finds the results of each survey technique to be similar.

   Reviews the advantages that new technologies, such as live-trapping combined with radio-tagging and aerial radio-tracking, have brought to the study of wilderness carnivores.

   See section 1.

   Describes and tests the Wildlink Data Aquisition and Recapture System of radio-telemetry, using wolves (Canis lupus) and white-tailed deer (Odocoileus virginianus) in Minnesota, 1989-90.

   Describes the field-testing of the Wildlink Capture Collar, which features anesthetic darts that can be fired by remote control, on wolves (Canis lupus) of the Superior National Forest, Minnesota, 1989-91.
   Evaluates a method of distinguishing breeding from nonbreeding wolves (Canis lupus) using nipple measurements by testing it on animals in northeastern Minnesota of determined breeding status. States that the method is unable to distinguish between current and past breeders.

   Tests commercially manufactured capture collars on female white-tailed deer (Odocoileus virginianus) in the Superior National Forest, Minnesota, under temperatures from -37 to 22 C. Deer were successfully recaptured in 28 of the 31 tests.

   See section 1.

   Outlines and explains the conditions under which the error polygon technique for measuring telemetry error is invalid for estimating precision of individual location estimates. When 2 bearings are used, it is valid for both individual and mean error estimates.

   A textbook teaching the mathematics of statistics, beginning with basic concepts. Topics include normal distribution, large and small sampling, general linear model, nonparametric methods, population variance, and systems of coding, among others.

   Uses canine cementum annuli analysis to distinguish between wolf (Canis lupus) pups and yearlings, Quebec and Labrador, 1980-84. Discusses closed foramen at the apex of the root, and deposits of cementum with no opaque annulus.
Chapter 7

Mathematically discusses and adjusts the Monomolecular, Autocatalytic and Gompertz growth functions for biological analysis. Concludes with a practical demonstration of the use of these functions.

Demonstrates a safe method of immobilizing Mexican wolves (Canis lupus baileyi), coyotes (Canis latrans), gray foxes (Urocyon cinereoargenteus), skunks (Mephitis macroura) and raccoons (Procyon lotor) intramuscularly, using ketamine hydrochloride (KHCl) and xilazine hydrochloride (XHCl). Written in Spanish, with an English summary.

Tests and evaluates the efficacy of two tranquilizer-drugs, telazol and a combination of ketamine hydrochloride and acetylpromazine, on Ethiopian wolves, 1988-92. Concludes that telazol is the preferable immobilizing agent.

A textbook and reference source of statistical mathematics.

A textbook teaching statistical mathematics as employed in contexts of biological research.

Presents a mathematical model for predicting reproduction, litter size, and mortality of wolves (Canis lupus) and bears (Ursus arctos) in Norway which can judge whether or not a species is endangered. Written in Norwegian, with an English summary.

Outlines and evaluates methods in the technology of satellite telemetry. Tests the effectiveness of a Platform Transmitter Terminal (PTT) in locating seals (*Phoca vitulina richardsi*) in the laboratory and at sea, southern California, 1988.


*See section 6.*


Examines deaths of wolves (*Canis lupus*) immobilized with a combination of etorphine HCl and acepromazine, Alaska, 1982-83. Discusses the importance of careful drug selection in the capture of wildlife.


Demonstrates a noninvasive method of characterizing fertility (ovulation and pregnancy) of female maned wolves (*Chrysocyon brachyurus*) using fecal steroid measures as indicators of estrogen and progestin levels.


*See section 3.*


*See section 4.*


Describes a method for determining the age of moose (*Alces alces*) based on the cementum annuli of molariform teeth.
8. Management

Identifies wildlife as a renewable resource which must be managed. Uses contemporary wildlife science to formulate a sound conservation philosophy for both individuals and organizations.

Evaluates the value of guarding dogs by comparing domestic sheep losses in different situations, including fenced pastures with and without guarding dogs and open ranges with and without guarding dogs, Colorado, 1986.

Deals with the issue of managing wildlife diversity (i.e., wolf prey) through deliberate control of wolf populations. This paper describes the history of wolf control in B.C., presents a case study, discusses social implications, and concludes with a new strategy of wolf control.

Presents results of a survey of the American public on the issue of coyote control. Measures public approval of coyote control according to such variables as increasing lamb losses, incident specific vs. general predator control, lethal vs. non-lethal control methods.

Presents the results of a survey of the American public on the issue of predator control. Touches on public attitudes related to predator control, and use of such attitudes in predator control policy analysis.

See section 1.


Describes laboratory and subsequent field trials involving coyotes (Canis latrans) and the antifertility agent diethylstilbestrol.


Presents a technology, involving steel traps and tablets of the drug “diazepan,” that is useful in decreasing injury to, and escape of, animals caught in traps.


Presents guidelines and suggestions for the strategy of predator control: When should it be conducted? How should it be applied? Where should it be practiced? To what extent should it be practiced? How much should it cost?


Discusses events surrounding the natural return of wolves (Canis lupus) to Scandinavia, following the 1967-77 peak in immigration from Russia to Finland. Cites hunting as the biggest threat to repopulation.


Evaluates wolf (Canis lupus) control with respect to cattle numbers in the Simonette region of Alberta. Discusses nontarget kill, wolf response to vacant territories, impact of wolf removal on cattle mortality, and management implications.


Advocates a return to snaring for catching and controlling predators. Tabulates figures of predator control in 1976, and ranks predator control methods with respect to various criteria.
Management


Chapter 8

   Discusses controversy over the practice of predator poisoning, and surveys attitudes on topics of coyote depredation and control, New Mexico, 1973.

   Describes trends in U.S. national park predator policy. Notes that stringent predator control leads to problems of over-grazed ranges, and that a balanced predator-prey system is a sustainable one.

   See section 1.

   A record of a reconnaissance trip undertaken by the author to assess practical considerations for wolf conservation in Poland, 1977. Includes observations of the study area, prey density, human attitudes, as well as larger plans for wolf management in central Europe.

   See section 4.

   See section 1.

   See section 1.


Chapter 8


Discusses the conflicting interests of wolf (Canis lupus) and bear (Ursus arctos) conservation, and domestic livestock husbandry in the Abruzzo region of Italy. Establishes a connection between the owners’ claims of damage by predation, and their socioeconomic positions, and suggests ways to improve the compensation system.


Remarks on the exploitation of wildlife in the Jasper National Park area, since 1754. Paraphrases a passage from the post journals of Michael Klyne, describing the winter of 1830-31 at Jasper House.


Records descriptive data on the number and age of cattle lost to predation by coyotes (Canis latrans), black bears (Ursus americanus), wolves (Canis lupus) and mountain lions (Felis concolor) in Alberta, 1974-78.


Tours the important points of wildlife management for the purpose of shaping sound management policies. Focusses on the issue of problem wildlife situations, and how agencies should react.


Evaluates electric fences with alternating charged and grounded wires as a nonlethal anti-predator technology. Study conducted in the Peace River region of northwestern Alberta, 1976-77.


Presents a review of the ecological and toxicological aspects of cyanide, and how wildlife resources should be protected from it. Describes its lethal and sublethal effects on plants, invertebrates, fish, birds and mammals.
   Propounds a solution to the deadlock between conservationists and ranchers over wolf restoration to Yellowstone, in the form of a private (conservationist-owned) fund for compensation of livestock losses.

   Traces events in the controversy over the reintroduction of wolves to Yellowstone National Park, from the conservationists’ perspective.

   Discusses the spatial requirements of wolves (Canis lupus), based on study of radio-tagged wolves in and around Algonquin Park, Ontario, 1987-1993. Advocates increased protection of wolves outside the park, because seasonal movements regularly take wolves outside the protected area.

   See section 2.

   Reports on an attempt to protect livestock production areas in Minnesota by translocating 104 wolves (Canis lupus) 50-317 km away into extensive forests. Information on movements obtained by radiotracking.

   Studies the survival and behavior of relocated wolves (Canis lupus) in northern Minnesota, 1975-78. Comments on the method of relocation.

   Studies wolf (Canis lupus) depredation in Minnesota, 1975-86. Maps wolf range, charts producer complaints and livestock losses, tabulates compensation payments, describes some control measures, and suggests future management practices.
See section 3.

Tests an electric fence for anti-cyote (Canis latrans) properties. Includes diagrams and photographs of the configuration of the electric fence.

Reports on the increasing livestock depredation perpetrated by wolves in regions of Bulgaria, 1984-1988. Advocates wolf control in areas of intense animal husbandry. Written in German, with an English summary.

See section 5.

Reports on a continuing trial of the effectiveness of guarding dogs in reducing predation on livestock. Ranks the Great Pyrenees, Anatolian Shepherd, Akbash Dog and Kuvasz according to producer satisfaction.

Postulates goals, objectives and strategies for the management of wolves (Canis lupus) in Alberta, according to an evaluation of their history and status in that province. Advocates limited trapping of wolves by educated trappers in order to maintain a balance in wolf-ungulate relations.

See section 1.
Critiques the conclusions drawn by M.R. Conover et al. regarding the effectiveness of aversive conditioning for controlling coyote (Canis latrans) predation.

Evaluates the lacing of baits and carcasses with lithium chloride (LiCl) as an anti-coyote (Canis latrans) technology. Study conducted on ten ranches in Saskatchewan, 1976-78.

Tests the strength of conditioned aversions in a group of adult coyotes (Canis latrans), using hamburger meat, lambs, rabbits and a lithium chloride inhibitor. Discusses method as a non-lethal predator control.

Reports on comparisons between selectivity and effectiveness of steel leg-hold traps and M-44’s in south Texas, and details the attributes of neck snares for predator control.

Challenges the assumption that wolf (Canis lupus) populations can bear heavy annual reductions without being damaged. Advocates a more qualitative view of wolf population dynamics, based on facts about wolf society, learning, reproductive/territorial behavior, and gene flow.

See section 1.
Chapter 8

A government study presenting information on opinions about controversial wolf management, in British Columbian society. Tabulates survey results, and proposes recommendations for resolving the controversy.


Reviews and evaluates the bounty system as a method for controlling predators in the Western United States, pointing out at least eight reasons why bounty plans have proved undesirable.

Reports partial results of a 3-year program for the reduction of wolf (Canis lupus) populations on Vancouver Island. Records numbers of wolves trapped, measures subsequent effects on deer populations, and comments on future wolf control requirements.

Provides arguments in support of wolf control on Vancouver Island, and outlines a course of action for such control.

See section 1.

Presents results of a survey of the Minnesota public’s perceptions of wolves, 1972.

An essay on the predatory role played by Native Americans in ungulate ecology in the historical Midwest of North America. Argues that the conception of wilderness devoid of human participation is a myth.


Examines concepts of management and exploitation of natural resources, generated by the Mormon belief in stewardship of land, as apparent in the settlement of Utah led by Brigham Young, 1847-77.


Presents results of a survey of attitudes towards animals. Employs a typology defining naturalistic, ecologist, humanistic, moralistic, scientific, aesthetic, utilitarian, dominionistic, and negativistic attitudes.


Explores contemporary American attitudes towards predators such as the wolf (Canis lupus) and coyote (Canis latrans). Makes comparisons of data according to groupings by age, sex, region of residence, education, and occupation.


Presents results of a survey of Minnesota public attitudes towards wolves (Canis lupus). Scores data on dominionistic, ecologist, moralistic, naturalistic, negativistic, utilitarian and knowledge scales.


See section 2.


Discusses present and historical attitudes of humans living in the Rocky Mountains towards wolves (Canis lupus), grizzly bears (Ursus arctos) and mountain lions (Puma concolor). Suggests ways to combat negative attitudes towards wildlife.
Advocates the widespread use of chemical antifertility agents in wildlife management. Reviews their history in control of canids, birds, felines, ungulates, rodents and horses.

See section 1.

Elucidates the molecular mechanism of the toxic action of fluoroacetate through biochemical analysis. Discusses metabolic activation, reactions of (-)-erythrofluorocitric acid with mitochondrial proteins, and animal toxicology.

Describes the practice and politics of illegal wolf-hunting with the aid of an aircraft in Alaska. Relates the case of Dr. John D. “Jack” Frost, who was arrested for violating the Airborne Hunting Act.

Discusses a physiological tolerance to strychnine aquired by four adult female Botta’s pocket gophers (Thomomys bottaee). Discusses implications for gopher control.

A compilation of anthropological papers on the hunting and gathering societies of the ancient and modern worlds, proceeding from the symposium “Man the Hunter,” University of Chicago, 1966.

Ranks and evaluates ability of various chemicals to repel coyotes (Canis latrans) and dogs from a visual representation of a food stimulus. Discusses -chloro-acetyl and cinnamaldehyde as potential repellents.
   An exposition of the theory, and a guidebook for the technique, of wildlife management. Acknowledged for its landmark treatment of the aesthetic and ethical value of wildlife.


   Evaluates electric fences as an anti-coyote (Canis latrans) technology, in North Dakota and Kansas, 1977-78. Includes data from a survey of sheep producers who use electric fencing.

   Subjects a variety of steel foothold traps to laboratory and field testing, to determine the efficiency of each. Compares traps on closure speed, performance in frozen soil, and trapper evaluation.

   Describes a technique for the testing of coyote repellents and attractants, including denatorium benzoate, DRC-5593, n-amyl mercaptan, chloropicrin, benzaldehyde, and cinnamic aldehyde.

   Tests the avoidance-learning response of coyotes using rabbits of different colour and select electric punishments. Suggests that tools of aversive conditioning may be effective anti-coyote devices.

Evaluates Komondor dogs as anti-coyote (*Canis latrans*) agents, Montana and North Dakota, 1976. Graphs data of coyote-sheep kills from pre-dog, dog, and post-dog periods.


An essay critiquing and revising the arguments for wildlife conservation.


Demonstrates the use of Codinvolve analysis, evaluative assertion analysis and Kellert’s typology of attitudes toward animals in the assessing of public sentiment on controversial issues, using a 1977 proposed reclassification of the status of wolves (*Canis lupus*) in Minnesota as an example.


A report monitoring the theoretical and practical accomplishments of the wolf control program in the Northwest Territories and Yukon. Appendices present expenditures and methods of wolf control.


Analyses the efficacy of predicide Compound 1080 in coyote (*Canis latrans*) control. Discusses the 1972 ban of the Compound, and resultant efforts to compensate for it with aerial hunting.


Diagrams, describes and recounts the history of the M-44 (SCSLEM) device for coyote control.


   See section 1.

   Dismantles the popular concept of the stability of nature as it relates to wolves (Canis lupus), supplying in its stead the theory of fluctuating population dynamics, in which wolf control programs may exert a positive role.

   See section 2.

   Records data from wolf specimens recovered in Wisconsin, 1975-79. Cites human interference as the factor limiting the return of wolves to Wisconsin.

   Notes events and trends in the relations among wolves (Canis lupus), dogs (Canis familiaris) and people on various high arctic islands, 1972-74.

   Formulates a set of propositions around which wildlife management in Canada should be structured, and suggests ways in which an improved wildlife policy might proceed.
Reflects on the spirit of preservation behind the American National Parks program. Argues against Public Law 787, which was passed in 1950 to allow reductions in wildlife numbers.

A classic discussion of the changing meanings of wilderness to American consciousness. Moves from a review of Old World attitudes, through contributions of Thoreau, Muir, Hetchy and A.S. Leopold, to projections of the future of wilderness in America.

A comprehensive review of the resources and management of Gates of the Arctic National Park and Preserve. Discusses natural and cultural resources, avocational and subsistence use, operations, development, land protection, and possible expansion.

Discusses the relative advantages and disadvantages of traps, snares and autoboggans (motor toboggans) in the capturing of live coyotes.

A compilation of essays and case studies on the subject of the conservation, management and development of natural resources, aimed at forging an international policy of resource management.

Determines the feasibility of using diethylstilbestrol to reduce reproduction in a wild fox population consisting of the gray fox (Urocyon cinereoargenteus) and the red fox (Vulpes vulpes), 1967.

Critiques and evaluates the bounty system for control of predators, using wolves in Ontario as a case study.
A dual discussion of the unique ecosystem of Isle Royale and the declining wolf population living there, supplemented with vivid photographs of both wildlife and those that study it. Concludes by calling for increased efforts in the conservation of wolves there.

Presents results of using guard dogs and gas exploders as anti-predator devices.

See section 3.

Discusses the plight of the wolf (Canis lupus) in Canada. Reviews bounty systems, predator control organizations, control methods and programs, and wildlife management in general. Includes photographs by author.

Discusses the plight of the wolf (Canis lupus) in Ontario. Provides a history of the bounty system, describes contemporary programs of wolf management, and projects a future for wolf management, based on a comparison with British Columbia.

An overview of the issues and events in wolf management in Ontario, ca. 1925-62. Reviews effects of the bounty system, and deliberates on the options for future wolf management.

Combats negative images of the wolf (Canis lupus) while reviewing the history of wolf management in Canada. Includes a number of photographs of wolves in action.
Chapter 8


See section 4.


Studies and discusses wolf (Canis lupus) population dynamics and management policy in and around the Flathead River valley, British Columbia and Montana, 1979-1990.


Presents negative aspects of the predator poison, Compound 1080, in hopes of blocking its reregistration.


Isolates common communication and education strategies of successful wildlife conservation projects in order to forward a set of general recommendations for designing new educational conservation programs.


Discusses the ideal role that scientists should play in conservation policy, such as that required by grizzly bears (Ursus arctos), wolves (Canis lupus), lynx (Felis lynx), wolverines (Gulo gulo) and mountain lions (Puma concolor), to better realize the translation of biological solutions into social practices.


A treatise on political policy analysis, advocating the employment of analytic techniques for public policy decision-making. Discusses the framework, objectives, costs, models, methods, operations, and evaluations of policy analysis.
Assembles evidence from natural resource management in Montana, Yellowstone National Park, Alberta and British Columbia to refute the popular bias that economic development and the conservation of large carnivores are diametrically opposed. Proposes that in fact the two are complementary.

A discussion of the influence of public opinion in wildlife management decisions, based on an examination of the history of wolf (Canis lupus) management in Mount McKinley National Park, 1930-60.

A survey and analysis of human participation in wildlife related activities. Evaluates the characteristics and expenditures of participants, the economic value of the activities, and attitudes and interest in wildlife.

8-123. Robinson, W.B. 1943. The “humane coyote-getter” vs. the steel trap in control of predatory animals. J. Wildl. Manage. 7: 179-189.
Compares the advantages and disadvantages of an alternate coyote trap called the “humane coyote-getter” with those of the traditional steel trap, based on studies in Wyoming, Colorado and New Mexico.

Discusses needs and strategies in coyote control, focussing specifically on the merits of devices employing lethal doses of thallium and compound 1080. Includes guideline for their proper use.

A biography of John George “Kootenai” Brown (1839-1916), Albertan homesteader and superintendent of parks.
   Describes first-hand experiences of the drastic decline of wildlife, such as the ‘Marco Polo sheep,’ in the Mustagh Ata, Tibetan Plateau, and Anye Machim areas of China, 1980-81. Discusses the takeover by domestic animals, and the lifestyle of Golok nomads.

   Outlines proper procedures to be taken by Alberta government officials in investigating livestock owners’ claims of depredation. Topics include: determining the cause of death, investigating indicators of health, and determining the predator involved.

   Reviews the history, chemistry, toxicology, laboratory findings, pharmacokinetics, diagnosis and treatment of thallium poisoning.

   Evaluates three collars designed to dose coyotes (Canis latrans) attacking sheep with a fast-acting toxicant, sodium cyanide.

   Discusses the tactic of protecting endemic bird populations on the Aleutian Islands, Alaska, by introducing sterilized red foxes (Vulpes vulpes), which would act as biological control agents for arctic foxes (Alopex lagopus).

   Discusses historical canid distribution in North America, control practices involving toxicants, further effects of control programs, and ecological factors important to canid interactions.

   Comments on the philosophical discourse between wildlife biology and the animal welfare movement.
   Discusses the demographic and genetic aspects, methods, agents, and problems of fertility control. Provides guiding principles for the use of fertility control by keepers of captive animals.

   A discussion of the theory of nature preservation through official reserves, designed both for the scientific community as well as governing bodies. Addresses topics such as the size, isolation, and design of nature reserves.

   Discusses events in the lifting of the ban on Compound 1080, from a conservationist perspective.

   A history and criticism of wildlife conservation practices in the Yellowstone region, including an encyclopedic list of the significant mammals occurring there. Features photographs of the animals and a topographic map of the park.

   See section 3.

   Documents and discusses two events—the halting of Alaska’s aerial wolf control program, and the banning of sport trapping of wolves in Minnesota—important to wolf conservation.

   Discusses the advantages of and challenges to methods of reproductive inhibition as replacements for the use of toxicants in coyote control. Considers various antifertility agents for males and females.
   Evaluates the efficacy of busulfan and PMHI as antifertility agents.

   See section 1.

   A summary of the toxicology and health effects of cyanide. Includes chemical and physical information, data on manufacture, import, use and disposal, and estimates on the potential for human exposure.

   Describes recent and projected wolf (Canis lupus) conservation in Canada. Discusses benefits of wolf studies, and maps the approximate distribution of wolves in North America.

   Remarks on considerations (historical, biological, financial and ethical) taken into account when in 1972 the Ontario government dismantled an outmoded bounty law.

   See section 3.

   Correlates the history of road development with information on the extirpation of Wisconsin's wolf population, in order to establish a maximum road density limit for the purpose of more informed wolf management.

   See section 1.
Reports favourably on the Soft Catch Trapping System, a leg-hold trapping method developed by Woodstream Corporation to reduce damage to the trapped animal.

Evaluates the Fremont Foot Snare, the Novak Foot Snare, the Victor 3 Soft Catch trap, and the Victor 3 coil spring trap in capturing coyotes, Alberta, 1985-87.

A study of the process of consensus in environmental dispute settlements (EDS). Discusses model EDS teams before moving to close examinations of three case studies, namely, the British Columbia Wolf Working Group, the Alaska Wolf Management Team, and the Yukon Wolf Management Team.

Comments on wolf (Canis lupus) activity and conservation efforts in the Biebrza River valley, Poland. Advocates implementation of legal protection for wolves in this area. Written in Polish, with an English summary.

Employs ecological imbalance as an example in a reflection on the disparity between a culture’s ideals and its actual practices.

Chronicles the history of wolf (Canis lupus) bounty, conservation and management in Minnesota, 1849-1973.
    Reports injuries and mortalities sustained by 126 wolves (*Canis lupus*) during live capture programs. Suggests less injurious methods of capturing.

    Outlines wolf (*Canis lupus*) numbers and management programs, 1950-89, and ungulate population trends and harvests. Discusses further management challenges, such as balancing wolf numbers and ungulate densities in the Nelchina basin.

    Describes a method for immobilizing wolves. Discusses different doses required for excited and unexcited individuals.

    Reviews the sources, pathophysiology, clinical manifestations (acute and chronic exposure) and treatment of cyanide poisoning, using two case studies.

    Describes in detail the method of aerial hunting of predators, such as coyotes (*Canis latrans*). Explains limitations, and makes recommendations for its most effective use.

    Chronicles the history of American fences used to limit depredation. Describes recent developments in fencing and the proper use of fences.

    Reflects on the meaning, purpose and development of wildlife management in the United States, 1933 to present. Suggests a recommended course for future wildlife management.
   A description of an experimental translocation of four live-trapped wolves (Canis lupus) from Minnesota to Huron Mountain, Michigan, 1973-74. Includes general guidelines for translocation based on the results of the experiment.

   Outlines methods of predicting the costs of various enterprises, with the aim of ameliorating program design and funding. Discusses cost-benefit and cost-effectiveness analysis in contrast to one another.

   See section 1.

   Reports on the use of melengestrol acetate (MGA) to inhibit and synchronize estrus in farm animals. Documents conception rates, effects of MGA during pregnancy, and effects on milk production and constituents.
Coyotes and Other Canids, and Wolf-Coyote Relationships


Studies 19 coyotes, representing 8 families, to measure average distances maintained between individuals within a single family, as well as distances maintained between different families.


Recommends the introduction of sterile red foxes to protect the avifauna of the Aleutian Islands from predation by arctic foxes, based on a trial on Uliaga and Adugak Islands, 1983-92.


Measures threshold level of olfactory response in dogs navigating a variety of mazes.


Measures time of eye-opening, development in weight and tooth eruption in young coyotes (*Canis latrans*), and compares results to data from other canids.
Chapter 9


Compares, contrasts and discusses behavior of two groups of coyotes (Canis latrans) in Wyoming, 1977-82. Addresses the role of helpers, den attendance, pup survival, space use and movement patterns, and intraspecific territorial defense.

Examines sociality, demography, reproduction, space-use, activity patterns, and feeding ecology of feral dogs in Italy. Uses wolf socio-ecology as a standard in evaluating the success of the feral dog in adapting to natural environments.


Describes the coexistence of wolves (Canis lupus) and coyotes (Canis latrans) in Riding Mountain National Park, 1974-79. Maps overlaps of home ranges, and studies coyote survival rates at varying wolf densities.


See section 3.

Documents the history, legal status, distribution, control, population dynamics, sightings, sex ratios, recruitment and predatory behavior of the hunting dog (Lycaon pictus) in Zimbabwe, 1956-85.

Assesses the influence of the carcass dumping area of a cattle feedyard on the coyote (Canis latrans) population of the surrounding area.
Coyotes and Other Canids, and Wolf-Coyote Relationships


Describes situation of dens, mean litter numbers, foraging arrangements, hunting methods, pelage variation, parental care, and interactions with coyotes (Canis latrans) of the red fox (Vulpes vulpes) population near Edmonton, Alberta.


Measures numbers of coyotes (Canis latrans) and red foxes (Vulpes vulpes), 1980-89. Hypothesizes that the spatial segregation observed between coyotes and foxes is due to interpecific competition.


Hypothesizes on the nature of interspecific relations among coyotes (Canis latrans) and red foxes (Vulpes vulpes), given fluctuating wolf (Canis lupus) populations, in Jasper National Park, Alberta, 1980-89. Records numbers of foxes and coyotes sighted.


Documents seven cases in which female, rather than male, emigration occurred to effect interpack transference in African wild dogs (Lycaon pictus Temminck), Serengeti National Park and Ngorongoro Conservation Area, Tanzania, 1968-72.


Studies African wild dogs in northern Tanzania, 1967-78. Discusses range, pack, recruitment, status, dispersal, and population dynamics of the subpopulation there.
Chapter 9

Monitors interactions between wolves (Canis lupus) and dogs (Canis familiaris) in Minnesota, 1979-87. Discusses implications of these interactions for wolf management and restoration programs.

Maps ranges of coyotes (Canis latrans) and wolves (Canis lupus) based on evidence from captures and radiolocations in order to describe spatial relations between the two species.

Describes population studies of coyotes (Canis latrans) in south-eastern Colorado. Looks at sex and age structure, reproduction, survival, dispersal, spatial organization, population estimates, and management implications.

A descriptive article discussing the history, ecology, food habits, space requirements, social structure, development as pups, population dynamics, communication and interspecific relationships of coyotes.

Analyses stomach contents from coyotes (Canis latrans) collected in Arkansas, 1969-74, in order to identify common food items.

Studies area use and spatial relationships among sympatric coyotes (Canis latrans) and red foxes (Vulpes vulpes) in eastern Maine 1981-84. Finds that the presence of resident coyotes seems to limit the available habitat for red foxes.

See section 5.
Coyotes and Other Canids, and Wolf-Coyote Relationships


Tests the hypothesis that red fox (Vulpes vulpes) predation causes a disparity in the sex ratio of ducks in Prairie Pothole Region, North Dakota, 1963-73. Discusses history and implications of the disparate sex ratio.


Reports on and discusses social and reproductive behavior of the dhole, or Asiatic wild dog (Canis alpinus), studied in India, 1976-78.


A study of the habitat, population, social and food ecology of spotted hyenas (Crocuta crocuta) of the Serengeti National Park and the Ngorongoro Crater, Tanzania.


Presents a comparative study of the fossil record of coyote-like canids in the northern hemisphere to reconstruct their evolution. Discusses Canis lepophagus Johnston, Canis priscolatrans Cope, and Canis latrans Say, from the Blancan to the Recent.


Investigates the normal blood constituents, and their ranges, in castrated or spayed working dogs.


Uses empirical restriction-site surveys of coyote (Canis latrans) specimens collected throughout North America to test theoretical equilibrium models of genotype turnover. Estimates genotypic variability.


Analyses mountain lion (Felis concolor), bobcat (Felis rufus) and coyote (Canis latrans) scat content to determine the diets of these animals. Compares results to scat analyses of 1972-74 and 1980-81.
Examines the effect of diethylstilbestrol, a synthetic estrogen, on the reproductive capacity of captive red foxes (*Vulpes fulva*). Results measured according to the production of offspring.

Describes a technique for determining the age of coyotes (*Canis latrans*) according to cementum annuli of the canine tooth. Assesses the reliability of the technique, even for old coyotes, as high.

Communicates the results of a trapping survey of carnivore populations in Wyoming, Colorado and New Mexico. Figures represent coyotes, bobcats, skunks, badgers, raccoons, swift foxes, red foxes and weasels.

A textbook on the anatomy, therapeutics, diseases, and surgery of the eyes of dogs.

Examines relationships among coyotes (*Canis latrans*), bobcats (*Felis rufus*) and red foxes (*Vulpes vulpes*) in western Maine, 1979-82. Discusses characteristics of furbearers studied, habitat use, spatial relationships, activity patterns, feeding ecology, niche overlap and competition.

Studies food habits of coyotes (*Canis latrans*) in Texas from analyses of coyote stomach contents and scat contents, 1971-73. Lists, fruit, honey mesquite pods, rodents, and leporids among items in the coyote diet.

Studies the role of the coyote (*Canis latrans*) in predation and depredation in Louisiana, through stomach and scat analyses.
   Measured olfaction in German shepherds, and analyses qualities of and anomalies in the resultant concentration-response functions. Discusses the possibility of a dual receptor mechanism underlying olfaction in dogs.

   Studies interspecific spatial relations of coyotes (*Canis latrans*) and wolves (*Canis lupus*) in Riding Mountain National Park, Manitoba, using snow tracking and ground radiotelemetry. Discusses overlap of coyotes and wolves regarding predation.

   Describes scent-marking by sympatric wolves (*Canis lupus*) and coyotes (*Canis latrans*), and determines whether scent marking has an interspecific behavioral role in separating the two species ecologically.

   Examines sympatry of wolves (*Canis lupus*) and coyotes (*Canis latrans*) in Riding Mountain National Park, Manitoba. Attends to specific foraging behaviors which permit niche separation between these two species.

   *See section 5.*

   Describes home ranges, activities, habitat use and home-range overlap with transients of 29 radio-collared coyotes (*Canis latrans*) from 11 different groups in the Champlain Valley, Vermont, 1984-86.

   *See section 3.*
Chapter 9

Discusses eastern coyotes (Canis latrans var.) in Maine, based on 90 specimen killed 1968-73. Touches on distribution, identification, physical characteristics, food habits, and niche.

Answers questions about migratory movements of coyotes (Canis latrans), such as whether or not they move between agricultural and boreal forest areas seasonally. Monitors coyote spatial relationships.

Summarizes accounts of coyote (Canis latrans)-red fox (Vulpes vulpes) interactions, North Dakota, 1970-85.

Documents spatial relationships between coyotes (Canis latrans) and red foxes (Vulpes vulpes) in North Dakota, 1977-78. Discusses population sizes, territory sizes, family spacing, frequency of encounters and interspecific conflict.

See section 5.

See section 5.

Records serologic and hematologic values of free-ranging, wild coyotes (Canis latrans) from northern Wisconsin, 1978-79. Examines data for normal variation due to age and sex differences, and compares results to those of captive coyotes.

See section 5.
Coyotes and Other Canids, and Wolf-Coyote Relationships


Determines the adaptive strategies of prey selection and habitat partitioning that operate to allow coyote (Canis latrans) and red fox (Vulpes vulpes) populations to exhibit sympatry in the southwest Yukon.


Records body measurements of coyotes (Canis latrans) from Kenai National Wildlife Refuge, Kenai Peninsula, Alaska. Compares these findings to data in existing literature on coyotes, in order to illuminate trends across latitude and longitude.


Provides a basic understanding of coyote (Canis latrans) ecology on the Kenai Peninsula. Addresses coyote food habits, home range, and interactions with wolves (Canis lupus).


An overview of and introduction to the ecology and behavior of the wild canids of North America, including wolves (Canis lupus, Canis rufus), coyotes (Canis latrans), and foxes (Vulpes vulpes, Vulpes velox, Vulpes macroura, Urocyon cinereoargenteus, Alopex lagopus). Features vivid photographs of the wildlife discussed.


Explains irregularities in the distribution pattern of red fox (Vulpes vulpes) rearing dens, based on a study including coyotes (Canis latrans), skunks (Mephitis mephitis) and raccoons (Procyon lotor) in Ontario, 1975-80.


Describes the diets of coyotes (Canis latrans) and relative abundance of mammalian prey through the winters of 1979-86. Touches on prey types, dietary patterns, feeding response, and optimal diet.
Chapter 9

Quantifies survival rates and patterns, and determines mortality causes in a lightly exploited, high-density coyote (Canis latrans) population in southern Texas.

An account of the ecology of the coyote (Canis latrans) supported by numerous photographs and illustrations. Describes the distribution, behavior, pathology, economic status, control, evolution, physical characteristics and taxonomy of the coyote.
    Argues that complexity and stability of an ecosystem are inversely proportional. Examines Nunney’s heuristic argument, and examples of stability and complexity in ten species.

    Reports on the prevalence and intensity of infection of T. hydatigena, Taenia krabbei and Echinococcus granulosus in moose (Alces alces) lung, liver, spleen, heart and kidney, with relation to age of moose. Presents findings on size and site of encystment of hydatid cysts within moose.

    A letter, concerned with the status and conservation of the Florida panther and other hybrids. Scrutinizes the Biological Species Concept of O’Brien and Mayr, and argues for a pattern-based definition of “species.”

    Refines the theory of 24-hr rhythms in animals by adding that a daily bimodal pattern of locomotor activity is a common property of the circadian oscillating system. Presents data from Greenfinches (Chloris chloris) and other birds.

    Researches habitat use, movements, and demography of moose (Alces alces) in south-central Alaska, 1976-86. Finds that brown bear (Ursus arctos) predation accounted for 73% of moose mortality.
Chapter 10


  Presents a summary of the theoretical features of zones of hybridization between subspecies. Discusses tension zones, and the value of hybrid zone studies in measuring reproductive isolation.


  The story, from a personal perspective, of the return of wolves to Montana, particularly as concerns the experiences and conservation of the Ninemile pack, a litter of wolves orphaned when the mother abandoned them.


  Addresses the problem of migrant ungulate conservation in the Greater Yellowstone Ecosystem given the extinction of wolves. Uses an analogy to Africa’s Serengeti ecosystem heuristically.


  Presents a method in which female caribou (*Rangifer tarandus*) can be classified in the postcalving period as to parous of the current year and nonparous of the current season. Allows determination of annual parturition rates.


  Researches the causes of rates of fluctuations in caribou (*Rangifer tarandus terraenovae*) numbers in Newfoundland, 1900-67. Reports on distribution and size of herds, birth rates, adult and calf mortality, and the role of predation.


  Studies breeding in a population of caribou at Mt. Alberta, from September to October, 1959. Discusses herd size, movement, herd structure, stag agonistic behavior, slurring display, and breeding status of stags.


  Discusses why numbers of caribou (*Rangifer tarandus*) declined in the 1800’s and early 1900’s. Of four hypotheses postulated, one—that the decline was due to increased hunting and predation—is supported by the article.

Presents and defends a theory that natural caribou (Rangifer tarandus) control is accomplished by different causes in different regions. Discusses severe weather, meningeal worm (Parelaphostrongylus tenuis), and predation.


Quantifies grizzly bear (Ursus arctos) predation and scavenging rates. Purposes to define the ecological niche of the grizzly bear, and to determine some implications of grizzly predation for moose management.


A collection of wildlife photography devoted to the wolves of Ravenwood, Minnesota. Supported by an aesthetic text centered on the author's feeling of spiritual communion with the wolves of that area.


Measures age-specific, live weights of adult and subadult Dall sheep (Ovis dalli dalli). Charts physiological measures, graphs rates of growth, and relates measurements to sex of sheep.


An edition of Anthony Hendry's (Hendry's) journal recording his daily experiences during his journey to the South Saskatchewan River, 1754-55, supplemented by commentary from the editor.


Describes a die-off of the Dall Sheep (Ovis dalli dalli) population of Sheep Mountain, Yukon, over the winter of 1981-82. Correlates mortality figures with data on winter severity, including temperatures, snowfall and wind speeds.
Chapter 10


Describes seasonal movements of a distinct subpopulation of caribou (*Rangifer tarandus granti*) in Alaska between March and November 1975.

Studies an elk (*Cervus elaphus*) population in Yellowstone National Park, 1967-76, in order to describe and explain natural population regulation. Discusses density, intraspecific competition, forage sources and predation.

Discusses the significance and role of interspecific competition in evolutionary theory, using Darwin’s finches (*Geospiza*) in the Galapagos Islands as an example. Discusses scientific alternatives to controlled experiments.

An edited and annotated version of the reconstructed diary of the 1869 Cook-Folsom-Peterson Expedition to the Yellowstone region.
Interprets the decline in the rate of calf recruitment in the George River caribou (Rangifer tarandus) herd of northern Quebec. Discusses poor physical condition of females, habitat deterioration, delayed birth rates, predation, and snow.

A study of the dynamics of moose populations in southwestern Quebec, including predictions generated by computer simulations. The authors forward a number of suggestions for the optimization of moose harvest.

Describes seasonal movements of woodland caribou (Rangifer tarandus) in a 32 000 km² study area in Ontario. Finds that the caribou return annually to a wintering area.

Presents estimates of dates of conception for the Kaminuriak barren-ground caribou (Rangifer tarandus groenlandicus) during mating seasons of 1966-67. Finds that most dates nearly coincide, which synchrony may be essential for calf survival.

Presents results of a study of undernutrition performed on captive white-tailed deer (Odocoileus virginianus) between December 1984 and May 1985. Includes analysis of feed consumption, body composition, blood and urine profiles.

A historical description of the life and business of the American Rocky Mountain fur trade in the nineteenth century. Illustrated by Alfred Jacob Miller.
Chapter 10

   Reexamines theory and examples of competitive exclusion in evolutionary theory. Suggests a reason for the slow understanding of these concepts in the scientific community, and hints at future directions of research.

   An illustrated edition of Lt. Gustavus D. Doane’s journal of his 1870 expedition to the Yellowstone region. Includes a biography of Doane, as well as his account of the Snake River exploration, 1876-77.

   A proposal for a project to restore the numbers of caribou (*Rangifer tarandus*) in Alberta, supplemented by a history of caribou in that province, 1900-80. Analyzes caribou biology in conjunction with human interference.

   Reports on seasonal movements, location and extent of seasonal ranges, rutting and calving areas, and population status of 24 woodland caribou (*Rangifer tarandus*) in west central Alberta.

   Records the time and frequency of antler shedding after parturition in a group of 45 individually recognized adult female reindeer (*Rangifer tarandus*). Discusses different reasons for postpartum retention of antlers, which varies from 1 to 11 days.

   Studies caribou (*Rangifer tarandus*) calving sites in Alaska and the Yukon. Assesses potential effects of oil development on the Porcupine caribou herd during calving period.


10-40. Fox, M.W. 1980. The soul of the wolf. Lyons and Burford, New York. 131 pp. A qualitative exposition of the nature of wolves, premised on the communion which human beings should feel with wild animals in order to conserve nature. Discusses various aspects of wolf physiology, behavior, language and social organization.

Chapter 10


Describes population studies of woodland caribou (*Rangifer tarandus caribou*) carried out in the Birch Mountains. Discusses population density and distribution, age composition, sex ratios, reproduction, survival, aggregations, seasonal movements, and habitat use.


Studies the responses of moose (*Alces alces*) to the burning of a 500-km² area in central Alaska, to determine if and how moose alter their movements to exploit a burn, whether age is a factor, and what implications the findings have for moose habitat and population management.


Summarizes information on the population dynamics of caribou (*Rangifer tarandus groenlandicus*) on Coats Island, Hudson Bay, Canada, 1975-84. Discusses winter mortality, population regulation, and social organization.


Relates ungulate social behavior and social organization to ecological parameters. Discusses Jarman-Bell principle, antipredator strategy, function of habitat, turnover rate, territoriality, dispersal theory, and Edinger's principle.


Reassesses bison taxonomy. Diagrams and discusses pelage features and other phenotypic qualities of specimen from Nyarling River, Elk Island National Park, Mackenzie Bison Sanctuary and Wood Buffalo National Park.
An accessible, illustrated introduction to wolves and wolf biology. Describes current scientific understanding of the nature and taxonomy of wolves, traditional myths about wolves, historical persecution of wolves, and modern conservation efforts, including the Yellowstone project. Features distribution maps, a quick summary of wolf facts, and vivid photographs.


Argues for a revision of the traditional Western, urban understanding of wilderness and wilderness management. Dismantles the urban understanding of wilderness as an unchanging, isolated equilibrium.

Provides information regarding elk and their foraging habits on the winter ranges of Yellowstone National Park from 1934-1938.

Summarizes information on the archaeology, history, status and management of muskoxen (Ovibos moschatus) on Banks Island, Northwest Territories. Discusses competition with caribou (Rangifer tarandus pearyi).

A compilation of essays which in concert draw comparisons between human beings and wolves (Canis lupus).

Chapter 10


Researches ingesta-free body fat, kidney fat and femoral marrow fat in European roe-deer (*Capreolus capreolus*) in order to establish combinations of different fat indices, which are reliable in estimating the body condition of roe deer.


An account of the author’s travels and hunting adventures in British Columbia, hunting wildlife, among which mountain goats receive particular attention. Includes numerous photographs and drawings of the experience.


An extensive study of the ecology of elk (*Cervus elaphus*) in Yellowstone National Park, centered on the issue of vegetation-ungulate relationships on the northern range, as determined 1970-79. Discusses proposed population control.


A comprehensive account of the ecology of caribou (*Rangifer tarandus*) of the Canadian Arctic and Subarctic. Includes maps of ranges and climatic measures, drawings, and compilations of quantitative descriptions of caribou.


Reviews and discusses the distribution of moose (*Alces alces*) in western North America, except Alaska, since Pleistocene times. Discusses climate as a limiting factor to moose distribution.


Studies physiological responses of deer (*Odocoileus hemionus sitkensis*) to variation in ranges, in order to determine a relationship between stomach content and summer forage quality, southeast Alaska, 1959-61.
   Demonstrates and evaluates the technique of using skeletal ratios to assess growth differences among Alaskan deer (Odocoileus hemionus sitkensis) on varying nutritional regimens.

   Reports quantitative and qualitative evaluations of range quality for black-tailed deer (Odocoileus hemionus sitkensis) in the “Panhandle” region of Alaska, 1959-61. Discusses reflections of these data in the local deer populations.

   Collects and analyses data on the grizzly bears (Ursus arctos horribilis) of Yellowstone National Park. Predicts trends in grizzly population dynamics through computer and stochastic models.

   Compiles information on moose (Alces alces) status and habitat selection in the provinces and states surrounding the Great Lakes. Touches of seral stages of plant succession, forest fires, logging, and forest insects.

   The diary of the Washburn Expedition to the Yellowstone region in 1870, supplemented by a larger history of the discovery, exploitation and subsequent administration of the area as a park.

   An anecdotal and aesthetic history of the author’s encounters with a pack of wolves in Michigan’s Upper Peninsula, 1983-85.

   Measures ratios of essential to non-essential amino acids in the blood plasma of crossbred wethers subjected to either starvation or a low nitrogen diet. Comments on urea concentrations, salivation, and rumen nitrogen content.
Chapter 10

A study of the status of ungulates in Alaska, their management, and their relationships with peoples.

Documents the history of exchanges involving elk, transacted between Canada and the United States, 1916-27.

A comprehensive exploration of the conceptualizations of wolves in human society.

A history of human interaction with the Gallatin Elk herd of Montana. Evaluates management attempts and prospects.

A textbook explaining the distribution and diversification of species, as observed in the United States and Central America. Includes appendices explaining relevant mathematical operations.

A history of the Yellowhead Route as trail, pass and highway.

A taxonomic study of the Queen Elizabeth Islands, Banks Island, Dolphin and Union, and mainland populations of caribou in Canada, using data gathered from examinations of skulls, skins, hoofs, and antler velvet.

A discussion of the speciation of birds, grounded in taxonomy and zoogeography. Includes a theoretical account of the term 'species'.
An overview, commentary and criticism of evolutionary biology. Discusses concepts of species, isolating mechanisms, hybridization, population, genetic variation, genotype, geographic variation and speciation.

An expository commentary teaching the essential principles and methods of zoological classification. Includes a section on zoological nomenclature, and a glossary of salient terms.

An abridged and revised overview of and commentary on evolutionary biology, discussing species, isolating mechanisms, hybridization, population, genetic variation, genotype, geographic variation and speciation.

An anecdotal account of the author's experience studying wolves (Canis lupus) in the high Arctic of Canada in 1986, supplemented with many vivid photographs.

An introduction to the world of wolves and wolf biology, enhanced by numerous vivid photographs of wolves in action.

Explains marrow-fat and clarifies its value as an indicator of body condition for elk (Cervus elaphus), caribou (Rangifer tarandus) and moose (Alces alces). Dispels the notion of a direct correlation between marrow fat and total body fat.

Reports on a study made of white-tailed deer (Odocoileus virginianus) maternal females and fawns in the Superior National Forest, Minnesota. Graphs data to determine a relationship between age of female and survival of fawns.
Demonstrates a cumulative effect of winter severity on Minnesota whitetailed deer (*Odocoileus virginianus*) and Isle Royale moose (*Alces alces*) fecundity.

Evaluates spectro-reflectance as an estimator both of green herbaceous phytomass in large geographic areas, and thus also of annual trends in forage availability on ungulate summer ranges.

Assesses agents of population regulation for the George River caribou (*Rangifer tarandus*) herd of Northern Quebec. Monitors population dynamics, 1955-86.

Argues from data on the ecology of *Rangifer tarandus pearyi* that the Peary caribou is a distinct and endangered species in Canada.

A compilation of reports surveying Sitka black-tailed deer population numbers and trends in Game Management Units (GMU) 1-4, 6, 8, Alaska, 1984-85.

A novel, the subject of which is a man’s relationship with a wolf pack.

An anthology of artistic narratives about wolves, representative of modern understanding of the nature and experiences of wolves. Anthologized writers include A. Murie, S. Olson, R. Caras, T. McNamee, A.S. Leopold, Linda Hasselstrom, P. Schullery and R. McIntyre.

Analyses 34 femur marrow samples from barren ground caribou (Rangifer tarandus granti). Determines linear and inverse relations existing among the water, fat and non-fat residue components of the tissue, and presents a method of determining femur fat content from dry weight measures.


Monitors physiologic attributes and behavioral response of white-tailed deer (Odocoileus virginianus) in a 252-ha Upper Michigan enclosure as the population increased from 23 to 159 animals due in part to supplemental feeding.


Discusses the role played by Baron Ferdinand von Mueller in the history of Australian ecology, particularly as regards the issue of the effect of an introduced species such as the European magpie on native marsupial wolves (Thylacinus cynocephalus).


An elementary introduction to the world of wolf biology in North America. Features numerous pictures of wolves and wolf management.


Studies proliferation of palatable forage and increases in moose numbers after the fire on the Little Sioux Burn, northeastern Minnesota, 1971-72. Discusses immigration and increased production.


Argues that the α-advantage of larger animals is often counteracted to a significant degree by the K-advantage of smaller animals. Suggests an explanation for the evolution of interference behavior.
Chapter 10


Estimates population density and harvest rates for a northcentral Alaska Range population of grizzly bears, 1981-86, in hopes of establishing a relation between the two variables.


A descriptive survey of ungulates and subungulates for the purpose of comparing and contrasting them on the topics of fetal and neonatal growth rates, relative proportion of the gravid uterus, average maternal and neonatal weights, and maternal milk production at the peak of lactation.


Records transferrin allele frequencies of Canadian woodland and barren ground caribou (Rangifer tarandus) with a view to evaluating the possibilities of genetic and ancestral difference between these populations, 1982-88.


A general account of Canada’s forests and tree types, descriptively surveying the Boreal, Subalpine, Montane, Coast, Columbia, Deciduous, Great Lakes-St. Lawrence and Acadian regions of the country.


Studies survival rates of elk (Cervus elaphus) in Wyoming. Links female calf survival rate to cow population density, and suggests that age-specific density dependence is an important factor in models of elk population dynamics.


A study of various species of the subfamily Caprinae occurring in the Himalayan regions of Pakistan, India and Nepal, 1968-75. Addresses taxonomy, distribution, population dynamics, predation, and social behavior.

Studies the movements and behavior of elk (Cervus elaphus) in order to judge whether a collective or an individual relationship between mother and young is at the basis of elk society, 1962-68.


Reports Dall Sheep (Ovis dalli dalli) numbers in Alaska's Denali, Lake Clark, Wrangell-St. Elias, Gates of the Arctic, Noatak and Yukon-Charley Rivers National Parks and/or Preserves, 1981-83.


A book advocating the liberation of animals from human tyranny. Moves from assumptions of the inherent worth of animals as sentient beings, through research of inhumane treatment of animals in factories and laboratories, to discussions of speciesism and vegetarianism.


Discusses conservation and nutrition of elk (Cervus canadensis Erxleben) in Yellowstone National Park.


Investigates whether or not forage availability regulates numbers of wild reindeer (Rangifer tarandus tarandus L., Rangifer tarandus platyrhynchos L) in a density-dependent way.


Chapter 10

A textbook teaching the science and technology of biochemistry. Sections focus on the chemical constituents of cells, enzymatic catalysis, metabolic reactions, and molecular genetics.

An exhaustive reference compendium assembling biochemical, genetic, morphologic, metabolic, ecological, symbiotic, parasitologic, biogeographic, and physiologic data.

A history of the exploits of John Palliser during his overland exploration of western Canada, 1857-60. Punctuated with excerpts from Palliser's own account of the journey.

A textbook teaching statistical mathematics as employed in contexts of biological research.

An exploration of the complex physical and ideological relationships between wolves and human beings. Touches on bounties, killing, predation, howling, and social organization of wolves, particularly in Yellowstone and Alaska, in a pursuit of a definition of the spirit of the wolf, and our relationship to it.

Summarizes population fluctuation of bighorn sheep (Ovis canadensis canadensis Shaw) from 1800-1967 in the Canadian Rocky Mountains. Discusses severe winters, growth of industry, hunting, preservation, forest fires, pneumonia-lungworm disease, and competition for forage.

   A personal exploration of the concepts of wolf and wilderness, as narrated by the author in the context of trips, often by canoe, into the wilds of Algonquin Provincial Park.

   A study detailing the practice by caribou (*Rangifer tarandus*) of digging craters in snow in order to obtain forage during the winter, 1975-76. Determines mathematical relationships between digging effort and alimentary energy reward.

   Documents the close association between pregnancy rates and levels of fat reserves and body weights in Peary caribou (*Rangifer tarandus pearyi*), 1974-77. Discusses relationship in terms of adaptation and energy conservation.

   The journals of the Lewis and Clark expedition through southwestern North America, 1804-06. The editor appends a history of exploration in this area, biographies of the explorers, and an overview of the expedition.

   Investigates catabolism of protein and fat reserves of mule deer (*Odocoileus hemionus*) in winter. Discusses how nutritional deprivation affects priorities associated with use of adipose and lean body tissue.
Chapter 10


Reports on studies of caribou (*Rangifer tarandus*) in Alaska’s Western Arctic caribou herd, 1979-82. Discusses the “open social unit” of caribou organization, and return to traditional calving areas.


Provides quantitative and qualitative descriptions of the relation between doe nutrition and calf vitality in white-tailed deer (*Odocoileus virginianus*), from a study of penned deer in Michigan, 1954-62.


Evaluates relationship between body composition and condition indices of 16 white-tailed deer (*Odocoileus virginianus*). Discusses chest girth, carcass composition, viscera mass, Kistner score, kidney fat mass, and gastrocnemius protein.


A history of civilization in the American West from European invasion and conquest to modern times, examining social, political and economic points of interest. Features numerous maps, tables, and illustrations.


An aesthetic and anecdotal discussion of the plight of wolves (*Canis lupus*) in the modern world.
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Appendix A: Periodical Abbreviation

(listed alphabetically, by abbreviation)

Acta Endocrinol.
Acta Endocrinologia
Acta Theriol.
Acta Theriologica
Acta Theriol. Sin.
Acta Theriologica Sinica
Acta Zoologica Fennica
Acta Zoologica Mexicana Nueva Serie
Advances in Ecological Research
Am. Anthropol.
American Anthropologist
American Journal of Reproductive Immunology and Microbiology
American Journal of Veterinary Research
American Midland Naturalist
Am. Nat.
American Naturalist
Am. Scient.
American Scientist
Am. Zool.
American Zoologist
Anim. Behav.
Animal Behaviour
Annals of Internal Medicine
Arctic Institute of North America Technical Paper
Australian Journal of Agricultural Research
Australian Journal of Experimental Biology and Medical Science

Behav. Ecol. Sociobiol.
Behavioral Ecology and Sociobiology
Biol. Conserv.
Biological Conservation
Biol. J. Linn. Soc.
Biological Journal of the Linnean Society
Biol. Reprod.
Biology of Reproduction
Bonner Zoologische Beitraege
British Journal of Animal Behaviour

Calif. Fish Game
California Fish and Game
Can. Aud.
Canadian Audubon
Can. Entomol.
Canadian Entomologist
Appendices

Can. Field-Nat.
Canadian Field-Naturalist
Canadian Journal of Botany
Canadian Journal of Zoology
Can. Vet. J.
Canadian Veterinary Journal
Comp. Biochem. Physiol.
Comparative Biochemistry and Physiology
Conserv. Biol.
Conservation Biology

Danish Review of Game Biology
Defenders Wildl. News
Defenders of Wildlife News

Ecol. Monogr.
Ecological Monographs
Environ. Behav.
Environment and Behavior
Evaluation Studies Review Annual
Evol. Ecol.
Evolutionary Ecology
Exp. Molec. Path.
Experimental and Molecular Pathology

Federation Proceedings
FLFAAN
Flora og Fauna

Hered.
Heredity
Holarct. Ecol.
Holarctic Ecology

I.U.C.N. Bull.
Int. Wildl.
International Wildlife

Journal of the Acoustical Society of America
Journal. American Veterinary Medical Association
Journal of Animal Ecology
Journal of Applied Ecology
Journal of Archaeological Science
Journal of Chemical Ecology
Journal of Clinical Microbiology
J. Comp. Neurol.
Journal of Comparative Neurology
J. Comp. Physiol.
Journal of Comparative Physiology
J. Environ. Ed.
Journal of Environmental Education
J. Exp. Zool.
Journal of Experimental Zoology
J. Fish Res. Board Can.
Journal. Fisheries Research Board of Canada
J. Helminth. Soc. Washington
Journal. Helminthological Society of Washington
J. Hered.
Journal of Heredity
J. Hist. Geog.
Journal of Historical Geography
J. Infect. Dis.
Journal of Infectious Diseases
J. Mammal.
Journal of Mammalogy
Appendices

J. Molec. Evol.
Journal of Molecular Evolution
J. Range Manage.
Journal of Range Management
Journal of Theoretical Biology
J. Wildl. Dis.
Journal of Wildlife Diseases
J. Wildl. Manage.
Journal of Wildlife Management
J. Zoo Wildl. Med.
Journal of Zoo and Wildlife Medicine
J. Zool. (London)
Journal of Zoology (London)
Journal of Zoological Systematics and Evolutionary Research

Mammal Rev.
Mammal Review
Meditsinskaya Parazitologiya i
Parazitarnye Bolezní
Memoirs. Entomological Society of Canada
Molec. Ecol.
Molecular Ecology

Nat. Hist.
Natural History
Natl. Wildl.
National Wildlife
Naturaliste Can.
Naturaliste Canadien
Neuroscience and Biobehavioral Review

Parasitol.
Parasitology

Pharmacol. Biochem. Behav.
Pharmacology Biochemistry and Behavior
Polar Rec.
Polar Record
Proc. Annu. Game Conf.
Proceedings. Annual Game Conference
Proceedings. Vertebrate Pest Conference

Roosevelt Wild Life Bull.
Roosevelt Wild Life Bulletin

SABOA
Sabouraudia

Theoretical Population Biology
Conf.
Transactions. North American Wildlife and Natural Resources Conference
Transactions. Wisconsin Academy of Sciences, Arts, and Letters

Vet. Glas.
Veterinarski Glasnik
Vet. Hum. Toxicol.
Veterinary and Human Toxicology
Veterinary Medicine and Small Animal Clinician
Vet. Mex.
Veterinaria Mexico
Vet. Parasitol.
Veterinary Parasitology
Vet. Pathol.
Veterinary Pathology
Appendix B: Addresses of Specialized Collections

(listed alphabetically, by library name or organization)

Canadian Wildlife Service
Edmonton, Alberta

University of Alberta Library System
Science and Technology Division
Cameron Library
UA Campus
Edmonton, Alberta T6G 2E8