

PEOPLE *and* PREDATORS

From Conflict to Coexistence

Edited by

Nina Fascione, Aimee Delach,
and Martin E. Smith

Foreword by James A. Estes

Defenders of Wildlife

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Foreword

Never before in the history of life on earth have global ecosystems been so dominated by a single species. Human influences are everywhere, even in the most remote and wild places. In that sense the word *pristine* is now just a concept, something to be remembered or imagined but never again seen. And along with these changes are worrisome trends—the loss of species and even threats to our planet’s life support systems. This is no revelation. Realists have known where we were headed since at least the time of Malthus. The world population presently stands at about 6.3 billion. Forecasts tell us that it will grow to nearly twice that number before it stabilizes or declines, and future threats to biodiversity and global ecosystem services are certain to track the human population. This is the reality we all must face. The goals of those concerned with this reality are to save as many of the pieces as possible, and somehow to hold our planet’s ecosystems together through the growth of humanity. The good news is the rise of conservation biology, and that more and more people are dedicating their lives to achieving these goals.

Carnivores are of special interest to conservation biology. These animals, once common nearly everywhere, are now rare or absent in most places. Indeed, the mid- to large-sized carnivores are typically the first species to be lost in human-dominated ecosystems on land and in the sea. Why is this, and what can be done about it? The why is easy. For one, we have selectively killed these creatures for food, or because they eat us and the things we value. For another, the larger carnivores are commonly wide ranging and relatively rare, and thus the maintenance of viable populations typically requires larger tracts of habitat than are needed to maintain viable

populations of most other species. Some of the details underlying these generalities are exposed in the following chapters through a variety of case studies, each of which, in one way or another, is built around conflict relationships between humans and carnivorous vertebrates. The reader will see that the conflicts are widespread across rural and developed landscapes, and even across the political fabric of human societies.

The question of what can be done about these conflicts is harder to answer. Laws and regulations clearly are not enough. Habitat losses and resource conflicts are squeezing carnivores out of existence with the inevitable upward march of human numbers. Compromise is not the answer. We've already lost far too much. Sequestering these creatures in parks and refuges is not the answer. There are simply too many species with too many differing needs to manage that at this late time. Besides, who wants to live in a world in which all of wild nature is stuffed away in a park somewhere? Coexistence, the theme of this volume, is the only possible solution. But can we possibly coexist with carnivores, or more properly stated, can they coexist with us? Probably not, so long as we view them as our enemies and believe that living with them incurs costs without conveying benefits. If, on the other hand, there were some broadly perceived benefit to living with carnivores that outweighed the cost, more people just might be willing to adopt coexistence as a realistic goal.

In fact, there are benefits to living with carnivores that few yet realize. The problem is that the costs are simple and tangible, whereas the benefits are complex and not immediately expressed in monetary terms. A wolf eats the rancher's cow. That's a simple and tangible cost to living with wolves. But wolves also eat elk, or scare them away from places they might otherwise roam and browse at will. And elk eat trees, which in turn stabilize hillsides and maintain riparian and floodplain vegetation. And birds and other wildlife utilize this vegetation, as do people in a variety of direct and indirect ways. Now the imbalance of costs and benefits to living with wolves isn't so clear.

A sea otter eats the fisher's abalone. That's a simple and tangible cost to living with sea otters. But sea otters also eat sea urchins, which in turn eat kelp. And without kelp many fish are reduced, and waves strike the shoreline with greater force than they would if the kelp were abundant, and many other things change that we humans value. Now the imbalance of costs and benefits to living with sea otters isn't so clear. And so it probably is for one carnivore species after the next.

Species interact with one another in complex ways that are difficult for us to see and understand. Most of these stories have never been told because most are still undiscovered. Might it be that such benefits could persuade more people to forego the costs of living with carnivores? While that seems like a stretch, it may also be the best and most utilitarian hope there is for carnivore conservation.

We stand at a point in time when wild things and wild places are disappearing rapidly. Large carnivores are perhaps the most poignant symbol of these losses. But that emotional rendering has not been sufficient to redirect policy, nor does it capture the enormity of all that we are losing. Our perception of the loss of species is reasonably accurate, while our understanding of the associated loss of species interactions—the complex effects of wolves on terrestrial ecosystems or sea otters on kelp forests—is miniscule almost beyond imagination. The challenge is to open our minds, to learn about these interactions, and to imagine what might be. With that knowledge lies hope and opportunity: a reason not to lock up our carnivores in a park somewhere and pray that some minimalistic vision of a viable population will suffice in preserving them for future generations; a pathway by which we might indeed effect a transition from conflict to coexistence between people and predators.

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Preface

On November 16–20, 2002, more than 800 scientists, activists, and educators came together in Monterey, California, for a three-day conference on predators called “Carnivores 2002: From the Mountains to the Sea.” This was the fourth in a series of biennial carnivore conferences hosted by Defenders of Wildlife, a national, nonprofit conservation organization dedicated to the preservation of native species and the habitats on which they depend. The Monterey meeting had a broad focus that included not only large terrestrial carnivores but mesocarnivores, marine carnivores, and raptors. There were more than 150 speakers and 50 posters covering a range of topics from ecology to management, behavior to threats, and research tools to human dimensions. The enthusiasm generated by the meeting led to discussions of a book based on selected talks from the conference, focusing on the interface between humans and predators. Thus *People and Predators: From Conflict to Coexistence* was born.

Given the breadth and variety of topics addressed at “Carnivores 2002,” the conference could have provided enough material for ten books about predators. However, for the purpose of creating a volume that would have wide appeal and applicability, the authors chose to focus on conflicts between carnivores and humans: the causes, possible solutions, and the relevance of conflict and resolution to the successful persistence of carnivore populations. Finding ways to successfully resolve issues that occur when humans and carnivores overlap in habit and habitat has been a crucial need in the recovery and conservation of wolves, bears, otters, and other species. This need will only grow as the popular and legal mandates to conserve and restore biodiversity, particularly carnivore species, intersect with

trends of human population growth, suburbanization, and changing land use patterns.

Each chapter of *People and Predators* deals with a facet of the interactions between carnivores and humans, provides background on a particular problem, and includes a case study describing how these challenges have been met, or what research or tools are still needed to resolve the conflict at hand. The species and conflicts described reflect much of the ground covered at "Carnivores 2002"; however, owing to constraints of time and space, *People and Predators* is focused almost exclusively on North American terrestrial carnivores. Thus, this volume is by no means a comprehensive treatment of possible conflicts and solutions, or even fully representative of those issues raised at "Carnivores 2002." We believe, however, that this volume provides concrete tools for the resolution of many of the problems that stand between us and a future in which carnivores fulfill their historic ecological roles.

As an outgrowth of the "Carnivores 2002: From the Mountains to the Sea" conference, this book could never have come to pass without the tireless efforts of all those who assisted with the conference. We are fortunate to work with such a dedicated group of conservationists at Defenders of Wildlife. We also wish to thank the staff of the Monterey DoubleTree Hotel; the Monterey Convention Center, where the conference was held; and the Monterey Bay Aquarium, which graciously donated space for our "ice-breaker" event. We also acknowledge the participants and presenters, without whom the conference could not have happened, particularly our keynote speakers: Sylvia Earle, James Estes, and George Rabb. We would especially like to thank Rodger Schlickeisen and Mark Shaffer for their leadership on Defenders of Wildlife's carnivore conservation efforts.

The numerous contributors to this book were a pleasure to work with. We thank them all for their research, their insights, and their enthusiastic cooperation in this project. We are very grateful to Terry Pelster, Sharon Wilcox, J. Christopher Haney, and Miriam Stein for their help with manuscript preparation. Barbara Dean and Laura Carrithers, Jessica Poppe, and Brigid Willson at Island Press were instrumental in guiding this process from conference to completion, and for that, we are deeply appreciative. And most of all, the authors would like to thank our spouses, Stephen Kendrot, Robert Barber-Delach, and Hanne Hansen, for their constant support and encouragement.

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Introduction

Nina Fascione, Aimee Delach, and Martin E. Smith

Throughout the centuries, predators have always held a unique place in the human psyche, inspiring both fear and awe (Kellert et al. 1996). Images of carnivores are diverse, but whether the emotions are positive or negative, carnivores fill our imagination in ways that are larger than life. For some people, carnivores elicit fears of child-snatching, bloodthirsty killers; others see heroic images used as symbols of cultural traditions, emblems in sport, and powerful automobiles. Carnivores also play a unique role in our ecosystems, serving as keystone species that help regulate the environment around them in beneficial ways. Yet predators can have more tangible, sometimes detrimental, impacts on humans. Wolves (*Canis lupus*) and grizzly bears (*Ursus arctos*), for example, do occasionally kill livestock, and grizzly bears and mountain lions (*Puma concolor*) have injured and killed humans in North America. Urban carnivores such as raccoons (*Procyon lotor*) can be considered a nuisance or transmit disease. So a basic question remains: How do we manage the world's carnivore populations to conserve this important natural resource while mitigating any harmful impacts?

People and Predators: From Conflict to Coexistence examines these complex human-carnivore relationships and investigates how humans can work to preserve this group of animals while protecting human lives and livelihoods. The goal of this volume is not only to highlight some of the problems encountered when humans and predators live in close proximity, but to offer some proven and potential solutions to such problems, so that we can conserve predators while maintaining a harmonious coexistence well into the future. Our desire is to help wildlife professionals and the

general public better understand a few of the issues facing carnivore conservation in the twenty-first century, and to provide tools for dealing with those problems.

No one book can adequately address the full range of carnivores and the variety of challenges that sharing the planet with them might entail. The chapters contained in this volume are examples of the various issues, and many of the solutions are pertinent to management of other taxa. Though the experience of living with carnivores is certainly a global one, *People and Predators: From Conflict to Coexistence* focuses on North America, since there is an almost overwhelming array of issues in this region alone. This continent has demonstrated the full gamut of human-carnivore relationships over the centuries, from early Native American use of predators as totems to the modern-day problem of nuisance urban carnivores. As the human population in North America continues to expand and encroach on landscapes that historically belonged to wildlife, it will become more important than ever to move from conflict to coexistence.

Living with Predators

It might be fair to wonder why we bother living with predators at all. If they eat our livestock, threaten our safety, and compete for desired resources, perhaps it makes sense to eliminate this group of animals entirely. Fortunately, predators also provide innumerable benefits that make it worthwhile to develop methods of harmonious coexistence. Carnivores help maintain ecosystem function by acting as keystone species, helping to regulate the surrounding environment (Berger 1999; Terborgh et al. 1999; Miller et al. 2001). Economists are discovering that carnivores can also be good for the bottom line. Wolf restoration in the northern Rockies has stimulated a tremendous growth in wildlife-related tourist dollars. Current studies will determine the exact nature of this wolf-driven economy, but estimates taken just prior to the restoration estimated annual income of \$20 million (Duffield 1992).

Similarly, recovery of California sea otters (*Enhydra lutris*) is expected to generate tourism income of \$176 million annually and to create between 1,400 to 8,400 jobs supported by tourism dollars. On top of that, ecosystem services associated with sea otter maintenance of healthy kelp forests would amount to \$7,600 per acre per year (Loomis, in prep.).

Many would argue that carnivores provide a rich cultural and historical

heritage that should be maintained. It cannot be denied that many North Americans derive an emotional value just by knowing predators exist (Kellert et al. 1996).

Today our knowledge of the role predators occupy in the ecosystem is greater than ever. In a system known as the “trophic cascade,” which describes the interactions between different levels of the food chain, predators exert an influence on more than just the numbers of their direct prey. Perhaps the most classic example of a keystone species is seen with the southern, or California, sea otter, which acts as a steward of the Pacific marine environment. By preying on kelp-eating sea urchins (*Strongylocentrotus purpuratus*) and other marine herbivores, sea otters protect kelp and other macro algae, allowing them to flourish and provide habitat for numerous species of fish. If sea otters are removed or diminished, these rich ecosystems collapse as sea urchins, unchecked, devour the kelp beds and destroy habitat (Estes and Palmisano 1974).

A more recent example of the keystone predator effect has been seen in Yellowstone National Park since the reintroduction of wolves in 1995 and 1996. While tourists flock to Yellowstone’s Lamar Valley to witness for themselves one of the park’s most glamorous predators, forest researchers are equally fascinated by the gradual return of quaking aspen, one of the most ecologically important riverside tree species in the Yellowstone ecosystem. Scientists have determined that there is a direct link between the recovery of the ecosystem’s top predator and the trees. Aspen growth essentially stopped once wolves were removed from the park in the 1920s. Now that the wolves have returned, the trees are growing again (Ripple and Larsen 2000; Ripple et al. 2001).

Elk, as it turns out, forage differently depending on whether predators are present. During the 60 years wolves were absent from the park, elk spent more time browsing alongside rivers, trampling the low vegetation and inhibiting new growth of native tree species, including aspen. With wolves once again on the scene, elk are behaving more cautiously—avoiding areas with dense foliage and spending more time in open areas to keep an eye on their surroundings. This behavior change is altering the entire landscape. By altering the movements and foraging patterns of elk, wolves are playing a key role in preserving the integrity of Yellowstone’s overall biodiversity.

As aspen and the other riparian vegetation grow taller and expand in canopy cover, the beneficial impacts to the system will include stream

channel stabilization, floodplain restoration, and higher water tables. Through a tropic cascade effect that improves riparian habitat, wolves may be beneficial to numerous species of vertebrates and invertebrates, including fish, birds, beaver (*Castor canadensis*), and butterflies, as well as many other species.

There are other beneficial chain reactions stemming from wolves' return to Yellowstone. Coyotes (*Canis latrans*), overpopulated for years in the absence of the larger canid, have been reduced by up to 50% in some regions, which in turn has enabled smaller animals such as foxes (*Vulpes vulpes*) and rodents to rebound (Crabtree and Sheldon 1999). With more rodents available, birds of prey have thrived. Leftover wolf kills are providing a reliable, year-round food source for a plethora of other species, including ravens (*Corvus corax*), magpies (*Pica hudsonia*), golden and bald eagles (*Aquila chrysaetos* and *Haliaeetus leucocephalus*), foxes, cougars, insects, and the park's famous grizzly bears. It would be hard to argue that the return of this top predator has not been beneficial.

Many carnivores are also labeled "umbrella" species. Protecting these predators and their habitats will, by default, preserve other, generally smaller, species that rely on the same ecosystems. Grizzly bears in particular are considered an umbrella species. Because they are large and wide ranging, conservation measures for grizzlies help protect a host of other species. Finally, many predators are also known as "flagship" species. Because they are often considered to be attractive or "sexy," they generate public interest and funds in protecting habitats that benefit other species as well.

Living with Humans

There is one carnivore that exerts a stronger influence on our ecosystems than all the rest—human beings. Though we tend to hear more about the threats predators pose to us, the fact is that we have long shaped the environment with our actions, and human activities have tremendous impacts—most of them deleterious—on predators. As human populations grow and wilderness areas shrink, it will become ever more imperative to find means to make room for predators, and methods of coexistence.

The global human population now exceeds 6 billion and is growing. Though our earth is large, we are consuming natural resources at an unprecedented rate and, at least in North America, apparently more rapidly than nature is able to replenish itself (Commission for Environmental Cooperation 2001). With less than 10% of the Earth's land surface protected

in some form (World Conservation Union 2000), there are increasingly fewer wild places remaining for wildlife. Additionally, some parks are protected on paper only, lacking the resources to manage wildlife for continued viability. Experts estimate that we will lose between 1 and 5 million species of plants and animals in the next few decades, primarily owing to habitat destruction, a pace of extinction that is as much as 10,000 times the historical background rate (Wilson 1989). If present trends continue, half of all the species on Earth may be on the road to extinction within 100 years.

Carnivores are particularly vulnerable, as many are wide ranging and require larger tracts of relatively undeveloped habitats in which to live. Other indirect human factors such as depletion of natural prey, pollution, and artificially introduced species and their accompanying diseases, as well as direct human persecution in the form of hunting and commercial trade, combine to threaten the very existence of many carnivore species (Weber and Rabinowitz 1996). The American jaguar (*Panthera onca*) of the southwestern United States and northern Mexico is dwindling. Mountain lions have been extirpated from most of the east. Lynx (*Lynx canadensis*) populations are depleted throughout most of their historical range. The grizzly bear is listed as threatened under the Endangered Species Act (ESA) and exists in only five small populations in the lower forty-eight states. The southern sea otter is imperiled owing to conflicts with humans, primarily illegal killing for perceived competition over resources, and disease, probably introduced by humans. Population counts of mesocarnivores such as wolverine (*Gulo gulo*), fisher (*Martes pennanti*), and badger (*Taxidea taxus*) are mostly estimates, since they are a difficult group to study, but all indications are that many populations have declined.

Fortunately, not all the news regarding carnivores in North America is bad. The public has a tremendous interest in predators and, for the most part, cares deeply about these species. This was demonstrated in no uncertain terms during the federal comment period on wolf restoration in the northern Rockies. More than 160,000 comments were sent by the public in 1993 on the final environmental impact statement (E. Bangs, pers. comm.) on the reintroduction of gray wolves to Yellowstone National Park and central Idaho, one of the highest number of public comments received to date on any wildlife issue. As a result of that restoration project and protection of wolves in the Great Lakes states, wolf populations in the contiguous United States have increased from fewer than 1,000 in the mid-1970s to roughly 4,000 today. Similarly, Endangered Species Act protection and

a ban on the pesticide DDT are responsible for the recovery of bald eagles and peregrine falcons. And, though still on a perilous road to recovery, the panther population in south Florida is hovering at around 100 after being down to a handful of individuals prior to restoration efforts.

The key question facing wildlife managers and legislators is how to manage rare, as well as common, carnivores while addressing the needs of both predators and people. The key questions facing society are whether we will make room for predators and whether we will tolerate them. There are myriad issues challenging a peaceful coexistence between humans and predators. These dilemmas can be classified generally as “ways in which predators threaten humans and our livelihoods” and “ways in which humans threaten predators and their livelihoods.” In other words, coexistence is a two-way street. Wolves eating sheep would clearly fall under the first category, and humans building roads in sensitive habitat would fall into the second group. Of equal importance are the ways in which humans react to predators and the level of value placed on their conservation.

Another way to examine the issue is through the various landscapes in which we coexist with predators. In *People and Predators: From Conflict to Coexistence*, we divide these landscapes into rural, developed, and political. The three chapters in Part 1, “Coexistence in Rural Landscapes,” discuss the challenges of maintaining predator populations in rural areas. Through case studies from three regions—the Great Lakes, the northern Rockies, and western Canada—our authors ascertain the damage large carnivores can inflict on farming and ranching interests by preying on livestock. The authors also propose solutions to predation problems through innovative preventative technologies and livestock management practices that reduce, and in some cases help eliminate, livestock depredation.

Part 2, “Coexistence in Developed Landscapes,” examines how the human-carnivore relationship changes as the landscape becomes more developed. In these landscapes, the conflicts are diverse and include problems caused by predators, as well as problems caused by humans. The first obvious challenge in a developed landscape is maintaining enough habitat to support viable predator populations. However, many carnivores can survive in developed landscapes, and residing in such close quarters to humans can provide for a wide variety of conflicts. Our authors examine such issues as how humans can share the landscape with mid-sized terrestrial carnivores and urban birds of prey; how human-introduced invasive species can negatively impact native carnivores; how designing wildlife