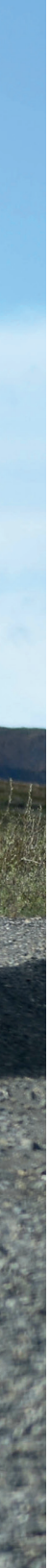
BROWN BEARS IN ALASKA'S NATIONAL PARKS



BROWN BEARS
IN ALASKA'S NATIONAL PARKS
CONSERVATION OF A WILDERNESS ICON

Edited by

GRANT V. HILDERBRAND, KYLE JOLY, DAVID D. GUSTINE, AND NINA CHAMBERS

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Alaska brown bear and salmon, an iconic combination. (Mark Johnson)

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FOREWORD

Brown Bears in Alaska's National Parks provides a vivid description of the importance of brown bears to Alaskans and to Alaska's natural environment. The book helps us better understand this iconic species and what is required for them to survive and thrive, as well as describing the ways they are being challenged by development and climate.

I have been fortunate to see brown bears in a variety of places in Alaska, from Pack Creek in the southeast to McNeil River in the south-central portion of the state, as well as in Alaska's wonderful national parks like Katmai, Lake Clark, and Glacier Bay. Sharing these experiences with fellow Alaskans as well as with tourists from all over the world has illustrated to me the extraordinary and unique value of these animals and the importance of habitat protection efforts and science-informed management to assure they can continue to thrive. Both federal and state agencies that make these management decisions rely on the information scientists provide. The public has an interest is assuring that there is adequate funding for the research and that unbiased information is used effectively.

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The authors have spent many decades observing, monitoring, and researching brown bears in a variety of national parks, giving them a deep understanding of brown bear diets and habits specific to different regions in Alaska, as well as the ability to compare them. This book describes the complex relationship between people and brown bears, including the traditional and spiritual connections Alaska Native cultures embrace.

Brown bears are highly intelligent and adaptive animals, as demonstrated by the remarkable variability and flexibility within the species across a wide variety of landscapes. Even within a specific location, they can change their behaviors to cope with changing conditions. However, there are limits to their resilience; if we want to assure their continued presence, we need to understand those limits and how to avoid pushing bears beyond them. The science shared in this book demonstrates the importance of efforts to continue monitoring the species so that land management practices can be altered appropriately, based on that science.

It also reminds us as members of the public how important it is that our voices are heard advocating on behalf of the wildlife in our national parks.

FRAN ULMER
Lt. Governor of Alaska, 1994–2002
Chancellor, University of Alaska Anchorage, 2007–2010
Chair, United States Arctic Research Commission, 2011–2020
Trustee, National Parks Conservation Association, 2004–present
Chair, Global Board of the Nature Conservancy, 2019–present

▸ Brown bears are highly intelligent and much of their knowledge is transmitted from mothers to cubs. (NPS/Lian Law)

PREFACE

National parks are home to many of Earth's most striking landscapes and treasured natural resources. The character that makes each park significant existed long before governments established boundaries delineating them. These areas, the ecosystems that comprise them, and the wonder they have instilled in humans predate recorded history.

The four of us are incredibly fortunate to work in Alaska's national parks. We view ourselves as stewards of resources that belong to all of us. Parks are something we all share but none of us possess. Working in parks, one feels insignificant in both time and space as the vistas are vast and time is measured in epochs. It feels both humbling and comforting to be part of something so much bigger than ourselves. We have yet to have a day in the field when we didn't see something new and amazing. One purpose of this book is to share some of our moments of discovery and amazement with you.

Brown bears are, perhaps, the most iconic North American symbol of wild things and wild places. They have inspired folklore, fear, wonder, and controversy. In some ways, the battle of nature versus progress has been waged around brown bears for centuries. In Alaska, we are blessed to have healthy populations

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of brown bears that span the state's wildly diverse, expansive, and largely intact natural ecosystems. Wildlife generally, and bears specifically, is why many national parklands were created in Alaska.

In this book, we discuss aspects of the natural history, ecology, and behavior of brown bears. In addition, we outline bear safety in a somewhat cursory manner because other, more definitive books and resources exist on this topic. Our second purpose for writing this book is to consolidate and describe the research we and our colleagues have conducted in Alaska parks in recent decades. As scientists, our currency is scientific publications that report our findings from very specific and nuanced studies. Here, we synthesize the knowledge gained through numerous national park studies holistically. We did not attempt to synthesize all current research on brown bears and note that many other people and agencies are also conducting high-quality research on them. As fundamental as discovery is to science, of equal importance are the new questions that arise as we learn. We also look to chart a path toward future needed work. This is of particular importance given how dynamic our world is due to the rapid and immediate effects of climate change and development.

A third purpose for this book is to use bears as a model for how we, as scientists, identify appropriate research questions based on the challenges and opportunities that face national park managers. These questions vary from park to park and across time. Succinctly, we know far less about most bear populations than one would likely suspect. Bears are challenging and expensive to study. Thus, we have to be strategic as we refine our research questions, develop and implement our projects, analyze and publish our results, and share our findings with those who decide how parks and the resources they were created to protect are managed. Further, we describe what we have learned with visitors and those who share our love of both the lands and the animals we strive to conserve.

Our final goal is, perhaps, the most important. It is simply to share our knowledge and admiration with you, so you join us in becoming stewards of this magnificent species. Understanding is a key to conservation. As brown bears are at the top of the food chain and require large, relatively undeveloped ranges, they will require stewards, like you, for them to persist side by side with us.

We know we are privileged to have made a career out of, what is for us, an innate passion. As much as anything, being a scientist is about the quest for knowledge, a thirst for discovering the unknown. If you picked up this book to thumb through it, read it, or give it as a gift, we know you or someone you love shares our passion. The natural world needs advocates, today more than ever. Thank you. We are honored to share a bit of our journey of discovery with you.

ACKNOWLEDGMENTS

The development of a book like this takes a huge team effort. We thank the scores of collaborators from all the individual bear projects who made the work possible. Special thanks to all the pilots who made our projects possible but especially Troy Cambier, the helicopter pilot who safely flew countless hours for many of the projects and provided a wealth of knowledge, experience, and humor to all of them. In science, it is often said "we stand on the shoulders of giants." Our initial knowledge was gained from and current work builds upon the foundation developed by many pioneering brown bear biologists; we are deeply indebted to them. We thank Marty Byrne and Angie Southwould for developing the maps. We thank all of our supervisors who saw the value of our involvement with this project, especially Sarah Creachbaum, Jeff Rasic, and Jim Lawler. Staff at the University of Alaska Press greatly improved the draft manuscript into this final product. We also thank two anonymous bear experts for reviewing and improving our initial draft.

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BROWN BEARS IN ALASKA'S NATIONAL PARKS

◂ Catching a quick nap after fishing. (NPS/Kelsey Griffin)

Humans have a complicated relationship with brown bears at various times, characterized by respect, fear, admiration, disdain, and worship. (NPS/Ken Conger)

1 STEWARDSHIP

PRESERVING BEARS FOR FUTURE GENERATIONS

Grant V. Hilderbrand, Andee Sears, David Payer, and Nina Chambers

As long as humans and brown (or grizzly) bears have overlapped in space and time, their coexistence has been complex. It is a relationship characterized at various times by respect, fear, admiration, disdain, and even worship. Brown bears and humans shared the landscape long before the existence of modern countries or borders or laws. They lived and died with the land. Together they subsisted and survived solely from what their ecosystems provided. In many ways, bears and humans were the 2 most dominant species in western North America. While humans and bears had singular skirmishes, both lived broadly in a tense but tolerant truce.

"The mountains have always been here, and in them, the bears."
—RICK BASS

"If all the beasts were gone, men would die of a great loneliness of spirit."
—CHIEF SEATTLE

BEARS AND WESTERN CONCEPTS OF CONSERVATION

Following the arrival of European settlers, modern civilization spread westward with a worldview that nature and the land were to be tamed. This perspective and many of the associated practices tied to farming, logging, damming waterways, road building, and bounty hunting of predators greatly diminished

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both the numbers and the range of brown bears in North America. In time, however, recognition of the importance of protecting wild landscapes, species conservation, clean air, and clean water led to 2 conservation eras. The first was in the early 1900s, during which the National Park Service (NPS) was established (1916) along with national forests, parks, and refuges. The second era, in the 1960s and 1970s, resulted in numerous legislative acts including the Wilderness Act (1964), National Environmental Protection Act (1967), Clean Air Act (1970), Clean Water Act (1972), and Endangered Species Act (ESA, 1973).

Our professional discipline of wildlife management followed on the heels of the first conservation era. In the late 1970s, the field of conservation biology emerged as a further maturation of wildlife management that recognizes the complexity of ecological interactions and the forces that shape them. Brown bears in the contiguous United States were largely restricted to national parks at the time of their listing as "threatened" under the ESA in 1975. They are, arguably, the single-most symbolic and controversial icon of wilderness of the modern conservation era. Their natural history requires large tracts of relatively undisturbed land, connectivity between patches of suitable habitat, abundant nutritional resources, and, because of their inherently low reproductive rate, protection from excessive human-caused mortality.

For these reasons, brown bears were often identified as "keystone" or "umbrella" species. A tenet of the practice of conservation biology, this is the idea that if brown bear populations are healthy, the ecosystem is likely healthy because the wild conditions they require also benefit other components of the ecosystem.

THE NATIONAL PARK SERVICE CONSERVATION MISSION

We, as an agency, have a central role in wildlife conservation. The mission provided in the Organic Act of 1916 that created the NPS specifically includes a call for us to conserve wildlife: "[to] conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[1]

The NPS interprets and implements this conservation mission in a manner "to understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of parks."[2] The term *park* is generally used to mean a unit of the National Park System, including national parks, preserves, and monuments. In these areas, the NPS strives "to maintain all the components and processes of naturally evolving park ecosystems,

▸ Bears are often considered indicator species; that is, if bear populations are healthy, it is likely that other components of the ecosystem are also healthy. (NPS/Matt Harrington)

ANILCA and Its Interpretation by Federal and State Agencies

While some parks in Alaska were established in the early twentieth century, most were established or enlarged in 1980 by the Alaska National Interest Lands Conservation Act (ANILCA).[3] ANILCA set aside more lands for conservation than had any previous conservation legislation—more than 100 million acres. It more than doubled the size of the National Park System, almost tripled the size of the National Wildlife Refuge System, and nearly quadrupled the size of the National Wilderness Preservation System. It also added 3.3 million acres to the National Forest System and designated 25 waterways as Wild or Scenic under the Wild and Scenic Rivers Act of 1968. ANILCA added 12 new parks, 6 of which are national preserves. It also expanded 3 existing parks: Denali (formerly Mount McKinley), Glacier Bay, and Katmai. Overall, the vast acreage ANILCA added to the federal conservation estate facilitates wildlife conservation on an unprecedented scale. Moreover, Alaska parks still contain many of the species that existed following the last ice age.

Like the NPS Organic Act, ANILCA prominently highlights the importance of wildlife conservation. The first sentence of the law reads: "In order to preserve for the benefit, use, education and inspiration of present and future generations certain lands and waters in the State of Alaska that contain nationally significant natural, scenic, historic, archaeological, geological, scientific, wilderness, cultural, recreational, and *wildlife* values, the units described in the following titles are hereby established" (emphasis added). ANILCA further outlines the "intent and purpose" to manage wildlife in accordance with "recognized scientific principles and the purposes for which each conservation system unit was established." Brown bears inhabit all parks in Alaska; for ten of the newly created parks, the purposes for which they were established expressly include protection of "habitat for, and populations of," brown or grizzly bears.

ANILCA also acknowledges the importance of wildlife harvest on Alaska parklands. One of ANILCA's fundamental tenets is the recognition that rural Alaskans depend on the fish and wildlife on these lands for sustenance, as well as for other important cultural, economic, and resource values. Therefore, subsistence hunting by qualified individuals is allowed in almost all ANILCA parks.

including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems."[4]

In accordance with the NPS mission, parks function as wildlife sanctuaries, aiding in the conservation and restoration of wildlife populations, including brown bears. In the Lower 48 states, Yellowstone, Grand Teton, and Glacier national parks, along with Waterton National Park in Canada, are core conservation areas for brown bear recovery. Brown bears also occur in North Cascades National Park, but the range of this small and isolated population is not contiguous with the other recovery areas; thus, efforts there have focused on habitat protection. Because of the wide-ranging nature of brown bears, recovery is contingent upon the ability of bear populations to expand to adjacent areas. This has resulted in conflicts with other landowners as development has increased and parks have become more isolated.

MANAGING FOR BEARS IN ALASKA

The current status of brown bears in Alaska differs from that of the Lower 48 states.

According to the Alaska Department of Fish and Game, Alaska is home to an estimated 30,000 brown bears.[5] Because brown bears are found widely across Alaska, protection under the ESA has been unnecessary here. As a large and relatively undeveloped state, Alaska has vast expanses of largely intact ecosystems. Parks and other undeveloped lands provide what brown bears need to thrive while also providing for human uses, including hunting and wildlife viewing.

Brown bear encounters are relatively common when people explore Alaska. In fact, viewing bears in their natural habitat is one of the primary reasons people from across the world travel to Alaska. And Alaska's national parks provide outstanding viewing opportunities. Bear viewing has continued to increase along the salmon streams of Katmai, in coastal sedge meadows of Lake Clark, and on the tundra of Denali.[6] For many out-of-state visitors, the opportunity to harvest or photograph a brown bear in Alaska is a once-in-a-lifetime experience. For Alaska Natives, bears have an immense cultural value that is part of their history, everyday life, and community. The connections of visitors and residents to bears highlight the social, cultural, traditional, nutritional, and economic value of bears and

Wildlife biologist Grant Hilderbrand and pilot Troy Cambier weigh a tranquilized bear in Lake Clark National Park and Preserve. (NPS)

reflect some of the experiences the NPS endeavors to provide in perpetuity.

The NPS views brown bears and humans, and their interactions, as part of the natural ecosystem; we, as NPS stewards, are charged with preserving both the ecosystem and the natural processes

therein. Because each park is different, we rely on understanding the specific needs of local bear populations and the potential effects of a variety of human activities and developments.

ASKING THE RIGHT QUESTIONS

Almost no North American bear population has been studied in detail over a long period of time. One notable exception is the Yellowstone grizzly bear population. Due to the 1975 listing of this population in the Lower 48 states under the 1973 Endangered Species Act,[7] this ongoing research has required a collaborative and collective pool of expertise and resources from scientists and managers from numerous agencies, including the United States Fish and Wildlife Service, United States Geological Survey, NPS, United States Forest Service, and the states of Wyoming, Montana, and Idaho. Even with decades of effort, more is being learned, the environment continues to change, and technologies for studying bears advance. In contrast to Yellowstone bears, most bear populations in Alaska have either never been studied or have been studied for a limited time with a focus on specific management questions.

Based on what we know about bear ecology and bears' relationship to their environment, we can ask myriad questions to better understand the factors that benefit or harm local bear populations. Despite all these important unanswered questions, time, logistics, and financial resources are limited. How do we, as biologists, determine which questions to pursue when designing scientific studies of brown bears on national parklands in Alaska? Most studies originate as a question from park managers, such as, *how will this* [activity, change, or decision] *affect bears or the natural function of the ecosystem*?

The types of decisions we, as the NPS, may face range widely, from direct human impacts to indirect effects of development to understanding ongoing ramifications of climate change. Approximately 70% of all NPS lands in Alaska are open to some form of hunting (subsistence or sport hunting or both).[8] In addition, brown bears are not restricted by jurisdictional boundaries and commonly use both parklands and adjacent lands. Thus, they may be subject to either federal or state harvest regulations or both. In general, when managing harvest (or any kind of human-caused mortality), we focus efforts on trying to understand the demographics of the population—the number of bears in a particular place at a particular time, birth rate, and survival.

An additional area of inquiry often relates to human development, both in and adjacent to parks. Specifically, developments of interest in Alaska include park infrastructure, roads, and future potential mineral exploration and extraction. The fundamental questions we as researchers try to address related to development include potential effects of increased access to remote areas (most of Alaska

is roadless), how animals move about and use the landscape, and which critical resources that bears rely on (e.g., denning habitat, food resources) will be impacted. Studies of bear habitat use and diet most often require us to collar a subset of the population to track them. Modern GPS (Global Positioning System) collars can collect bear locations every few minutes and allow us to analyze the habitats bears select (or avoid), important routes of travel, concentrated locations of important food resources, and den locations—denning is a particularly vulnerable time in their life. Detailed dietary and physiological studies similarly require that we handle animals to collect information on body weight, body fat, and seasonal diet by collecting and analyzing hair and blood samples. This approach gives us insights into the health of individual animals and helps refine our understanding of what resources bears are using on the landscape. Collectively, we can understand where bears are, why they are there, and what foods or habitat types are critical for the ongoing health of the population.

Often, wildlife management is, in fact, the management of people. Parklands in Alaska are used by local rural residents for subsistence hunting and gathering and for their cultural values. In addition, visitors from all over the world are drawn to parks to hike, camp, take photos, climb, view wildlife and vistas, hunt, fish, and simply enjoy nature. Our primary goal as park managers, relative to human-bear interactions, is to keep both bears and people safe and to minimize stress and disturbance to bears and all wildlife. Our research into human-bear interactions often focuses on areas where bears and people commonly encounter one another, specifically bear-viewing sites (e.g., Brooks Camp in Katmai National Park and Preserve), the Denali Park Road, and campgrounds and trails. Study designs are often very specific to the location and information needs but may include collaring (e.g., the Denali Park Road study; see chapter 8), observational work (e.g., Brooks Camp; see chapter 10), or social-science surveys. The goals of these types of studies often include improving and refining our education and outreach messages to visitors to minimize adverse interactions between bears and people and promote the safety of both.

Another major topic of interest for park managers, and for our global society, is the impact of climate change. Like us, bears live in dynamic environments. Parklands in Alaska go through seasonal extremes; and bears are highly adapted to changes in weather, precipitation, and temperature. Their reproductive cycle and period of fat accumulation (hyperphagia) in the fall are evolved to match periods of food availability—abundance as well as scarcity—to support both themselves and their offspring through a period of winter dormancy. Because bears are so well adapted to their environment, they may be vulnerable to environmental change. Prior and

current work provides baselines that we can use to assess the effects of climate change in future studies. By understanding how adaptive individuals can be in behavior, diet, and habitat selection (a concept known as *plasticity*), we can infer how adaptable bear populations are and how resilient they are to change. While some climate changes may be subtle (e.g., shifts in the distribution and timing of berry ripening), others may be extremely obvious and hugely impactful (e.g., heat stress on Pacific salmon that decreases salmon abundance or glacial retreat that creates new habitat).

While studies are often designed to inform a single or specific question or action, we also collect information opportunistically, as a cost-effective way to learn more about basic brown bear ecology and develop baselines for future studies. As an example, if bear capture and handling is part of a habitat use study, additional samples related to genetics, contaminants, stress, and diet can be collected at no additional cost. For non-invasive studies, such as hair-snare–based genetic population estimates, more detailed assessments of genetic relatedness and diet can also be conducted using the same samples. As these techniques are employed across studies, it allows us to develop baselines for a particular park and comparison across parks. Efforts such as these help us interpret park-specific findings and contribute to our broader understanding of bears as a species and of the environments in which they live.

THE PATH AHEAD

This book describes how we, as the NPS, conduct natural resource research and management more broadly, especially for brown bears. In the following chapters, we describe the relationships between bears and people, bear ecology, what we're learning about how bears adapt to climate change, bear research in parks, and how our knowledge is applied to park management. This book is not meant to be the last word on brown bears in Alaska. Rather, it captures a moment in time in a millennia-old relationship that, we hope, will continue for millennia to come.

NOTES

1. United States Congress, National Park Service Organic Act, 1–4.
2. United States Department of the Interior, National Park Service, *Management Policies 2006*, chapter 4, "Natural Resource Management."
3. United States Congress, Alaska National Interest Lands Conservation Act.
4. United States Department of the Interior, National Park Service, *Management Policies 2006*, chapter 4.
5. Alaska Department of Fish and Game, "Species Profile: Brown Bear."
6. National Park Service, "Visitor Use, Katmai National Park and Preserve."
7. White, Gunther, and van Manen, *Yellowstone Grizzly Bears*.
8. United States Congress, Alaska National Interest Lands Conservation Act.

Bears in Alaska live in dynamic environments. Our research is intended to expand our knowledge so we can conserve bears and their habitats within the context of human activity and climate change. (NPS/Tania Lewis)

Posing with their family bear spear, last used by their grandfather Roosevelt Jon, are (*left to right*), Stanley Starr, Al Starr Jr., and Randy Starr. The spear was used traditionally in winter hunting. Hunters would wake the bear in its den and brace the spear at the den opening so the charging bear would fall onto the point. Denali National Park and Preserve, June 2023. (NPS)