

# Introduction

## *A Comprehensive Approach to Evaluating the Potential for Wolf Restoration in the Southern Rockies*

Richard P. Reading, Brian Miller, Amy L. Masching,  
Rob Edward, and Michael K. Phillips

Wolves (*Canis* spp.) represent one of the most iconic species of wildlife. Until recently, people heavily persecuted wolves throughout most of their range, and in many areas of the world wolves remain the targets of eradication, or at least control. Yet there are people working to restore wolf populations.

Humans eliminated gray wolves (*Canis lupus*) from the Southern Rocky Mountains of the United States (figures I.1 and I.2) by the middle of the last century, but today wolf restoration proceeds in other portions of the species' range in North America. Some have begun to explore the feasibility and desirability of restoring wolves to the Southern Rockies, the region of mountains, foothills, and basins extending from southern Wyoming into northern New Mexico, or at least letting wolves reestablish themselves on their own in this area.

This book's authors include wildlife biologists, geographers, legal and policy experts, and conservationists whose common concern is the future of the wolf and the long-term ecological health of the Southern Rockies. Because of the wolf's absence from the Southern Rockies, these are not unrelated concerns. We organized this book to answer, or at least shed light on, the following questions:

1. Can we restore a viable wolf population to the Southern Rockies and reestablish the animal's role as a predator that benefits ecosystem integrity?
2. How might a restored Southern Rockies wolf population help to strengthen wolf

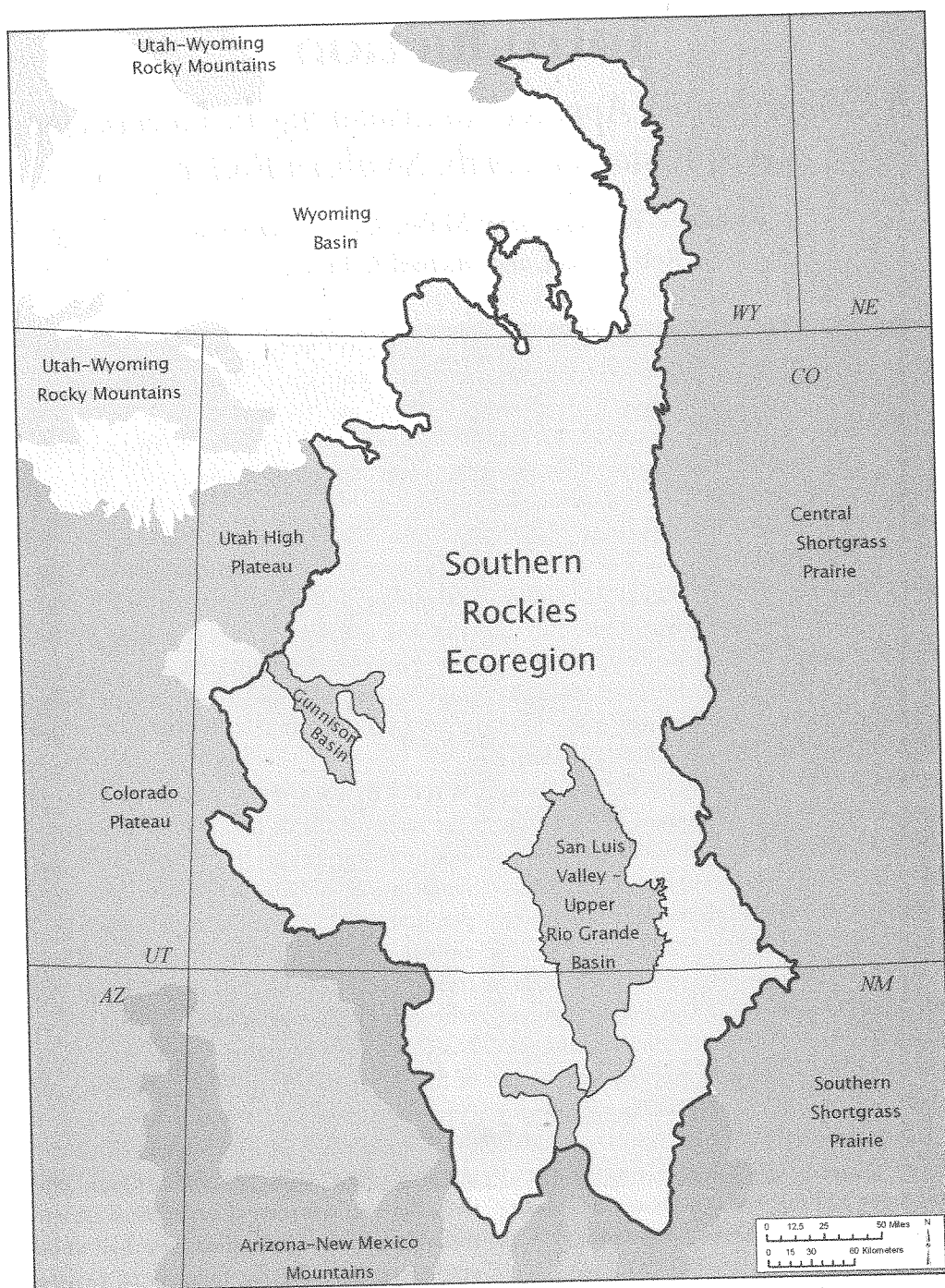
population and recovery goals throughout the western United States and Canada?

3. What are the ecological, socioeconomic, political, and legal contexts that will influence restoring this species?

Due to simultaneously rapid human development of natural landscapes and locally expanding wolf populations, as well as battles over the wolf's status under the Endangered Species Act (ESA), there may not be a more appropriate time to attempt to answer these questions.

### **WHY RETURN THE WOLF?**

The wolf instills in humans the deepest of emotions: spirituality, inspiration, awe, contempt, anger, and fear. At once a magnificent predator and dreaded outlaw, the wolf is an animal of legend. Many Native American tribes revered the wolf in their legends and religion. The European settlers who came to North America brought with them a culture of fear centered on the wolf, complete with familiar tales of cunning wolves attempting to trick and eat innocent children. From the seemingly practical standpoint of early settlers, the wolf was seen as a symbol of uncontrollable wildness, an animal that had to be eradicated in order for humans to survive and prosper. Over most of the wolf's former range, Euro-American settlers were successful at doing just that. Once found in relative abundance throughout Canada, every US state, and Mexico, and occupying nearly all ecosystem types, the wolf was driven to



**Figure I.2**—Location of the Southern Rockies Ecoregion relative to surrounding ecoregions. Note that we include the Gunnison and San Luis Valley–Upper Rio Grande basins within the Southern Rocky Mountains Ecoregion.

Source: US Forest Service ECOMAP project and The Nature Conservancy

extinction south of the Canada-US border by the mid-1900s, with the exception of a small population in northern Minnesota.

Today, many people admire the wolf as an apex predator and a highly social animal, while others still see little to no value, purpose, or redeeming qualities in the animal. Yet within both of these views, the wolf is a symbol of wildness; it is this wildness that inspires the holders of the former view and creates antipathy in those who believe the latter. For those who recognize that wild places are few, dwindling, and increasingly diminished in native floras and faunas, wildness is no longer seen as something that must be destroyed in order for humans to prosper. Even more encouraging, perhaps, is the growing recognition that our willingness and ability to protect wild places and wildlife is a measure of our prosperity and wisdom.

It is due to these cultural transformations that the ESA was passed in 1973, and under this legislation the gray wolf was listed as endangered in 1974, providing the species with legal protection. As a result of ESA protection, the wolf has made a dramatic comeback in the upper Midwest, with more than 2,000 gray wolves now thriving in northern Minnesota and hundreds more expanding into northern Wisconsin and Michigan. The gray wolf also began to successfully recolonize northern Montana during the 1980s. Due to direct human intervention, in 1987 managers began returning the red wolf (*Canis rufus*) to portions of its former range in the southeastern United States, releasing the Mexican wolf to the southwestern United States in 1998, and, in 1995, returning the gray wolf to Yellowstone National Park and north-central Idaho under authority of the ESA.

In the Northern Rocky Mountains of the United States (i.e., the Rocky Mountains north of Colorado), wolf recovery has exceeded the expectations of federal, state, and tribal agencies involved in the effort.

In 2000, there were an estimated 63 adult wolves in northwestern Montana, 177 in the Greater Yellowstone Ecosystem, and 192 in central Idaho (Bangs, Fontaine, Jiminez, et al. 2001), and by September 2008 these numbers had grown to 1,463 wolves in the Northern Rockies of the United States (US Fish and Wildlife Service 2008a). In addition, restored wolf populations have proven far more valuable to many local economies than predicted, due to increased interest in activities such as wolf viewing in Yellowstone National Park. Also of note, livestock depredations have been far lower than anticipated (Bangs, Fontaine, Jiminez, et al. 2001; Smith and Ferguson 2005).

The ESA mandates restoring populations of species listed as threatened or endangered where habitat exists and where restoration is feasible to meet recovery goals (Endangered Species Act 1973). As a result, other regions in the United States have been under consideration for wolf restoration by the US Fish and Wildlife Service (USFWS), the agency that implements recovery plans under the ESA. However, USFWS's recovery strategies, such as delineating distinct population segments (DPS) as biologically based wolf recovery zones and a recent proposal to reclassify and delist the gray wolf in portions of its former range under the ESA, make it unclear whether or not the law will be used to fulfill this objective (Phillips, Fascione, Miller, and Byers 2000; US Fish and Wildlife Service 2000a, 2008). However, the Southern Rockies stand out among potential candidate regions for repatriating the gray wolf, in part due to studies favorably measuring the region's ability to support viable populations of wolves (e.g., Bennett 1994; Phillips et al. 2000; Carroll et al. 2003; Carroll et al. 2006). There are also studies reporting general acceptance by people to bringing wolves back (Manfredo, Bright, Pate, and Tischbein 1994; Meadow, Reading, Phillips, et al. 2005).

## WHY THE SOUTHERN ROCKIES?

We define the Southern Rockies landscape based on the US Forest Service ecoregion classification system (McNab and Avers 1994). Ecoregions are delineated based on similar patterns of topography, vegetation, soils, geology, species, and climate across a large landscape (Bailey 1995). We used the ecoregion classification boundaries with some minor modifications, such as adding major valleys classified as part of other ecoregions by the Forest Service, but which are surrounded by the Southern Rockies (figure 1.2). The Southern Rockies Ecoregion as we define it is a large landscape, stretching north to south from the Laramie Mountains near Casper, Wyoming, along the Continental Divide in Colorado, and south to the Jemez, Sangre de Cristo, and Sandias of New Mexico to Albuquerque. The Great Plains are its eastern boundary and to the west, the red rock country of the Colorado Plateau. Politically, the area encompasses parts of Wyoming, Colorado, and New Mexico, sixty-four counties, and lands administered by federal agencies such as the US Forest Service, Bureau of Land Management, and National Park Service, as well as state, county, and local agencies. The area of the Southern Rockies covers about 166,818 sq. km (about 64,409 sq. mi.), or an area roughly equivalent to that of New England.

The Southern Rockies include the magnificent rugged mountains of Colorado, with fifty-four peaks higher than 14,000 ft. (4,267 m) in elevation, as well as countless other peaks of only slightly lesser stature. There is a less dramatic side to the Southern Rockies as well, including several vast intermountain basins, gently rolling foothills, and high, broad plateaus (Shinneman, McClelan, and Smith 2000).

The wide range in elevation and complex landforms comprising the Southern Rockies cause uneven distribution of moisture and significant differences in temperature—often

over short distances—and thus lead to sharply contrasting local climates. These diverse climatic conditions help support fourteen ecological communities and native species (Shinneman, McClelan, and Smith 2000). The Southern Rockies region is also diverse because of its location as a biological meeting place where species converge from the boreal forests to the north, the grassland steppes (prairies) to the east, and the semiarid deserts to the south and west. Yet, as diverse as the patterns of ecosystems and landforms may be in the Southern Rockies, they are collectively unique and are distinguishable on the whole from surrounding ecoregions.

Via a long day hike, one can witness this tremendous variety in nature. Imagine a trek that descends a high-elevation peak in central Colorado: beginning at a cold, windswept mountain 13,000 feet (3,962 m) above sea level, a pika (*Ochotona princeps*) forages in an alpine meadow along the edge of a scree slope while a white-tailed ptarmigan (*Lagopus leucurus*) scurries into a stunted krummholz forest patch. At 11,000 feet (3,352 m), a pine marten (*Martes americana*) scurries across a trail and quickly disappears into a cool, dense subalpine forest of spruce (*Picea* spp.) and fir where a gray jay (*Perisoreus canadensis*) is perched and watching. When you reach 8,000 feet (2,438 m), a flammulated owl (*Otus flammeolus*) floats through a warm, dry forest of old ponderosa pines (*Pinus ponderosa*) and an Abert's squirrel (*Sciurus aberti*) hurriedly gathers pinecones. Down to 6,000 feet (1,828 m), white-tailed prairie dogs (*Cynomys leucurus*) bark at the sight of a ferruginous hawk (*Buteo regalis*), and a herd of pronghorn (*Antilocapra americana*) race across a broad, treeless valley of bunchgrasses and shrubs. At 5,000 feet (1,524 m), a desert bighorn (*Ovis canadensis*) takes a drink from a cool stream, keeping an eye out for a hungry puma (*Puma concolor*), and dozens of songbirds can be heard singing in the riparian forest of tall cottonwood trees (*Populus* spp.)

with lush undergrowth. Within the stream, a native Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) fights the current in search of stonefly nymphs.

For thousands of years, the gray wolf was also a part of these Southern Rockies ecosystems. Perhaps numbering in the thousands, the gray wolf functioned as a top-level predator in the region, preying upon herds of elk (*Cervus elaphus*), deer (*Odocoileus* spp.), and other species (Bennett 1994). The Southern Rockies biological communities evolved with the gray wolf. The animal's presence and regulatory role on prey was essential to the region's ecological function and integrity.

Yet, as with most other areas of the United States, decades of persecution by Euro-American homesteaders, government trappers, bounty hunters, and ranchers drove the wolf to extinction in the Southern Rockies; the last known wolf in the region was killed in 1945 by a state hunter in Conejos County, Colorado (Bennett 1994). These successful efforts, as with the native grizzly bear (*Ursus arctos*), were meant to make the West "safe" for livestock, people, and progress. During the early 1900s, the handful of wolves that remained were seen as marauding renegades, and they often took on legendary status, with nicknames like Three Toes and Old Lefty. Today, without the gray wolf, the Southern Rockies landscape is biologically incomplete. Yet, initial assessments of the region's prey base, wild landscapes, and human attitudes toward wolf restoration suggest that this need not be the case.

#### **WHY AN ECOREGION APPROACH?**

According to Noss and Cooperrider (1994), large natural landscapes such as ecoregions may be the most appropriate scale for conservation and land management activities. The myriad ecosystems comprising an ecoregion share ecological relationships, including corresponding natural processes, such as migrating species and the flow of

nutrients through a system, and natural disturbances, such as fire, drought, or disease outbreaks. Recognizing these relationships across large landscapes has become an essential component of conservation efforts and natural resource management activities. This approach contrasts sharply to past resource management and protection activities, which were largely carried out within politically defined landscape units, such as national parks, national forests, and states. Such political- and human-defined landscapes typically have little correlation with natural ecosystem boundaries, natural processes, or species habitat needs. For instance, in the Southern Rockies, in order to get to a reliable food source in winter, an elk may have to leave the protection of a national park, where hunting, logging, and livestock grazing are not allowed; cross a heavily logged and roaded multiple-use national forest where hunters abound; and finally settle in for the winter on its historical grassland wintering habitat, which may now be privately owned by cattle ranchers and second-home homeowners.

Only in recent years have land managers and conservation scientists successfully promoted a natural landscape approach to biodiversity conservation and natural resource management through concepts such as ecosystem management and land unit delineations such as greater ecosystems, an example being the Greater Yellowstone Ecosystem of northern Wyoming and parts of Idaho and Montana (e.g., Salwasser 1992; Grumbine 1990).

Only large landscapes fulfill the life history needs of gray wolves, such as their substantial prey requirements, expansive pack territory sizes, and long juvenile dispersal distances. To address the relevant factors affecting wolf restoration and the potential of the Southern Rockies to support such restoration requires examining large landscapes. Moreover, such an assessment must

be placed within the even larger context of the Intermountain West. The Southern Rockies potentially provide a vital link between restored gray wolf populations just to the north, in the Greater Yellowstone Ecoregion, and to ongoing efforts to restore the Mexican wolf in the southwestern United States. (Phillips, Fascione, Miller, and Byers 2000). With all these factors in mind, this book evaluates the suitability of the Southern Rockies and surrounding landscapes for possible wolf restoration that would create a wild and natural legacy for future generations of people, predators, and prey.

## COMPONENTS OF ASSESSING THE FEASIBILITY OF WOLF RESTORATION

Our objective is to determine if the Southern Rockies are suitable for restoring wolves in their former range. While the book's contributors support restoration, they evaluated the pros and cons objectively. It is in the best interest of wolves to ensure that any restoration effort is both biologically and socially feasible. The authors—experts in a number of disciplines—address the following question: Is wolf restoration in the Southern Rockies ecologically, socially, and legally rational, feasible, and justified? If this question cannot be answered in the affirmative, then it would be irresponsible to proceed, and if restoration did take place, it would likely fail.

With the above question in mind, the book is divided into three sections: Overview, Social Assessment, and Ecological Assessment, with multiple chapters in each section.

### OVERVIEW

The first four chapters provide a historical and theoretical context for the social and ecological assessments that follow. Chapter 1 briefly surveys the long history of human interactions with nature; chapter 2 addresses human-wolf interactions over time in the

Lower 48 and recovery efforts in North Carolina, the Great Lakes, the Greater Yellowstone Ecosystem, and in New Mexico and Arizona; chapter 3 discusses why, from an ecological perspective, we should be concerned not only about the effect wolves and other large carnivores have on their prey but also about the associated ripple effects up and down the food chain; and chapter 4 suggests that if we are to restore wolves to the Southern Rockies, it will likely require translocating, or moving, animals into the region from elsewhere. Chapter 4 also explores the biological and social science variables that should be considered and addressed prior to translocation.

The book begins with two chapters that review the relationship between people and nature in North America from prehistory to the present. In chapter 1, Miller and Foreman explore the human-nature relationship broadly and over a time frame extending over millennia. They argue convincingly that Earth's current extinction spasm began with the arrival of humans into North America during the last ice age. Three waves of extinction characterize this extinction spasm, the first starting soon after people arrived and began killing wildlife unaccustomed to this new, highly efficient predator. The second wave of extinction followed the arrival of European colonists with their new "guns, germs, and steel" (see Diamond 1997). Finally, and most recently, economic globalization ushered in the present wave of extinction, which threatens to completely and permanently alter the ecological fabric of Earth.

Focusing in on wolves in chapter 2, Phillips and Miller describe the decline of wolves in the United States, the change in emphasis from extermination to conservation of the species, recent wolf recovery efforts, and the future prospects for continued recovery. They first describe the prevailing attitudes and rationale that led to the steady decline

and near elimination of wolves south of Canada into the United States and Mexico. Fortunately, as Phillips and Miller describe, just as the United States was on the cusp of extirpating wolves from the Lower 48, human attitudes toward wolves shifted in the middle of last century. By the last few decades of the 1900s, people increasingly called for wolf restoration, eventually leading to large-scale, government-sponsored recovery programs. These programs continue today, with some enjoying spectacular success while others continue to struggle. Current debate rages over how extensive—both in numbers and geographically—wolf recovery should grow. Should and will wolf recovery extend to the Southern Rockies Ecoregion? The social and ecological feasibility and desirability of such an endeavor form the topics of the remainder of the book.

In chapter 3, Paquet, Miller, Kunkel, Reading, and Phillips discuss the importance of large carnivores to healthy, well-functioning ecosystems and to people. They explain how wolves, as predators at the top of the food chain, influence other species and ecosystem processes. Often termed “highly interactive” or “keystone” species, top predators frequently have disproportionately large impacts, especially given the relatively small size of their populations, that affect a broad array of other species, primarily through predation, the threat of predation (which affects behavior), or the direct killing of potential competitors. These impacts trickle down through the food chain. Yet, people value large carnivores for far more than their ecological role. Paquet and his colleagues also briefly discuss how large carnivores provide cultural, aesthetic, existence, and economic value to a growing number of people.

The final chapter in this section, chapter 4 by Miller, Reading, Ralls, Clark, and Estes, covers the broad array of biological and social variables that influence the success of animal translocations. Translocation programs form

the core of wolf restoration efforts in the southeastern United States, southwestern United States, Idaho, and Yellowstone, and a similar program would likely be required to restore wolves to the Southern Rockies. Yet, most translocations fail because they fail to properly consider the full complement of factors discussed by Miller et al. Many of the variables introduced in chapter 4 are discussed in more detail in the chapters that comprise the remainder of this volume.

## **SOCIAL ASSESSMENT**

Arguably the greatest challenges to wolf restoration are sociopolitical rather than ecological. The second section of the book focuses on nonbiological issues, with four chapters exploring the social aspects of potential wolf restoration in the Southern Rockies. Chapter 5 looks at the human landscape and land use within the Southern Rockies; chapter 6 reviews several studies that examine human attitudes toward wolves; chapter 7 addresses policy and legal issues; and chapter 8 looks at policy and policy making from a problem-solving approach, using a policy sciences framework first detailed by Harold Lasswell (1971; Lasswell and McDougal 1992).

## **ECOLOGICAL ASSESSMENT**

The gray wolf is a highly adaptable species, as illustrated by the array of habitat types it historically occupied: from the Arctic tundra to the deserts of India, into high mountains, across expansive steppes, and through dense forests. Yet, certain habitat characteristics, such as an abundance of large ungulates, render some regions more amenable to wolf presence than others. In the book's final section, the contributors provide an ecological assessment of the potential of the Southern Rockies to support an ecologically meaningful population of wolves. Chapter 9 presents an overview of ecosystems comprising the Southern Rockies Ecoregion; chapter 10 reviews disease and other animal health



considerations important to wolf restoration, and chapter 11 reviews past research and ecological modeling exercises that evaluate the current and projected future ability of the Southern Rockies to support wolves and discusses further the ecological implications of wolf restoration to the region.

The Southern Rockies Ecoregion covers a vast area, from southern Wyoming to northern New Mexico. Shinneman, Miller, and Kunkel provide an ecological overview of the ecoregion in chapter 9. They provide the context for the ecological assessment of the ecoregion for wolf recovery. After briefly discussing the geology, climate, and natural processes of the Southern Rockies, Shinneman et al. describe the composition and condition of the fourteen major ecological communities comprising the Southern Rockies, from high alpine to low-elevation riparian zones. The chapter ends with a review of the species and communities in the Southern Rockies that are currently most at risk. Shinneman and his colleagues conclude that despite significant human alteration, the ecoregion presents an excellent opportunity for protecting and restoring large landscapes and wide-ranging species.

From avian flu to the West Nile virus to chronic wasting disease, animal-borne diseases are receiving increasingly more attention. Any attempt at restoring wolves to the Southern Rockies requires a comprehensive assessment of disease and parasite risks. In chapter 10, Gillin and Hunter explore the various pathogens known to afflict wolves and the likely extent to which those pathogens would impact wolf restoration. They also briefly touch on some of the major diseases that affect the primary prey of wolves. Gillin and Hunter caution that any translocation would involve moving the whole suite of organisms associated with the individual animals being translocated, such as parasites and any diseases they may harbor. In addition, domestic animals within the

restoration site present a potential source of pathogens to wolves. The extent to which pathogens control wolf populations remains poorly understood, but Gillin and Hunter provide guidelines for minimizing the risks to both translocated wolves and the community of animals at the translocation site.

Much of the Southern Rockies Ecoregion's vast area remains relatively wild. In the final chapter, Phillips, Miller, Kunkel, Paquet, Martin, and Smith review published research to evaluate the potential of the Southern Rockies to support wolves, and then they examine the ecological implications of wolf restoration. Past studies found that good habitat remains for wolves in the Southern Rockies. Phillips et al. report that the best estimates suggest that the ecoregion could support well over 1,000 wolves. Using biological and socioeconomic considerations, they suggest that the best sites for restoration are northern New Mexico, southwestern Colorado, northwestern Colorado, and west-central Colorado, in that order. Phillips et al. argue that research from other areas suggests that wolves would impact the populations of other carnivores and ungulate prey with cascading effects through the ecosystem, largely resulting in a healthier community. Although large ungulate populations like elk may decline, populations in the Southern Rockies currently remain higher than managers' objectives. As such, at least in the short-term, wolves likely would not affect hunter harvests. Moreover, a restored wolf population would predate upon livestock and pets in the region. Phillips et al. predict relatively low overall depredation, although individual ranchers may experience significant impacts. They recommend a mix of lethal control and nonlethal deterrents, as well as providing compensation for people impacted by depredation. Finally, Phillips and his colleagues find that fears over land use restrictions and human safety due to wolf restoration are generally overstated.



## CONCLUSIONS

Wolves and wolf restoration are contentious. These wild carnivores inordinately influence the systems they inhabit—and the human psyches they infiltrate. After centuries of persecution, wolf supporters now outnumber wolf detractors (at least in the United States). In many rural areas, however, wolf detractors still outnumber wolf supporters. Yet, successful wolf restoration does not rely on a simple vote. Ultimately, wolf restoration will succeed where the biological context suggests that sufficient, high-quality habitat exists and where the sociopolitical context suggests that people will permit wolves to remain. In this volume, we recruited experts from a wide variety of fields to conduct a comprehensive assessment of pertinent biological and social considerations bearing on wolf restoration success in the Southern Rockies Ecoregion.

Wolves might eventually disperse to the Southern Rockies and establish a viable population, although the process would likely take decades. Given the ecological importance of wolves, waiting for them to (possibly) recolonize the region on their own seems inadequate. Active restoration efforts—namely, translocating wolves to the Southern Rockies—would expedite rekindling the vital ecological process of wolf predation to a region that is degrading ecologically in the absence of that process. If active restoration efforts are initiated, wildlife managers

should consider the myriad biological and social factors that influence restoration success. The authors have outlined the most important of these variables and conducted biological and social assessments, and the results suggest that the Southern Rockies Ecoregion encompasses sufficient habitat to support a healthy population of wolves and that the public will support the project. Future projections of human development in the region paint a slightly less optimistic picture ecologically but point to growing support from the public. Still, some stakeholders, although a minority of the public, would likely oppose, perhaps strongly, any attempt to restore wolves.

If society wants to restore wolves to the Southern Rockies, managers must work to mitigate opposition by working to creatively and effectively address the concerns of those negatively impacted by wolf restoration. The success of wolf translocation programs in Yellowstone National Park and central Idaho underscore that restoration is possible, but the challenges that continue to face Mexican wolf restoration efforts in Arizona and New Mexico highlight the difficulties that could develop. Overall, based on the information provided in this book, we believe that wolf restoration would succeed in the Southern Rockies, and we look to the day when a viable population of wolves returns to the region to help restore its ecological health and wilderness character.