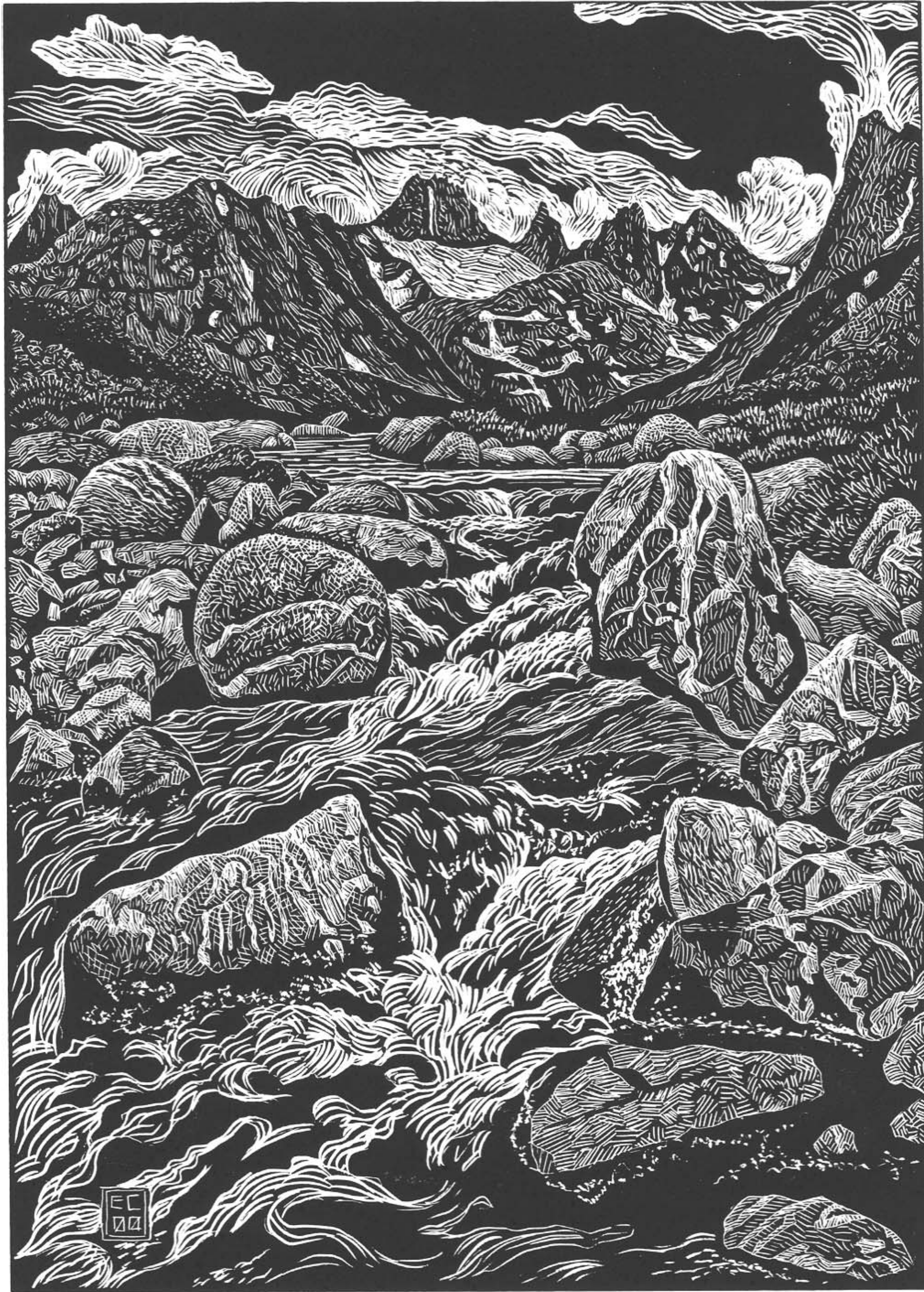

It's just one world, this spine of rock and streams
And snow, and the wash of gravel, silts
Sands, bunchgrasses, saltbrush, bee-fields,
Twenty million human people, downstream, here below…

-Gary Snyder

3 THE HUMAN LANDSCAPE

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(This chapter is a shortened version of Gosnell and Shinneman in press "The Feasibility of Wolf Reintroduction to the Southern Rockies", edited by Phillips et al. 2003.)

1. Introduction

A successful Wildlands Network Vision requires careful consideration of habitat and ecological conditions, but equally important are the human dimensions of wildlife conservation. A solid understanding of a region's culture, politics, and history can provide conservationists with insight into locals' attitudes regarding wildlife issues, help them identify key stakeholders, and prepare them for potential conflicts and allies.

In this chapter we describe the human landscape of the Southern Rockies, which includes concrete "things" on the land, like people, buildings, roads, dams, and mines, as well as less tangible anthropogenic influences, like political boundaries, land management regimes, and local economies.

Section 2 of this chapter describes the ways in which humans have organized and "divvied up" the land, in terms of ownership, management, protection, and roads. Next, we look at historical and current uses of the land, and associated ecological impacts. Section 4 describes the cultural landscape, past and present. The sections on population, land development, and economic trends use recent data to describe what is currently happening in the region as a whole, as well as in the subregions of interest. The conclusion considers what the findings in this chapter might mean for a Wildlands Network Vision.

2. The Lay of the Land

Land Ownership

A complex pattern of public and private land ownership exists in the Southern Rockies (Figure 3.1 and Table 3.1).

Table 3.1 Land ownership in the Southern Rockies ecoregion.

Owner	Hectares	%
U.S. Forest Service	7,070,000	42.4
U.S. Bureau of Land Management	1,940,000	11.6
Other federal, state, county and city	870,000	5.2
Native American tribal land	500,000	3.0
Private	6,300,000	37.8
Total	16,680,000	100

see Figure 3.1 for data sources.

This pattern owes its existence to a history of land acquisition by the U.S. government and transfer of public lands to private interests through mining claims, farmland acquisition under the Homestead Act of 1862, and other means (Wilkinson 1992). The U.S. government also retained large portions of the land and eventually allocated these lands to newly established public agencies such as the U.S. Forest Service, National Park Service, and Bureau of Land Management. Western states were granted "school trust" lands from the federal government, inheriting millions of acres (usually in separate square mile sections) that were intended to raise money for public education.

The federal government owns roughly 55% of the land in the Southern Rockies. When state lands are added to that total, about 58% of the Southern Rockies are within public

ownership. The U. S. Forest Service is the single largest landowner.

The Southern Rockies' ecosystem types do not fall evenly across this complex pattern of land ownership. Many lower elevation ecosystems, such as grasslands and shrub lands, are mainly on private, Bureau of Land Management, or state lands, while most land area within high-elevation ecosystems, such as subalpine forests and alpine tundra, occurs on National Forest lands. Moreover, single functioning ecosystems, defined at almost any scale, regularly fall across multiple land ownership types. Because of vastly different management emphases among these entities, comprehensive protection of ecosystems can be difficult.

For example, this complex public-private ownership pattern has concentrated development in lower elevations and valleys that are predominately in private hands, often fragmenting undeveloped, natural habitat that remains on adjacent public lands. Yet, the region also has one large mostly contiguous area of public land that connects the Medicine Bow Mountains in Wyoming to the southern end of the Sangre de Cristos in New Mexico, and the Front Range foothills outside Denver to the Colorado Plateau in the west (Figure 3.1). This intact public land pattern provides hope for maintaining habitat connectivity across the region.

Another human-created landscape pattern important to native ecosystems is the distribution of cities and counties in and around the ecoregion. These cultural and political entities influence land use and development patterns, based on factors such as population growth, local economies, and land use planning policies. For instance, certain counties and cities, such as the City of Boulder, Boulder County, and Jefferson County in Colorado, have ambitious open space land acquisition programs, as well as growth control measures, while most other Southern Rockies cities and counties have no such land conservation initiatives and often very little in the way of effective land use planning (Shinneman et al. 2000).

Land Management and Protection

Since the establishment of the U.S. Forest Reserves in the 1890s, the Southern Rockies have witnessed numerous conservation milestones. Rocky Mountain National Park was established in 1915, and in 1919 the Trapper's Lake area on the White River Plateau was the first National Forest area in the nation managed for wilderness values. Since those early conservation accomplishments, the Southern Rockies have gained 49 federally designated Wilderness Areas and 6 National Parks and Monuments. When other strictly protected lands, such as U.S. Forest Service Research Natural Areas (RNAs), are added to that total, there are at least 1,740,000 ha protected, or roughly 10.5% of the ecoregions land-base. More than 200,000 additional hectares are within areas afforded slightly lesser levels of protection, such as state wildlife areas, National Wildlife Refuges, and Bureau of Land Management Areas of Critical Environmental Concern (ACECs). In addition, the region contains other protected lands, at various levels of stewardship, that are not mapped and thus not included above (*e.g.*, county and city open space lands, private nature reserves, and many private land conservation easements).

As a result, the Southern Rockies contain a fairly high percentage of protected land compared to most other regions in the U.S. However, most of the strictly protected federal lands, such as National Parks and Wilderness Areas, were not selected to represent the full diversity of ecosystems and species in the region. Rather, these areas were typically chosen for protection because of scenic and recreational values, because they contained charismatic wildlife such as elk, or because they had little economic value.

So, many of the Southern Rockies' ecosystems and species are not well represented in the existing system of publicly owned nature reserves, such as National Parks and Wilderness Areas. Biologically rich landscapes, such as low elevation riparian areas and shrub lands, are not covered well in the current system of nature reserves. Shinneman et al. (2000) determined that only 3 of 12 major terrestrial ecosystem types in the Southern Rockies had more than 10% of their total area within strictly protected lands such as National Parks, Wilderness Areas, and Research Natural Areas.

Numerous areas may yet become protected in the Southern Rockies to remedy the above gaps. Recently the U.S. Forest Service identified just over 2,000,000 ha of roadless lands on National Forests that were to be given some protection under the Roadless Area Rule (U.S. Forest Service 2000). At the time of this writing, that finding is being reassessed by the G.W. Bush administration. However, the potential to protect additional wildlands in the region is a significant opportunity, as these lands would bring the total protected area to roughly 4,000,000 ha. Moreover, these lands contain significant amounts of lower elevation ecosystems now poorly protected. Shinneman et al. (2000) predict that if these roadless areas were given protection, nearly 10 of the 12 major ecosystem types they analyzed would have at least 10% of their total area protected, and 5 of the 12 would have protection levels above 25%. In addition, local conservation groups have inventoried roadless areas that the U.S. Forest Service does not yet officially recognize (Shinneman et al. 2000).

Local and regional land trusts have become quite

numerous in the region, buying private properties and establishing conservation easements with willing landowners. For instance, the Colorado Coalition of Land Trusts now has 6 regional and national land trusts and 33 local land trust member organizations working throughout the Colorado portion of the Southern Rockies. Millions of dollars of federal, state, and local government money have been directed toward local open space and state park and wildlife refuge acquisitions, and to acquire significant new federal lands such as the U.S. Forest Service's recent acquisition of New Mexico's 36,000 ha Baca Ranch. Great Outdoors Colorado donates proceeds from the Colorado lottery to protect land, usually in cooperation with other governmental and non-profit entities. The Nature Conservancy as well as the Wildlands Project, have undertaken landscape level conservation planning efforts. In addition, Great Sand Dunes National Monument and Black Canyon of the Gunnison National Park received additional protection through expanded boundaries and Wilderness designation, and wilderness legislation has been introduced in Congress to protect 520,000 ha of primarily Colorado Bureau of Land Management roadless areas.

Roads/Infrastructure

The ecological value of protected land in the Southern Rockies is compromised by ubiquitous roads, which fragment the landscape. Starting with the mining boom of the late 1800s, people wanted more transportation in the Southern Rockies, and wagon roads, stagecoach routes, and railroads soon criss-crossed the region. During this early settlement period, railroads in particular were instrumental not only in getting valuable minerals out of the region, but in bringing resources, new industries, new residents, and tourists into the Southern Rockies. Cities such as Greeley, Colorado and Laramie, Wyoming, sprang up and prospered along railroad lines, and railroads helped to transform the Southern Rockies from a frontier region to a modern industrial economy. Railroads also helped facilitate migration to the region; between 1860 and 1900, Colorado's population grew from 34,277 to 539,700 (Noel et al. 1994).

During the early to mid 1900s the construction of paved automobile roads changed the region even more. In Colorado, paved roads grew from roughly 800 to 6,400 km between 1930 and 1940 (Noel et al. 1994). By the 1950s, with the advent of the interstate highway system and the mobility provided by the modern automobile, easy access was possible into formerly remote mountain locations, promoting further population growth, tourism, and new development industries, including the region's famed downhill ski resorts.

Today there are over 121,000 km of primary and secondary roads in the Southern Rockies (Figure 3.2), not including most residential streets and the thousands of miles of poorly mapped primitive roads (Shinneman et al. 2000). There are over 27,742 km of inventoried roads on National Forest lands in Colorado alone (Finley 1999). Local road densities vary greatly within the region, but are often much higher than expected, even in relatively undeveloped areas. For instance, one study in New Mexico found that road density in Bandelier National Monument and surrounding area averaged over 6.25 km/km^2 (Allen 1994). In contrast, there are also several large areas in the Southern Rockies that are relatively devoid of roads, especially those centered in large Wilderness Areas, such as in portions of the San Juan Mountains and on the White River Plateau. However, except for these large wildlands, few areas in the Southern Rockies are more than 6.5 km from the nearest road (Shinneman et al. 2000). Alpine and subalpine habitats have fewer roads than have most other habitats; lower elevation and more biologically diverse habitats are usually the most heavily roaded in the Southern Rockies (Shinneman et al. 2000).

Roads are a concern for many land managers, biologists, and conservationists due to their impacts on native species and ecosystem function (Schoenwald-Cox and Buechner 1992, Trombulak and Frissell 2000). Ecologically deleterious impacts of roads include: 1) increased species mortality due to automobile collisions (Bangs et al. 1989) reduced species mobility for both small and large animals, due to the barrier effect (Fahrig et al. 1995, Foster and Humphrey 1995) increased dispersal of edge-adapted, weedy, aggressive, opportunistic, and parasitic species due to the travel corridor effect (Tysor and Worley 1992, Parendes and Jones 2000); 4) greater human access to habitat interiors and activities such as fuel-wood gathering, hunting, poaching, plant gathering, and recreation in those areas (Lyon 1983, Trombulak and Frissell 2000); 5) increased sediment and pollution runoff into nearby streams and wetlands (Bauer 1985, Forman and Deblinger 2000); and 6) increased likelihood of severe erosion when roads are built on steep slopes (Trombulak and Frissell 2000). Combined, these factors fragment and isolate natural habitat by subdividing formerly intact vegetation patches and creating a "road effect zone" that changes the habitat conditions and species compositions well into the interiors of adjacent natural habitat (Reed et al. 1996, Shinneman and Baker 2000, Forman 2000).

Various factors influence the relative impact that roads have on the environment and species. For instance, a lightly used, primitive dirt road may not restrict some species from moving across, while a busy, paved, four-lane highway may be an impermeable barrier to many wildlife species.

The U. S. Fish and Wildlife Service has identified Interstate 80 in Wyoming and Interstate 70 in Colorado as serious threats to future lynx (*Lynx canadensis*) populations, and state routes are likely to be expanded as traffic increases. On the other hand, primitive roads may have lower collision rates, but they allow access to wildlife areas and raise the probability of poaching. Options such as closing some roads (seasonally or permanently) and constructing wildlife underpasses or land bridges may lessen the negative ecological effects of some road networks. When road densities are high, species such as elk (*Cervus elaphus*), mountain lion (*Puma concolor*), wolves (*Canis lupus*), black bear (*Ursus americanus*), and grizzly bear (*Ursus arctos*) may not persist due to an aversion to roads or negative impacts from increased human hunting, poaching, and harassing (Lyon 1983, Van Dyke et al. 1986, McClellan and Shackleton 1988). For instance, studies suggest that if road densities exceed 0.4 km/km^2, wolf populations may not persist (Thiel 1985, Mech 1989).

3. Historical and Current Land Uses

Mining, livestock grazing, logging, and water use have had significant ecological impacts on the natural ecosystems of the Southern Rockies. While these activities no longer form the basis of the Southern Rockies' economy, they still play major roles in the shape and condition of the current physical landscape. Mining put the Southern Rockies on the map for many Americans during the late 1800s, and helped to promote westward migration in the United States and the settlement and industrial development of the Southern Rockies. Livestock grazing started in the 1600s in northern New Mexico and now occurs in nearly all grazable locations and ecosystem types throughout the region. Although the Southern Rockies have never been an economically prosperous lumbering region as a whole, 150 years of Euro-American settlement and localized logging booms have had significant impacts on the region's forests. Nearly every drop of water originating in the Southern Rockies has been allocated toward agricultural, industrial and urban uses, manifested in the region's myriad dams, ditches, and tunnels that store and redirect millions of acre-feet of water every year. In this section we discuss in more detail the history and ecological consequences of these land and resource uses.

Logging

Logging in the Southern Rockies has never been as big an industry as in the Pacific Northwest. Nonetheless, most of the 9,500,000 ha of forest and woodlands in the Southern Rockies (59% of the land cover) have been affected by timber cutting, road building, and fire suppression (Shinneman et al. 2000). Ponderosa pine and Douglas-fir forests – both central to the region's foothill forest ecosystems – have been the hardest hit by logging activities, which have often focused on cutting the largest, oldest trees. Of the remaining ponderosa pine (*Pinus ponderosa*) stands in Southern Rockies National Forests, less than 5% are considered to be in an old-growth structural stage, a problematic situation for species that depend on old-growth habitat (Shinneman et al. 2000, Chapter 2—The Natural Landscape).

In addition to eliminating old-growth habitat, logging practices have fragmented habitat with clearcuts and roads. A 1996 study of the spruce-fir and lodgepole pine forests on the Medicine Bow National Forest in Wyoming found that clearcutting there had resulted in a landscape more fragmented than any in the Pacific Northwest (Reed et al. 1996). Forest fragmentation may lead to declines in populations of forest-interior-dependent species, including the boreal owl (*Aegolius funereus*), the northern goshawk (*Accipiter gentilis*), and the American marten (*Martes americana*).

Mining

Mining has had a significant effect on the landscape, as well. There are currently hundreds of active mines in the region. In addition, there are at least 9,700 abandoned mines in the Southern Rockies, many of which continue to pollute terrestrial and aquatic ecosystems in the region (Shinneman et al. 2000). One of the worst offenders is the Summitville Mine in the San Juan Mountains, which was declared bankrupt in 1992. This open-pit, cyanide heap-leach gold mine leaked significant quantities of acidic, metal-rich drainage and cyanide solutions into the Wightman Fork of the Alamosa River, destroying all aquatic life for 27 km downstream (Hinchman and Noreen 1993, Shinneman et al. 2000).

Water Use

Water use in the Southern Rockies has enabled the region to flourish, but contrary to popular belief, as much as 90% of the water diverted from streams goes not to the sprawling subdivisions along the Front Range, but rather to crops like hay and alfalfa, grains, vegetables, and fruit (Riebsame 1997). There are approximately 800,000 irrigated hectares in the Colorado. This is not to say that urban water use is inconsequential. In Denver, for example, over half the water consumed is attributable to outdoor landscaping (Riebsame 1997). The biggest impacts related to water use in the Southern Rockies come from dams and reservoirs, *e.g.*, loss and degradation of stream habitat and riparian habi-

tat, loss of groundwater function, and alterations in stream hydrology (Shinneman et al. 2000). Water issues are exacerbated by drought cycles, and the last few years of drought have heightened concern about conservation, additional storage, and techniques to squeeze more water out of our arid region.

Agriculture

Agricultural practices have played a major role in the transformation of the Southern Rockies landscape through the conversion of native vegetation and natural communities to croplands and rangelands. Roughly 800,000 ha, or 5% of the Southern Rockies, are currently classified as either dryland or irrigated cropland, and this 5% tends to be some of the most biologically important land in the ecoregion (*e.g.* valley bottoms, riparian areas, and wetlands). The Southern Rockies Ecosystem Project found that approximately 82% of all croplands in the ecoregion are below 2,461 m in elevation, and 10% are within 150 m of a river or perennial stream (Shinneman et al. 2000).

Agriculture in the region, however, appears to be on the decline. In Colorado, New Mexico, and Wyoming, the number of full-time farms decreased between 1992 and 1997, as did the average size of farms in all three states. Land in farms decreased by 4% in Colorado and 2% in New Mexico, but increased by 4% in Wyoming (US Department of Agriculture 1997). Some of the decrease in cropland is absorbed by suburban and exurban development, which are also inhospitable to wildlife.

Livestock Grazing

Ranching's contribution to the region's economy has been declining, but its effects on the land are still extensive and significant. Most ranchers in the Southern Rockies depend at least partially on public lands for grazing their animals. Typically, cattle and sheep spend summers on high elevation meadows in National Forests, and then in fall are moved to lower elevation rangelands, often Bureau of Land Management grasslands. Figure 3.3 shows active grazing allotments on federal lands by county throughout the region.

Nearly 70% of the 7,160,000 ha of U.S. Forest Service lands in the ecoregion have active grazing allotments on them, and 93% of the 3,320,000 ha of Bureau of Land Management lands in Colorado are actively grazed by livestock. Of the 1,200,000 ha of state school trust lands in Colorado, roughly 80% are actively grazed by livestock. These figures are similar for Bureau of Land Management and state lands in the Wyoming and New Mexico portions of the ecoregion. In addition, livestock grazing is allowed on portions of all three National Wildlife Refuges in the region, as well as in many Wilderness Areas. Given these numbers, Shinneman et al. (2000) estimate that roughly 70%-80% of state and federal public lands in the ecoregion are actively grazed by livestock, and 80%-90% are available to livestock grazing.

The Bureau of Land Management is required to monitor the condition of its rangelands. In 1998, the Colorado Bureau of Land Management estimated that 72% of the 1,240,000 ha where forage condition was rated and classified was in "fair" or "poor" condition. Given that "fair" condition means the land supports less than one-half its historical carrying capacity, these numbers should cause some concern.

Wilcove et al. (1998) estimated that livestock grazing has been a factor in the imperilment status of 33% of federally listed threatened species and 14% of endangered species. Since cattle tend to congregate along stream banks, water quality and stream hydrology can suffer serious negative impacts (Schultz and Leininger 1990). Heavy grazing causes changes in plant species structure and composition (*e.g.*, the proliferation of weeds like cheatgrass (*Bromus tectorum*), and some of those changes can lead to increased soil erosion (D'Antonio and Vitousek 1992). Indeed, rangeland managers often intentionally introduce non-native grasses, such as crested wheatgrass (*Agropyron cristatum*, Noss and Cooperrider 1994).

Large ungulates, predators, and other native animals are negatively affected by grazing as well. Fences for controlling roaming livestock interfere with animal movement, especially pronghorn (*Antilocapra americana*), but also deer (*Odocoileus* spp.) and elk (Noss and Cooperrider 1994). Livestock compete with native herbivores for forage, water, and space, and livestock managers make a practice of eliminating "pests" and predators like prairie dogs (*Cynomys* spp.) and coyotes (*Canis latrans*, Peek and Dalke 1982). Top predators such as wolves and grizzly bears were eliminated in the Southern Rockies in the early 1900s, largely to accommodate the livestock industry (Fitzgerald et al. 1994). The absence of these large carnivores has resulted in unnaturally large elk populations throughout much of the Southern Rockies, which has led to over-browsing of native vegetation, like aspen (*Populus tremuloides*), in some places (Stohlgren 1998, Baker et al. 1997).

The Forest Service and Bureau of Land Management are working with livestock operators to improve the condition of public rangelands, and there has been some progress. However, of the 1,920,000 ha where the Bureau has determined rangeland trends, only 26% showed improvement in 1998.

Recreational Uses

Every year, millions of people visit the public lands of the Southern Rockies for recreation, bringing significant tourist dollars to the region, many of whom come at least in part to see wildlife. Their presence is positive for the economy, but challenging for wildlife managers.

Most people who come to the Southern Rockies for recreation target one of the six National Parks and Monuments in the region or one of the eight National Forests. Recreation on Bureau of Land Management land is on the rise, especially with the growth of off-road vehicle recreation, but it does not rival use of the parks and forests.

The most popular National Forests in the region, measured in "recreation visitor days" (RVDs), are the White River, Pike/San Isabel, and Santa Fe (Shinneman et al. 2000). The White River National Forest ranked fifth in the nation in 1995 in terms of visitor days and is recognized throughout the world for its exceptional outdoor recreation opportunities. Its 900,000 hectares surround major resort areas like Aspen, Vail, and Breckenridge, and provide 13% of all ski visits in the nation. Being only 2-4 hours west of Denver on I-70, it is the primary target of Front Range "weekend warriors." Although the White River National Forest contains only 16% of Forest Service lands in Colorado, it hosts about 30% of the state's National Forest Recreation (U.S. Forest Service 1999). In addition, the Pike/San Isabel area is popular with backpackers, campers, and all-terrain vehicle enthusiasts; and the Santa Fe National Forest is heavily visited because of its close proximity to the urban areas of Santa Fe and Albuquerque.

One of the big impacts associated with recreation in the Southern Rockies is the extensive land development associated with ski areas (*e.g.* parking lots, second homes, condos, resorts, golf courses, and shopping centers). The ski areas themselves fragment high elevation forests with ski runs, chair lifts, and high mountain lodges, and they sometimes dewater streams for snow-making. The recent expansion of Vail Resort Ski Area into lynx habitat in the White River National Forest provides an example of how controversial ski area impacts can be (Thompson and Halfpenny 1991, Glick 2001). The White River National Forest currently has 18,212 ha under special use permits for skiing, and is contemplating plans for ski area expansion.

And the ski industry will continue to flourish in the Southern Rockies. Figure 3.4 predicts higher rates of growth in user days for activities like cross country skiing (242%), downhill skiing, and backpacking, and slower rates for hunting (22%), fishing (59%), snowmobiling, and off-road driving (54%)(Bowker et al. 1999), though presently off-road vehicle use is skyrocketing in popularity.

Summit County Colorado is growing the most rapidly of any county in the Southern Rockies and has the highest potential to provide additional capacity for skiing on National Forest lands. If growth rates stay the same, the combined daily capacity in 2010 will need to be 53,070 skiers at one time to meet the projected demand of 5,000,000 skiers per year. About 570 additional ha of National Forest lands are needed to meet this demand. By 2030, it is estimated an additional 3,424 ha would be needed to meet projected demand for skiing based on current growth rates. This would result in a total of 10,000 ha of National Forest land allocated to Summit County skiing (U.S. Forest Service 1999).

Though mechanized recreation is not projected to grow as fast as downhill and cross-country skiing over the next 50 years, it still has a significant and growing presence on the landscape. In Colorado, the number of registered all-terrain vehicles (ATVs) more than tripled during the 1990s, and snowmobile numbers increased by 64% (Finley 1999). Off-road vehicle use on fragile desert lands is of particular concern. Low elevation lands near population centers are under extreme pressure from ATVs and backcountry jeeping, while the higher elevations are increasingly subject to snowmobile activity. Mountain biking is a burgeoning sport with significant impacts to ecosystems on popular trails.

Even hiking and backpacking, seemingly low-impact activities, can have cumulative ecological impacts. Trails often traverse riparian areas and nesting areas and can harm native species and damage delicate natural communities. Heavy traffic in high elevation tundra can cause damage that takes years to repair. The Colorado Fourteeners Initiative is working throughout the state to improve trail systems and minimize human impact in fragile mountain ecosystems.

The main impacts associated with recreation on the public lands of the Southern Rockies are direct disturbance of wildlife, modification of habitat through vegetation damage, introduction of exotic species, erosion, and air and water pollution (Knight 1995).

4. The Cultural Landscape

Prior to the arrival of permanent Spanish and later Anglo settlements over 450 years ago, the Southern Rockies were home to native peoples who lived in both permanent habitations as well as on the land as hunters and gatherers. Beginning with the Paleo-Indians who inhabited the Southern Rockies around 11,000 years ago, the ecosystem gradually became home to the pueblo (village) peoples, who planted and harvested crops in valleys and on mesa tops, and later to hunting and gathering tribes, like the Apache, Ute, Comanche, Arapahoe and Cheyenne.

The most highly developed culture in prehistoric Colorado was the Anasazi culture, prevalent in the Four Corners region from the 11th through 13th centuries (Waldman 1999). The complexes they inhabited are popular National Parks and Monuments today: Mesa Verde, Chaco Canyon, Canyon de Chelly, and others. By 1300, the Anasazi had disappeared. The Pueblo Indians, descendants of the Anasazi, remain an important part of the region. In the 13th century, the Utes moved into the ecoregion from the Great Basin of Nevada, and ranged from northern New Mexico to southern Wyoming (Waldman 1999, Southern Ute website). Somewhere between the 9th and 14th Centuries, Athapascans arrived from the north to become the Apaches and Navajos, occupying northern New Mexico and southern Colorado (Waldman 1999).

The 17th century saw extensive colonization and missionary efforts by the Spanish. New Mexicans began to move into the Arkansas Valley in the early 1700s. This also was the beginning of Hispanic settlement of the San Luis Valley. French trappers and traders began moving into the region in the 1700s, as well, adding new dimensions to the ongoing conflicts between the Spanish and the Indians. Anglos began flooding the area with the Colorado Gold Rush of 1859. Trinidad became an important town, a point of contact between eastern Hispanic settlements and Anglo Coloradoans. Abbott et al. (1982:49) characterized the early history of this region as follows:

> *"Since the early 1700s, the southern Rockies, the San Luis basin, and the Arkansas Valley had been zones of contact among dissimilar peoples – Utes and Apaches, Comanches and Spaniards, Frenchmen and Spaniards, and above all, New Mexicans and Americans – competing for control of the same territory… {T}he lands of Colorado were one of the major frontiers of world history, a zone of interpenetration between the expansive societies of Hispanic and Anglo America."*

The Comanche began moving through southeastern Colorado in the 1700s (Waldman 1999). The Arapaho and Cheyenne arrived at the edges of the present Southern Rockies Ecosystem in the early 1800s (Waldman 1999). As these groups moved through the area they occasionally fought each other. Those plains tribes also kept the Ute tribes largely confined to the mountainous areas. In 1840, the Southern Cheyenne, Kiowa, and Comanche allied against the Crow, Shoshone, Pawnee, Ute, and Apache (Waldman 1999). Later, several of these tribes would become important fighters against white expansion into the Great Plains (Waldman 1999).

While the Southern Rockies share many physical characteristics that make it an ecoregion, socially and culturally, the landscape is quite diverse. Although county boundaries obviously do not conform to ecoregion boundaries, they offer the best approximation for the purposes of socioeconomic analysis. There are 64 counties in or near the Southern Rockies with significant socioeconomic ties to the region – 6 in south-central Wyoming, 48 in Colorado, and 10 in northwestern New Mexico. Using these county boundaries, the region encompasses 349,450 km^2. In terms of race and ethnicity, the Southern Rockies are predominantly white, but with more Hispanic and more American Indians than the nation as a whole. Table 3.2 compares the region's racial and ethnic composition with that of the United States.

Counties in New Mexico and southern Colorado had the highest percentages of Hispanic people. Six counties were more than half Hispanic — Mora, San Miguel, Rio Arriba, Costilla, Conejos, and Taos — and 20 were more than a quarter Hispanic. Thirty-two of the region's 64 counties – exactly half – were more than 90% white in 2000. San Juan County in New Mexico had the highest proportion of American Indians (36.88%), due to its overlap with the

Table 3.2 Ethnic background of the Southern Rockies compared to the United States, 2002.

Ethnic Background	Southern Rockies	U.S.
White	80.22%	75.10%
Hispanic	21.21%	12.50%
Native Hawaiian or other Pacific Islander	10.00%	0.10%
Some other race alone	8.64%	5.50%
Black or African American	3.43%	12.30%
Two or more races	3.03%	2.40%
American Indian and Alaska Native	2.54%	0.90%
Asian	2.05%	3.60%

Source: U.S. Department of Commerce, Bureau of the Census, 2000 Census of Population and Housing.

Navajo Reservation and the many Pueblos located there. Sandoval (16.28%), Rio Arriba (13.88%), and Montezuma (11.23%) counties, where the Colorado Ute Mountain Ute reservation is located, all had significant Indian populations, as well. The highest percentages of people with ancestry from Africa or Asia occurred in the urban counties along Colorado's Front Range and around Albuquerque.

In terms of educational attainment, Colorado, New Mexico, and Wyoming were all close to national averages (county data were not available). Only 11.48% of Americans over the age of 25 had a college degree in 2000. Wyoming and New Mexico were slightly below that average, at 10.57% and 10.35%, respectively, while Colorado was slightly higher, at 13.21%.

As a nation, the percentage of people below the poverty level was 13.3% in 2000. Colorado (10.2%) and Wyoming (12%) were both below the national average, while New Mexico, at 19.3%, was significantly higher.

Politically, the region was evenly split in 2001: 33.76% of registered voters were Democrats in 2001, while 35.75% were Republicans, and 30.49% were registered as Other. New Mexico was more Democratic (52.28%), Wyoming was more Republican (60.06%), and Colorado was more evenly split, but slightly more Republican (36.11% vs. 30.07% Democrat).

The most Democratic counties in the Southern Rockies coincide with concentrations of Latinos in New Mexico and southern Colorado, and with the Front Range urban areas. However, Republicans are dominant in El Paso County, Colorado (Colorado Springs), while the most highly concentrated Republican counties are located in southern Wyoming and northern Colorado.

6. Current Population Trends

The Southern Rockies are an attractive destination for migrants, as demonstrated by significant rates of population growth over the last century. In this section we look at population trends gleaned from the 2000 U.S. Census and examine the varied reasons for the region's longstanding popularity (Table 3.3).

On April 1, 2000, the Southern Rockies county population was 5,408,152. Metropolitan Denver, the largest urban area, had roughly 2,000,000 people. Not surprisingly, the counties with the greatest populations are concentrated along the eastern slope of the mountains, where large cities like Fort Collins, Denver, Colorado Springs, Santa Fe and Albuquerque are located. The 12 counties in these areas account for 77% of the entire Southern Rockies population. Because county boundaries extend beyond the ecoregion boundaries, a significant portion of this urban population falls outside of the ecoregion boundary. The least populous counties in the region were mainly in the southwestern corner of Colorado.

The urban Front Range counties mentioned above ranked highest in population density, with Denver County leading the way at 2,090 people per km^2. The least densely populated counties were, again, in southwestern Colorado, with average densities of 0.4 people per km^2. Colorado's average population density was 16.4 per km^2, New Mexico's was 5.9 per km^2, and Wyoming's was 2 per km^2. Fifty-four of the 64 counties in the region had human densities lower than the national average of 31 per km^2.

It is important to note that population distribution statistics at the county level do not accurately demonstrate precise patterns of human population. In the Southern Rockies, population centers are typically concentrated in lower elevations and mountain valleys, so large portions of heavily populated counties may be relatively devoid of development.

Over the course of the 20th century, people came to the Southern Rockies in ever increasing numbers. Between 1900 and 2000, the U.S. population increased by 274%, the Southern Rockies by 710%, Colorado by 697%, New Mexico by 831%, and Wyoming by 434%. They came for many reasons. The gold rush, beginning in 1859, was typical of the hope for riches and a better life that attracted peo-

Table 3.3 Population growth from 1910 - 2050.

Area	1910	1930	1950	1970	1990	2010	2050
United States	92,228,496	123,202,624	151,325,798	203,211,926	248,709,873	298,056,500	395,461,000
Western states	6,825,821	11,896,222	19,561,525	33,735,250	51,127,810	68,553,000	109,304,000
Colorado	799,024	1,035,791	1,325,089	2,207,259	3,294,394	4,650,500	6,208,000
New Mexico	327,301	423,317	681,187	1,016,000	1,515,069	2,158,000	3,364,000
Wyoming	145,965	225,565	290,529	332,416	453,588	604,500	863,000

1900 – 2000 Data Source: U.S. Census Bureau, Population Division, 2002.
2000 – 2050 Data Source: U.S. Department of Commerce, Bureau of the Census, 2000 Census of Population and Housing; Center of the American West, Western Futures Project, www.centerwest.org.

ple to the region. The late 1800s and early 1900s saw significant population growth correlated with railroads, silver booms, "cattlemania," coal bonanzas, and town building efforts. Between 1900 and 1920, Colorado's population increased by 74%, but then dropped 20% in the next two decades because of economic down-turn (Abbot et al. 1982).

The population growth that occurred during and after World War II marks the beginning of the "New West" (Riebsame 1997). Commenting on the West as a whole, White (1991) attributes this westward movement to the federal bureaucracies, which devoted disproportionate shares of their resources to western development. The economy of the Southern Rockies remained strong after the war, due in large part to military expenditures on the Western Slope and in the Four Corners region (Wilkinson 1999). But people came to the region as much for quality of life as for jobs and the opportunity to make money.

The 1970s saw another population increase related to the energy boom when the Arab oil embargo resulted a focus on domestic sources: coal throughout the Intermountain region between New Mexico and Montana; oil and gas in the Overthrust Belt near the Wyoming-Utah border; and uranium in Colorado, New Mexico, and Wyoming. Later, oil shale and synfuels in northwest Colorado and southern Wyoming would contribute to the boom, which helped make Denver second only to Houston among energy capitals of the country (Riebsame 1997, Wiley and Gottlieb 1982). During the 1970s the human population of the Southern Rockies region as a whole increased by a third, nearly three times the national growth rate.

In the past decade, the Southern Rockies population has increased 28%. Colorado ranked third in the nation for growth over the past decade, while New Mexico and Wyoming increased their populations by 20.1% and 8.9%, respectively. This latest population boom was related to national prosperity fueled by a bullish market, the growing popularity of the region, and the continued growth of "footloose" industry – mostly in the high tech sector – that had begun in the late 1960s. This boom was characterized by wealth and spending on luxuries such as second homes in the mountains. Population projections for the region suggest that high growth rates and the aforementioned patterns of development will continue (Table 3.3).

7. Current Economic Trends

The Southern Rockies economy has evolved over the past 100 years from extraction of natural resources like gold, silver, oil, gas, uranium, coal, timber, and forage to service industries, retail trade, finance, insurance, and real estate. Today's economy is more diverse and complex, with significant portions of the region's income coming from small "footloose" businesses and non-labor sources.

Commonly used economic growth indicators are total personal income and employment (number of new jobs) as they relate to population growth over a period of time. In the Southern Rockies, total personal income has increased at rates significantly higher than in the U.S. overall, and job creation has stayed ahead of population growth (Table 3.4). While population nearly doubled in the Southern Rockies between 1969 and 1999, jobs in the region increased 187%, with 2,300,000 new jobs created during that period. In comparison, jobs in the United States as a whole increased by 80%.

In addition to number of jobs, an important economic indicator related to employment is the type of job being created, i.e., what percentage of the workforce is made up of wage and salary workers (those who work for someone else) versus proprietors (self-employed business owners). In the Southern Rockies, wage and salary earners dropped from 85% to 81% of the workforce, while proprietors increased from 15% to 19%. These changes closely mirror changes in the national workforce.

Table 3.4 Percent increase in income, employment, and population across the U.S. and for the Southern Rockies from 1969-1999.

	United States	Southern Rockies	Colorado	New Mexico	Wyoming
Total Personal Income	121%	249%	253%	183%	136%
Employment	80%	187%	184%	143%	104%
Population	35%	87%	87%	72%	46%

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System.

Twenty-two percent of new jobs created between 1969 and 1999 in the Southern Rockies were proprietors running their own businesses (compared to 20% in the U.S. as a whole). Stated another way, self-employment currently accounts for approximately one in five jobs in the Southern Rockies. Data from the Census Bureau's County Business Patterns does not include farm employment, self-employed people, railroad employees, or government employees.

Over half of the 164,280 Southern Rockies business establishments in 1999 employed less than five people, and

87% employed less than 20 people. This is indicative of a stable, diverse economy. When a community is dominated by one or two large employers (like in a mining town or a timber community), much of the economic risk is in the hands of one employer. With several smaller companies in a community, that risk is more dispersed (Rasker 1994).

A closer look at the type of proprietorship reveals that almost all new business owners are "nonfarm"-related, and many represent growing "footloose" industries. People who can take their businesses anywhere are increasingly choosing to relocate in the Southern Rockies for quality of life reasons (Power 1996). Many of these new, small businesses are in the service sector.

By such economic indicators, the Southern Rockies appear to be booming, both in terms of population and economics over the past 30 years. But, because the large majority of counties measured are in Colorado, the picture masks the 16 counties of Wyoming and New Mexico, many with less vibrant local economies. It is important to recognize the varying social and economic conditions in the different subregions of the Southern Rockies.

For example, while the counties in the Colorado Front Range are far removed from an extractive economy (defined here as farm, mining, agricultural services, forestry, fishing, "and other"), counties in southern Wyoming, southwestern Colorado, and northern New Mexico retain somewhat significant remnants of "Old West" economies. The four counties that had more than a quarter of their jobs in extractive industries in 1999 are Saguache (33%), Dolores (31%), and Conejos (27%) in southwestern Colorado and Mora (35%) in northern New Mexico.

8. Current Land Development Trends

Population and economic growth are inevitably accompanied by land development. Disturbingly, however, the physical expansion of residential housing in the Southern Rockies has occurred at a rate even faster than population growth, for three reasons: an increase in lower-density suburban development; the boom in exurban and "ranchette" rural development; and the growth in second homeownership in the Southern Rockies (twice the national average), which is not reflected in population statistics (Theobald 2000). Thus, the impact of urban sprawl and expansion of low-density housing developments into natural landscapes in the Southern Rockies and surrounding areas are even more significant than the high population growth rates suggest, and housing development is among the most significant agents of landscape change.

Moreover, the negative impact of housing expansion on ecosystems and species is actually much greater than the total area developed. Scattered, low-density development results in fragmented habitat. In many mountain valleys and foothill forests, low-density exurban developments often occur along public-private ownership boundaries, and may block wildlife movement. This insularizes wildlife habitat on surrounding public lands (Theobald 2000).

Developed areas also create a "disturbance zone" that extends beyond the actual development and into adjacent natural habitat. The ecology of this zone is affected by the spread of noxious weeds, predation by household pets (cats are particularly destructive), increases in human-adapted species (e.g., raccoons, skunks, or starlings), introduction of detrimental wildlife attractions (e.g., trash cans), and increases in recreational activity (Knight 1995). The extended zone of negative effect for songbirds and medium-sized mammals is similar around low-density housing development and high-density development; indeed, low-density housing may have greater overall impact due to the larger landscape area (Odell and Knight 2001). Moreover, important natural processes, such as fires and floods, are often suppressed around developed areas to protect houses and businesses. The generally close proximity of much of the region's forest land to private, developable land will restrict options for natural disturbance management on public lands, in particular the ability to allow natural and ecologically beneficial forest fires to burn (Shinneman et al. 2000, Theobald 2000).

Using housing-unit data from U.S. Census Block Groups, Theobald (2000, 2001) calculated historical and future spatial trends in development patterns for the region (Figure 3.6). Looking specifically at the Southern Rockies ecoregion (and not the county-defined region), land within urban (>1 housing unit per ha) and suburban (1 unit per 1-4 ha) development grew from roughly 42,000 ha in 1960 to 175,000 ha by 1990. This area is projected to grow to roughly 390,000 ha in 2020 and to 550,000 ha in 2050. Exurban development (1 unit per 4 - 16 ha), grew from roughly 190,000 ha to 600,000 ha between 1960 and 1990, and it is projected at roughly 850,000 ha by 2020 and 1,120,000 ha by 2050. Exurban, suburban, and urban developments collectively covered about 775,000 ha (4.6% of the ecoregion) in 1990 and are projected to grow to 1,670,000 ha (10% of the ecoregion) by 2050 (Table 3.5).

This development is mainly concentrated in mountain valleys, foothills, and lower elevation valleys (Shinneman et al. 2000, Theobald 2000). These areas often include valuable agricultural lands and species-rich wildlife habitat such as ponderosa pine forests, oak shrublands, montane grasslands, riparian, and wetland habitat (Shinneman et al. 2000).

Table 3.5 Housing Density in the Southern Rockies.

Housing density	1960	1990	2020	2050
Urban/Suburban	42,000	175,000	390,000	550,000
Exurban	190,000	600,000	850,000	1,120,000
Total	**232,000**	**775,000**	**1,240,000**	**1,670,000**

data source: Theobald (2000, 2001).

9. Conclusion

In sum, the Southern Rockies are booming, both in terms of population and economic growth; but the region retains significant wildlands. Indeed, it is the relatively pristine environment that attracts so many people and businesses to the region. As communities continue the shift from extractive economies to service economies and marketing natural amenities, they will be more likely to see the economic benefits of restored and intact ecosystems.

One of the biggest concerns is the astronomical population growth rate and attendant residential development. Because of proximity to the popular and highly traveled I-70 corridor, counties in west-central Colorado had high growth rates: Eagle County has grown by 90% and is ranked 9th in the country for the 1990s; Garfield County has grown by 46.1%. The tendency for this corridor to attract the second homes of wealthy people means that the effect on Nature is worse than the population numbers indicate.

Hinsdale and Mineral Counties (Southwest Colorado) had growth rates of 69% and 49% respectively, and both ranked in the top 26 fastest growing counties in the nation. Archuleta County ranked 14th in the nation, with an 85.2% growth rate. Granted, Hinsdale, Mineral, and Archuleta Counties were some of the most sparsely populated counties in the region to begin with, so even with high growth rates, their population density remains relatively low; but present trends are surely cause for concern.

Many people come to the Southern Rockies for their natural beauty and recreation opportunities. Eventually, growth will erode those amenities, particularly if scenic views from the porch are a more deeply held core value than functioning ecological processes. In addition, these changing demographics do not automatically translate to a change in power from the Old West to the New West. That may be true over the long-term, but in the short-term there may be heightened conflict between competing values (Glick 2001).