

The 2011

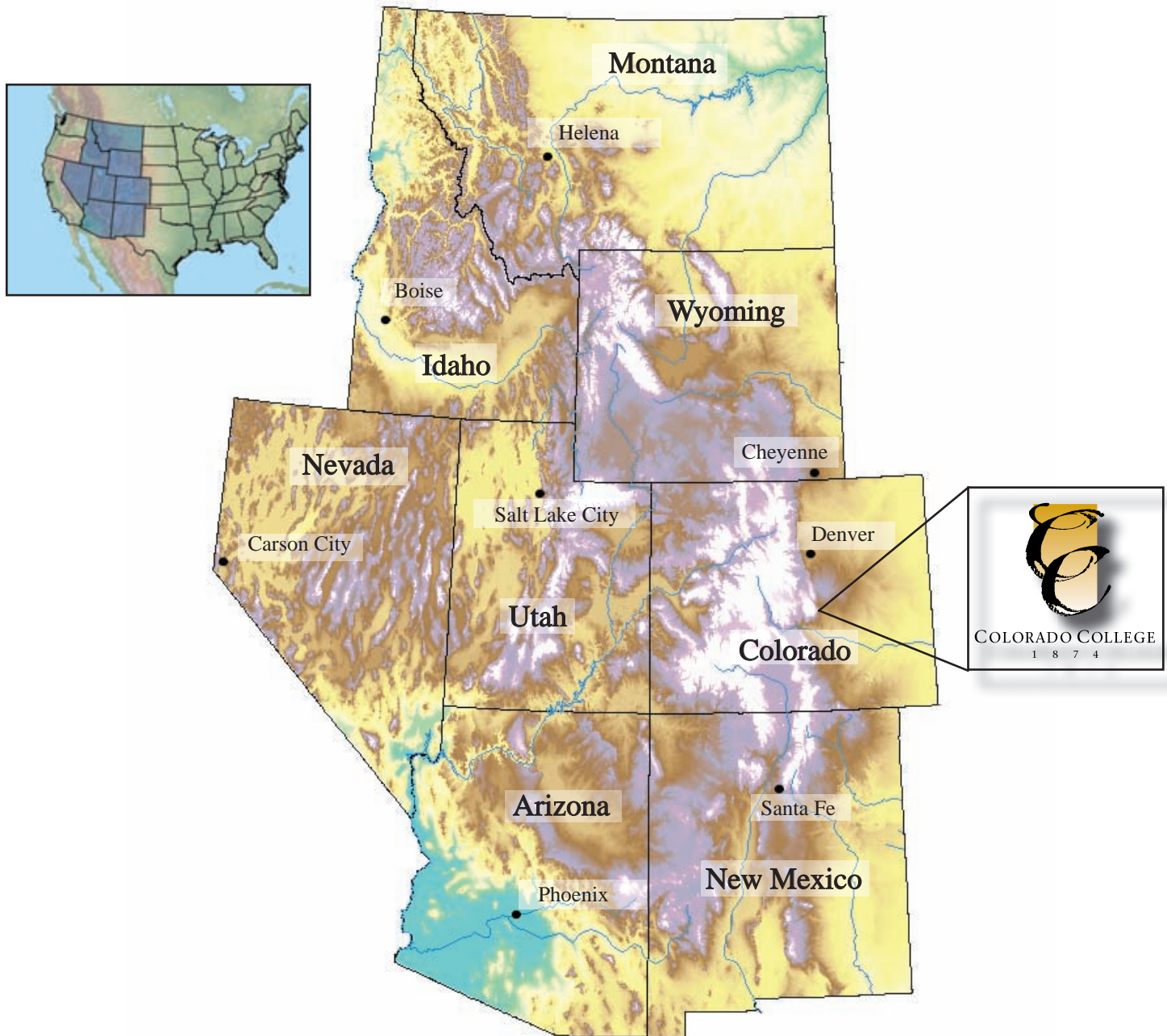
C O L O R A D O C O L L E G E

STATE OF THE ROCKIES REPORT CARD

The Rockies Region, Rockies' Eastern Plains, Infrastructure, and Recreation

An Outreach Activity of Colorado College: Vision 2010

Colorado College's Rocky Mountain Study Region



The Colorado College State of the Rockies Project is designed to provide a thoughtful, objective voice on regional issues by offering credible research on problems faced by the Rocky Mountain West, and by convening citizens and experts to discuss the future of our region. Each year, the State of the Rockies provides:

- Opportunities for collaborative student-faculty research partnerships;
- An annual *State of the Rockies Report Card*;
- A companion State of the Rockies Speaker Series and Symposium.

Taken together, these arms of the State of the Rockies Project offer the tools, forum, and accessibility needed for Colorado College to foster a strong sense of citizenship for both our graduates and the broader regional community.



The Colorado College State of the Rockies Project

An Outreach Activity of
Colorado College
Vision 2010



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C O L O R A D O C O L L E G E
STATE OF THE ROCKIES REPORT CARD

The Rockies Region, Rockies' Eastern Plains, Infrastructure, and Recreation

Edited By:

Walter E. Hecox, Ph.D.
Rockies Project Supervisor

Russell H. Clarke
Rockies Program Coordinator

Matthew C. Gottfried
GIS Technical Director

This eighth annual edition of the State of the Rockies Report Card is dedicated to Richard F. Celeste, Colorado College's 13th president. His vision and leadership have helped create and nurture the college's State of the Rockies Project, which has helped reconnect the institution to its regional heritage and provides an opportunity to celebrate its distinctive history. President Celeste's retirement in June 2011 will bring to an end the first era of Rockies Project activities, and we would like to extend our gratitude and best wishes for his future endeavors.

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The Colorado College State of the Rockies Project
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A photograph of several pink flowers, possibly columbines, in a field. The flowers are in various stages of bloom, with some fully open and others as buds. The background is a soft, out-of-focus green field under a bright sky.

The Colorado College State of the Rockies Project

Research, Report, Engage!

An Introduction from the President

THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

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On behalf of Colorado College, I am especially proud this year to introduce the *2011 State of the Rockies Report Card*. Nine years ago, in my first year as president, the campus undertook a self-examination whose result has been embodied in our “Vision 2010” – a roadmap for building upon our existing strengths and designing new avenues for providing a 21st-century education of distinction. One unique outcome of this introspection is the State of the Rockies Project, now publishing its eighth annual *Report Card*.

Having called the Rockies home for more than 130 years, the college owes an immense debt of gratitude. Indeed our very founding in 1874 came about largely due to General William Palmer, whose vision and foresight established Colorado Springs as a beacon on the eastern plains at the foot of Pikes Peak. The General early on called for an educational institution that has become Colorado College. Over succeeding decades the region has continued both to shape our unique approaches to undergraduate education and to support our liberal arts endeavor. One measure of how important the region remains is the near 30 percent of our students originating from the eight-state Rockies region and near 40 percent of our graduates residing in the region.

In prior years, annual *Report Cards* have examined how specific issues challenge the Rockies region and its natural,

cultural, and historic importance. These 30 prior studies have included regional energy issues, the condition of our national parks and health of our forests, expected impacts of climate change, success stories among our Native American peoples, toxic waste, creative occupations, a host of wildlife topics, agriculture in the Rockies, and civic engagement. Media coverage has supplemented our annual conference and speakers series efforts, bringing regional, national and international attention to the issues studied and the results found by our undergraduate researchers. We are proud to continue Colorado College’s long tradition of contributing to and strengthening our surrounding region’s social, economic, and environmental qualities.

This year’s research and resulting published sections focus on three key dimensions to what makes the Rockies unique: rejuvenation of the eastern plains, infrastructure, and recreation. The Rocky Mountains serve as a spine to the region, spectacular but forbidding and difficult to navigate. Conquering the region always has depended upon transport and communication to connect vast distances. The same mountains, forming the Continental Divide, cater to millions seeking exercise and solace through recreation. To the east of these mountains lie vast open plains, the western part of the Great Plains, once an “ocean of grass” that has gone through settlement and cultivation, only now to move back toward its origi-

About the author: Richard F. Celeste is the President of Colorado College

nal “empty quarter” character. All of these foci on the Rockies reflect our students’ research to illuminate the past, describe the present, and suggest options for future conditions.

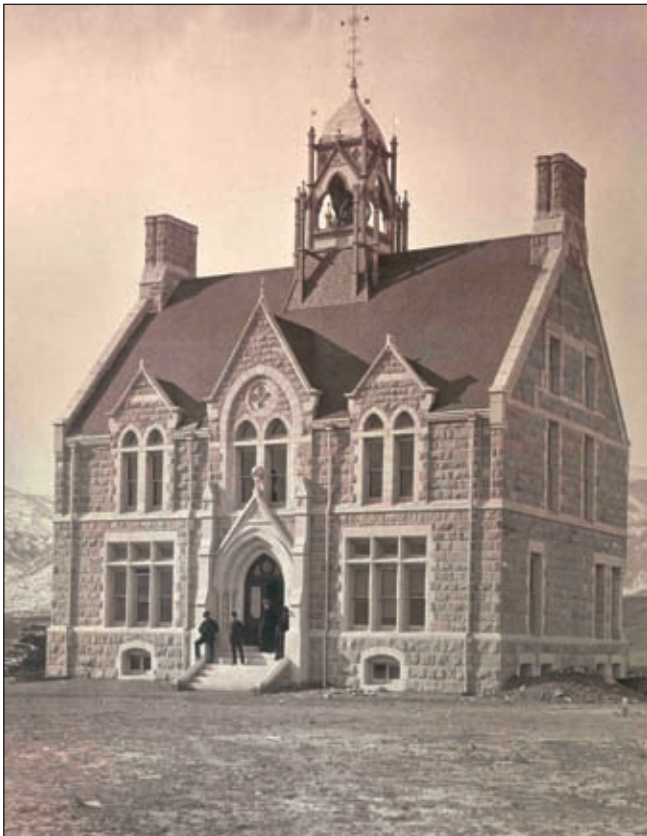
Our mission statement continues to guide us in our goals and highlights the importance of the mountains so important to our character:

At Colorado College our goal is to provide the finest liberal arts education in the country. Drawing upon the adventurous spirit of the Rocky Mountain West, we challenge students, one course at a time, to develop those habits of intellect and imagination that will prepare them for learning and leadership throughout their lives.

As I move through this last year as president before retirement, I invite you to explore the Rockies through the material in this *Report Card*. I am confident that it will inform, challenge, and stimulate your knowledge and thinking. At the same time I encourage you to reflect back on the 30 other research topics illuminated by our students in prior *Report Cards*. We welcome you to a growing number of people who care to learn more about and contribute to protecting the unique features and character that make the Rockies region everyone’s special “backyard.”

Richard F. Celeste

Richard F. Celeste
President of Colorado College



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© Colorado College, Biology Class 1969



Colorado College, the Rocky Mountain West, and **The State of the Rockies Project**

By Dr. Walter E. Hecox

THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

Colorado College today, as for the past 136 years, is strongly defined by location and events of the 1800's. Pikes Peak abruptly rises out of the high plains that extend from the Mississippi and Missouri rivers towards the west. Peaking at 14,000 feet, this eastern-most sentinel of the Rocky Mountain chain first attracted early explorers and was later the focus of President Jefferson's call for the southern portion of the Louisiana Purchase to be mapped by Zebulon Pike in 1806. Gold seekers in 1858 spawned the start of the "Pikes Peak or Bust Gold Rush" of prospectors and all manner of suppliers to the mining towns. General William Jackson Palmer, while extending a rail line from Kansas City to Denver, in 1869 camped near what is now Old Colorado City and fell in love with the view of Pikes Peak and red rock formations now called the Garden of the Gods. An entrepreneur and adventurer, Palmer selected that site to found a new town with the dream that it would be a famous resort—complete with a college to bring education and culture to the region. Within five years both Colorado Springs and Colorado College came into being in the Colorado Territory, preceding Colorado statehood in 1876.

Early pictures of present-day Cutler Hall, the first permanent building on campus that was completed in 1882, speak volumes to the magnificent scenery of Pikes Peak and the lonely plains. Katherine Lee Bates added an indelible image of the region. In 1893 she spent a summer teaching in Colorado Springs at a Colorado College summer program and on a trip up Pikes Peak was inspired to write her famous "America the Beautiful" poem. Her poem helped spread a celebration of the magnificent vistas and grandeur of Pikes Peak and the

surrounding region, and provided bragging rights for Colorado College as "The America the Beautiful College."

The last quarter of the 18th century was challenging both for Colorado Springs and Colorado College. Attempts to locate financial support in the east and ease the travails of a struggling college were grounded on the unique role of Colorado College in then President Tenney's "New West" that encompassed the general Rocky Mountain region. His promotion of this small college spoke of Colorado College being on the "very verge of the frontier" with a mission to bring education and culture to a rugged land. Even then, Tenney saw the college as an ideal place to study anthropology and archeology, use the geology of the region as a natural laboratory, and serve the mining industry by teaching the science of mineralogy and metallurgy. In the early 1900's a School of Engineering was established that offered degrees in electrical, mining, and civil engineering. General Palmer gave the college 13,000 acres of forest land at the top of Ute Pass, upon which a forestry school was built, the fifth forestry school created in the US and the only one with a private forest.

Subsequent decades brought expansion of the institution, wider recognition as a liberal arts college of regional and national distinction, and creation of innovative courses, majors, and programs. The unique Block Plan, implemented in the 1970's, consists of one-at-a-time courses lasting three and one-half weeks each that facilitate extended course field study, ranging across the Rockies and throughout the Southwest. Thus CC has a rich history indelibly linked to the Rockies.

Today is no different: CC has new programs that meet evolving challenges in the Rockies, including environmental

About the Author: Walter E. Hecox is professor of economics in the Environmental Program at Colorado College and the Project Director of the Colorado College State of the Rockies Project.

and Southwest studies programs, a sustainable development workshop, and exciting fieldwork offered by a variety of disciplines. Students can thoroughly explore the Rockies through the block plan and block-break recreation.

The State of the Rockies Project

The Colorado College State of the Rockies Project is designed to provide a thoughtful, objective voice in regional issues by offering credible research on challenges and problems facing the Rocky Mountain West, and through convening citizens and experts to discuss the future of our region. Each year the Project seeks to

- **Research:** offering opportunities for collaborative student–faculty research partnerships
- **Report:** publishing an annual Colorado College State of the Rockies Report Card
- **Engage:** convening companion State of the Rockies monthly talks and other sessions.

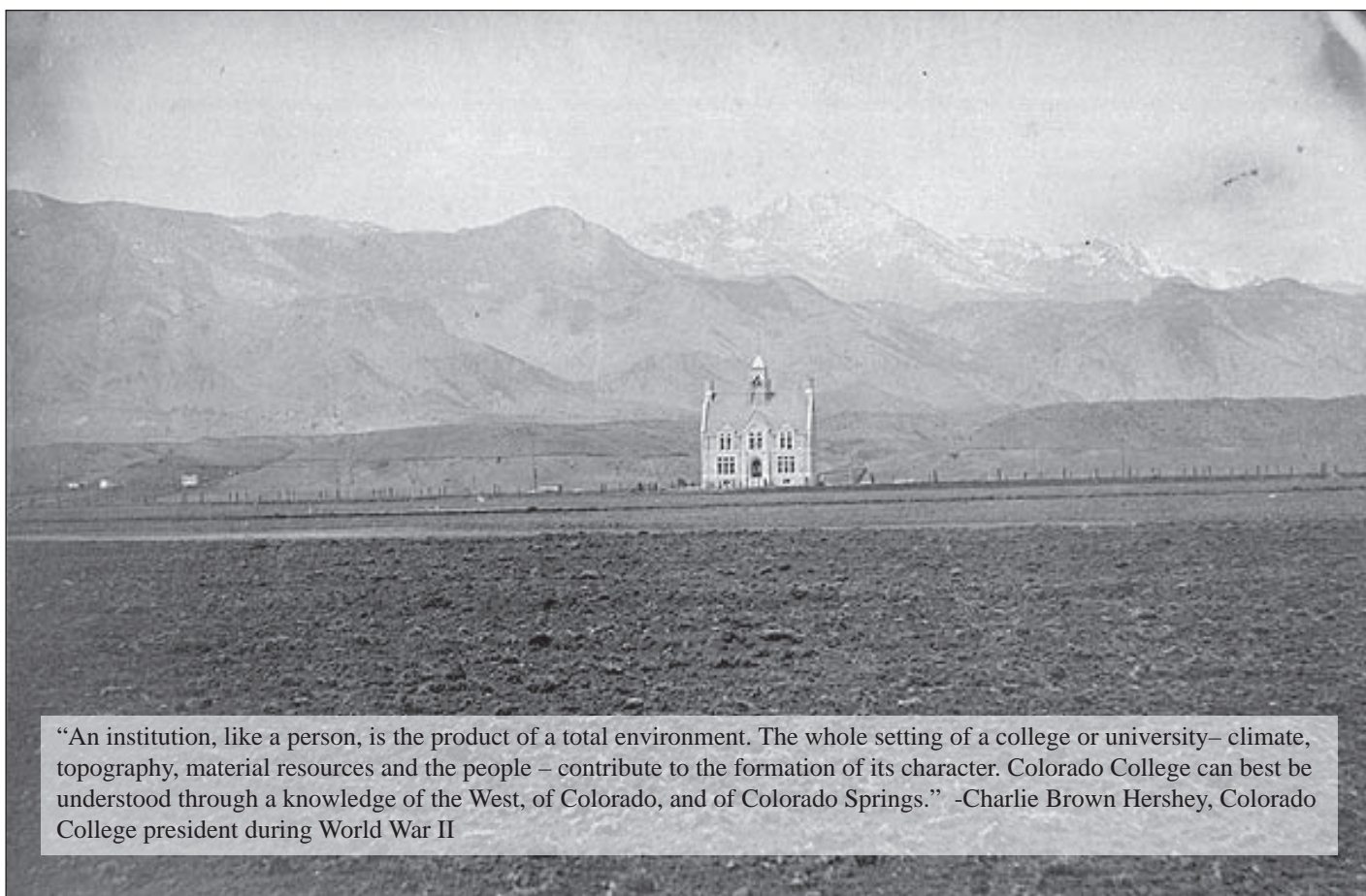
Taken together, these three arms of the State of the Rockies Project offer the tools, forums, and accessibility needed for Colorado College to foster a strong sense of citizenship among our students, graduates, and the broader regional community.



© Colorado College, Geology Bus



© Walt Hecox, Field Trip in San Luis Valley, CO



© Colorado College, Cutler Hall in front of Pikes Peak

“An institution, like a person, is the product of a total environment. The whole setting of a college or university— climate, topography, material resources and the people – contribute to the formation of its character. Colorado College can best be understood through a knowledge of the West, of Colorado, and of Colorado Springs.” -Charlie Brown Hershey, Colorado College president during World War II

Editors' Preface

By Dr. Walter E. Hecox, Russell H. Clarke, and Matthew C. Gottfried

THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

Perspectives on the Rockies Project

The end of an era can be momentous and indeed the Rockies Project finds itself reflecting on our origins and eight years of student-centered activity. While it seems ages ago, the 2002-03 academic year was a time of institutional reflection and thought about the college's future, as the new president Dick Celeste organized a months' long discussion process leading to a program of action called Vision 2010. Below was his 2002 charge to the campus:

"I challenge you to find ways to make Colorado College – already a very good enterprise – even better between now and 2010."

The initiatives in Vision 2010 focused on further developing the college's existing strengths in an effort to translate our values into reality, with the mission of providing the best undergraduate liberal arts education in the country. Doing so requires matching our performance to our promise, moving toward a

About the Authors: Walter E. Hecox is professor of economics in the Environmental Program at Colorado College and the Project Director of the Colorado College State of the Rockies Project.

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new level of intellectual rigor, creating a more diverse and respectful community, and building a 21st-century campus.

Early in the "visioning process" arose the idea of re-connecting the college to the Rocky Mountain region. It quickly resonated with President Celeste, former two-term Governor of Ohio, who grasped how important geography and terrain are in shaping an educational institution such as Colorado College. The very founding of the college and its evolution over nearly 14 decades deeply reflects the Rockies in all of their grandeur and forbidding challenges. Generations of students, many from the Rockies, have received their undergraduate education from CC and often have returned to the region, providing careers of leadership and service. Indeed being "in" the Rockies at the foot of Pike's Peak brings immense opportunities for field study, research and recreation in our spectacular Rocky Mountain backyard.

As some say, "the rest is history": the Rockies Project commenced during 2003 and the first *Report Card* was published in April 2004. In succeeding years annual report cards have been joined by yearly speakers' series, symposia and conferences, as well as widespread visibility through media coverage. In the process, roughly 40 bright CC students have par-

ticipated as student-researchers; and after graduation are in the process of gaining additional experience, graduate work, challenging jobs and service around the nation as well as within the Rockies region.

Upon the imminent retirement of President Celeste from Colorado College at the end of the 2010-11 academic year, the Rockies Project extends a hearty thanks to him for his vision, leadership and enthusiasm. Without his help, the project literally would not have found a place at CC and been successful for eight years!

Rockies Project 2010-11 Focus

Central to this year's activities, as in the past, are the three goals of the Colorado College State of the Rockies Project:

- **RESEARCH:** To involve Colorado College students as the main contributors to the *Report Card* and conferences,
- **REPORT:** To produce an annual research document on critical issues of community and environment in the Rocky Mountain West (the *Report Card*), and
- **ENGAGE:** To host annual monthly speakers series and conferences at Colorado College, bringing regional experts together with concerned citizens.

Research and Report

Rockies Region and Zones

The term "land and sky determine" effectively ties together the content of this *Report Card*. Our Project's Rocky Mountain region, consisting of 8 states and 281 counties, whose spine is the Continental Divide, is characterized by vast open spaces, towering mountains, spectacular beauty, and harsh climatic conditions. In earlier report cards our project took a different approach to defining the region by dividing it into three "north-south" areas called "zones" that depict similar conditions:

- **the Eastern Plains Agricultural Zone**
- **the Continental Divide Spine**
- **the West and Southern Mountain Amenity Zone.**

The first section of this year's *Report Card* revisits our 2004 "trifurcation" of the Rockies. Here we update information which sustains our original concept: people and communities and counties within each of these "north to south" zones often have more in common with each other than with those in their own state, but differing zones to the east and/or west. The "Continental Divide Zone" continues to host most of the urban areas and population, with high education and income levels largely flowing from jobs in the service sector. Proximity to recreation in the mountains continues to be a major "comparative advantage" for this part of the Rockies. To the east of the Continental Divide, the part of the Great Plains overlapping Rockies' states, our "Eastern Plains Agricultural Zone," clus-

ters together counties and communities with far different characteristics than the mountainous region. Levels of population growth, income and employment are low, many communities are dwindling in size and vibrancy, and the original defining characteristics of intense agriculture as a "breadbasket for the nation" is fast changing. To the west of the Continental Divide the "West and Southern Mountain Amenity Zone" is defined by rugged plateaus and river basins, abundant energy and mineral resources, and sparse populations.

The close look this *Report Card* takes at both the entire Rockies region's characteristics and the distinct ways by which Rockies zones or sub-regions differ on the same measures makes starkly clear one reality of the region. A "one-set-of-policies-fits-all" approach to management of resources, the environment, communities, and their infrastructure in the Rockies is as inappropriate as would be a national set of policies that does not take into account the substantial differences between the Rockies vs. the neighboring Pacific and Central Divisions that have integrity within Congress and the Census Bureau.

The Eastern Plains: Decline and Potential Rejuvenation

What should our nation do in reaction to the stagnant conditions depicting much of the Great Plains, and thus the Rockies Project's "Eastern Plains Agricultural Zone"? Periodically, there are Congressional proposals for a new Homestead Act that is proposed as a way, once again, to populate the Great Plains region and return the economic vitality of the early decades after settlement. This year's *Report Card* starts with the challenge from these legislative proposals: what is to be made of the depressed economic, social and community conditions in the region? Should government once again create incentives that entice what now should be called re-settlement? Or should long-term market and demographic forces work their way through the region, eventually resulting in a far different region than our concept of a "breadbasket"? While counties north to south in the "Eastern Plains Agricultural Zone" share many characteristics, the news is not uniformly bad. Some communities are discovering sources of economic and population vitality through renewable energy activity including biomass, solar and wind; others are seeking to return vast stretches to "open range" areas for domestic and wild animals to roam and tourists to enjoy, a phenomenon discussed as an "American Serengeti."

Infrastructure: Essential Services in Need of Attention

The human settlement of the Rockies has been one long and continuing struggle against near impenetrable mountains and harsh conditions. Creating human transportation and communication infrastructure is synonymous with the "settling" of the American West. Transport evolved from early explorers and settlers on foot, horseback and wagon train, to rugged paths evolving into toll roads and then paved roads and highways. Similarly, communication has evolved to stitch together peoples and communities once in near isolation; first via the pony express, then the telegraph and then telephone, now supplanted by satellite and fiber optic cable. Again, the Continental Divide at first was nearly impenetrable, resulting in north to south roads and communication pre-dating the later

engineering feats that have penetrated the mountains, deep valleys and deep river canyons. We explore the history of conquering the Rockies with infrastructure, reflect upon the fact that location of economic activity and communities has largely been dictated by the resulting corridors of communication and transportation, and end by asking a key question: has the Rockies region received it's "fair share" of what the nation has spent as investment in regional infrastructure?

Nature Based Recreation in the Rockies: the New Value of the Region's Resources

The Rocky Mountains continue to define the region and its human and economic activity. Once nearly impenetrable, as we trace out in our section on infrastructure, settlers long were attracted to the vast mineral riches and then arable land, forests, water and wildlife that also define the region. An era of resource extraction can be traced from the late 1800's until the middle of the twentieth century. The mountains, during this era, largely were viewed as harsh and hostile, a barrier to what humans wanted to extract as wealth-creating economic activity. But a counter value to the same mountains and rugged landscape gradually evolved post World War II: increasing levels of leisure, income and mobility have spawned a continually growing demand for the intangible benefits people can extract from the Rocky Mountains as tourists, recreationists, and early retirees.

Remember that the "Continental Divide Spine Zone" itself is vibrant largely because people seek out jobs and homes close to nature's spectacular beauty and recreational opportunities. This "amenity" use of nature is every bit as directly grounded in the "land and sky" as has been the extractive era of resources. However, now people are seeking out, indeed demanding, communities with a high quality of life and close proximity to open lands for recreation and tourism. Jobs and income result from this "new" use of nature, ones that often conflict with the remaining demands for extraction of resources from the very lands people now wish could stay in their "natural condition" rather than be developed and exploited. Where are the prime areas in the Rockies that contain the recreation activities so much in demand? Can communities and regions in the Rockies have viable economies and communities that are so heavily dependent upon recreation? These and other aspects of recreation are illuminated by our intense look at recreation in the Rockies.

Summer 2010 Field Trip Perspectives

In addition to the intense research on the CC campus, multiple trips throughout the Rockies accompanied the ten week student research season. These trips allowed the inclusion of case studies and qualitative experiences to help strengthen the topics being discussed and viewed through data. Traveling over 2,400 miles through Colorado, Wyoming, Montana, South Dakota and Nebraska allowed the researchers to see a plethora of people, places, businesses and organizations related to the topics of the Rockies Eastern Plains, Infrastructure and Nature Based Recreation covered in *The 2011 Report Card*.

First, the Rockies' team headed north to Yellowstone,

Wyoming for two nights of camping. After experiencing the classic natural wonders of Yellowstone the team headed to Jackson, Wyoming for a meeting with Jon Shick, owner of High Mountain Heli-Ski. The afternoon was spent in the Jackson area meeting with Paul Walters from the Jackson Hole Airport, the only airport in a national park, and Lori Iverson from the National Elk Refuge. In the afternoon the entire group sat down to discuss conservation efforts with Louise Lasley from the Jackson Hole Conservation Alliance. This meeting was followed by a conversation with Rick Knori from Lower Valley Energy about the unique state of the Jackson Hole area's energy needs. The evening was capped off with a small gathering of CC alumni in the area at the local Snake River Brew Pub.

The following day was spent in West Yellowstone, Wyoming on a tour of Yellowstone's boundaries, highlighting the friction over bison moving outside the park and interacting with cattle. This tour was led by Mark Pearson of the Greater Yellowstone Coalition. Later the Rockies team traveled on to Bozeman, Montana where the next two days were spent meeting with various nonprofits, organizations and businesses.

In Bozeman, part of the Rockies team met with the Director of Public Services for Bozeman, Debbie Arkell, while the other researchers met with Sarah Olimb from the World Wildlife Fund to learn more about the Great Plains ecosystem. Later in the day the team met with Ganay Johnson from the American Prairie Foundation to learn about the Prairie Reserve in northeastern Montana, followed by a meeting with the Sonoran Institute to focus on planning issues that are facing Rockies' communities. The evening brought together CC and State of the Rockies alumni for food and drinks at Montana AleWorks.

On the way out of Bozeman the Rockies team was fortunate to tour the high-tech factory of Simms Fishing Products. Aaron Theobald, John Hoagland and K.C. Walsh, owner of Simms, discussed the future of outdoor recreation through their hand-crafted, high end fishing products. Afterward Ray Rasker and Mark Haggerty from Headwaters Economics discussed some of their research findings on relevant topics in the Rockies to the researchers.

Heading northeast the Rockies researchers stopped in Judith Gap, Montana to tour the Judith Gap Wind Farm and sit down with town resident Harry Peck to discuss the history and future of the tiny plains town. After spending the night in Sheridan, Wyoming and experiencing the Rodeo, the Rockies team traveled to the Black Thunder Coal Mine in Wright, Wyoming to tour one of the largest open pit coal mines in the world, powering 6 percent of the United States electricity and providing numerous jobs for the region.

Turning south towards Colorado College the team stopped at Wind Cave National Park to talk with biologist Dan Roddy about bison management issues related to recreation. After camping at the park and experiencing the American classic, Mt. Rushmore, the Rockies team finished off the eight days of field research with a drive through Nebraska, stopping to view a Burlington Northern train yard.

Throughout the summer student researchers took various day trips around Colorado. This included Fowler where they learned about this community's unique approach to utili-

© Russell Clarke



ties and job creation. Visits with various other organizations along the Front Range rounded out the field work that contributed to the *Report Card*.

In addition to the data analysis and interviews presented in the main sections, the *2011 Report Card* includes case studies largely based upon the field research conducted on the various field trips. These depictions help sketch the unique challenges and opportunities that exist not only in the small corners of the Rockies, but the thriving megapolitans of the region as well.

Engagement

Monthly Speakers Series on Forest Health

Building upon three years of experience with monthly speakers series on topics relevant to the Rockies, during the 2010-11 academic year we have helped fulfill our “engagement” objective by inviting experts to campus around a common focus: “Are Our Forests Dying? Forest Health in the Rockies.” Given the millions of acres being killed in the Rockies by a massive pine beetle infestation, there is large public awareness and concern about our forests, a defining aspect of what makes the Rockies so spectacular. Our speakers included: Professors Dave Theobald and Jason Sibold of Colorado State University; Timothy Egan, Award Winning Author talking about his book: *The Big Burn*; Forest Service managers Tony Dixon and Jan Burke covering the impacts of the infestation on the White River National Forest; Colorado State Government employees Mike King, Executive Director of Natural Resources, and Nolan Doesken, State Climatologist, reflecting upon Colorado forest health controversies; and Suzanne Jones, regional director for the Wilderness Society, and Sloan Shoemaker, Execu-

tive Director of the Aspen Wilderness Workshop, winding up the series with comments on the role of environmental groups and public involvement.

Reinstating April Rockies Conference

The unveiling of this 2011 State of the Rockies *Report Card* once again offers us an opportunity to celebrate the Rockies Region with an annual conference on April 4-6, 2011. Our over arching theme for the series of three evening sessions is: “Envisioning and Managing Rockies’ Unique Landscapes and Resources.” Monday, April 4th we welcome to campus Terry Tempest Williams, renowned author and advocate of the American West; she will be recognized as our 2010-11 “Champion of the Rockies” and give a reading from her perceptive writings. Tuesday, April 5th Mike Kaplan, CEO of Aspen Skiing Company, will offer provocative perspectives entitled: “What Do We Want to Be? Business and Community Coming of Age in the Rockies”. Wednesday, April 6th is devoted to the concept of an “American Serengeti” through screening of a National Geographic special and perspectives from Martha Kauffman, Managing Director of the World Wildlife Fund Northern Great Plains Program, and Dick Dolan, Managing Director of the American Prairie Foundation.

Pull Together to Protect the Rockies

For the eighth year the Rockies Project and Colorado College aim to inspire *Report Card* readers and Rockies event attendees to creatively contemplate, discuss, and engage in shaping the future of our beloved, beautiful, and fragile region—the Rocky Mountain West. Enjoy!

About the Author: Walter E. Hecox is professor of economics in the Environmental Program at Colorado College and the Project Director of the Colorado College State of the Rockies Project.

Overview Section: The Rockies Region

A Region Continually Defined and Redefined by Resources and Environment

By **Walter E. Hecox Ph.D.**

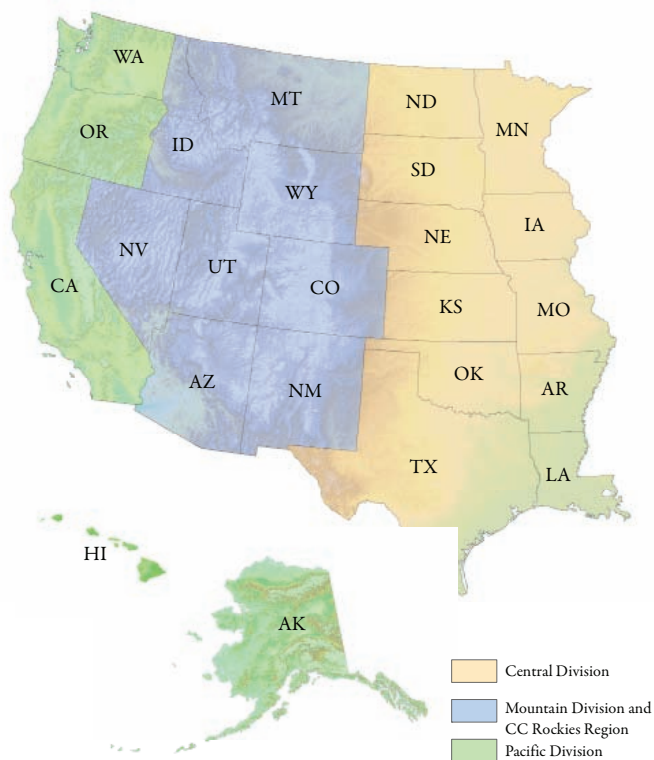
THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

Key Findings:

- Over the past 40 years, the Rockies has grown by 157 percent in total population, when compared to the U.S. growth rate of 39 percent.
- Resource-based employment has shrunk nearly everywhere over 18 years, and varies substantially among the Rockies' states, with Wyoming having the highest remaining jobs in this sector in 2008 (12.3 percent) and Nevada having the lowest (2.8 percent).
- The sectors in the Rockies where service-based earnings are above comparison neighboring regions and the U.S. average include: construction (6.4 percent); retail trade (5.3 percent); real estate and rental and leasing (1.6 percent); Administrative and Waste Services (3.3 percent), arts, entertainment and recreation (0.9 percent); and accommodation and food services (3.8 percent). In contrast, "lagging" service sectors in the Rockies incorporate: wholesale trade (3.6 percent); finance and insurance (4.2 percent); professional and technical services (6.8 percent); and health care and social assistance (6.8 percent).
- We see that the Rockies as a whole had more people with a high school education than the national average in 2008.
- Manufacturing jobs in the Rockies and its zones, predictably, stand below the US level of 7.8 percent of employment in 2008, contrasted with 5.1 percent Rockies wide, 3.0 percent in the Eastern Plains, 5.5 percent along the Rockies spine, and 4.8 percent in the Southwest zone
- Average total compensation per job is one overall measure. The Rockies at \$51,413 per average job in 2008 fell below the national average of \$56,116.



Figure 1: Census Divisions of the Western United States



Overview

The Continental Divide literally forms the spine of an eight state region that we refer to at Colorado College as “the Rockies.” Containing 863,242 square miles and 24 percent of the landmass and 7.2 percent of the 2009 population in the United States, it is a region of spectacular natural beauty, harsh climate and soil conditions, huge tracts of sparsely settled lands juxtaposed next to rapidly growing urban areas. These vast open spaces continue to capture the imagination of residents and visitors alike: a suggested promise of rugged individualism, the reality of recreation and solitude that appears endless but in fact is limited and fragile, challenges to extract vital natural resources without damaging the land and thus diminishing its heritage to the future, the responsibility to form patterns of human habitation and resource management to match the grandeur of the scenery.

At first glance perhaps, the view millions receive as they fly “over” the Rockies region on their way to other destinations, the region appears to be a huge empty quarter. In 2004, clusters of dense population made the region 1.4 percent developed (urban or built-up land, including rural transportation corridors), confirming what our eyes told us from afar. Looking more closely, patterns emerge of dense agricultural activity, roads, and clusters of people in towns, cities and large metropolitan areas. Water defines life in the region, historically along streams and in the rich river bottom areas, and increasingly today in areas where water has been pumped from the ground and diverted on the surface to feed agricultural, municipal and industrial demands. Equally defining of the Rockies is the 46 percent of its land publicly owned and managed in a stunning array of types, from BLM

grazing lands, to forests controlled by the Forest Service, to the “crown jewels” of nature and culture under National Park Service and to formal or informal wilderness designation. Some chafe under “absentee” management from Washington D.C., while others look to this same management to preserve the public domain and its health for current and future generations.

So we have a region that is vast, rugged, and at the same time fragile, varied in the density and pattern of population and economic activity, alluring to waves of tourists and migrants wishing to partake of its openness and beauty. For some 14 decades, since the 1870’s and attempts to measure economic activity in the region, boom-bust cycles of human habitation and economic activity have alternated to make life in the Rockies challenging and uncertain. A review of how the Rockies have changed over past decades, when joined to a snapshot of the entire region as it looks today, helps us understand why it has integrity as a physiographic region connected by its Continental Divide spine running along the crest of the Rockies from the Canadian Border in the north to Mexico in the south.

Resources Define Economic Activity

Natural resources and environment historically have both determined and shaped human habitation and economic activity in the Rockies region. Starting in the mid-1800’s a pattern of explorers, then prospectors, followed by Anglo settlers began to take advantage of the region’s vast natural wealth, seemingly there “for the taking.” Only in later decades into and through the twentieth century have the numbers of people and sophistication of technology allowed for ever more significant extraction and use of the land, water, minerals and flora as well as fauna to support patterns of economic activity and human settlement.

A paucity of information on the early decades of Anglo settlement in the Rockies make difficult a complete picture of ways by which the “land” initially supported humans. **Table 1** traces in rough terms the roles of agriculture, forestry and fishing, starting at 32 percent of employment in 1870, remaining near one-third of regional jobs until the 1930’s and the Dust Bowl conditions that began to push these jobs continually down to 10 percent in 1960 and three percent by 2000.

Trade and transportation jobs initially served to support mining, agriculture and forestry as well as the formation of towns and cities, gradually developing a web of roads and commerce spreading its tentacles further into the remote areas of the Rockies. Standing at one-tenth of jobs in 1870, trade and transportation gradually have grown to form one-fourth of regional jobs, standing at 26 percent in 2000.

Mining employment, one of the original “attractors” of people west seeking their fortunes was not measured separately until 1910, after the initial booms in mining. Starting at nine percent of employment in 1910, mineral and energy extraction has gradually shrunk until it represented only one percent of jobs in 2000.

Jobs providing intangible services to employers, residents and visitors formed the remaining portion of employment in the last decades of the 19th century, standing at 26 percent in 1970 and rising to near one in five jobs by 1900.

Table 1:
Historic Employment in the Rockies
1870-2000

	Agriculture, Forestry, and Fishing	Mining and Manufacturing	Mineral Extraction	Manufacturing	All Other (Services)	Trade and Transportation	Transportation & Public Utilities	Wholesale and Retail Trade	Construction	Finance, Insurance & Real Estate	Services**	Government	Unreported Industry
1870	32%	32%	0%	0%	0%	10%	0%	0%	0%	0%	26%	0%	0%
1880	21%	35%	0%	0%	0%	13%	0%	0%	0%	0%	31%	0%	0%
1890	26%	28%	0%	0%	0%	17%	0%	0%	0%	0%	29%	0%	0%
1900	29%	27%	0%	0%	0%	18%	0%	0%	0%	0%	26%	0%	0%
1910	32%	29%	9%	20%	0%	19%	10%	9%	0%	0%	18%	2%	0%
1920	34%	26%	7%	18%	0%	19%	9%	10%	0%	0%	19%	2%	0%
1930	32%	24%	6%	18%	0%	20%	9%	11%	0%	0%	22%	2%	0%
1940	26%	15%	6%	8%	0%	26%	8%	17%	5%	2%	19%	5%	2%
1950	18%	14%	4%	10%	68%	30%	10%	20%	8%	3%	20%	6%	2%
1960	10%	16%	4%	13%	74%	28%	8%	20%	8%	4%	24%	7%	3%
1970	7%	13%	3%	10%	80%	25%	5%	20%	5%	7%	20%	23%	0%
1980	4%	13%	3%	10%	83%	26%	5%	21%	6%	8%	23%	19%	0%
1990	4%	11%	2%	9%	86%	26%	5%	21%	5%	8%	29%	17%	0%
2000	3%	8%	1%	7%	89%	26%	5%	21%	7%	9%	32%	14%	0%

Source: U.S. Census and <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/02896>

the Rockies region has across the states and when contrasted with its neighboring multi-state Pacific Coast and central Midwest regions (shown in **Figure 1**).

The Region At A Glance

The People

Over the past 40 years, the Rockies has grown by 157 percent in total population, when compared to the remainder of the county at 33 percent and the U.S. growth rate of 39 percent. People have been flooding into the Rockies in search of the region’s allure, but their location defies the image of a rural Rockies. Urbanization has accompanied this rapid growth, with the Rockies urban population (those living in a city with more than 50,000 people) comprising 75 percent of the people in the Rockies region. In the face of this rapid growth, not all portions of the Rockies have shared in this population boom; **Figure 2** shows counties whose population has increased, stayed steady, and shrunk from 1970 to 2010. This is a stark reminder that dramatic changes in the structure of economic activity and in the demographic profile of the region’s population reinforce the boom-bust nature of regional change.

Table 3 profiles some key demographic indicators for the Rocky Mountains and the comparison regions of the Western U.S. We see that people now living in the Rockies are relatively young (median age 35 years) but with a significant and growing portion above age 65 (12 percent), somewhat diverse in racial-ethnic origin (81 percent Caucasian, 23 percent Latino of any race, three percent Native American and three percent African-American). Seventy-nine percent have lived in the same location for more than one year, but there are significant numbers of people moving into and around the Rockies. Three percent have moved within the same state in the past year while four percent have moved to a different state in the Rockies in the past year. Poverty is present among

The twentieth century brought to the Rockies a gradual change in the region’s economy, with manufacturing and services replacing the dwindling role of agriculture, mining and forestry. As shown in **Table 2** the first data that trace this pattern of a more sophisticated, less resource dependent economy start in 1910. Manufacturing activity in the Rockies has always been modest, with the heavy industry located outside the region with transportation bringing finished manufactured goods to the Rockies. Standing at 20 percent in 1910, manufacturing jobs have decreased to 13 percent in 1960 and further declined to seven percent in 2000. Government employment in the early decades was low, starting at two percent in 1910 and growing inexorably to a peak of 23 percent in 1970 and then declining to 14 percent in 2000.

Services in the private sector have remained roughly 1 in 5 jobs from 1910 to 1970, rising to one-third of jobs by 2000. When these private sector service jobs are combined with public sector employment, approximately one out of two jobs in the Rockies are now intangible services, contrasted with possibly one out of two jobs in the 1970-1900 period being in land-based resource cultivation and extraction.

The eight state Rockies region can be viewed through three primary lenses; its people, employment, and income/earnings. Variations within the region by state help provide a glimpse of the similarities and differences across the region’s formal political boundaries. What stands out are the similarities

Figure 2: Population Growth in the Rockies Region 1970-2010

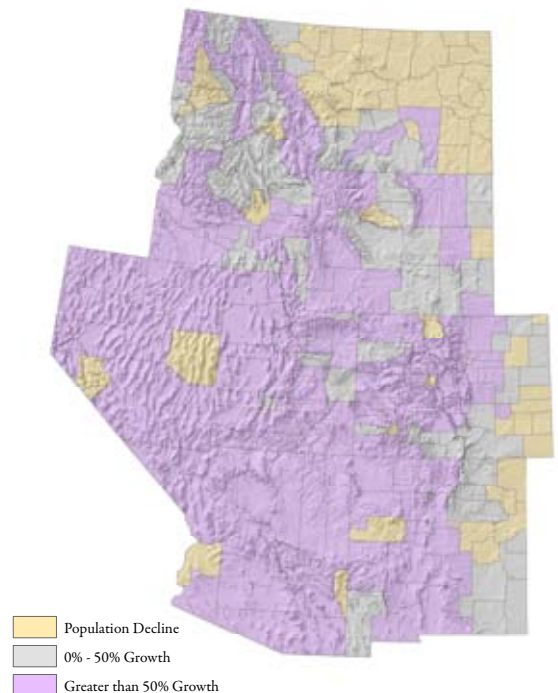
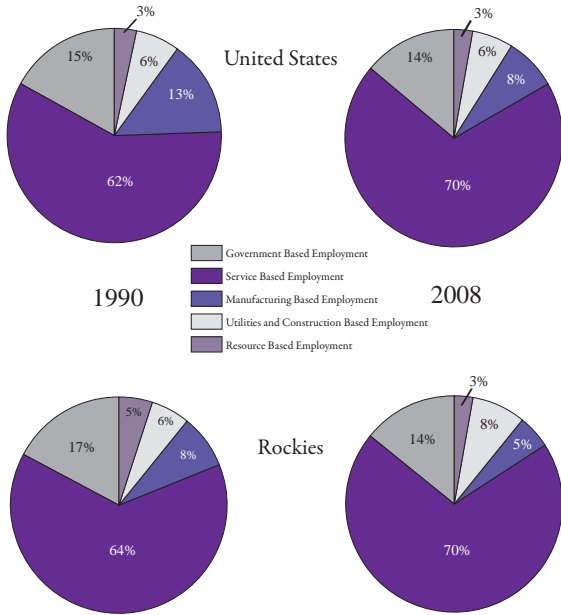


Table 2:
Manufacturing and Service Employment in the Rockies 1910-2000

	Manufacturing (percent of total employment)	Services (percent of total employment)
1910	20	18
1920	18	19
1930	18	22
1940	8	19
1950	10	20
1960	13	24
1970	10	20
1980	10	23
1990	9	29
2000	7	32

Source: US Census and <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/02896>

Figure 3: Employment 1990 and 2008



Source: Regional Economic Information System, Bureau of Economic Analysis, US Department of Commerce

families at the national average while 22 percent of those who are Hispanic are considered in poverty, much higher than the national average.

Employment

The spread of jobs among economic sectors in the Rockies has changed in tandem with population growth and decline as well as major structural changes in the nature of technology, changing characteristics of new goods and services, and global trade flows. **Figure 3** shows changing proportions of employment broken into four major sectors in 1990 and 2008 for the Rockies, neighboring regions, and each Rockies state. Several fundamental trends are clear: resource-based employment has shrunk nearly everywhere over 18 years, and varies substantially among the Rockies' states, with Wyoming having the highest remaining jobs in this sector in 2008 (12.3 percent) and Nevada having the lowest (2.8 percent). Manufacturing has dwindled nationwide, falling from 13.1 percent to 7.8 percent in the U.S. and 9.7 percent to 5.7 percent in the Rockies 1990-2008. Services' based employment has risen throughout the U.S. over these 18 years (62.2 percent to 69.7 percent) while similar trends exist in the Rockies (63.6 percent to 70.3 percent) and each of the region's states. Government employment continues to represent approximately one in seven jobs, declining from 15.3 percent in 1990 to 13.5 percent in 2008 in the U.S. with a similar decline in the Rockies region. New Mexico and Wyoming continue to have proportionately high government employment, in range of one in five jobs, but similar to the rest of the nation experiencing relative declines from 1990 to 2008.

These sector trends can be explored further by looking at a U.S. Census profile of jobs in the Rockies through 2008 U.S. Census data (**Table 4**). Current patterns of employment reflect the profound changes mentioned above that have swept

Table 3: People by Census Region, 2009

	Rockies	Rockies (percent)	Central Regions	Central Regions (percent)	Pacific	Pacific (percent)	Other Regions Combined	Other Regions Combined (percent)
Population Growth 1970-2010	12969112	156.6%	-	-	-	-	-	39% (U.S.)
Population	21,303,294	-	54,736,844	-	48,459,567	-	176,956,313	-
Population under 18	5,609,571	26	14,237,246	26	12,323,660	25	42,011,498	24
Population over 65	2,454,485	12	6,498,713	12	5,450,254	11	23,597,281	13
Native American	665,013	3	630,534	1	529,487	1	597,859	0
Caucasian	17,339,541	81	42,376,665	77	31,484,234	65	133,267,225	75
African American	693,665	3	6,047,346	11	2,590,407	5	27,932,699	16
Latino	4,881,758	23	10,057,688	18	14,268,879	29	16,267,721	9
Lived in same location more than one year	16,804,791	79	44,189,734	81	39,733,001	82	148,541,563	84
Moved within same state in past 12 months	624,235	3	2,328,569	4	1,499,347	3	5,716,267	3
Moved from other state in past 12 months	887,297	4	1,424,622	3	930,362	2	4,283,195	2
Moved from abroad in past 12 months	156,159	1	309,503	1	391,523	1	1,003,622	1
Number of families	5,188,490	24	13,810,707	25	11,355,735	23	44,727,206	25
Families in Poverty	485,631	2	1,556,902	3	1,066,161	2	4,296,579	2
Families in Poverty w/ children 18 or younger	139,747	-	401,856	-	320,947	-	844,186	-
In poverty (white)	1,181,155	6	2,819,480	5	1,970,389	4	8,364,089	5
In poverty (black or African American)	662,718	3	5,756,752	11	2,462,292	5	26,725,990	15
In poverty (hispanic)	4,779,431	22	9,839,107	18	13,991,944	29	15,886,452	9
Housing Units	8,954,938	-	23,165,255	-	18,404,837	-	77,172,981	-
Housing Units Occupied	7,763,761	-	20,411,907	-	16,835,911	-	67,598,894	-
Housing Units Vacant	1,191,179	-	2,753,347	-	1,568,924	-	9,574,090	-
Median Age	35	-	36	-	36	-	37	-

Note: The numbers in this table are estimates from the American Community Survey. The 5 year estimates were used to obtain the greatest accuracy possible. Certain variables were calculated by combining variables from the survey to obtain wanted variables. Due to time constraints involving data release and publication some items were grouped and others omitted from the tables in the 2008 section, resulting in a different table.
Source: American Community Survey, 2009, 5 year estimates

through the region: exploding service-based jobs alongside smaller proportions of workers involved in farming and resource extraction. Technology and environmental concerns about how natural resources are managed, alongside a global economy of open borders and easy access to world-sourcing of goods and services combine to reshape the regional economy

Table 4: Employment in the Rockies 2008

	United States	United States Percent	Rockies	Rockies Percent	Pacific	Pacific Percent	Central	Central Percent
Total employment	181,755,100	100.0%	13,176,607	100.0%	28,741,831	100.0%	34,312,105	100.0%
Wage and salary employment	143,013,000	78.7%	10,156,906	77.1%	22,169,371	77.1%	26,674,530	77.7%
Proprietors employment	38,742,100	21.3%	3,019,701	22.9%	6,572,460	22.9%	7,637,575	22.3%
Farm proprietors employment	1,910,000	1.1%	138,585	1.1%	145,610	0.5%	754,305	2.2%
Nonfarm proprietors employment	36,832,100	20.3%	2,881,116	21.9%	6,426,850	22.4%	6,883,270	20.1%
Farm employment	2,642,000	1.5%	199,551	1.5%	384,672	1.3%	900,862	2.6%
Nonfarm employment	179,113,100	98.5%	12,977,056	98.5%	28,357,159	98.7%	33,411,243	97.4%
Private employment	154,536,100	85.0%	11,171,435	84.8%	24,394,061	84.9%	28,666,393	83.5%
Forestry, fishing, and related activities	858,500	0.5%	60,460	0.5%	298,627	1.0%	162,359	0.5%
Mining	1,155,900	0.6%	176,553	1.3%	82,194	0.3%	596,870	1.7%
Utilities	590,700	0.3%	44,073	0.3%	77,216	0.3%	131,126	0.4%
Construction	11,151,000	6.1%	1,005,278	7.6%	1,648,629	5.7%	2,279,871	6.6%
Manufacturing	14,090,900	7.8%	678,436	5.1%	2,079,127	7.2%	2,750,469	8.0%
Wholesale trade	6,570,500	3.6%	419,358	3.2%	1,060,766	3.7%	1,292,972	3.8%
Retail trade	18,862,200	10.4%	1,420,394	10.8%	2,877,962	10.0%	3,563,319	10.4%
Transportation and warehousing	6,019,500	3.3%	391,536	3.0%	875,926	3.0%	1,257,670	3.7%
Information	3,529,800	1.9%	246,969	1.9%	739,108	2.6%	607,009	1.8%
Finance and insurance	9,023,400	5.0%	676,454	5.1%	1,267,174	4.4%	1,718,804	5.0%
Real estate and rental and leasing	8,369,700	4.6%	753,200	5.7%	1,523,171	5.3%	1,351,405	3.9%
Professional, scientific, and technical services	12,347,100	6.8%	899,408	6.8%	2,305,830	8.0%	1,924,364	5.6%
Management of companies and enterprises	1,993,300	1.1%	118,840	0.9%	293,470	1.0%	352,956	1.0%
Administrative and waste services	10,999,200	6.1%	839,476	6.4%	1,741,675	6.1%	1,997,660	5.8%
Educational services	3,877,000	2.1%	210,390	1.6%	564,737	2.0%	552,358	1.6%
Health care and social assistance	18,593,400	10.2%	1,132,050	8.6%	2,571,347	8.9%	3,374,024	9.8%
Arts, entertainment, and recreation	3,860,200	2.1%	311,861	2.4%	736,451	2.6%	588,823	1.7%
Accommodation and food services	12,314,700	6.8%	1,138,380	8.6%	1,991,694	6.9%	2,246,984	6.5%
Other services, except public administration	10,329,100	5.7%	648,319	4.9%	1,658,957	5.8%	1,917,350	5.6%
Government and government enterprises	24,577,000	13.5%	1,805,621	13.7%	3,963,098	13.8%	4,744,850	13.8%
Federal, civilian	2,817,000	1.5%	224,757	1.7%	396,500	1.4%	462,651	1.3%
Military	2,079,000	1.1%	150,687	1.1%	399,451	1.4%	421,563	1.2%
State and local	19,681,000	10.8%	1,430,177	10.9%	3,167,147	11.0%	3,860,636	11.3%
State government	5,259,000	2.9%	414,873	3.1%	814,957	2.8%	1,021,653	3.0%
Local government	14,422,000	7.9%	1,015,304	7.7%	2,352,190	8.2%	2,838,983	8.3%

Source: NAICS 2008

and move it closer to neighboring regions' and the U.S.'s mix of employment where jobs in the "natural resource" sectors now account for less than two percent, with the remaining jobs in manufacturing and services represent 98.2 percent. **Table 4** is based upon the new North American Industrial Classification of economic sectors, allowing much more detailed sub-divisions of employment. **Figure 4** displays the differences in 2008 between the Rockies and US sector shares; with the lack of manufacturing and the abundance of accommodation and food services standing out as defining characteristics of employment in the Rockies.

So much for the "myth" that in the "rugged" Rockies people live close to the land in rural settings, wresting their sustenance from the bounty of the land, with more than its share of government workers to manage the public domain!

Income and Earnings

Changes in income for the eight state region mirror the trends in population growth and employment composition affecting the Rockies. **Table 5** shows a 2008 profile of income by place of work and by earnings in each sector. Notable aspects of the region's income include the one percent that comes from farm income and 0.4 percent that arises from farm proprietors' income, as well as the 0.2 percent of earnings in the forestry, fishing, and related activities sector alongside the 1.8 percent of earnings in the mining sector. All confirm the shrunken importance of land and natural resources in the contemporary Rockies economy. Manufacturing earnings in 2008 stood at 5.6 percent, significantly below neighboring regions and the U.S. average (8.1 percent). Rockies government earnings at 13.3 percent are higher than neighboring regions and the U.S.

The sectors where service-based earnings are above comparison neighboring regions and the U.S. average include: construction (6.4 percent); retail trade (5.3 percent); real estate and rental and leasing (1.6 percent); Administrative and Waste Services (3.3 percent), arts, entertainment and recreation (0.9 percent); and accommodation and food services (3.8 percent). In contrast, "lagging" service sectors in the Rockies incorporate: wholesale trade (3.6 percent); finance and insurance (4.2 percent); professional and technical services (6.8 percent); and health care and social assistance (6.8 percent).

Changing sources of income in the Rockies mirror the demographic trends we have reviewed above, including increasing numbers of people who bring significant sources of non-employment income and wealth from outside the region as they seek out "livable" communities for their recreation, relocation, and retirement. **Figure 5** depicting 2008 data shows that there is now a diverse mix of "earned" wage and salary disbursements (53.1 percent) alongside non-wage sources of income: transfer payments (13.8 percent) and

Figure 4 : Rockies Differences from the United States by Shares of Employment in 2008

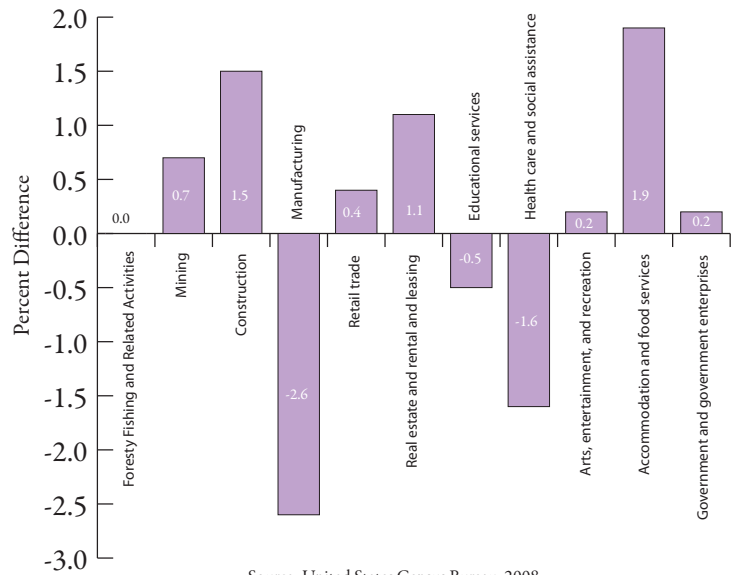


Figure 5: Personal Income Components in the Rockies, 2008 (Percent)

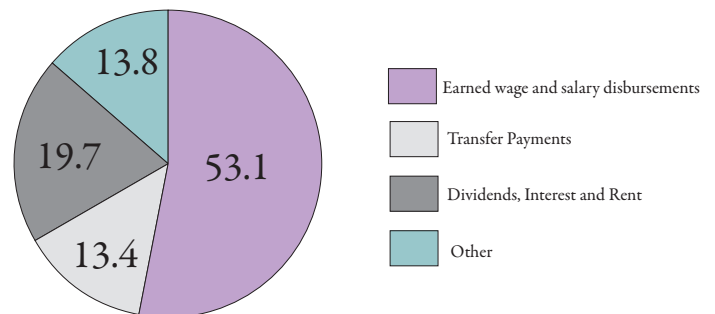


Table 5: Rockies Income Profile 2008

	West and Southern Mountain Amenity Zone	West and Southern Mountain Amenity Zone (Percent)	Continental Divide Spine	Continental Divide Spine (Percent)	Eastern Plains Agricultural Heritage Zone	Eastern Plains Agricultural Heritage Zone (Percent)	The Rockies	The Rockies (Percent)	The United States	The United States (Percent)
Personal Income (\$000)	323,287,795	100%	444,797,458	100%	38,053,420	100%	806,138,673	100%	12,225,589,000	100%
Nonfarm Personal Income (\$000)	322,274,757	99.7%	442,329,387	99.4%	36,486,013	95.9%	801,090,157	99.4%	12,149,246,000	99.4%
Farm Earnings (\$000)	1,013,038	0.3%	2,468,071	0.6%	1,567,407	4.1%	5,048,516	0.6%	76,343,000	0.6%
Net Earnings (\$000)	208,634,981	64.5%	303,293,196	68.2%	24,124,685	63.4%	536,052,862	66.5%	8,146,227,000	66.6%
Transfer Payments (\$000)	47,502,906	14.7%	57,338,196	12.9%	6,683,452	17.6%	111,524,554	13.8%	1,875,588,000	15.3%
Dividends, Interest and Rent (\$000)	67,149,908	20.8%	84,166,066	18.9%	7,245,283	19.0%	158,561,257	19.7%	2,203,774,000	18.0%
Wage and Salary Disbursements (\$000)	171,529,533	53.1%	238,607,931	53.6%	18,321,925	48.1%	428,459,389	53.1%	6,538,004,000	53.5%
Per Capita Personal Income (\$)	36,546	-	37,344	-	36,730	-	36,991	-	40,166	-

Source: Regional Economic Information System, Bureau of Economic Analysis, US Department of Commerce

dividends, interest and rent (19.7 percent). This pattern of non-wage income supplementing "earned" wages and salaries dampens the susceptibility of regions to wild boom-bust cycles in wage-based earnings and introduces many "newcomers"

and “age-diverse” residents who bring additional lifestyles and values to what has become increasingly an “amenity-based” economy in the Rocky Mountain states.

The Rockies Divided: Three Sub-Regions That Make Sense

Introduction

The Rockies Region is NOT homogeneous! We have just looked at overall characteristics of the region, made up by eight states containing 281 counties and this data helps make the case that socio-economic and demographic similarities bind the region together. However, distinct Rockies zones or sub-regions can be identified by evaluating the differences among clusters of counties within the Rockies Region. It is important to focus here on various parts of the entire Rockies Region as unique groups of counties, for a “one-set-of-policies-fits-all” approach to management of resources, the environment, communities, and their infrastructure in the Rockies is as inappropriate as would be a national set of policies that does not take into account the substantial differences between the Rockies vs. the neighboring Pacific and Central Divisions that have integrity within Congress and the Census Bureau.

The Rockies Region is bound together by the Continental Divide “spine,” and clustered to the east and west of the spectacular Rocky Mountains. Our analysis of the counties within the eight state Rockies Region has identified three distinct sub-regions or zones (**Figure 6**):

- The Continental Divide Spine
- The Eastern Plains Agricultural Zone
- The West and Southern Mountain Amenity Zone

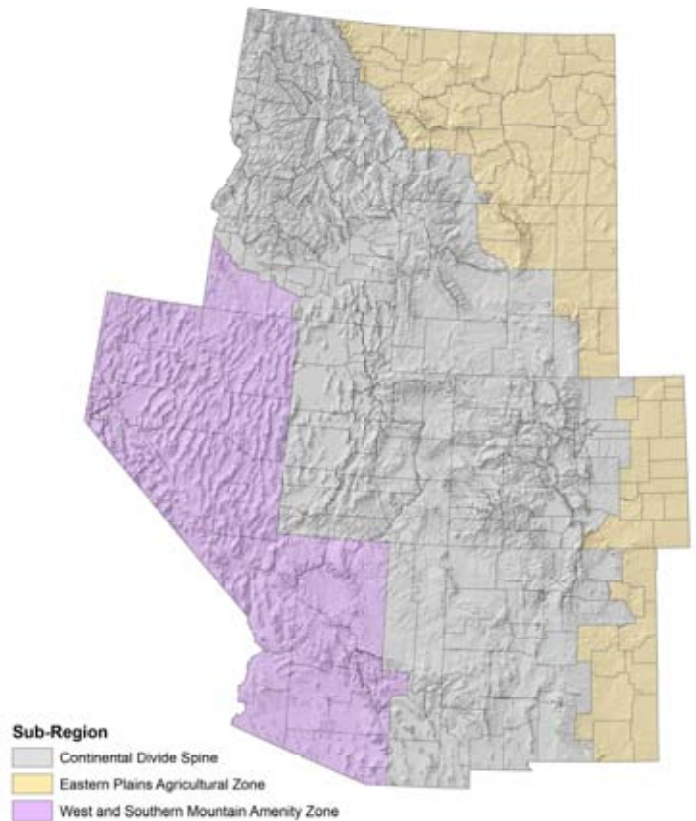
Varying topography, as well as defining characteristics of economic activity and demographics, distinguishes these three sub-regions. Each of these Rockies clusters of counties shares many common characteristics that bind them together and call for different policies and programs of resource management as well as social and economic health.

Here we provide a view of distinguishing characteristics these sub-regions have that bind them together. A comparison is made to comparable data for the entire Rockies eight state region.

The Land

Topography is THE defining characteristic of the Rockies Region. While all who live in the region, whether in communities or rural settings, share either a view of the Rockies “spine” or are comforted that mountains are close-by for recreation and solitude, there are dramatic differences in the “land base” of the sub-regions. **Table 6** makes this abundantly clear. Region-wide 26 percent of the Rockies is forested, but only seven percent of the Eastern Plains Zone has forests vs. 37 percent of the Continental Divide Spine and 21 percent of the West and Southern Mountain Amenity Zone. Similarly, the presence of public lands vary dramatically, standing at 31 percent for the U.S., 46 percent for the Rockies Region, but only 16 percent for the Eastern Plains as compared to 51 percent for the Continental Divide Spine and 66 percent for

Figure 6: Sub-Regions of the Rockies Region



The Land	The United States	The Rockies	West and Southern Mountain Amenity Zone	The Continental Divide Spine	Eastern Plains Agricultural Heritage Zone
Total Acres of Forested Land	736,681,000	143,586,893	27,160,320	107,370,844	8,575,989
% of Total Land Area Forested	32.6%	26.0%	21.2%	37.0%	7.0%
Population Per Square Mile	87	26	45	26	5
Acres of Public Lands	699,000,000	252,963,153	84,624,811	146,564,446	20,246,854
% of Total Land Area Publicly Owned	30.9%	45.8%	66.0%	50.5%	16.4%
Total Acres of Designated Wilderness	105,678,486	22,211,898	5,783,689	15,880,594	343,897
% of Total Land Area Wilderness	4.7%	4.0%	4.5%	5.5%	0.3%
Total Acres of National Park Service Lands	84,000,000	9,972,779	3,328,724	6,125,529	437,049
% National Park Service Owned Lands	3.7%	1.8%	2.6%	2.1%	0.4%
Total Acres of Forest Service Lands	191,000,000	95,022,002	14,562,593	73,948,117	5,528,936
% Forest Service Owned Lands	8.4%	17.2%	11.4%	25.5%	4.5%
Total Acres of BLM Lands	261,000,000	140,110,389	62,683,449	64,222,763	12,742,957
% Bureau of Land Management Lands	11.5%	25.4%	48.9%	22.1%	10.3%
Average USDA Natural Amenity Rank	-	4.9	5.3	5.0	4.1

Source: BLM, USFS, USDA Economic Research, Aldo Leopold Wilderness Research Institute
 Note: This table was taken from the State of the Rockies 2004 Report Card and updated for population per square mile. Some numbers might have slightly changed but were not considered significant. Population was taken from ACS 2009 estimates.

the West and Southern Mountain Amenity Zone. If declared Wilderness and presence of national parks are used as rulers, the Eastern Plains represents a cluster of counties almost totally

Table 7:
People by Rockies Sub-region, 2009

	West and Southern Mountain Amenity Zone	West and Southern Mountain Amenity Zone (percent)	Continental Divide Spine	Continental Divide Spine (percent)	Eastern Plains Agricultural Zone	Eastern Plains Agricultural Zone (percent)	Rockies	Rockies (percent)	Other Regions Combined	Other Regions Combined (percent)
Population Growth 1970-2010	5,454,682	331.3	5,685,655	122.1	119,313	17.8	12969112	156.6%	40,678,963	32.5
Population	8,604,286	-	11,667,867	-	1,031,141	-	21,303,294	-	280,152,734	-
Population under 18	2,253,204	26	3,096,202	27	260,165	25	5,609,571	26	68,572,404	24
Population over 65	1,065,186	12	1,242,906	11	146,393	14	2,454,485	12	35,546,248	13
Native American	208,606	2	405,200	3	51,207	5	665,013	3	1,757,880	1
Caucasian	6,689,747	78	9,785,953	84	863,841	84	17,339,541	81	207,128,124	74
African American	409,980	5	266,229	2	17,456	2	693,665	3	36,570,452	13
Latino	2,466,902	29	2,231,020	19	183,836	18	4,881,758	23	40,594,288	14
Lived in same location more than one year	6,691,844	78	9,280,946	80	832,001	81	16,804,791	79	232,464,298	83
Moved within same state in past 12 months	132,905	2	456,454	4	34,876	3	624,235	3	9,544,183	3
Moved from other state in past 12 months	381,932	4	464,843	4	40,522	4	887,297	4	6,638,179	2
Moved from abroad in past 12 months	72,362	1	79,227	1	4,570	0	156,159	1	1,704,648	1
Have High School Attainment 25+	1,494,049	84	1,877,809	88	219,108	85	3,590,966	86	-	85 (U.S.)
Have Bachelors Degree 25+	888,462	25	1,441,050	31	90,324	20	2,419,836	28	-	28 (U.S.)
Number of families	2,050,808	24	2,868,492	25	269,190	26	5,188,490	24	69,893,648	25
Families in Poverty	194,410	10	261,602	9	29,619	11	485,631	9	6,919,642	9
Families in Poverty w/children 18 or younger	55,568	-	7,6505	-	7,674	-	139,747	-	1,566,989	-
In poverty (white)	430,617	5	694,325	6	56,213	5	1,181,155	6	13,153,958	5
In poverty (black or African American)	394,697	5	253,578	2	14,443	1	662,718	3	3,4945,034	12
In poverty (hispanic)	2,422,542	28	2,180,859	19	176,030	17	4,779,431	22	39,717,503	14
Housing Units	3,622,322	-	4,868,610	-	464,006	-	8,954,938	-	118,743,073	-
Housing Units Occupied	3,107,548	-	4,254,450	-	401,763	-	7,763,761	-	104,846,712	-
Housing Units Vacant	514,776	-	614,160	-	62,243	-	1,191,179	-	13,896,361	-
Median Age	35	-	34	-	38	-	35	-	-	-

Note: The numbers in this table are estimates from the American Community survey. The 5 year estimates were used to obtain the greatest accuracy possible. Certain variables were calculated by combining variables from the survey to obtain wanted variables. Due to time constraints and available data some items were grouped and others omitted from the tables in the 2004 section.

Source: American Community Survey, 2009, 5 year estimates

devoid of these wild lands and their protective designations. Surprisingly, national forests are present even in the Eastern Plains Zone (5 percent), although substantially below the eight percent national level and the 17 percent Rockies Region proportion, with the Continental Divide Zone understandably having the highest proportion of forest lands (26 percent). BLM lands, representing the lower elevation public lands largely suited for grazing, are present in the Eastern Plains Zone at 10 percent, very close to the U.S. proportion (12 percent), but again there are higher proportions of these public lands among the Continental Divide Zone (22 percent) and the Western and Southern Zone (49 percent). Wide-open spaces are not just a buzzword around the Rockies.

We have seen that only 1.4 percent of the Rockies region’s land is devoted to urban or built-up uses, and yet this sparseness of population itself is not evenly distributed. The population density in 2008 for the U.S. stood at 86 persons per square mile and in the Rockies Region 25, matching the “empty-quarter” image of the area. But within the Rockies on the Eastern Plains it stood at only 5 persons per square mile, while for the Continental Divide Spine it was 25 persons and for the West and Southern Mountain Amenity Zone, a rapidly growing region of retirement and quality of life “seekers,” a substantially higher density of 44 persons.

The People

Patterns of human habitation around the Rockies reinforce trends topography and changing economics establish

as seen in **Table 7**. Over 40 years, 1970 to 2010, the total U.S. population grew 39 percent while for the Rockies Region it rose 157 percent. Within the Rockies the West and Southern Mountain Amenity Zone grew an astounding 331 percent and the Continental Divide Spine a buoyant 122 percent, but the Eastern Plains lagged even the U.S. level at 18 percent population growth. In 2009 the proportion of people living in metro-designated counties reinforced the Rockies stereotype with 75 percent of the Rockies living in urban areas (50,000+).

Ages of the Rockies residents provide additional insight into the demographics that help shape available workforces and demands for social services. While

in the Rockies there is a younger population with 26 percent below 18; among the Rockies zones the West and Southern Mountains Zone matches the national average at 26 percent, the Eastern Plains has 25 percent, and the Continental Divide Spine has 27 percent. At the other end of the “dependency” distribution, some 13 percent of the U.S. population is 65+, while for the Rockies it is 12 percent. Within the Rockies the smallest proportion 65+ reside within the Continental Divide Spine (11 percent), with the West and Southern Mountain Zone at 12 percent and the Eastern Plains at 14 percent. Median ages for these regions reflect these proportions of the elderly.

Racial composition around the Rockies highlights both homogeneity and diversity. The proportion identifying themselves as White (one race) stood at 81 percent for the Rockies, and 84 percent for the Eastern Plains Zone, with the Continental Divide Spine at 84 percent and the West and Southern Mountains Zone at 78 percent. Hispanic or Latino identification for the Rockies stood at 23 percent, with the West and Southern Mountain Zone understandably highest with 29 percent.

Mobility likewise reflects the economic and demographic buoyancy of areas. For all parts of the Rockies in 2009 79 percent of the people stayed living in the same location at the previous year, while three percent moved in state and four percent moved from a different state. In the Rockies sub-regions the Eastern Plains Agricultural Zone had the highest percentage with 81 that stayed in the same place for the year, while the West and Southern Amenity Zones had the lowest

with 78 percent. Consistent with national trends, a large proportion of the “moving” between houses occurs within the same state. Likewise the Eastern Plains Agricultural Zone had the lowest percentage move from abroad in the past year.

We see that the Rockies as a whole had more people with a high school/GED than the national average in 2008. In the Rockies this trend is spread across the three sub-regions as the Continental Divide Spine has 88 percent high school/GED rate compared with the West and Southern Amenity

Zone with a region low, 84 percent. The Rockies is right on average with the national statistics for those who have obtained a bachelors degree or higher with the Continental Divide Spine having the greatest percentage of college graduates.

Poverty is distributed unevenly around the Rockies. The entire region in 2009 had a families in poverty level of nine percent comparable to the rest of the United States. Within the Rockies both of the fast growing sub-regions had family poverty levels below the Eastern Plains Agricultural Zone which registered a high of 11 percent. The decline of the Eastern Plains Agricultural Zone is once again witnessed by leading families in poverty in the Rockies region.

Employment

How are workers employed throughout the Rockies? A look at Census data from the 2008 reveals some predictable clusters of employment related to the region’s resource base and demographics, as well as some surprises. Regions like the Rockies with vast proportions of undeveloped land and rich natural, scenic and recreational resources would be expected to have many employed in occupations related to farming, fishing and forestry. But this pattern works only for the Eastern Plains with 6.4 percent in farming contrasted with the US and Rockies combined region level of 1.5 percent. Forestry, fisheries and

Table 8:
Employment in the Rockies Sub-Regions 2008

	Eastern Plains Agricultural Zone	Eastern Plains Agricultural Zone (percent)	Continental Divide Spine	Continental Divide Spine (percent)	The West and Southern Amenity Zone	The West and Southern Amenity Zone (percent)	Rockies	Rockies (percent)	United States	United States (percent)
Total employment	665,275	100.0%	7,536,238	100.0%	4,975,094	100.0%	13,176,607	100.0%	181,755,100	100.0%
Wage and salary employment	498,854	75.0%	5,714,695	75.8%	3,943,357	79.3%	10,156,906	77.1%	143,013,000	78.7%
Proprietors employment	166,421	25.0%	1,821,543	24.2%	1,031,737	20.7%	3,019,701	22.9%	38,742,100	21.3%
Farm proprietors employment	31,456	4.7%	96,581	1.3%	10,548	0.2%	138,585	1.1%	1,910,000	1.1%
Nonfarm proprietors employment	134,965	20.3%	1,724,962	22.9%	1,021,189	20.5%	2,881,116	21.9%	36,832,100	20.3%
Farm employment	42,785	6.4%	132,132	1.8%	24,634	0.5%	199,551	1.5%	2,642,000	1.5%
Nonfarm employment	622,490	93.6%	7,404,106	98.2%	4,950,460	99.5%	12,977,056	98.5%	179,113,100	98.5%
Private employment	508,055	76.4%	6,306,464	83.7%	4,356,916	87.6%	11,171,435	84.8%	154,536,100	85.0%
Forestry, fishing, and related activities	3,251	0.5%	21,942	0.3%	15,897	0.3%	60,460	0.5%	858,500	0.5%
Mining	35,514	5.3%	91,332	1.2%	25,300	0.5%	176,553	1.3%	1,155,900	0.6%
Utilities	2,826	0.4%	16,982	0.2%	16,695	0.3%	44,073	0.3%	590,700	0.3%
Construction	46,846	7.0%	572,077	7.6%	377,457	7.6%	1,005,278	7.6%	11,151,000	6.1%
Manufacturing	20,145	3.0%	416,221	5.5%	241,242	4.8%	678,436	5.1%	14,090,900	7.8%
Wholesale trade	19,898	3.0%	214,316	2.8%	163,226	3.3%	419,358	3.2%	6,570,500	3.6%
Retail trade	71,892	10.8%	796,421	10.6%	550,724	11.1%	1,420,394	10.8%	18,862,200	10.4%
Transportation and warehousing	23,494	3.5%	201,873	2.7%	154,876	3.1%	391,536	3.0%	6,019,500	3.3%
Information	7,733	1.2%	154,404	2.0%	70,777	1.4%	246,969	1.9%	3,529,800	1.9%
Finance and insurance	23,486	3.5%	377,480	5.0%	272,698	5.5%	676,454	5.1%	9,023,400	5.0%
Real estate and rental and leasing	22,838	3.4%	416,289	5.5%	310,983	6.3%	753,200	5.7%	8,369,700	4.6%
Professional, scientific, and technical services	16,828	2.5%	559,851	7.4%	303,467	6.1%	899,408	6.8%	12,347,100	6.8%
Management of companies and enterprises	1,060	0.2%	64,780	0.9%	50,073	1.0%	118,840	0.9%	1,993,300	1.1%
Administrative and waste services	22,361	3.4%	415,230	5.5%	383,318	7.7%	839,476	6.4%	10,999,200	6.1%
Educational services	3,384	0.5%	130,579	1.7%	69,209	1.4%	210,390	1.6%	3,877,000	2.1%
Health care and social assistance	49,501	7.4%	619,020	8.2%	418,354	8.4%	1,132,050	8.6%	18,593,400	10.2%
Arts, entertainment, and recreation	10,319	1.6%	177,834	2.4%	119,839	2.4%	311,861	2.4%	3,860,200	2.1%
Accommodation and food services	44,803	6.7%	528,397	7.0%	554,056	11.1%	1,138,380	8.6%	12,314,700	6.8%
Other services, except public administration	33,610	5.1%	374,858	5.0%	235,132	4.7%	648,319	4.9%	10,329,100	5.7%
Government and government enterprises	114,435	17.2%	1,097,642	14.6%	593,544	11.9%	1,805,621	13.7%	24,577,000	13.5%
Federal, civilian	13,769	2.1%	148,955	2.0%	61,974	1.2%	224,757	1.7%	2,817,000	1.5%
Military	12,612	1.9%	93,857	1.2%	44,074	0.9%	150,687	1.1%	2,079,000	1.1%
State and local	87,951	13.2%	854,752	11.3%	487,474	9.8%	1,430,177	10.9%	19,681,000	10.8%
State government	19,386	2.9%	252,493	3.4%	119,311	2.4%	414,873	3.1%	5,259,000	2.9%
Local government	63,683	9.6%	552,299	7.3%	366,883	7.4%	1,015,304	7.7%	14,422,000	7.9%

Source: NAICS 2008

mining occupations stood at 1.8 percent for the entire Rockies vs. 5.8 percent for the Eastern Plains, 1.5 percent for the Rockies Spine and 0.8 percent for the Southwest Zone. Thus, in the rugged Rockies workers are largely employed away from jobs based directly on cultivation of land and extraction of resources.

Manufacturing jobs in the Rockies and its zones, predictably, stand below the US level of 7.8 percent of employment in 2008, contrasted with 5.1 percent Rockies wide, 3.0 percent in the Eastern Plains, 5.5 percent along the Rockies spine, and 4.8 percent in the Southwest zone. Beyond natural resource-based, construction and manufacturing jobs, an astounding 84 percent of jobs are in the service sector in the Rockies, above the US level of 83.5 percent!

The service sector occupational categories in the Rockies outpacing the national averages include: retail trade, finance and insurance, real estate activities, administrative and waste services, arts, entertainment and recreation, accommodation and food services, and government jobs.

Proportions of jobs that employ Rockies workers provide more detail about what is happening as employment activity, reflecting the basic differences in economic activity within each of the Rockies zones. Here are some highlights from **Table 8** by the Rockies regions:

Table 9: Rockies Income Profile 2008

	West and Southern Mountain Amenity Zone	West and Southern Mountain Amenity Zone (Percent)	Continental Divide Spine	Continental Divide Spine (Percent)	Eastern Plains Agricultural Heritage Zone	Eastern Plains Agricultural Heritage Zone (Percent)	The Rockies	The Rockies (Percent)	The United States	The United States (Percent)
Personal Income (\$000)	323,287,795	100%	444,797,458	100%	38,053,420	100%	806,138,673	100%	12,225,589,000	100%
Nonfarm Personal Income (\$000)	322,274,757	99.7%	442,329,387	99.4%	36,486,013	95.9%	801,090,157	99.4%	12,149,246,000	99.4%
Farm Earnings (\$000)	1,013,038	0.3%	2,468,071	0.6%	1,567,407	4.1%	5,048,516	0.6%	76,343,000	0.6%
Net Earnings (\$000)	208,634,981	64.5%	303,293,196	68.2%	24,124,685	63.4%	536,052,862	66.5%	8,146,227,000	66.6%
Transfer Payments (\$000)	47,502,906	14.7%	57,338,196	12.9%	6,683,452	17.6%	111,524,554	13.8%	1,875,588,000	15.3%
Dividends, Interest and Rent (\$000)	67,149,908	20.8%	84,166,066	18.9%	7,245,283	19.0%	158,561,257	19.7%	2,203,774,000	18.0%
Wage and Salary Disbursements (\$000)	171,529,533	53.1%	238,607,931	53.6%	18,321,925	48.1%	428,459,389	53.1%	6,538,004,000	53.5%
Per Capita Personal Income (\$)	36,546	-	37,344	-	36,730	-	36,991	-	40,166	-

Source: Regional Economic Information System, Bureau of Economic Analysis, US Department of Commerce

Eastern Plains Agricultural Zone

Agriculture, forestry, fishing, hunting and mining jobs by industry proportion (at 12.3 percent) are six times higher than the national level and four times higher than the Rockies average. Manufacturing jobs (3 percent) are far below the national average (14 percent) and the Rockies average (7.8 percent). Information jobs, FIRE employment (finance, insurance, real estate, rental and leasing) and work in professional, scientific, management, and administration categories all stand below national and Rockies averages, a total of only 14.2 percent vs. 25.5 percent for the US and 26.8 percent for the Rockies. Jobs in education, health and social services as well as arts, entertainment, recreation, accommodation and food services for the Eastern Plains represented 21.3 percent, below the U.S. level of 26.9 percent and Rockies-wide 26.1 percent.

Continental Divide Spine:

Agriculture and natural resource related jobs as well as construction, some 3.3 percent of jobs in 2008, outpace national levels and match Rockies employment proportions. Manufacturing, while significantly higher than the Eastern Plains Zone, stands at 5.5 percent vs. 7.8 percent for the nation. Work in information, finance, insurance, real estate, professional, management, and administration represented 26.4 percent of jobs in 2008, compared to 25.5 percent for the US and 26.8 percent for the combined Rockies, again signaling the highly educated workers inhabiting the string of cities in close proximity to the Continental Divide. Similarly work in professional, scientific, management and administration industries, at 10.2 percent, outpace both the nation (9.3 percent) and the Rockies (9.8 percent).

West and Southern Mountains Amenity Zone:

Defying the seemingly perpetual image of the Rockies as

a land of ranching, mining and lumbering, agriculture and natural resource related jobs in this fast growing region are at a minimal level of 1.5 percent vs. the nation at 1.9 percent and the Rockies Region at 1.3 percent. Construction jobs, to provide communities and infrastructure for rapid growth, mimicked the Rockies Region average of 7.6 percent. Manufacturing in this Zone (4.8 percent) predictably lags the nation (7.8 percent) and the Rockies (5.1 percent). Jobs in FIRE and related sectors, at 28 percent, exceed the other parts of the Rockies and the national average. Geographical remoteness no longer appears to hinder “white-collar” employment in professional, scientific, management and administrative work: this Zone has one in ten such jobs, exceeding both the Rockies and national averages. Driven by an abundance of environmental, recreational and cultural “amenities,” this sub-region has some one and one-half times the jobs as the nation (13.5 percent vs. 8.9 percent) in the arts, entertainment, recreation, accommodation, and food services.

Income and Earnings

Wages and salaries are driven by availability of jobs.

Table 10:
Earned vs. Unearned Income 2008

Income: 2008 Profile	West and Southern Mountain Amenity Zone	Percent	Continental Divide Spine	Percent	Eastern Plains Agricultural Heritage Zone	Percent	The Rockies	Percent	The United States	Percent
Personal Income (\$000)	323,287,795	100%	444,797,458	100%	38,053,420	100%	806,138,673	100%	12,225,589,000	100%
Nonfarm Personal Income (\$000)	322,274,757	99.7%	442,329,387	99.4%	36,486,013	95.9%	801,090,157	99.4%	12,149,246,000	99.4%
Farm Earnings (\$000)	1,013,038	0.3%	2,468,071	0.6%	1,567,407	4.1%	5,048,516	0.6%	76,343,000	0.6%
Net Earnings (\$000)	208,634,981	64.5%	303,293,196	68.2%	24,124,685	63.4%	536,052,862	66.5%	8,146,227,000	66.6%
Transfer Payments (\$000)	47,502,906	14.7%	57,338,196	12.9%	6,683,452	17.6%	111,524,554	13.8%	1,875,588,000	15.3%
Dividends, Interest and Rent (\$000)	67,149,908	20.8%	84,166,066	18.9%	7,245,283	19.0%	158,561,257	19.7%	2,203,774,000	18.0%
Wage and Salary Disbursements (\$000)	171,529,533	53.1%	238,607,931	53.6%	18,321,925	48.1%	428,459,389	53.1%	6,538,004,000	53.5%
Per Capita Personal Income (\$)	36,546	-	37,344	-	36,730	-	36,991	-	40,166	-

Source: NAICS 2008

This “earned” portion of personal income, however, is only part of where purchasing power emanates. What can be termed “non-work” sources of income include transfer payments and dividends, interest and rent, with both supplementing a region’s income beyond the employment base. The pattern of income for the Rockies and its sub-regions, shown in **Table 9**, provides a window into how people and their communities survive and thrive “out-west.”

It is “old” news by now that farming and agriculture represent very low proportions of employment even in the Rockies where only 1.4 percent of the land is “developed.” But worse news exists! Farming is too often a losing endeavor, as shown by the extremely low levels of total personal income derived from farming in 2008: a miniscule 0.6 percent for the U.S. and the Rockies. Only the Eastern Plains defied this reality, standing at 4.1 percent while the Continental Divide Spine stood at 0.6 percent and the West and Southern Mountains Zone a mere 0.3 percent. In general “farm” residents must supplement their earnings (and losses) from agriculture increasingly by working other “day” jobs and through non-work sources of income.

Net earnings from employment can serve as a proxy for the proportion of income generated by jobs (the remaining income, after social service taxes, comes from dividends, interest and rent as well as social security type payments. As shown in **Table 10**, the national proportion in 2008 stood at 66.6 percent while the Rockies Region nearly equal at 66.5 percent. Among the Rockies zones the Continental Divide Spine had the highest proportion of net earnings (68.2 percent) followed by the West and Southern Mountain Amenity Zone at 64.5 percent and with the Eastern Plains lagging way behind at only 63.4 percent of “earned” income. Equally informative, therefore, is the proportion of personal income not coming from employment, but rather from what some call “non-labor” sources: interest, rent and dividends as well as income transfer payments. The Southwest zone has the highest income from dividends, interest and rent, at 20.8 percent, while the Eastern Plains has the highest proportion of income from current transfer receipts: 17.6 percent.

Focusing for a moment on income from jobs, how high paying are they in the Rockies? Average total compensation per job is one overall measure. The Rockies at \$51,413 per average job in 2008 fell below the national average of \$56,116. Within the Rockies region, the West and Southern Mountains Zone and Eastern Agricultural Zone underperformed the Rockies average per capita income of \$36,991, while the Continental Divide Spine outperformed the Rockies level with a per capita income of \$37,344.

Transfer payments as well as dividends, interest and rent form the “non-work” sources of income. Children and the elderly in the dependency portions of the population often receive transfer payments either for retirement and/or due to poverty. Many adults both during their working years and into retirement receive substantial income from returns on their assets. Combined, these supplements to job earnings partly insulate communities, counties and regions from the wildest variations of boom-bust cycles of employment. As shown in **Table 10** for 2008, transfer payments in the Rockies exceeded national and regional levels only for the Eastern Plains, where

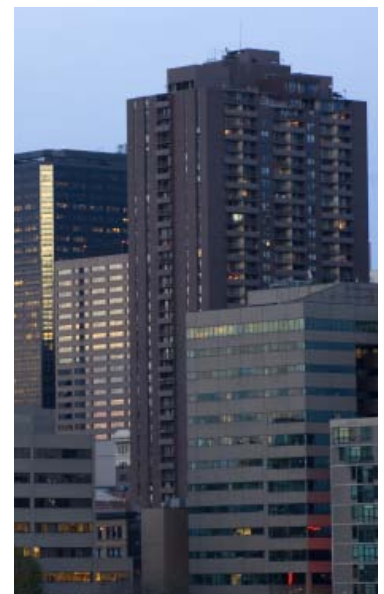
17.6 percent of income is thus generated. In contrast, the income from dividends, interest and rent outpace the national level of 18.0 percent for the Rockies combined area (19.7 percent) and its sub-regions, with the West and Southern Mountains Zone standing highest at 20.8 percent.

Insights

The Rockies, when dissected as we have done here into three sub-regions that each share distinct characteristics and conditions, become more complex than just a “region with a spine.” Certainly some local, state, regional and even national policies are suitable to all of the 281 counties. These include policies that encourage creation of new jobs, that support healthy and vibrant communities, and that provide appropriate “local” participation in resource and environmental management decisions.

But it is clear now that the Eastern Plains Agricultural Zone is challenged by slow to negative population growth, high dependency levels of the young and elderly, poverty, and diminished prosperity emanating from their shared agricultural land base. In contrast, “boom” conditions exist for the West and Southern Mountain Amenity Zone and, in different patterns, for the Continental Divide Spine. Influxes of newcomers, both seeking jobs and high quality of life in the working and retirement years, generate a different class of challenges: those of rampant growth that often outpace community infrastructure and stress the “traditional” fabric of small communities and even large metro areas.

Future Rockies Report Cards and Conferences will be focused on many of the trends identified here. With the full 2010 census available in the future, more accurate and detailed social statistics will be available to better analyze the Rockies’ people. We won’t be as restricted as to the data available and no longer rely upon estimates. We will explore in depth case studies of communities facing explosive growth vs. dwindling populations and ways to earn a living. We will consider innovative experiments that connect local and regional communities to the management of federal lands and reserves. We will search out those clusters of counties within the Rockies that are taking bold steps to cope with rapid change while retaining the quality of life that acts as the glue holding people to their communities and surrounding lands. In all of this, we welcome suggestions for topics to explore, experts who can enlighten and extend the Rockies Conversation, and ideas for useful Report Card information that is insightful and stimulating.



Overview Section: The Eastern Plains

Decline and Potential Rejuvenation

By **Brendan Boepple and Rebecca Spira**

THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

Key Findings:

- An 1889 survey counted only 1,091 bison left in North America, by 2005 some 50 “conservation” herds totaling 19,000 bison existed in North America. Today areas as large as 3,000,000 acres have been suggested for sustaining wild bison herds on an ecologically meaningful scale.
- The Great Plains west of the Mississippi were plowed up at a rate of 2.6 million acres a year from 1850 to 1950.
- Ten percent of the ground water in the Ogallala aquifer has been depleted in the last 20 years, with a nine-foot drop in the water table in Colorado’s portion.
- For the Eastern Plains of the Rockies average farm size in 1930 was 1,061, in 1959: 2,479 acres and in 1997: 2,989 acres; over the same period the number of farms declined from 71,289 to 33,034
- The median age for the Eastern Plains Agricultural Zone is 38 years, three years older than the entire Rockies region
- One farmer today can produce more output than five farmers in 1940. The number of farmers in the U.S. has dropped almost 80 percent since 1910, from 40 million to about three million.
- Wind energy production in the Rockies has grown 3,904 percent in ten years

About the Authors:

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Since the Lewis and Clark expedition first crossed the Northern Great Plains and beyond into the highest reaches of the Rocky Mountains, generations of explorers, settlers, and policy-makers have been perplexed by the question, “What are the Great Plains for, and what are we to make of them?” Lewis and Clark’s 1804-1806 exploration, and the settlement during the century to follow, plowed through “oceans of grass” with abundant wildlife, vast landscapes, and undisturbed ecological processes, as well as encountered Native American tribes. The expedition’s reports back to the “East”, along with those of Zebulon Pike in 1806, and John Wesley Powell in 1869 helped focus attention on the vast riches of the lands in the Louisiana Purchase.

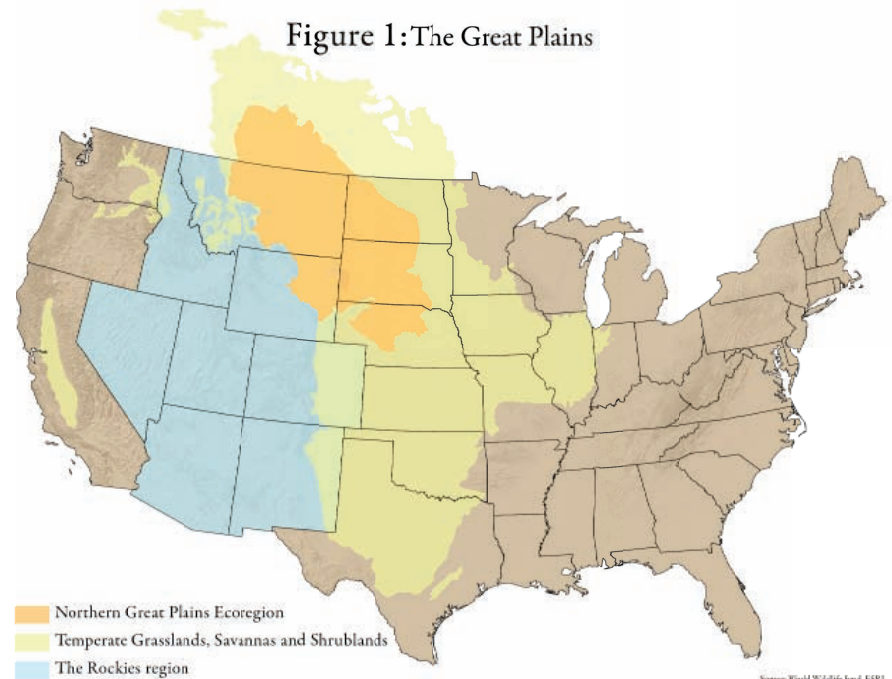
Beginning in 1862, the various Homestead Acts were an answer to the question about the Plains, and were a call for waves of settlers to “put into production” vast stretches of virgin lands only considered valuable if humans extracted a bounty of produce. The settlers could spread democratic ideals by staking out straight plots of land to make a living and hopefully a profit. Agricultural development of the West served as an answer to the question of the Great Plains, but subjected economies, communities, and the environment of the region to manic fluctuations of boom and bust. Intense tilling, plowing, and other “sod busting” agricultural practices did reach points of economic boom; however the ecological processes and climate of the Northern Great Plains were unable to support the long-term agricultural settlement. Homesteaded lands in the Eastern Plains of Montana saw their first great bust in the beginning of the 20th century. The more southern reaches of the Great Plains saw decline with the environmental disaster of the 1930’s Dust Bowl, and later with the decline of available water, including the continued draw-down of the Ogallala Aquifer. As many farmers in rural communities began to sell their farms to large corporations and move toward suburbs and cities after World War II, the Homestead Act’s “vision” of how to conquer the region was shown to be an insufficient answer to the Great Plains question.

In recent decades, loss of population and economic vitality has affected many of the rural communities in the High Plains. Numerous rural communities in the Eastern Plains Agricultural Zone (EPAZ), a small part of the larger Great Plains eco-region, have lost population, and now register low levels of economic prosperity as agricultural economies are largely mechanized and corporatized. This has left large parts of eastern Montana, Wyoming, Colorado, and New Mexico, asking the questions that the original Homestead Acts answered 150 years ago: “What are the Great Plains for and what are we to make of them today?”

Today’s economic, environmental, and political climate, resonating throughout national, regional, and local levels, has given this question direction and opportunity. Since 2003, there have been calls for a “new” Homestead Act by the federal government, intended to improve infrastructure and encourage working age populations to return to viable regional

economies.¹ In 2007, Senator Bryon Dorgan of North Dakota introduced new homestead legislation that called for bottom-up economic revitalization through tax breaks, government subsidies to start new businesses, and forgiveness of college debts for those “resettling” in eligible counties. Additionally, the push for alternative energy solutions has drawn many to dream of widespread utilization of the abundant renewable energy resources on the plains. Many areas in New Mexico and Colorado boast rich solar energy potential, while the high winds that were once a challenge to farmers and settlers across Wyoming and Montana’s plains have been recognized for

Figure 1: The Great Plains



Source: World Wildlife Fund, ESR

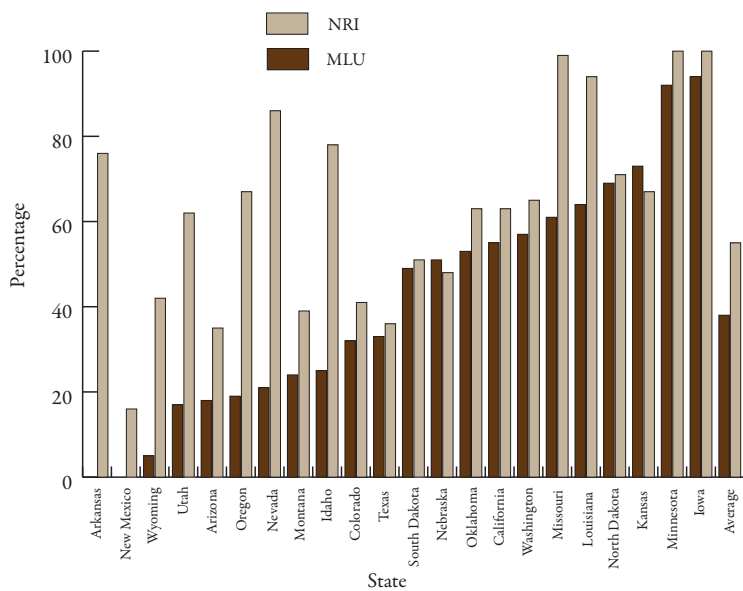
their great alternative energy potential. These renewable energies may provide long-term restorative environmental benefits along with potential economic benefits if the necessary transmission corridors are created and required capital is found to construct vast energy collection arrays. In addition some have called for a resurgence of economic and community vitality in the region based upon a “nature-based economy,” that seeks to restore the Plains to its pre-European settlement ecological conditions. “Prairie reserves” could be an effort to restore the High Plains to centuries’ past vast open spaces with roaming herds of domestic animals and wildlife. There are hopes that opening up the Plains as a “North American Serengeti,” can restore the region’s ecology from its damaged agricultural history while infusing recreation and tourism-based economic activity.

Recently, there are many people critically analyzing, evaluating, and reappraising what the Great Plains region represents, and what it has to offer in light of the current demographic and environmental situation. Finding an answer to the question of the Plains means listening closely to all of the voices that arise from the “sea of grass,” the solutions they suggest, and the needs they hope to meet. The political, economic, and environmental implications of these solutions represent a variety of interests found from region to region, state to state, and county to county. The best answer to the question of the Plains

Figure 2:

Percent of Potential Grasslands Lost as Indicated by Major Land Use Report (MLU) 1997 and National Resources Inventory (NRI)

Source: Richard Connor, et al., United States Grasslands and Related Resources: An Economic and Biological Trends Assessment (College Station: Texas A & M University, 2001)



will come from a deliberation that both remembers the past and recognizes the present in understanding future possibilities for the Plains.

Characteristics of an Ocean of Grass and its Wildlife

As seen in **Figure 1**, four of the eight states in the Rockies region contain eastern portions that overlap the Great Plains. Large parts of Montana, Wyoming, Colorado, and New Mexico are home to a prairie ecosystem, similar to that of Midwestern states like North Dakota, South Dakota, Nebraska, and Kansas. The Great Plains Research Project at the University of Michigan, part of the Inter-University Consortium for Political Science and Research, defines the limits of the region as the Canadian border to the north, the 32nd parallel to the south, the line of 700 mm or roughly 28 inches of average annual precipitation to the east, and the lands 5,000 feet of elevation and higher to the West as boundaries that fully encompass geographic commonality of the Great Plains. With agricultural settlement of this region came conversion of virgin prairie to cultivated cropland. The transformation of these natural ecosystems to agricultural lands is seen in **Figure 2**. With settlement came the decline of the grasslands west of the Mississippi, which were plowed up on an average 2.6 million acres a year from 1850-1950. The conversion of the short-grass prairie, which makes up the Eastern Plains Agricultural Zone, to crop production, did not occur until the 1880's. **Figure 2** shows an estimate of land west of the Mississippi covered by native grassland and croplands since 1850, as indicated by the 1997 Major Land Use (MLU) report of grassland pasture and range and National Resources Inventory (NRI) report of non-federal rangelands. The graph illustrates a decrease in grasslands and increase of croplands over 10 year periods throughout the second half of the 19th century until 1990. This simultaneous process of cropland conversion and grassland plow-up saw fluctuations in populations in set-

tlers. Though the prairie is still home to many communities, with numerous inhabitants being descendants of original settlers, other parts of the region were long abandoned by the middle of the 20th century.²

The Northern Great Plains (NGP), which has been referred to as an “ocean of grass,” is a natural habitat for a variety of short and mixed grasses, insects, prairie dogs, pronghorn, deer, elk, wolves, and the Great American bison. According to the 2004 Conservation Assessment of the Northern Great Plains, written in collaboration by a group of ecologists, biologists, and conservationists, including the World Wildlife Fund, the Northern Great Plains eco-region is 279,000 square miles, North America’s largest grassland eco-region, comprising the northwestern quarter of the Great Plains.² Most of the NGP receives less than 16 inches (40 cm) of precipitation a year. Precipitation varies cyclically, however, as the region is subject to prolonged drought amongst other things, natural disasters such as sporadic fires occur.

The population trends of endemic species have often been considered good indicators of ecosystem conditions and thus act as a useful index to determine the overall health of the ecosystem.³ Today 1,595 species of plants and 1,100 vertebrate species call the Northern Great Plains their home.⁴ Despite human settlement, the only extinct species that lived on the Plains before people settled there is the now-extinct Rocky Mountain Locust. Others species, like the grizzly bear and gray wolf, have been largely reduced in population, and some like the black footed ferret are highly endangered. In the Northern Great Plains eco-region non-native species account for 13-30 percent of all species, and major areas of the NGP’s biodiversity remain unaffected.⁴

Despite the resiliency of many Great Plains species, there remains concern that their continued decimation will threaten the fragile ecological systems of the region. Plant and animal life was and remains dependent upon the natural system prior to settlement. Thus, any one alteration could cause a ripple effect across the entire sea of grass, threatening the natural exuberance of the region. Great Plains ecologist Dan Licht explains, “Nowhere in the Great Plains does there exist a vestige of naturally functioning grassland ecosystem...because the prairie ecosystem has lost not only grass, but also wildlife.” He goes on, “The extermination of Great Plains wildlife was probably the largest human-caused elimination of fauna, in terms of biomass, the world has ever seen.”⁵ The decline of the Great Plains eco-system is well indicated by the threatened and endangered status of the region’s endemic species that have evolved in the Great Plains and whose distribution is limited to the NGP.

The protection of these endemic species is of central importance to biodiversity conservation because their health and survival is symbiotic with that of the local environment. Among the species of grass endemic to the NGP eco-region (apart from the blue grama and buffalo grass that remain largely abundant) are Great Plains stickseed (*Lappula cenchrusoides*), second bladderpod (*Lesquerella arenosa*), Dakota wild-buckwheat (*erigoum nisher*), and dense flower knotweed (*polygonum polygaloides*). Others grass species are of significant conservation interest because they are near-endemics, listed as endangered or threatened by the U.S. and Canadian governments, or consid-

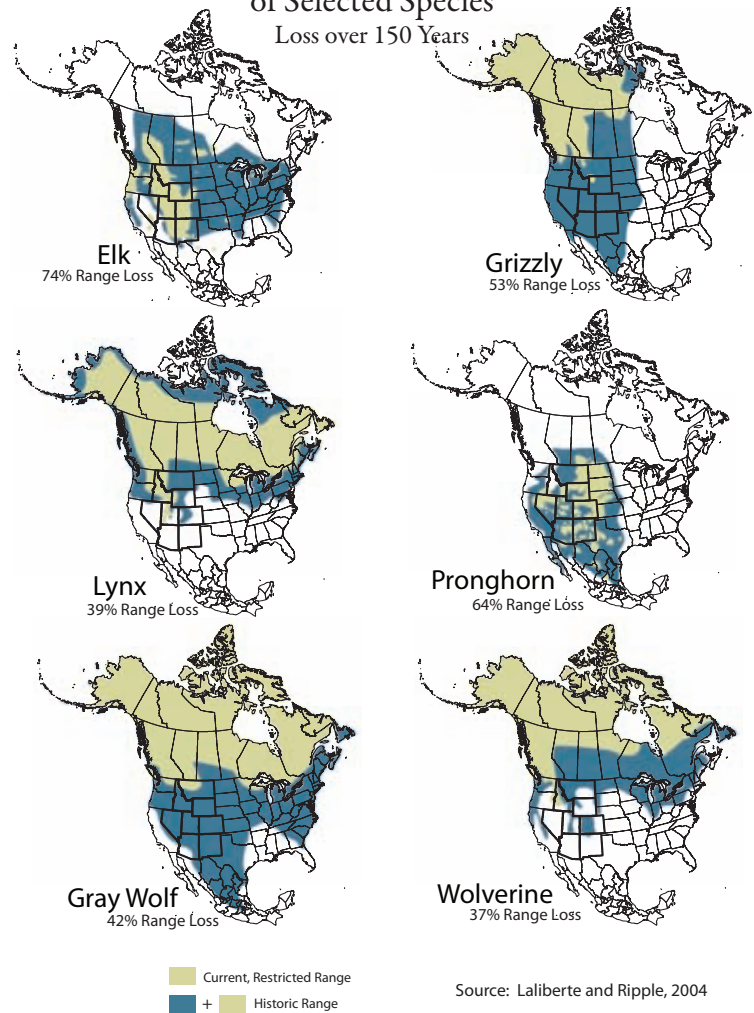
ered at risk according to Natural Heritage Network standards. The flora of the Great Plains is in need of a conservation plan, for their habitat receives the lowest levels of government protection. Of the 404 endemic species in Wyoming, only 294 inhabit protected lands with less than 15 percent of these species having fewer than 10 percent of their populations preserved.⁶ Bird species of the grasslands face the greatest threat of decimation over any other bird population in North America.

The NGP eco-region is home to 95 species of mammals, 20 of which are carnivores. **Figure 3** shows the pre-settlement territory of some of the major mammals in the eco-region. Including shrew and bats, 23 of these species are insectivorous mammals. In general, prairie carnivores have been the group most affected by human settlement of the region. Grizzly bears and the gray wolf no longer roam most of the region (though, populations do exist near Yellowstone and the Eastern Rockies High Plains). River otters and wolverines were once abundant within the region, but are now usually found only in the outskirts. The presence of mountain lions has drastically decreased, resulting in this species being threatened in South Dakota and Nebraska; the black-footed ferret is highly endangered as well. The swift fox, once more abundant than the red or grey fox, is considered at risk in the entire eco-region and occupies perhaps only 40 percent of its former range. Dramatic shifts in the abundance of prey, disappearance of the wolf, and predator control programs have altered the presence of mid-sized predators. The populations of these predators, such as coyotes (*Canis latrans*), have changed due to various factors.

The grassland elk that once roamed the tall grass prairies and the arid short grass steppes, became extinct by the late 1800's. Elk were once a primary Plains species, but their numbers have now dramatically decreased in the Northern Great Plains, and are no longer quantified as "innumerable" as early explorers of the plains once had described. Beavers have also experienced reduced numbers as a result of ecosystem degradation. Their absence is widely felt, for they have a strong influence over hydrologic regimes and plant composition that affects the distribution of other species, such as waterfowl and amphibians.⁶ The black-tailed prairie dog, which was once able to thrive throughout the NGP eco-region, now finds itself a candidate for the Endangered Species Act. The Audubon bighorn sheep, which occupied the badlands of the Dakotas, Nebraska, and Montana, became extinct around 1925 due to over hunting. The Great American Bison, once numbering 30-70 million, were completely gone from the Northern Plains by 1883.⁷

Before settlement, the grasslands were regulated by wild fires, initiated by lightning strikes and sometimes by the Native Americans. These fires helped recycle the dead grass and renew the nutrients in the soil, while also ridding the grasses of pests and plant disease. The presence of bison on the plains helps contribute to the regulatory function of wildfires—bison leave behind patches of dried grass from their grazing areas, which helps host the next fire. Settlers who moved to the Plains would extinguish these fires, disallowing the natural rejuvenation process on the plains to occur. Plants would overgrow, and weeds would eventually set in, altering and damaging the natural ecosystem functions.⁸ There is currently heavy fire suppression on the plains with only 33.4 km², or about .02 percent of the total mixed grass prairie being affected by fire per year, and only 14.2 km² of the 2,675.8 km² (.05 percent) of short grass

Figure 3: Historic and Current Ranges of Selected Species

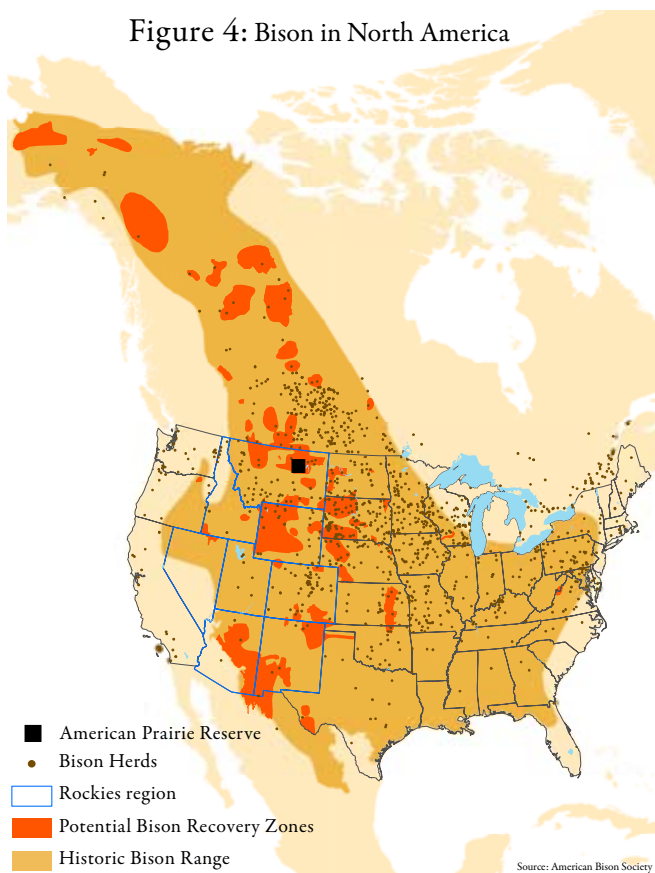


prairie being affected.⁹ While fires were once a yearly occurrence on the long grass prairie, a three to five year occurrence on the mixed grass prairie, and a major ecological driver on the short grass prairie, government managers largely ignored the important ecological roles that fires have played during the past century.⁹ Some range managers have begun reinstating fire as a management tool and the practice, when implemented during the right season, has been shown to have several immediate benefits to plant species on the prairie.¹⁰ Callenbach offers us these words:

"bison are wild, freedom-loving beasts. These weighty symbolic virtues also pose difficult problems- conceptual and practical, economic and political, cultural and ecological. Indeed, if we are to let bison be bison, we will have to modify some of our current ways of being human. These changes will benefit us as well as bison, but they will be profound".¹¹

The American Bison (also known as buffalo) is among the wildlife that was once abundant throughout the Plains, but now is sparsely scattered throughout the NGP and EPAZ. The enormity of the bison's previous territory is shown in **Figure 4**. George Catlin, on his way up the Missouri River in 1832 in what is now Montana, left us with a prophetic image of the American Bison upon witnessing them first hand. "What a thrilling specimen for America to preserve and hold up to the view of her refined citizens and the world in future ages! A nation's Park, containing man and beasts, in all the wild and freshness of their nature's beauty."¹² It is amazing how Catlin

Figure 4: Bison in North America



foresaw the demise of the buffalo from the beginning of settlement, and that their survival would be dependent upon government protection.

Frederick W. Turner states that in 1835, “more buffalo robes were being shipped down the Missouri than beaver pelts—almost fifty thousand of them annually.”¹³ Killing bison for hide and sport helped contribute not only to their own demise, but to the alteration of an entire ecosystem. The 1860’s brought not only railroads and settlement, but praise for the buffalo hunter, William F. Cody, or Buffalo Bill, as America would know him. These symbols of the American spirit seemed to necessitate the eradication of the American Bison, and the destruction of the ecosystem. “For five hundred dollars a month Cody killed buffalo, and in a year and a half while employed by the Kansas Pacific he dropped an estimate of 4,280.”¹³ Between 1872 and 1874, Turner adds, an estimated 3,158,730 buffalo were killed by the white man.¹³

The Northern Great Plains Conservation Assessment determined that there were about 50 “conservation herds” of buffalo in North America in 2005. Many believe that bison play a necessary role in the strength of the Great Plains ecosystem. While cattle have taken up a similar role in prairie ecosystems, they do not truly fulfill the traditional ecological role of the bison. In earlier centuries their rapid reproduction rate resulted in vast herds, helping to sustain the biodiversity of grassland carnivores, like the cougar and gray wolf. The absence of bison on the plains is heavily reflected by the decline of the grassland carnivore populations.¹⁴ The grazing patterns of these large herds of bison were also instrumental in maintaining biodiversity throughout the eco-region. Bison herds roam throughout the plains, moving on from one grazing area to another. Their large numbers (and appetite), make for heavily grazed areas,

which are then temporarily abandoned and provide for a patchwork of grazed land where other species can thrive. The native species of grass have adapted to these grazing patterns. Their impact on the native grasses helps spread seeds as a result of their grazing patterns, playing a significant role in nutrient cycling, and the distribution of prairie birds, prairie dog colonies, and other large herbivores.¹⁴ The Northern Great Plains Conservation Assessment estimates that there are few communities or species in the Northern Great Plains not affected, in some form, by the presence of bison.¹⁴

The Northern Great Plains Conservation assessment in 2005 helped bring a concern for bison to the ecological forefront. Bison, according to the assessment, were ecologically extinct from their historic herd locations, with the exception of a handful of places. By 2005 there were approximately 50 “conservation herds” in North America. These herds are either publicly owned, or managed by private organizations with clear conservation objects. The animals in these “conservation herds” make up approximately 19,000 bison out of about 500,000 bison in North America.¹⁴ Only six of these are free-ranging herds; of these, only four are in the U.S.. They are located in Henry’s Mountains, Utah, Yellowstone National Park in Wyoming, Montana, and Idaho, along with the adjoining Grand Teton National Park and National Elk Refuge in Wyoming.¹⁴ None of these are found within the NGP.¹⁴ Captive bison in the nine conservation herds in the NGP now occupy a mere 280,000 acres (less than 0.1 percent of their former range within the NGP). The few public herds that remain today are heavily managed.¹⁴

As Earnest Callenbach, author of *Bring Back the Buffalo!*, explains,

“the only way to replicate the ecological symbiosis that free-roaming herds once had with grasslands is to put bison, elk, pronghorn, and deer back on large territories, along with their appropriate predators (including humans, hunting on a year-round basis), and let them reestablish coexistence with the grasses and the myriad other forms of life there.”

Bison ranchers like Ted Turner can do their part to set a new standard, but much of the task, as Callenbach advises, will need to be taken up by public lands.¹⁵

In the grasslands, like any ocean, body, or natural ecosystem, one loose thread can unravel the entire ecosystem, threatening the entire ecosystem. Approximately two-thirds of North America’s mixed- and short-grass prairies have been tilled, leading experts to conclude that the Great Plains is one



of the most altered ecosystems in North America. Threats to the Plains started developing with everything that accompanied settlement. Sod busting, altered soils (and thus the species that thrive on them), grazing practices, the mechanization of agriculture, fragmentation of lands, oil and gas development, the diminished Ogallala Aquifer, and effects of climate change have all taken their toll on the Great Plains in significant ways.

It will require preservation on a vast scale to keep our current grasslands intact; its true preservation requires that grasslands become a national and global priority. The non-profit, World Wildlife Fund, has identified the Northern Great Plains as one of 10 large areas it works in, evidencing the impressive ecology and importance to the world's biodiversity. There is much at stake if preserving grassland biodiversity is left unaddressed, for it affects not only the environment but the people who live there. The homestead acts and waves of settlement helped characterize the plains as land used for agriculture. The increase in agriculture and the simultaneous decrease in grassland it brought about, along with the switch to large-scale agricultural operations, have left many rural inhabitants on the Plains facing uncertainties regarding the utility of the environment they live in.

High outmigration rates in rural areas over the past 20 years seem to indicate that many rural inhabitants have run into limited economic opportunity living on the Plains. However, there are those populations that remain, finding possibility for economic opportunity through innovative and entrepreneurial means. One example of this on the Plains is the alteration of the Switzer family ranch in Nebraska, altering their cattle operation to provide a greater diversity of bird habitat. As a result of this, the family has seen increasing returns to their cattle ranch operation as well as the environment. The environmental benefits that the ranch brings has led to its recognition and awarding of the Important Bird Area Status from the Nebraska Audubon Society.¹⁶ Innovative and entrepreneurial thinking from local landowners on the Plains, like the Switzers, shows the possibility for rethinking what economy and environment means for the Plains.

Threats to the Great Plains Ecology

In the 100 years from 1850 to 1950, major conversion of grassland to crop land started to occur. High demand for wheat during World War I, a short-grass crop, accompanied by the Homestead Act and railroad developments, sent farmers west, beginning "the Great Plow-up."¹⁷ In those 100 years, three million acres a year was converted to cultivated cropland. This resulted in an average loss of three million acres per year in grassland.¹⁸ Human impact on the Great Plains has ranged in level of severity over time and across different regions. Tillage of soils from the great "plow-up", fragmentation of lands from high road densities and railroads, and the impacts of mining and extraction industries were among the damaging factors accompanying human settlement. The "plow-up" is still occurring on many lands in the Eastern Plains as commodity prices rise, such as the price per bushel of corn which has risen in recent years due to demand for ethanol production. It is estimated that from 1982 to 1997 five to 10 percent of native prairie acres on private land in north-central Montana (Blaine, Phillips, and Valley Counties) were in decline, while crop subsidies still encouraged farming on unsuitable lands, creating

"false" profitability.¹⁹

Modern domestic livestock grazing has also been found to impact the ecological health of the Great Plains. Grazing certainly comes with many ecological benefits and is a natural ecological process among Plains species. Light to moderate grazing stimulates seed growth, distributes seedbed, and returns nutrients to the soil. This was traditionally undertaken by ungulates and prairie dogs among other species. Light to moderate grazing also benefits many songbird species in the Great Plains. Modern grazing practices, however, may affect the biodiversity of the ecosystem.²⁰ Current range management practices vary among ranches. Uniform grazing patterns, however, tend to be exhibited within management practices.²¹ The impact of grazing on the ecology of the Plains has been indicated through its bird populations, which have been found to concentrate their populations based on species and grazing preference.²⁰ Some species that prefer heavily grazed sites, like the horned lark and chestnut-collared longspur, tend to proliferate in those areas. Variation of bird densities across the Plains has been a noted effect.²⁰ Whether or not these variations are detrimental to the overall health of the Plains cannot be concluded based on this.

The extraction industry has posed threats to the grasslands that overlie large areas of oil, gas, and coal reserves. In places like the Powder River Basin of Montana and Wyoming, much of it located in a National Grassland, coal-bed methane extraction has affected the biodiversity and functioning of its ecosystem.²² Water discharge with a high salinity is a byproduct of coal-bed methane mines, affecting the nutrients in the soil, and thus the vegetation and wildlife endemic to the region.²³

A whole host of other impacts accompany the mining industry in the Great Plains, including those on humans, along with the high density roads and infrastructure that are needed. Additionally, the negative impact of removing native prairie for fossil-fuel extraction poses another problem as grasslands provide environmental benefits that are in high demand with increased climate change. Prairies may be one of the leading global repositories of sequestered carbon, containing more carbon per unit area than those of most other ecosystems worldwide. As the tillage of more and more prairie continues, stored greenhouse gases are released into the atmosphere, further contributing to global greenhouse effect. Not only does this plowing release greenhouse gases, this prairie has great potential for carbon sequestration if left untilled and undamaged. Recent research has shown that native prairie vegetation acts as a strong sink for carbon and a minor sink for methane.²⁴ While grazing lands still produce nitrous oxide (N₂O), a greenhouse gas with a greater impact than carbon dioxide, research out of the USDA's Agricultural Research Service Northern Great Plains Research Lab shows that native prairie vegetation produces three times less N₂O than seeded forage.²⁴ Considering this information, an examination of the long-term role of grasslands, not just regionally, but also globally should be considered when evaluating the future of our native prairie. The native sod still left in the Great Plains has witnessed more than a century and a half of agricultural intervention beginning with the earliest Western explorers. This past has left many an irreparable mark on the Plains, but a better understanding of the prairie's value both ecologically and economically may change the trend for the future.

Westward Expansion and Agricultural Settlement of the Rockies

“The most destructive force in the American West is its commanding views, because they foster the illusion that *we* command.” (Richard Manning)

Explorers

After acquiring the Louisiana Territory from Napoleon in 1803, Thomas Jefferson was interested to discover what he had purchased from the French and sent forth multiple expeditions to explore the newly acquired territory. These expeditions are outlined in **Figure 5**. First and most famous of these expeditions was Lewis and Clark and their Corps of Discovery. In the spring of 1804 the explorers set forth from St. Louis in order to find a “direct water communication from sea to sea formed by the bed of the Missouri and perhaps the Oregon.”²⁵ They would eventually find their way across the vast expanses of what is now the western United States, and while they failed to find a commercial water route across the region, the stories and reports they returned with ignited the frontier settlement craze that persisted well through the 19th century. Other expeditions would follow Lewis and Clark, such as Zebulon Pike’s exploration of the southwest United States from 1806-1807. The expedition sustained itself on the large herds of bison that populated the plains. Their numbers were so great that Pike commented, “I will not attempt to describe the droves of animals we now saw on our route. Suffice it to say that the prairie was covered with them...their numbers exceeded imagination.”²⁶ Pike’s expedition took a more southerly route than the previous explorers and led him directly across the Eastern Plains of the Rocky Mountains to the mountain that now bears his name. While attempting to climb what we now know is the eastern most 14,000 foot peak in the Rockies, Pike and two other expedition members were forced to spend the night in a cave without supplies. Pike and his companions “arose hungry, dry, and extremely sore...but were amply compensated for [their] toil by the sublimity of the prospect below. The unbounded prairie was overhung with clouds, which appeared like the ocean in a storm; wave piled on wave and foaming.”²⁶ The vantage point offered the explorer a look out on to the grasslands of the Eastern Plains that in less than a century would see a flood of settlers spurred on by free land and the prospect of prosperity in the newly opened West.

Homestead Acts/ Legislative History of Agricultural Settlement

Growing industrialization and commercialization in America during the 19th century opened up new markets for farmers, shedding light upon the Great Plains as a source of raw material, cultivation, and the promise of economic prosperity. Seeing great economic opportunity in the lands west of the Mississippi, President Lincoln signed

the original Homestead Act into law in 1862, which entitled citizens over 21 or the heads of households to apply for plots of land up to 160 acres, which they would then cultivate and improve for five years, after which they would be fully entitled.²⁷ The prospect of free land for cultivation appealed to the traditional American values and the “yeoman” ideal, motivating settlers to migrate to and cultivate available land in the Eastern Rockies portion of the Great Plains. The development of farmland on the Great Plains of the Rockies region can be seen in **Figure 6**.

After building a home and then successfully completing the five years of cultivation required under the Homestead Act, settlers could obtain a final patent or deed to their farm. The agricultural settlement in the newer territories in the late 19th century, which today includes much of our eight-state Rockies region, shows a very strong correlation with settlement of Homesteads in those areas.²⁷ In 1880, there were a total of 4,506 farms in Colorado and five years later in 1885, 4,804 final homesteads had been deeded to individuals.²⁷ Between 1880 and 1885 in Montana, the census counted 1,519 total farms, 1,094 of which had obtained deeds by 1885.²⁷

At the same time that land was being opened up to settlers through the Homestead Act, Congress was giving away land to corporations under the Pacific Railroad Act, expanding the land given away to railroads to 127 million acres within a 10 year period.²⁷

The dominant gaze that explorers had earlier cast upon the American West envisioned the wealth that could grow out of tilling the soil; however, their eyes deceived them. The land west of the Mississippi was untouched, and those in Washington thought that the land could universally grow crops and graze cattle, all of which could be shipped as freight to the thriving demand from the East. There were, however, those explorers who saw a different reality of the American West. In 1869, John Wesley Powell set out on the Colorado and Green rivers, becoming one of the first to realize that Congress had made a grave mistake opening up lands for public use. Pow-

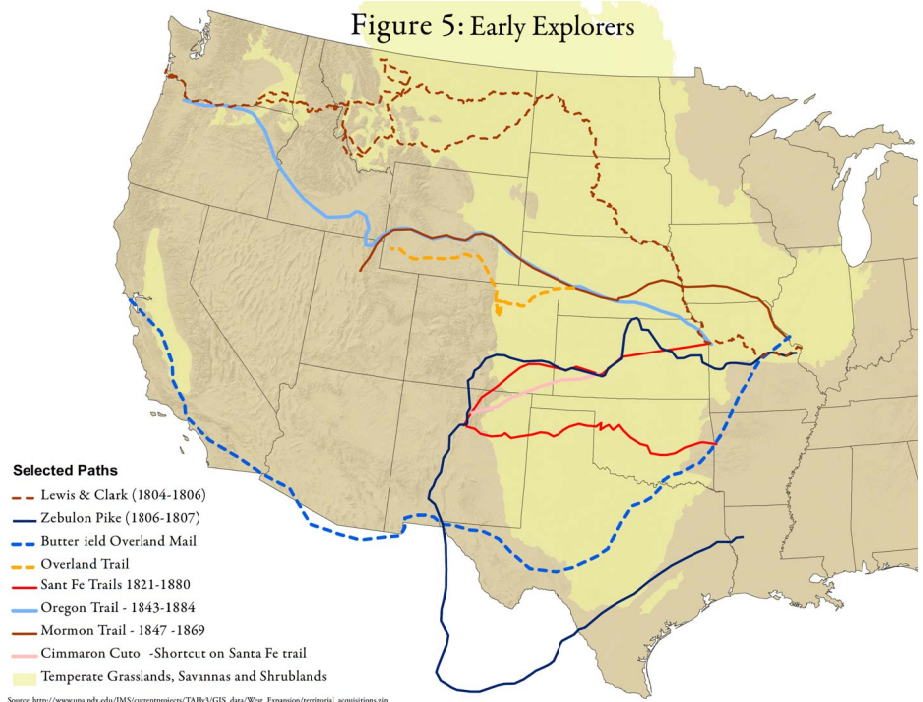
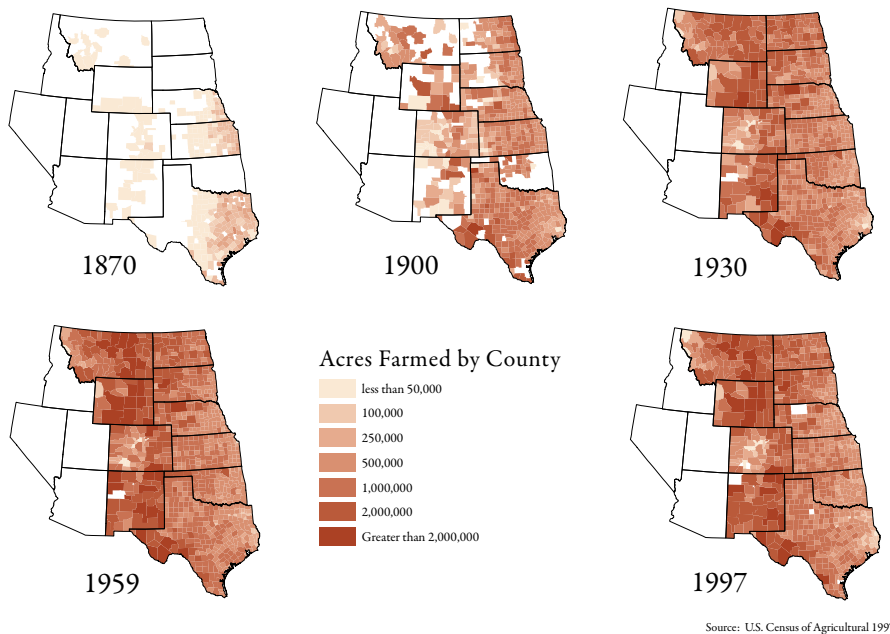


Figure 6: Progression of Farming Settlement



ell's account of the West's dry and arid landscape was largely ignored by settlers and land policy-makers, despite his seat on the first public-lands commission. Powell's report emphasized Congress' oversights in passing its Homestead legislation and commented that "All of the lands were supposed to be ARABLE LANDS."²⁸ Looking back at the situation in an op-ed piece for the *New York Times*, Nicholas Kristof labeled the 150 year period of Plains over-settlement as "one of the longest-running and most costly errors in American History."²⁹

Powell voiced his concern to Congress regarding Homesteads in his 1878 *Report on the Arid Lands of North America* and suggested a classification of lands into either timber, or irrigable lands and "all of the lands falling without these boundaries would be relegated to the greater class designated as pasturage lands."³⁰ Powell called for a minimum of 2,560-acre homesteads on pastoral lands separate from irrigable areas, recognizing that "in general, the lands greatly exceed the capacities of the streams" and thus pastoral activities should be encouraged on lands that were not suited for planting.³⁰ However, fears in Congress and throughout the country of "baronial estates" and "land monopolies," coupled with a desire to increase the population in political jurisdictions resulted in Powell's suggestions and thus those of the nation's first public lands commission falling on deaf ears.³¹ Had a land policy been instituted allowing for more acreage per homestead, settlement frequency and proximity would have declined, making it more difficult for territories to become states. Allowing larger homesteads and thus fewer settlers would have impeded political power in Washington that directly correlated to federal funding as well. However, had a different course been taken, perhaps settlers would have been better able to implement practices of agriculture suitable to the climate, rather than a practice suitable to politicians back east.

Subsequently, little was made of Powell's suggestions. The blind utilitarianism persisted throughout the early years of the 20th century. A United States Geological Survey

(USGS) report from the time claimed "The High Plains continues to be the most alluring body of unoccupied land in the United States, and will remain such until the best means of their utilization have been worked out."³² Once again, government officials failed to heed Powell's warning and encouraged the settlement of more homesteads on lands that were not suitable for the agriculture being practiced. Lack of knowledge regarding the climate of the High Plains, coupled with wet years during the height of homesteading on the Northern Plains lulled settlers into a false sense of security.³³ Coincidentally, the years from 1906-1916 proved to be the wettest on record for eastern Montana during the 20th century, with the five years that followed resulting in severe drought.³³ Belief in the Dry-farming Doctrine and claims of "rain follows the plow" disappeared with the return of drought to the upper high plains, especially eastern Montana.³⁴

In 1909, recognizing that most easily irrigable land had already been homesteaded, Congress amended the original Homestead

Act of 1862 by passing the Enlarged Homestead Act. This act doubled settlers' allotments to 320 acres and allowed for some successful homesteading in the arid areas. It encouraged the construction of irrigation ditches on the Great Plains, so that those lands could be settled. The rationale for this act met a number of interests. Theodore Roosevelt wrote in his message to Congress, "the western half of the United States would sustain a population greater than that of our whole country today if the waters that now run to waste were saved and used for irrigation".³⁵ Also behind Roosevelt's thinking was that if settlers were to depend on irrigation and a healthy clean water supply for their economic success, then it would be in their interest to protect the upstream forested land.³⁵

Roosevelt's concern for the nation's forests resulted in the creation of the U.S. Forest Service (USFS) in 1905, and the formation of a second public-lands commission. Gifford Pinchot was the first head of the USFS, having been head of the Division of Forestry in the Department of the Interior since 1898. He also took on a leading role in the second public-lands commission that came to many of the same conclusions Powell had previously voiced to Congress. The new commission held that public lands be used to "effect the largest practicable disposition of public lands to actual settlers", but also argued that the time of disposition was gone and encouraged government retention of public lands out of increasing necessity.³⁶ Heavy settlement, over-grazing, and the scale of fraud over public lands led to the position held by the commission, that "the number of patents issued is increasing out of all proportion to the number of homes."³⁶ The Commission encouraged government regulation to help conserve the overstocked grazing lands and called for the remaining public lands to be partitioned into grazing districts and grazing rights assigned to local ranchers.³⁶ A survey of ranchers across the west identified overwhelming support, by a margin of five to one, for government regulation.³⁶ This vision was finally realized in 1934 with the passage of the Taylor Grazing Act.³⁶ However, action did not come



ditionally, none of the new homesteads were settled on the Eastern High Plains of the Rockies region, but were centered on irrigable river areas in other parts of the West.⁴⁰ The record of boom and eventual decline in homesteading is effectively shown in **Figure 7**.

During the 1950's and 1960's mechanization of agriculture greatly reduced the necessity for labor in the industry, and jobs were drawn away from

soon enough for much of the Great Plains and many portions of the Eastern Plains of the Rocky Mountains as they experienced the incredible environmental destruction of the Dust Bowl years during the 1930's. The new grazing act was instituted in large part to stop the "sodbusting" that had torn up much of the region's topsoil with agricultural settlement during the homesteading years. Finally Congress had come to realize the grave mistake they had made by encouraging settlement and farming on the short grass prairie and recognized that the land was far more suited to cattle and other livestock grazing.

The Taylor Grazing Act of 1934 converted much of the remaining potential homestead lands into grazing land to be leased from the government. Many saw this legislation as "ending the age-old policy of homesteading" and as a signal of "the federal government's admission of the frontier's closing".³⁷ The number of patents issued did indeed decline prior to and during World War II. However, "lawmakers fashioned loopholes in the Taylor Act that permitted homesteading to continue on a limited basis."³⁸ While homesteading did continue on a much smaller scale, the era of settlement of federal lands had largely come to an end. As seen in **Table 1**, the conversion of public to private land through homesteading had its greatest effect in many of the Great Plains states, with many seeing more than a third of their total lands transferred into the hands of individuals. During the height of homesteading, from 1862 to 1934 over 1.6 million homestead applications were processed and more than 270 million acres- 10 percent of all U.S. lands- were transferred from federal to private lands.³⁹

World War II encouraged greater demand for goods and agriculture, thus helping plains economies thrive. However, the anticipated return of veterans to agriculture fell well short of previous estimates for planners in Washington who had expected, "a tremendous expansion of agriculture, industry, and trade in the West."⁴⁰ Many of the measures taken by Bureau of Reclamation after the war actually did far more to improve irrigation for previous homesteaders and other private lands, rather than returning veterans. Of the 400,000 new farms envisioned for returning veterans, only 3,041 new farms were opened on government lands between 1946 and 1966.⁴⁰ Ad-

ditionally, Secretary of the Interior Stewart Udall called for streamlining land laws in hopes of ensuring 'continued public ownership and management' of lands. He urged the repeal of the Homestead Act and the Desert Land Act of 1877, which allowed individuals to buy up to 320 acres given under the requirement that they successfully irrigate the land. With Udall's encouragement, Congress created the Public Land Law Review Commission in 1964. This commission pushed the federal government's responsibility for land protection even further, and encouraged the government to "where feasible, enhance the quality of environment, both on and off public lands."⁴¹

Eventually, in 1976, under the recommendation of the Public Land Law Review Commission, Congress repealed the Homestead Act for the lower 48 states.⁴¹ Homesteading on federal lands was allowed to continue in Alaska for another 10 years, but was finally repealed nationwide in 1986. The final repeal of the Homestead Act paralleled with the emergence of more and more preservation efforts throughout the West. The rise of the environmental movement and subsequent legislation such as the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973 began to stress conservation

Figure 7: Final Homestead Entries 1868-1960

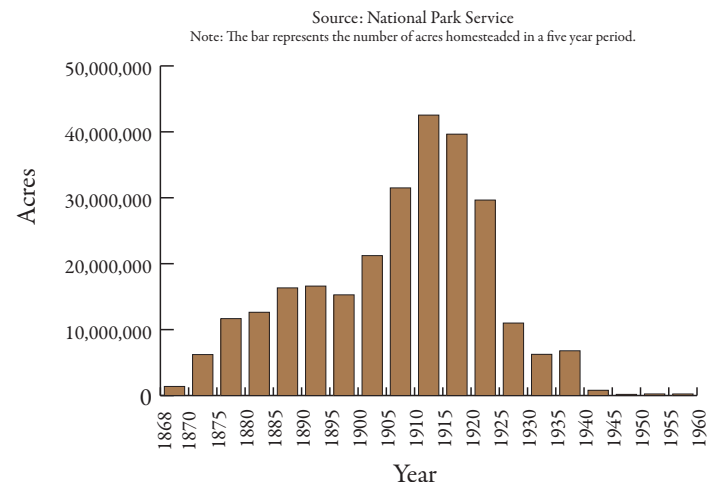


Table 1: Homesteading by State

	State	Total Homesteads	Total Homesteaded Acreage	Percent of State	Average Homestead Size (Acres)
Rockies	Arizona	20,268	4,134,356	6%	204
	Colorado	107,618	22,146,400	33%	206
	Idaho	60,221	9,733,455	18%	162
	Montana	151,600	32,050,480	34%	211
	Nevada	4370	704,167	1%	161
	New Mexico	87,312	19,422,958	25%	222
	Utah	16,798	3,607,688	7%	215
	Wyoming	67,315	18,225,327	29%	271
Borders Rockies Eastern Plains	Kansas	89,945	13,089,258	25%	146
	Nebraska	104,260	22,253,314	45%	213
	North Dakota	118,472	17,417,466	39%	147
	Oklahoma	99,557	14,865,912	34%	149
	South Dakota	97,197	15,660,000	32%	161
Other Homesteaded States	Minnesota	85,072	10,389,606	20%	122
	Arkansas	74,620	8,133,791	24%	109
	California	66,738	10,476,665	10%	157
	Oregon	62,926	10,513,945	17%	167
	Washington	58,156	8,465,002	20%	146
	Alabama	41,819	4,578,323	14%	109
	Missouri	34,633	3,644,306	8%	105
	Dakota Territory	33,951	5,244,345	6%	154
	Wisconsin	29,246	3,110,990	9%	106
	Florida	28,096	3,326,712	10%	118
	Mississippi	24,126	2,637,412	9%	109
	Louisiana	22,988	2,561,334	9%	111
	Michigan	19,861	2,321,937	6%	117
	Iowa	8851	903,164	3%	102
	Alaska	3277	363,775	0.10%	111
Ohio	108	7707	0.03%	71	
Illinois	74	5667	0.02%	77	
Indiana	30	1785	0.01%	60	

Source: National Park Service, National Homestead Monument, Homestead by Numbers

the Dakotas, Montana, Wyoming, and Colorado,” and many of the windbreaks and the lessons from the 1930’s were abandoned in favor of development.⁴³ However, boom finally led to bust in the early 1980’s, “when the oil cartel could no longer sustain high prices in the face of mounting global supplies (evoked by OPEC’s artificially high price), the cost of energy plummeted.”⁴⁴ Effects were felt hardest in energy dependent towns such as Gillette, Wyoming and Rifle, Colorado.

Major Decline in the Region’s Population, Economic Activity, and Environment

While the population of the U.S. has increased steadily over the last century, the trend has not been apparent in rural America. The Eastern Plains of the Rockies has broken with this nationwide trend of population growth. The inhospitable condition of the high plains climate with minimal precipitation and incessant winds led many settlers to abandon the agricultural lifestyle on the Great Plains. With this large outmigration of people, local economies have additionally seen decline to the point where some communities are ghost towns or mere shadows of their previous boom conditions. Across the Eastern Plains region of the Rockies, Main Street storefronts stand vacant and lack of revenue has led many towns to drastically cut social services. However, this current situation is not an isolated incident in time, but rather the product of nearly a century and a half of boom and bust that has slowly whittled away at rural communities and left them as skeletons of their past.

The cycle of boom and bust first showed itself shortly after the passage of the Homestead Act in 1873 when the Great Plains region witnessed manic economic vicissitudes. Homesteaders who were cultivating their land in the 1870’s were hit hard by the depression of 1873 that lasted until 1879.⁴⁵ Farmers were dragged further into debt, and the political climate of the age lacked the federal support to pull them out. Settlement on the Plains was rarely met with proper infrastructure to link rural and urban areas. Furthermore, the monopolization of the railroads led to exorbitant transport prices, thus preventing small farmers from participating fairly in the market, particularly when competing against large businesses.⁴⁵ Co-

operatives began and alliances such as the Grangers were formed, calling for stricter regulation and better protection of farmers.

Economic boom re-emerged during World War I; high wartime demand for wheat met with a productive harvest, only to plummet into an economic bust in 1920, with post war demand decrease and severe drought in the Plains.⁴⁵ The population on the Plains had reached its peak just after World War I, and has since seen a

Table 2: Coal Reserves in 2009

State	Estimated Recoverable Reserves (Million short tons)
Arizona	0
Colorado	9,634
Idaho	2
Montana	74,770
New Mexico	6,899
Utah	2,631
Wyoming	38,743
Rockies	132,679
United States	260,553

Source: National Mining Association, http://www.nma.org/pdf/c_reserves.pdf
 Note: Data for Nevada was withheld

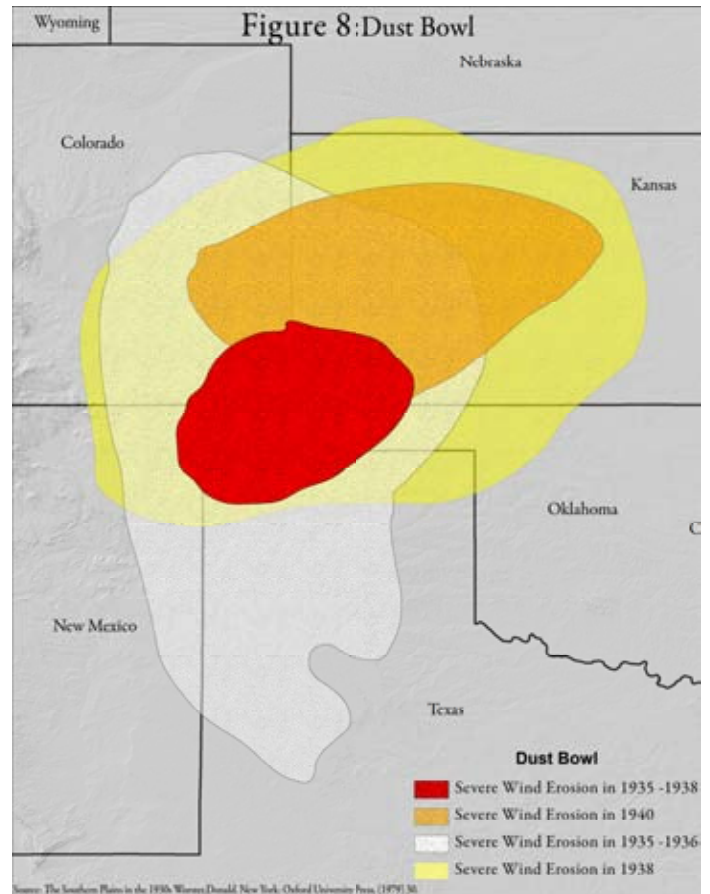
and environmental protection, resulting in a conflict of interest with homesteaders already on the land.⁴² Paramount amongst these conflicts was the issue regarding water rights between agriculturists, environmentalists, and the explosive suburban and urban development throughout the West.⁴²

Additionally, discovery and exploitation of the West’s vast energy reserves shifted the perception of the region away from its traditional agricultural role and towards one more focused on energy extraction. This shift resulted predominately because the OPEC oil embargo of 1973 and the 1979 energy crisis in the wake of the Iranian Revolution greatly increased demand on the West’s energy sector. This rise in domestic demand led to the development of many energy projects throughout the West, with some of the highest concentrations on the Eastern Plains of the Rockies states. **Table 2** shows the vast amount of coal underneath the eastern Rockies that quickly became the focus of exploitation during the energy crisis. During this period “Some 200 energy boomtowns suddenly sprouted in

steady trend of decline.⁴⁶ Responding to inquiries of land settlement from post-war veterans, Congress passed Public Resolution 29 in February 1920. This legislation saw 10,875 veterans apply for 1,311 plots of farm land in the West.⁴⁷ Veterans found themselves committed to cultivation of land that had been subjected to severe drought. Subsequently, scarcely 60 percent of these homesteaders met the law's requirements, largely due to infertile land and lack of funding.⁴⁷ Despite continued settlement in infertile lands, Congress rejected the 1925 "Fact Finder's" initiative that encouraged loans and agricultural advisors for settlers. The proposed act stipulated that no settlement project should be approved until scientific studies are conducted showing that project was "adaptable for actual settlement and farm homes."⁴⁷ As the grasses became upturned, and the land was tilled, the ideal of prosperous yeoman agriculture in the West was becoming more and more of an illusion.

The disillusion turned to nightmare in the 1930's when environmental and economic disasters collided on the Great Plains in the form of the Great Depression and the Dust Bowl. Years of "sodbusting" on the Great Plains during booms of the early 20th century, coupled with the desperation of the Great Depression left the local grasses of the prairie uprooted and allowed for the loss of topsoil in an area the size of Pennsylvania, roughly one million acres.⁴⁸ The resulting environmental degradation has been ranked amongst the worst environmental disasters in history. Hugh H. Bennett, Chief of Franklin Delano Roosevelt's Soil Conservation Service created in 1932 said of the Dust Bowl that "of all the countries in the world, we Americans have been the greatest destroyers of land of any race of people barbaric or civilized" and went on to claim that the disaster was a result of "our stupendous ignorance."⁴⁸ This environmental disaster, resulting in the near decimation of the area's agriculture sector, resulted in one of the largest instances of outmigration in American history. Only a portion of our Rockies region was directly affected by the Dust Bowl, as seen in **Figure 8**; however, this epitome of the boom and bust cycle coupled with environmental degradation and its effects on people should be well recognized by those looking at current areas of high depopulation and their potential futures. Timothy Egan makes the point regarding the Great Plains area affected by the Dust Bowl that, "By the measure of money -which was how most people viewed success or failure on the land - the whole experiment of trying to trick a part of the country into being something it was never meant to be was a colossal failure."⁴⁸ The colossal scale of devastation wrought by humans during the drought of the 1930's is depicted in the Baca County Duster Image. At the heart of our research is the question, "what is the relationship meant to be between people and land?" The Dust Bowl era did much to raise this question throughout America and the Eastern Plains of the Rockies.

The combination of these past economic and environmental trends resulted in an ecological situation starkly different than it was prior to Anglo settlement and a volatile economic and demographic condition for many communities on the High Plains of the Rocky Mountain Region. Over the past century these trends have had a strong correlation with the ups and downs of the region's main historic industry, agriculture. Paramount among these changes has been the shift in ownership of farms to larger producers, heavily encouraged by the idea of economies of scale, and the depletion of water resources



in the region. Both have put a stress upon the traditional "small family farm" agricultural economy.

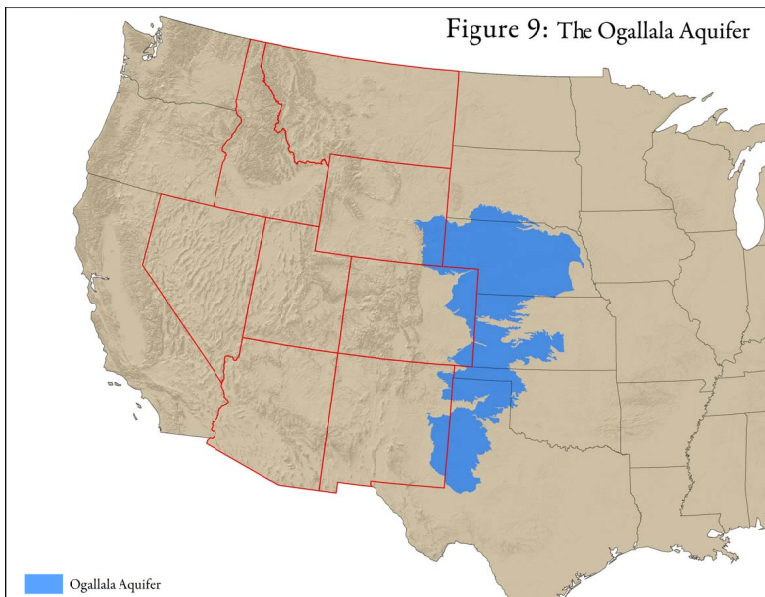
The years following World War II brought with them another boom and greater food consumption throughout the U.S. and worldwide. The greater increase in demand for goods spurred agricultural innovation on the plains and farmers found a new solution for farming the arid land. The discovery of the Ogallala aquifer, the increasing availability of inexpensive electricity, and the subsequent increase in technological innovation encouraged agriculture on marginal lands that had been largely abandoned in the drought years of the Dust Bowl. The invention of the center-pivot sprinkler in the early 1950's by Frank Zybach and its subsequent proliferation throughout the agricultural industry forever changed irrigation and farming, not only in the High Plains, but also around the world.⁴⁹ Large-scale irrigation became far more efficient just as the post-World War II demand escalated. However, the subsequent use of the Ogallala aquifer has caused it to drain three times faster than nature can refill its water reserves. The underground ocean has already lost 11 percent of its original volume and more water is extracted each day for a multitude of uses.⁴⁹ The continued use of the aquifer at such a rate may have drastic consequences as William Ashworth outlines in his book *Ogallala Blue*:

"Some of the consequences of groundwater mining are environmental: springs dry up, rivers diminish, the numbers and varieties of plants and animals are reduced. Some are economic: increased pumping costs as wells deepen, increased food costs and decreased land values as crops shrink. And some are human. The human costs may include bankruptcies, foreclosures, and forced migrations. They may include failed businesses and abandoned towns."⁴⁹

The role of the aquifer is not as large in the agricultural industry of the Eastern Plains region of the Rocky Mountains as it is in the rest of the High Plains, as seen in **Figure 9**. However the projected futures of those communities in our region that do rely on the aquifer for their existence have a questionable future. In those eastern counties of Colorado that rely on the aquifer, 10 percent of the ground water has been depleted, half of which has occurred in the last 20 years. On average, the Centennial State (Colorado) has experienced a nine-foot drop in the water table (over that many years); however in certain locations of Yuma and Kit Carson counties, the drop has been closer to 50 feet. Additionally, because Colorado sits on the upstream fringe of the aquifer, water has slowly been draining east to other portions of the aquifer.⁴⁹ A similar situation is occurring in New Mexico where the use of the aquifer for irrigation is limited to the eastern boundary of the state near the Portales Valley and Northern Lea County. New Mexico has seen 20 percent of the aquifer already depleted under its section of the High Plains, with an average decline of 13 feet.⁴⁹ Further north in Wyoming, the aquifer has been largely untapped as irrigated agriculture has been slow to develop with an economy based on other commodities. However, from 1980 to 2000, the aquifer did experience an average drop of three and a half feet in its portions under Wyoming.⁴⁹ While the aquifer does not reach far enough North to influence agriculture in Montana, the state is certainly not immune from water allocation conflicts. Our concerned counties cannot simply shut off the tap to preserve aquifer levels, nor do they exactly need to; however the slow depletion of water on the High Plains region of the Rockies must be recognized when discussing the future of the communities that reside there and when considering the care and use of the land.

The depletion of the aquifer certainly has serious implications for the future of the region; however the current effects upon the region can be just as startling. Increased electric ‘lift costs,’ due to the need for deeper wells has decreased the margin of profitability for many farmers, contributing to the consolidation of farms. This consolidation cannot be solely attributed to the diminishing aquifer, but is certainly a serious

Figure 9: The Ogallala Aquifer



concern for many farmers living on the aquifer in Colorado and New Mexico.

Major Shifts in Agriculture

The transformation away from small family farms towards large agribusiness has had a great effect upon rural communities. From the humble start of 160 acre homestead farms to enormous corporate agriculture, the result has been a decline in workers per acre farmed, as well as a loss of family agriculture that has encouraged the exodus of farmers' children that would have previously stayed on the family farm to carry forward its production into the next generation. On the Eastern Plains of the Rockies, the average farm size in 1930 was 1,061 acres, in 1959 it was 2,479 acres, and in 1997, 2,989 acres. In 1930, the Eastern Plains contained 71,289 farms; in 1997 the number of farms was just 33,034. This agriculture trend, depicted in **Figure 10** has resulted in demographic repercussions throughout the region that bring into question the future of the plains. A high rate of outmigration, especially amongst younger individuals, has subsequently resulted in an aging population, sometimes referred to as the “Brain Drain.”⁵⁰

Current Conditions on the Eastern Plains

Over the past 20 years, counties in the Eastern Rockies Agricultural Zone have witnessed major population decline, measured by percentage of outmigration. This massive loss of population measures those who have actively migrated out of the county. In our eight-state Rockies region, a total of 70 counties have experienced outmigration losses of 10 percent or higher from 1990 to 2010 as seen in **Figure 11**. Among these

counties, 57 are in states that identify as part of the Great Plains ego-region, and 38 are part of the Eastern Plains Agricultural Zone of the Rockies. New Mexico contains nine of these high out-migration counties. All but two of counties lie in EPAZ. Colorado contains 11 of these counties, with seven on the Eastern Rockies Agricultural Zone. Wyoming only contains two counties that have out-migration percentages of 10 percent or more, and these lie just west of the Eastern Plains Agricultural Zone. Montana has 25 counties that have experienced out migration of 10 percent or more from 1990 to 2010, all residing within the Eastern Plains Agricultural Zone as depicted in **Figure 11**. All but one of Wyoming's Eastern Plains Agricultural counties have actually seen a large in-migration increase from 1990-2009, which may be a reflection of the energy related employment opportunities that Wyoming, the largest coal producer in the nation, provides.

Not only are many of the counties in the Eastern Plains Agricultural Zone losing population, but many have median

Figure 10:
Consolidation of Agriculture, Average Farm Size on the Rockies' Eastern Plains

Source: The Great Plains Project, Inter-University Consortium for Political and Social Research

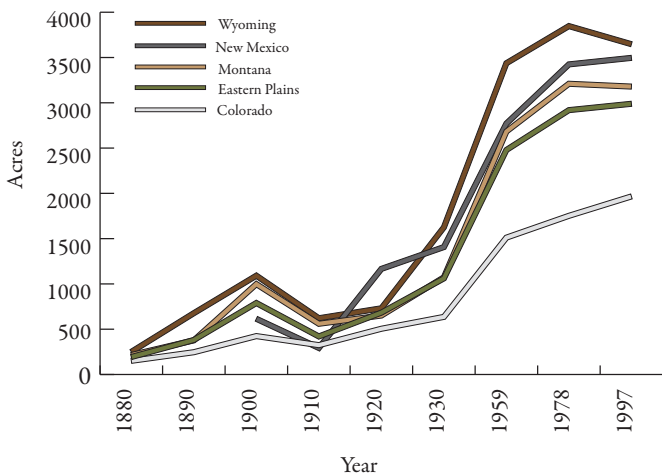
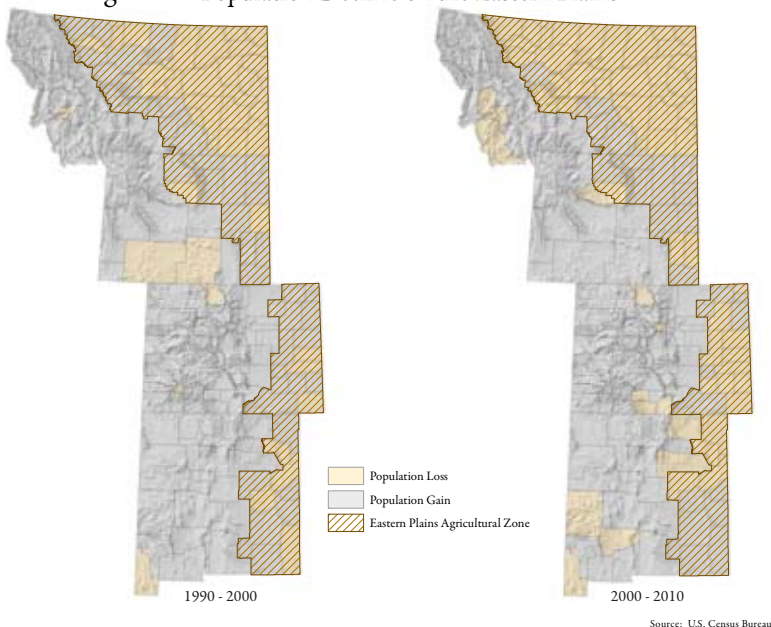


Figure 11: Population Decline on the Eastern Plains



ages far above the national average. As seen in **Figure 12**, the Eastern Plains Agricultural Zone contains many counties whose median age is between 41 and 49, a large portion of these counties are in Montana's EPAZ, while Wyoming and Colorado, and New Mexico contain several each. The median age for the Eastern Plains Agricultural Zone is 38 years, three years older than the entire Rockies region, whose average age is about 35 years old. Counties that have experienced out-migration of ten percent or more also have some of the oldest populations in the Rockies. This may indicate that younger people are the primary out-migrants of Eastern Rockies rural communities, while older generations tend to stay.

Income has often been a disputed measure of vitality for rural communities, but should be noted nevertheless. In the EPAZ of Montana, many counties have a median income in below \$40,000 in 2009. As shown in **Figure 13**, Both New Mexico and Colorado also have counties with low incomes on the EPAZ. Wyoming, is the only state in the Eastern Rockies Agricultural Zone with a county whose median income reached \$42,421-\$57,339 in 2000; this is Campbell County, whose labor source has played an important role in the coal extraction industry since the 1970's. With the exception of two counties in Arizona, no other Rockies states had median incomes this low in 2000. By comparison, the median income for the U.S. as a whole in 2000 was \$41,994.⁵¹

Economic Activity

Together, Montana, Wyoming, Colorado, and New Mexico contain 49 agricultural dependent counties. As **Figure 14** shows, 42 of these counties are located on the Eastern Plains Agricultural Zone. Montana contains 23 farm dependent counties on the EPAZ, while Wyoming only contains two in its Eastern Plains Agricultural Zone. Colorado by comparison contains 11 farm dependent counties, while New Mexico contains six on their Eastern Plains zones. Another variable worth considering regarding agriculture on the Eastern Plains is the level of government subsidies required to sustain the farming being conducted there. As **Figure 15** shows, agricultural subsidies in the Rockies are heavily concentrated in the Eastern Plains, bringing into question the viability of such practices if government assistance is eliminated.

The mining industry has a strong impact on some areas of the Eastern Plains region, with its greatest prevalence in the state of Wyoming as seen in **Figure 16**. In the Eastern Plains Agricultural Zone, Wyoming takes the lead with four mining dependent, while Montana and New Mexico's EPAZ has two, and Colorado has zero.

Another indicator of economic activity in the Eastern Plains zone is the lack of revenue from recreation that supports many other counties throughout the eight-state Rockies region. **Figure 17** shows that only five counties in the Eastern Plains of the Rockies region depend on recreation, all of which are either in Montana or Wyoming. This trend has the effect of not only minimizing the potential sources of employment, and thus revenue, but the lack of recreation in these counties also lowers the level of human amenities found there. This has a secondary effect of discouraging migration into these counties because they lack the natural and outdoor recreation amenities that attract people. These demographic and economic trends show the current state of the Eastern Plains region and portray

Figure 12: Median Age

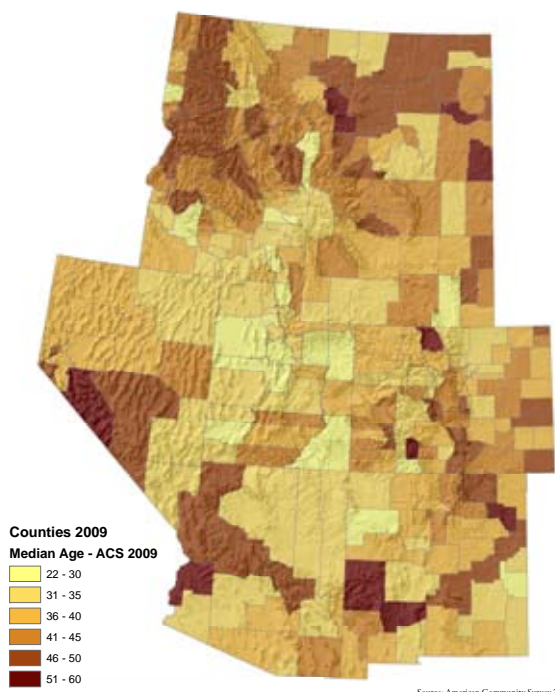
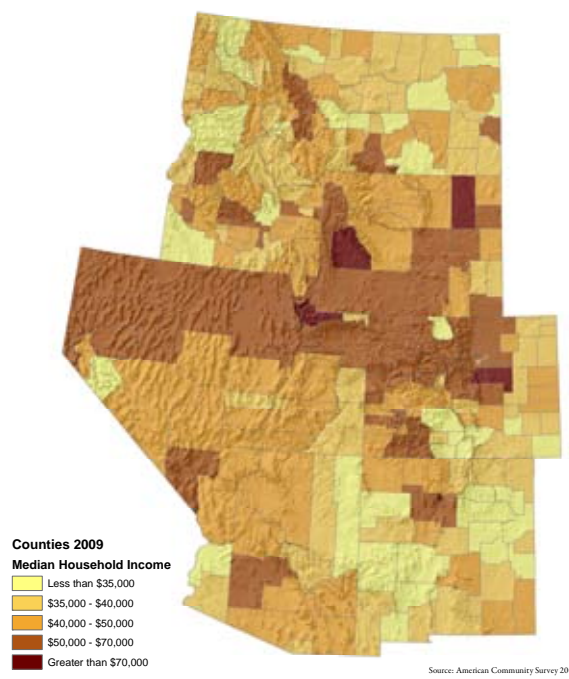


Figure 13: Median Household Income



the crossroads that many communities in the region face.

How will we decide to utilize the short-grasses that cover the region? Will bison roam? Will wind-turbines spin in the distance? Will there be a solar panel on every roof? Our country faces a new age in which to learn the lessons from our settlement history and has an opportunity to begin a new future for our national environment and rural communities.

Rejuvenation Possibilities for the Eastern Plains

In large part, the demographic and economic facts are undisputed—rural counties in the EPAZ have experienced significant out-migration. What this means for a community,

however, is the subject of much debate. Will greater economic stimulation result in an increase in community activity? Will restoration of the grasslands eco-region result in community and economic revitalization? Our inquiry into the Plains is not and never was based on how to make poor people become wealthy, nor was it a search for a panacea to the region’s environmental, economic and social problems, for answers to these questions would not yield a sufficient evaluation about the vitality of the plains. Any inquiry into the future of the Great Plains must understand the environment and politics of the region as one in the same. Aldo Leopold encouraged us to “see land as a community to which we belong” rather than “as a

Figure 14: Agricultural Dependent Counties in the Rockies

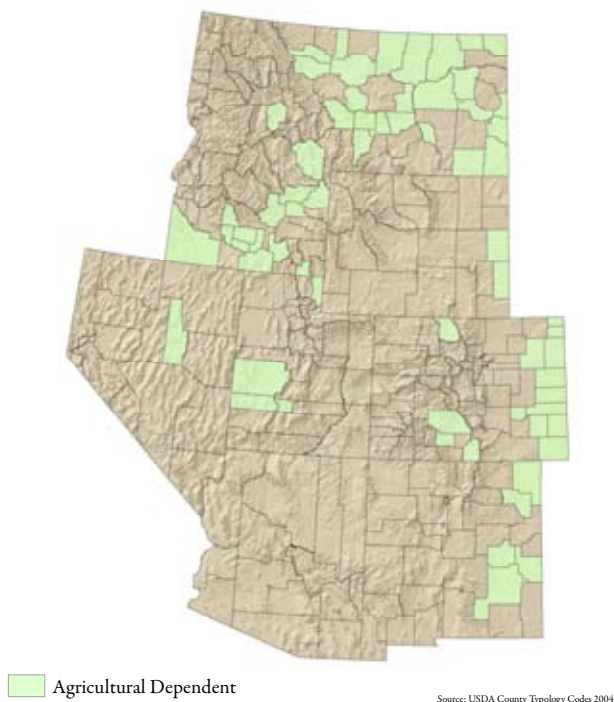


Figure 15: Agricultural Subsidies

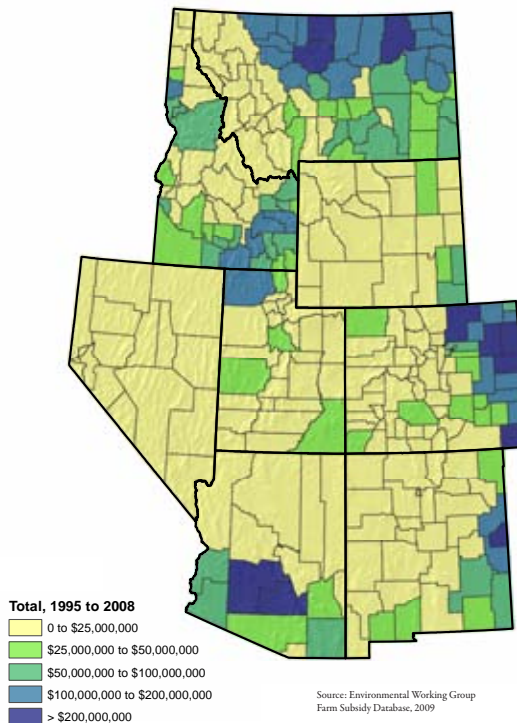
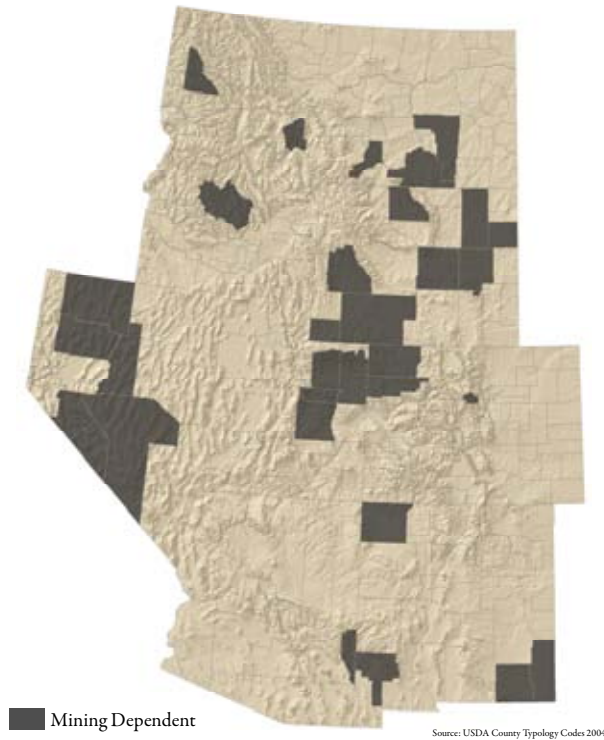
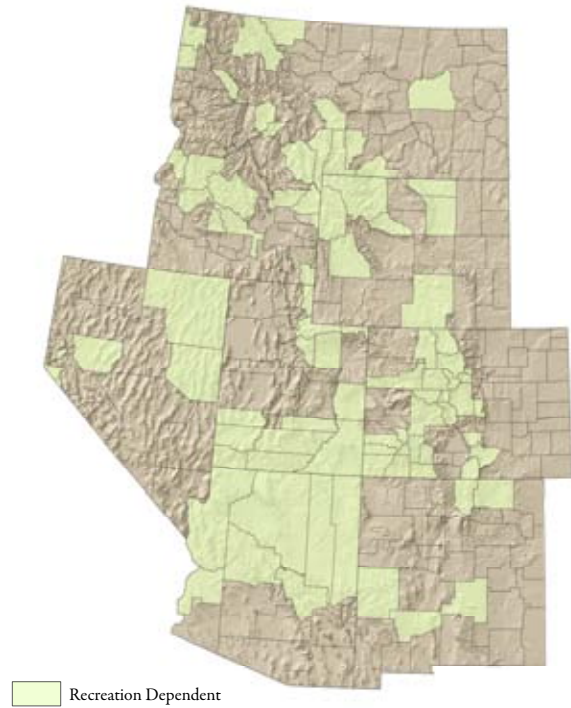


Figure 16: Mining Dependent Counties in the Rockies



Source: USDA County Typology Codes 2004

Figure 17: Recreation Counties



Source: State of the Rockies 201

commodity belonging to us” and through such a transformation “we may begin to use it with love and respect.”⁵² Leopold acknowledges the difficulties of such a shift: “That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known, but latterly often forgotten.”⁵² Thus, any revitalization must yield answers to questions of both community vitality and the natural world. What then is vital for both the land and the community? The answer may lie in a political and economic approach that considers the nutritional value and diversity of its essential resources. To begin with potential avenues of revitalization, we assess the economic and environmental implications of tapping a resource that existed long before the settlement of the West, the traditional ecological habitat of the Great Plains and its keystone species, the American Bison.

Preservation Efforts: Land Preserves and Wildlife Diversity

Bison

Bison once covered the full extent of the Great Plains grasslands of North America, but as seen in **Figure 4** on page 24, today they are only found in small, highly managed herds throughout the region mostly found on farms and ranches. According to the Northern Plains Conservation Network (NPCN) Conservation Assessment, 96 percent of all bison in North America are in private herds, subject to artificial selection for domestication. There are increasingly high levels of introgression of domestic cattle genes in the bison genome in those raised for meat, as well as those in public herds. Thus, among the Plains’ bison, genetic purity in herds is a rarity—if it even exists at all. Only National Parks like Wind Cave, Yellowstone, and Grand Teton maintain confidence that their herds are the *pure* versions of the iconic animal, but even they often hesitate to use *pure*. These herds *purity*, however, has recently been subject to doubt.⁵³

Large-scale reintroduction of bison herds must become a priority if risks of genetic erosion are to be avoided and the ecological and evolutionary processes of the legendary American symbol are to come to fruition. Areas as large as three million acres (5,000 sq mi/12,500 sq km) have been suggested for sustaining wild bison herds on an ecologically meaningful scale.⁵³ **Figure 4** on page 24 shows areas that would be conducive to bison reintroduction. This figure is important considering that the potential for expanding existing herds is fairly restricted—52 percent of bison herd managers report that there is no potential for expanding the range of their herds due to sociopolitical concerns. However, some opportunities may exist to encourage their expansion. Increasing opportunities for herd expansion have created a need to identify the few remaining large landscapes where high numbers of bison can be accommodated.⁵³

How is it that the great American Bison can help save our Great Plains communities, and where did this idea come from? Preservation of the American bison is not a new concept. Early explorers pioneering the Western Frontier sent back reports of the Plains teeming with bison. Such reports, and the Industrial Revolution’s demand for raw materials, sent hide-hunters and bone-pickers west, killing vast numbers of bison and diminishing the population. Homesteading and cattle ranching in the late 19th century brought further disruption to the Plains ecosystem and bison population. In 1889, William F. Hornaday conducted a survey reporting only 1,091 bison left in North America, helping to ignite Roosevelt’s conservation efforts in the early 1900’s to preserve the American bison.⁵⁴ In 1905, Roosevelt along with William Hornaday established the American Bison Society to save the American Bison from extinction. The society died out in 1935, but was revived in 1966 with the resurgence of the environmentalist movement, renamed as the American Bison Association.⁵⁵

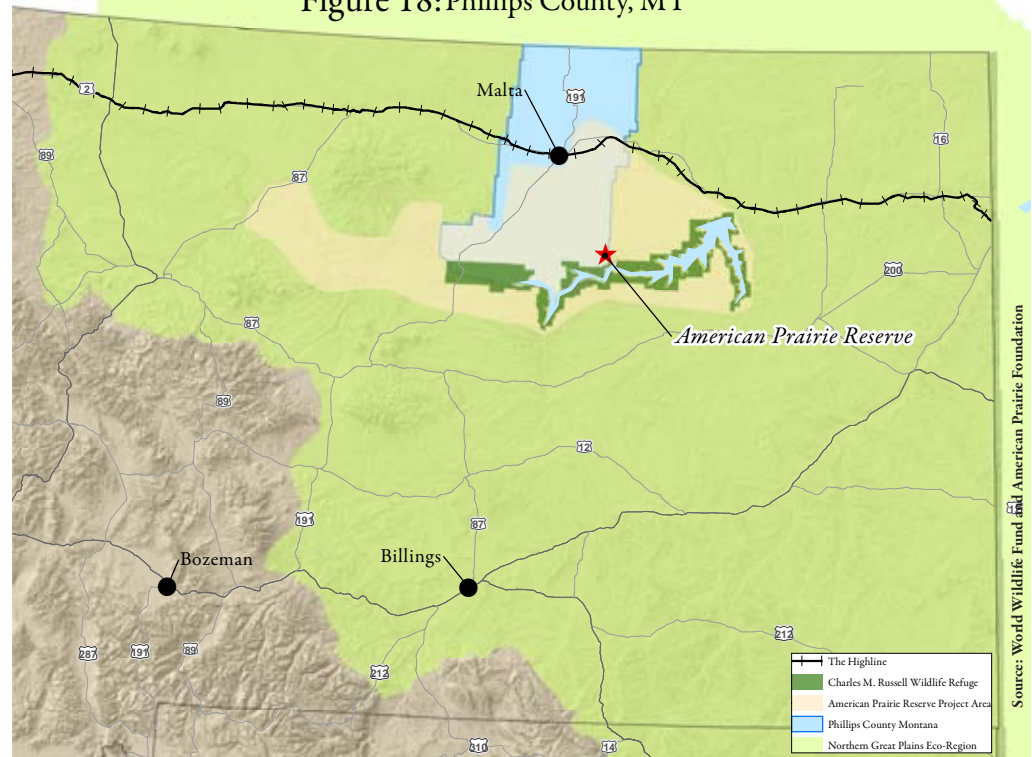
Two geography professors in New Jersey studying Great Plains economic, environmental and population trends

helped give rise to the idea that the Great Plains would be better off if it returned to its pre-settlement conditions with a “Buffalo Commons,” or a type of bison reserve. This idea was pioneered in 1987 by Professors Frank and Deborah Popper, in their essay, *The Great Plains: From Dust to Dust*. This essay, which argued against continued agricultural practices in the Great Plains, served as a metaphor for the future of the Great Plains, and continues to spark interest, discussion, and in many cases, anger, throughout rural communities. The Poppers’ essay was something of a social prophecy. Without any real footnotes or citing references, the Poppers predicted that if the federal government waited for once-settled lands to be deserted (foreseeing these out-migration trends due to the mechanization of agriculture⁵⁶), the government would actually have an easier time buying up lands. Almost 25 years later, it seems that their predictions, to a degree, may be actualized. Growing concern for the environmental degradation of the Northern Plains mixed with a need for greater economic growth and revenue in rural Plains communities has spurred the revival of Plains conservation efforts in the 21st century.

The Poppers presented a span of conservation possibilities for the Great Plains, although they all include a recognition that agriculture would not succeed in the region. They, along with geographer Bret Wallach, proposed restoring a large part of the Plains to their pre-European settlement condition. Wallach suggested that the U.S. Department of Agriculture’s (USDA) Forest Service (USFS) work with Plains farmers and ranchers, paying them not to cultivate the land, and manage them similarly to the national grasslands already under the USFS’s stewardship.⁵⁷ The farmers would, alternatively, follow a Forest Service-approved program to rejuvenate the native short-grasses. Afterward, the service would buy out their land and leave them with about 40-acres.⁵⁸ While Wallach made no references to returning bison to the Plains, the Popper’s idea of a “Buffalo Commons,” has come to fruition in Northern Montana in the form of the American Prairie Reserve.

Since 2002, the American Prairie Foundation (APF) has been working to develop the American Prairie Reserve in northeastern Montana as seen in **Figure 18**. In 2004, The World Wildlife Fund together with the American Prairie Foundation published, “Oceans of Grass: A Conservation Assessment for the Northern Great Plains,” bringing the declining state of the Northern Great Plains eco-region to public concern and discussing the conservation goals made possible with the growth of the prairie reserve in northeastern Montana. The goal of the American Prairie Reserve is to create a fully functioning prairie ecosystem, with efforts to provide ways for the public to access the wildlife and nature opportunities, and encourage ways that the land can contribute significantly to the local economy.⁵⁹ The

Figure 18: Phillips County, MT



land around Phillips County was chosen largely because 90-95 percent was already an intact grassland ecosystem. Since 2002, the APF has worked to reintroduce endemic species like the bison and the black footed ferret, to the area. APF has already contributed \$18.2 million dollars to the local economy.⁶⁰ The per-acre estimated values of ecosystem services in the Northern Great Plains are generally higher than the rental value of the land. The annual value of the ecosystem services in the Northern Great Plains is \$40 billion.⁶¹

Criticisms of the Reserve

The preservation of the American prairie has not gone without criticism and complaint. In February 2010, a United States Department of the Interior document was leaked, revealing a proposal for nearly three million acres of northeastern Montana to be turned into a possible bison range and given national monument status. The document had identified fourteen total proposed national monument sites in nine states. Though the Department of the Interior denied many of the claims made by the document, the reaction it received was widespread and felt. For some Montanans, like those involved with the Montana Community Preservation Alliance, an organization formed by land and local business owners, the national monument issue is virtually indistinguishable from the APF’s private effort to create the American Prairie Reserve. The leaked document angered many Montanans, who voiced criticisms of prairie preservation. At a forum hosted by Republican Rep. Denny Rehberg, rural landowners expressed concerns that the proposals threatened to fragment their communities and further take away ranching opportunities.⁶² The American Prairie Reserve aims to draw a tourist-type economy to Phillips county and northeastern Montana as a form of economic stimulus. For many residents of Phillips County, as Ganay Johnson, a representative for APF explained, the “idea of selling lattes to tourists”, has



not emerged as a particularly desirable form of stimulus.⁶³

Another conservation proposal that the Poppers included was an effort to slow the depletion of the Ogallala Aquifer by expanding national grasslands, BLM grazing districts, and the anti-sod busting National Conservation Reserve. Another approach, which would let ranchers and farmers keep all of their land, was to turn 15,000 square miles of Eastern Montana into an East African-style game preserve, referred to as the “Big Open.” This idea, which was publicized by the Popper’s landmark essay, was proposed by Robert Scott of the Institute of the Rockies in Missoula, Montana. He foresaw something of a North American Serengeti that could support 75,000 bison, 150,000 deer, 40,000 elk, and 40,000 antelope. A ranch of about 10,000 acres (16 sq mi) could potentially make \$48,000 a year in hunting licenses alone, along with the other jobs and businesses that would complement the hunting industry, like taxidermists, restaurants, and sports outfitters.⁶⁴ Herd management on the game reserve would be open to ecotourism and hunting, providing economic incentives for the region. Issues of wildlife management and conservation are repeatedly topics of conservation politics because they draw a wide variety of interests. As the prairie reserve idea grows, it will undoubtedly encounter the political controversies of bison management that other national parks have dealt with over the years.

Bison Politics

At the top of the list of wildlife concerns across bison herds today is the issue of cattle introgression, or in other words “bison genetic purity”. Hybridization of bison and cattle traces itself back to Spanish settlers in the 1500’s. Current concern for introgression generally traces itself back to 1873, when ranchers, like Charles Goodnight, began to crossbreed their livestock.⁶⁵ This history of crossbreeding has thus created a saga of genetic issues related to introgression of cattle DNA

into bison herds. Introgression refers to gene flow between populations caused by hybridization followed by breeding of hybrid offspring to at least one of their respective parental populations.⁶⁶ Today’s current herds, which originated from Wind Cave National Park and were moved into protected parks like the American Prairie Reserve and Yellowstone National Park, trace their roots back to bison from herds with history of hybridization.⁶⁷ Almost all bison in existence today descend from the 100 bison in five private herds, and a wild population in Yellowstone, which had about 30 bison at the turn of the 20th century.⁶⁸ These bison were used to establish public populations in the United States of America and Canada which has helped reproduce the population of 500,000 bison in existence today.⁶⁸ At Texas A&M University, new genetic testing is being conducted on animals from these herds to evaluate their level of cattle introgression. While the nature of the testing has been subject to skepticism, at the heart of the research is the question, “what does knowing the level of genetic purity in our bison herds tell us about our iconic American bison that we have worked so hard to protect”? Will genetically “impure” bison still afford the same level of protection that pure bison receive in national parks and under their state protected status?⁶⁹ To this question, bison manager of Wind Cave National Park, Dan Roddy, responded quite practically, “So long as the bison do what bison do, they are bison.”⁷⁰

Among the list of bison concerns that occupy ranchers and national parks alike is Brucellosis, yet another issue that traces its roots back to domesticated cattle. Brucellosis is a bacterium that causes abortions in ungulates such as cattle, elk and bison. The disease was first introduced to the Yellowstone National Park bison herd in 1917, having thought to be contracted from dairy cattle that were brought into the area. Brucellosis has been found in Yellowstone bison, as well as elk populations, complicating the management of the wildlife

and relationships with nearby ranchers.⁷¹ A multi-year quarantine study was designed in order to provide data about effected quarantine management techniques for Brucellosis.⁷¹

The conservation of the American bison is essential to Great Plains conservation efforts. The future of the bison, however, depends on the future of the Plains. The future possibilities for the Plains thrust the bison into a number of competing identities, as wildlife, as game for hunting, or as livestock. This is witnessed in Wyoming's joint classification of bison as livestock and wildlife.

In some parts of the country where bison have been long extinct, the animal is considered simply an American icon. In national parks such as Yellowstone, the majestic creature receives protection as wildlife. On many ranches on the Plains, as well as in restaurants and supermarkets across the nation, the American bison has been used as a tasty and nutritious alternative to beef. The classification of bison as livestock has witnessed increasing demand for the meat in health food and grocery stores. Traditionally more expensive than beef due to the lack of supply and the more expensive infrastructure and breeding stock, the growing bison meat industry has witnessed reduced prices and increasingly competes with beef. Though they are native to the Great Plains, many bison raised for meat are actually a cross breed between cattle and bison (approximately 3/8 bison and 5/8 cattle), often referred to as "beefalo." Thus, while bison are no longer in danger of going extinct, their genetic make-up is threatened.⁷² The purpose and role of the iconic American bison on the Plains will be determined by the future that we envision, create, and shape for the Plains.



© Russell Clarke, Lasater Ranch, Matheson, CO

Economic Stimulation and Community Revitalization Efforts

The Original Homestead Act of 1862, for better or for worse, made rural America and agricultural America one in the same. Thus, the USDA has provided an important avenue for federal dollars to reach rural communities. John Allen, former director of University of Nebraska's Center for Applied Rural Innovation has said, "you think about in the United States, we've correlated rural policy and agricultural policy. We've basically taken public dollars and funneled those into agriculture with the idea that if agricultural did well, rural would do well. That hasn't been the case for some time."⁷³

Much of U.S. agriculture today does not fit our iconic picture of rural America. In fact, most agriculture in the U.S. is considered by the USDA as "conventional" or "corporate" agriculture. The corporatization of agriculture, made possible by the capital innovations of the 20th century, has led to specialized crop production that yields high volumes of production, made possible by use of pesticides, fertilizer, and external ener-

gies, all exploiting economies of scale. Most of the meat, dairy, and eggs that we eat come from highly-concentrated livestock feedlots.⁷⁴ Today's conventional, large-scale agriculture has had a significant impact on the people and communities of rural America. One farmer today can produce more output than five farmers in 1940. The number of farmers in the U.S. has dropped almost 80 percent since 1910, from 40 million to about three million. The number of farms in this country has also plummeted, from over six million in 1910 to two million in 2008, with the average farm size almost tripling from roughly 150 acres to 418 acres in 2007.^{74,75,76}

The ecological impact that this type of agriculture has had on the Great Plains does not call for the exit of agriculture but calls for a new kind of agriculture. Depletion of the Ogallala Aquifer, soil erosion and compaction, and degradation of the Great Plains ecosystem are some of the environmental consequences of our conventional agriculture. Some critics have taken this to mean that if the Plains communities are to be sustainable, they must start to practice an agriculture that preserves the associated land and environment.⁷⁷ If agriculture is the heart of rural America, then how do rural communities best

act in accordance with this essential nature? The biggest challenge of "sustainable agriculture" is determining what the concept could possibly mean and how it can turn both economic and ecological profits.

While the demographic trend of the region is certainly cause for alarm, it is by no means a death sentence for the West and its rural communities. Rural communities of the Eastern Plains have weathered depression and despair many times in their past and will surely exist to weather such

forces in the future. The question at hand is what will these rural communities look like going into the future? To continue with a "business as usual" approach would be to allow the region to be at the whims of the economic and natural vicissitudes that have plagued the region since settlement. Larry Swanson of the University of Montana sees a continuation of consolidation on the plains, but sees hope for the "middle-sized places in middle places" that "can serve as lifelines into larger areas of rural decline."⁷⁸ However, for those "'small places in big spaces' it is harder and the strategies have to be focused on the big spaces and what special attributes they may have that could draw people back."⁷⁸

What strategies can be implemented for these "small places in big spaces" that help to avoid the historical economic and social turbulence? Development of energy sources both nonrenewable and renewable is one possibility, while the return to a pre-white settlement Great Plains and the marketing of an American Serengeti is another potential avenue. However, all possibilities for rejuvenation do not require drastic shifts to new industry; many of the practices currently being conducted

on the plains need merely to shift course to support a more economically and ecologically sound future. Dale Lasater's holistic cattle ranch in Matheson, Colorado is one example of a business that transformed itself from its traditional practice to one that has taken on a more ecological and economically viable approach and has increased profits through developing the niche market of grass fed and finished beef. This innovation was not pushed upon the Lasaters by the federal government or any other outside organization, but began with the family's desire to increase profits while also encouraging the natural cycles on the prairie. It is this ingenuity of individuals on the Eastern Plains, encouraged by years of resilience at the whims of nature and economic instability, which has hardened the resolve of its inhabitants and will be the greatest source for potential rejuvenation going into the future. Mark Muro, research director of the Brookings Mountain West, remains optimistic for the Rocky Mountain region because of what he calls the "Western Proposition" and comments, "self-help is a huge theme in the West -- both as a matter of necessity but also as an ethic. Self-reliance is going to be critical to finding truly sustainable indigenous sources of growth."⁷⁹

One of the greatest avenues for this ethic of "self-help" to aid Eastern Plains' inhabitants is for farmers and ranchers to transform their already existing agricultural practices towards those that are more adapted to the ecology of the Eastern Plains, thus making them more sustainable. However, some find the notion of sustainable agriculture to be an oxymoron. Jared Diamond referred to agriculture as "the worst mistake in the history of the human race."⁸⁰ There are then those like Wes Jackson and Allan Savory, who advocate a more holistic approach to agriculture.

"If Jackson's dream ever becomes reality, the future will see poly-cultural perennial agriculture. The world will see crops that do not deplete natural soil nutrients, do not consume the dwindling supplies of water and oil as rapidly as conventional agriculture, and -- since the crops won't require much, if any, cultivating- they don't destroy the topsoil."⁸¹

These ecological benefits are up against the high production levels and financial profits that corporate agriculture seeks each year. Grass-fed beef has emerged as its own unique beef product amongst the cattle industry, and thus sells to niche markets like Whole Foods and Natural Grocers. Third-party certifications of environmental ethics in cattle grazing could potentially help incentivize eco-friendly cattle grazing that benefits environmental health, but for now most of America's beef consumption will be fattened and finished on feedlots with large environmental footprints.⁸²

Rural Policy Initiatives

Many rural development organizations have

encouraged conservation easements, a separable interest in real property that limits the use of the land in specific ways and that can be enforced by a land trust, a nonprofit land conservation organization, or government agency.⁸³ Conservation easements are legal agreements that work to protect the environmental value of private land. They set limits for land use and work to ensure that conservation goals of privately owned land are being upheld.⁸⁴ The government can alternatively take action to buy back land that is no longer in production, in general, paying landowners 30-50 percent of the land's full value for a conservation easement.⁸⁵ However, rising crop prices and subsidies have led many farmers to put Conservation Reserve Program (CRP) lands back into production. In 2007, 820,000 acres of grasslands disappeared from the CRP.⁸⁵ Land conservation in rural development can also be brought about through incentives. Taxing is one such avenue to encourage development consistent with their conservation goals, recognizing that the public needs to support their public goods. Tax Increment Financing is a tool to allocate tax money toward improving sidewalks, utilities, and even planting trees in place of devel-



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opment, so long as it is consistent with the community's vision. This is more commonly found in urban areas, but the same underlying principles can be applied in rural areas too.

A Main Street Initiative program is another way to keep cultural and natural assets alive in rural communities on the Great Plains. Tax Increment Financing that recognizes cultural and historic assets can help restore economic vitality to historic Main Streets, rather than expanding development away from the town's center. Main Street programs can help bring economic diversity to the center of community, fostering community interaction and dynamic within the town's Main Street, whilst preserving the natural surrounding amenities.⁸⁶

Federal Efforts to Help Rural Communities

The federal government has undertaken a new paradigmatic approach to national economic development by targeting regional clusters as central to local, regional, and national eco-

Table 3:
Wind Power Capacity (MW)

State	1999	2004	2009
Arizona	0	0	0
Colorado	22	231	1,068
Idaho	0	0	105
Montana	0	1	271
Nevada	0	0	0
New Mexico	1	266	497
Utah	0	0	20
Wyoming	73	285	814
Rockies	96	783	
United States	2,472	6,723	28,635

Source: National Mining Association, National Renewable Energy Lab- USDOE

conomic growth. This paradigm shift in economic development encourages tapping into regional industrial clusters, so that our economy can grow from the “bottom-up.” The government budget for 2011 reads,

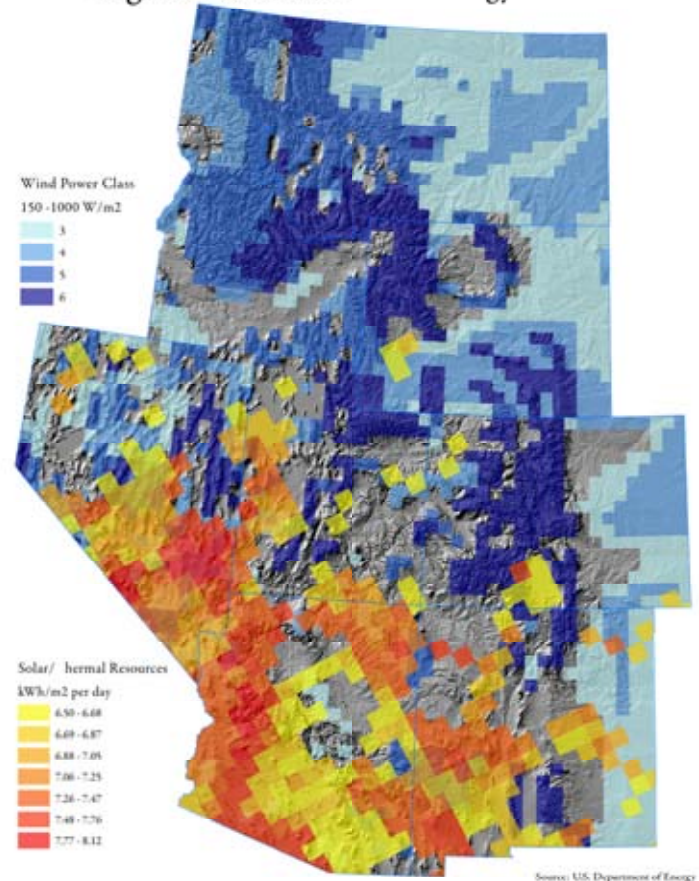
“We need to recognize that competitive, high-performing regional economies are essential to a strong national economy. That’s why the President announced a broad-based initiative to review how Federal policies impact local communities and to better target and coordinate resources across agencies to promote job creation environmental sustainability, and broad-based economic growth.”⁸⁷

Further, a new Harvard University economic study has supported the concept that clusters produce, “higher growth in new business formation and start-up employment.” These reports have led the Small Business Association to encourage the use of regional cluster development to enhance a region’s “ability to compete on a national and global scale.”⁸⁸

The USDA is among the four federal agencies that have been working together to encourage smart regional innovation for economic development in America. Among these, the USDA is calling for a new Regional Innovation Initiative to marshal federal resources to promote more economic opportunities in rural areas. Support for these regional projects will be designed to meet local needs, and funding will come from funds set aside for about 20 other existing programs (roughly five percent). The USDA has structured its budget summary for 2011 around four strategic goals: 1) promoting agricultural production and biotechnology exports to help increase food security; 2) ensuring access to nutritious and balanced meals; 3) building self-sustaining, repopulating, and economically thriving rural communities, and 4) ensuring that national forests and private working lands are conserved, restored, and made more resilient to climate change, while working to enhance water sources.⁸⁹ The USDA’s challenge is to convert this dogma into actual programs on a regional level that benefit rural communities.

The 2011 federal budget provides \$900 million for direct farm operating loans, and \$1.6 billion for guaranteed loans. These loans should serve an estimated 22,500 farmers (15,000 of whom will received direct loans, and 7,500 loans will receive guarantees). The availability of these loans provides short term

Figure 19: Wind and Solar Energy Potential



credit to farmers who need help financing costs to continue improving farm operations, like purchasing seed, fertilizer, live-stock, feed, equipment, and other supplies (capital costs).

As far as farm ownership loans go, the USDA budget provides \$475 million in direct loans and \$1.5 billion for guaranteed loans. These loans will give about 7,100 people the opportunity to either acquire a farm or keep an existing one. About 2,800 borrowers will receive direct loans and 4,300 will receive guaranteed loans. The USDA 2011 budget has increased grants by \$14 million from the 2010 level for the Rural Energy for America Program, a renewable energy loan and grant program for the purchase of renewable energy system. The budget also requests \$17 million in discretionary funding to support a program level of \$50 million for Bio-refinery Assistance Program. With this funding, the total available for Section 9003 Program is over \$950 million.⁹⁰

While the result of federal money being allocated to rural communities may seem like another government ploy, not too different from the original Homestead Act, one fact is certain —rural regions have an impact on urban areas and our nation as a whole. Just exactly what role rural areas are going to play will be answered over time, with the growing cost of natural gas and oil likely showing us our answer. Faced with rising energy costs, rural communities have begun to recognize that they must tap the plethora of renewable energies in their region to improve their overall economic viability.⁹¹ Not only does this development of renewable energies potentially lower utility costs for rural residents, rural areas pose great potential for the development of larger scale renewable energy production as the U.S. attempts to promote domestic energy sources and reduce its reliance on fossil fuels.

Wind Energy

The Rockies region has seen a great rise in the development of renewable energies over the past 10 years with wind energy showing a 3,904 percent increase in capacity.⁹² As shown in **Table 3**, in 1999 the Rockies produced just 96 megawatts of wind energy, in 2004 that statistic rose to 783 MW, and in 2009 it reached 3,748 MW.⁹² **Figure 19** depicts how many of the areas in the EPAZ have rich wind potential with northeastern Wyoming showing some of the greatest potential for wind energy. Wind development is already underway in all four states that the EPAZ spans and the various projects have already shown economic benefits. The National Renewable Energy Lab (NREL), based in Golden, Colorado has documented the economic development impacts of Colorado's first 1,000 megawatts of wind energy.

By implementing a Renewable Portfolio Standard (RPS) through state legislation, Colorado was able to power the equivalent of 248,000 homes with wind by January of 2009, nearly 12 percent of the state's total housing units.⁹³ In addition to the 1,700 full-time jobs created during the construction period, wind projects in Colorado created 300 permanent jobs in the state's rural communities, totaling \$14 million in annual payroll.⁹³ Further studies conducted by the NREL also show the potential benefits of Montana and New Mexico reaching the 1,000 MW mark. In New Mexico, 487 direct and indirect local jobs would be created, totaling \$41 million per year to local economies.⁹⁴ If Montana was to reach the 1,000 MW mark, 547 long term jobs would be created, totaling \$43.8 million per year to local economies.⁹⁵ Additionally, in 2004 Montana and New Mexico ranked fifth and eighth respectively nationwide in tons of carbon dioxide (CO²) produced for electrical consumption per capita. Wind energy would take great steps in reducing this carbon footprint, eliminating 2.6 million tons annually in New Mexico and 2.9 million tons annually in Montana. Additionally, New Mexico would save 1.1 billion gallons of water annually and Montana would save 1.2 billion gallons annually. Both statistics regarding carbon dioxide (CO²) and water consumption are especially valid in lieu of potential legislation limiting carbon emissions, and water shortages across the country that are often felt most strongly at the rural agricultural level. Benefits to rural communities would also come from the initial and annual payments to the landowners on which turbines are erected. Local property tax in states and rural areas would additionally rise, allowing for communities to invest in social amenities that would subsequently draw migrants to the area. To achieve the goals of the U.S. Department of Energy's Wind Powering America, which calls for 100,000 megawatts of wind power by 2020, the U.S. Department of Energy estimates that during the next 20 years, \$60 billion in capital will be invested in rural America, providing \$1.2 billion in new income for farmers and rural landowners, and the creation of 80,000 jobs.⁹⁶

Despite the advantages, wind energy development in the West has not come without its share of costs and complaints. Many of the most excellent or outstanding areas for wind power are in rural areas, where both the noise and construction have been considered aesthetically unappealing to locals. Some companies, like Caithness Energy who is constructing a wind

farm in eastern Oregon, offer to pay residents who live near wind farms to not complain about the noise or the unsightliness of the turbines.⁹⁷ Birds, bats, and other in-flight creatures may also risk harm from wind turbines. Not only do wind turbines pose risks to species, they threaten the migratory corridors and pollination, and insect management capacities of both bats and birds, potentially altering the grasslands ecosystem.⁹⁸

Wind turbines, which stand anywhere from 200 to 400 feet, have also been reported to interfere with aircraft radar. While no major incidents have yet to be reported, the rapid rotational speeds of the blades can mask aircraft on civilian and military radar. With speeds up to 200 mph, the blades can cause radar "clutter," producing penumbral effects that can hide planes and prevent radar signals from reaching targets. The rotation has also been found to interfere with meteorology by mimicking thunderstorm patterns.⁹⁹ The interference with radar has led to concerns with the Department of Defense, the Department of Homeland Security, and the Federal Aviation Administration (FAA). Proposals for turbines are required to be submitted to the FAA for review, which has jurisdiction over any structure over 200 feet high. As wind farms grow, concern rises, spurring research for new possibilities, among which are new "stealth" blades for turbines, to make the blades invisible to radar, which is being worked on by companies such as Vestas. Other possibilities include radar upgrades and more careful structuring of wind farm layouts. Until a workable solution is found, the FAA will continue to handle wind-turbine cases to ensure safety.

Solar Energy

A similar trend has been seen in the development of solar energy throughout the U.S. with a 36 percent growth in solar industry revenues in 2009, even with the economic recession. However, total solar capacity greatly lags behind wind capacity, with the entire U.S. producing 2,108 megawatts of power, less than the wind capacity of Colorado and Wyoming combined.¹⁰⁰ However, the continued venture capital support for the solar industry, which totaled \$1.4 billion in 2009, shows great promise for the industry, especially when considering the proportion of capital going into solar in comparison to the rest of the renewable energy industry.¹⁰¹ Additionally, national growth of 441 megawatts in 2009 shows that the development of solar energy is climbing sharply.¹⁰² As for the Rockies re-

Figure 20: United States Ethanol Production

Source: Renewable Fuels Association, Historic U.S. Ethanol Production, <http://www.ethanolrfa.org/pages/statistics>

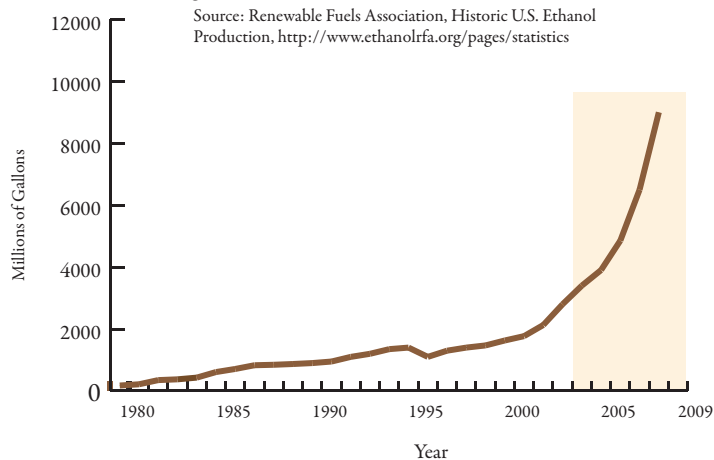
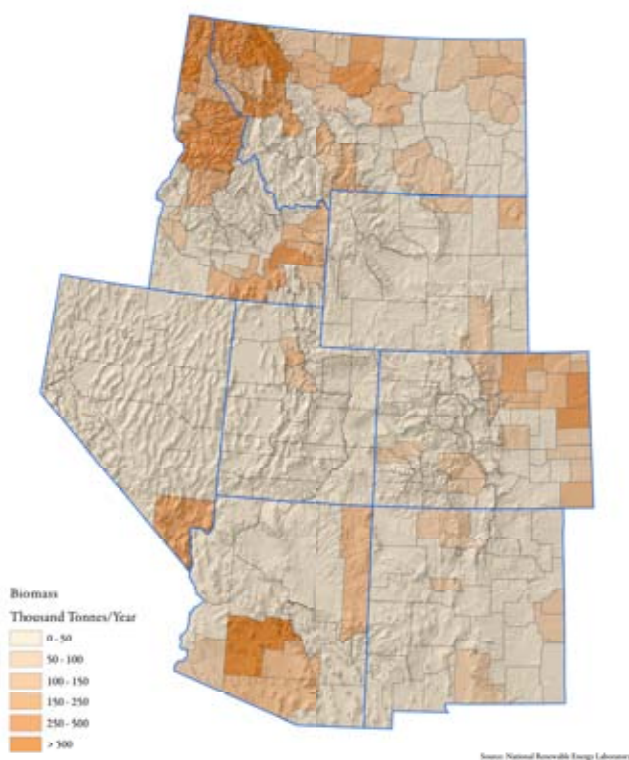


Figure 21: Biomass Potential Map

gion, Nevada, Colorado, and Arizona came in third, fourth, and fifth respectively in the nation for cumulative capacity.¹⁰² The Rockies region experienced a 31 percent increase in solar energy produced in 2009, resulting in a cumulative 212 megawatts of solar power generated by the end of 2009.¹⁰³ Arizona and Colorado had the greatest levels of development, with each state bringing on roughly 23 megawatts of new solar power in 2009; this resulted in a 64 percent increase in solar power generated in Colorado and an 88 percent increase in Arizona.¹⁰³ As seen in **Figure 19**, the Eastern Plains counties of the Rockies have excellent solar potential, especially in the southern region of Colorado and New Mexico. Solar energy provides an excellent source of small-scale energy production on the roofs of homes and businesses, allowing individuals and towns to lower their utility costs.¹⁰⁴

Ethanol

Ethanol production is one of the fastest growing energy sectors in America. Spurred by the OPEC crisis of the late 1970's, the U.S. ethanol industry began by producing just 175 million gallons in 1980, but has seen a steady increase ever since.¹⁰⁵ As depicted in **Figure 20**, by 1990 ethanol plants across the country were producing 900 million gallons annually and by 2000 production had exceeded 1.6 billion gallons.¹⁰⁵ However, the most profound growth has occurred in the new century with the greatest boom from 2005 onward.¹⁰⁶ Encouraged by government subsidies and legislation, national ethanol production reached 10.7 billion gallons in 2009.¹⁰⁷

However, the future of ethanol production is not without controversy. Scholars have asserted that the ethanol industry's production has begun to level out, or will soon because of the increase in corn prices and restrictions on additional cropland.¹⁰⁶ Additionally, in lieu of the rising national debt, some have pushed for the abandonment of subsidies for the fuel.¹⁰⁸

The Congressional Budget Office has calculated that it costs taxpayers \$1.78 to produce a gallon of ethanol made from corn and \$3.00 to produce a gallon of cellulosic ethanol.¹⁰⁹ Certain energy scholars believe that the energy balance for corn-ethanol production is actually negative, thus more energy is put into the processes of production than is actually finally produced.¹¹⁰ However, the USDA maintains that there is actually a positive net energy output when comparing amounts of fossil fuels used in production to the amount of ethanol finally produced.¹¹¹

Creation of ethanol plants may still offer great potential for rural areas and with new developments in ethanol production; many plants have the potential to be farmer-owned and dispersed throughout rural areas.¹¹² Ethanol production presents many employment opportunities throughout the rural region of the Eastern Plains. In 2007 ethanol production added \$47.6 billion to the nation's Gross Domestic Product, while additionally creating 238,541 jobs throughout the American economy.¹¹³ An additional appeal of ethanol production is its ability to retain the traditional agricultural industry of a region by encouraging higher crop prices and land values, thus benefitting farmers for a practice they had already been undertaking.¹¹⁴ Various counties illustrated in **Figure 21** show high potential for biomass ethanol production, including northeastern Montana and the Eastern Plains of Colorado. Additionally, the October 2010 decision by the Environmental Protection Agency (EPA) to allow for an increase from 10 percent ethanol blended into gasoline to 15 percent shows the potential for increased demand into the future.¹¹⁵



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Oil and Natural Gas

Production of traditional energy resources has long been an important economic dimension for the Rockies region. The reserves of these traditional energy resources also pose a potential source of economic revitalization for the future of the Eastern Plains region. As of February 2010, the Rockies region produced eight percent of the nation's crude oil with New Mexico leading the region, supplying three percent of total U.S. production.¹¹⁶ The eight-state Rockies region has an even larger share of the nation's natural gas production with 27 percent of 2008's total output.¹¹⁷ Encouraged strongly by the Powder River Basin of northeastern Wyoming and southern Montana, the Rockies region mined 52 percent of the nation's total coal produced in 2008.¹¹⁸ Considering the vast reserves of fossil fuels already lying beneath much of the Eastern Plains region and the extensive infrastructure already developed for traditional energy sources, oil, natural gas, and coal extraction pose a potential source of economic revitalization for rural

communities. However, the volatility of energy prices could make communities susceptible to the traditional boom and bust cycles of the Great Plains and historic mining towns. The booms that might develop out of rising energy prices could put pressures upon local communities with an influx of workers that would subsequently strain the already minimal social services in local communities.¹¹⁹

New Homestead Legislation

The Homesteading idea was reborn in late 20th century. In the 1980's, people began to realize that the strategy being followed by most small rural towns to try to stimulate population growth was not working. Most were trying desperately to attract large businesses, known as "elephant hunting," which often resulted in companies taking advantage of economic incentives and moving on or going out of business. Richard Wood notes the devastating experiences of "elephant hunting" in Eastern Plains communities in *Survival of Rural America: Small Victories and Bitter Harvests*. When a pickle factory, the largest employer in the towns of Lamar and La Junta, Colorado, closed down in 2005, these communities lost 453 jobs- over 10 percent of their workforce.¹²⁰ Rural communities like La Junta and Lamar, whose workforce is employed by one major industry, suffer devastating losses to the population, community, and economy when that industry closes. Over the past 20 years aging populations, low levels of income, and mass out-migration from many rural communities across the Eastern Plains has been depicted by census data. To rejuvenate some of these communities, New Homestead legislation has been proposed to encourage people to stay and start new businesses.

New Homestead Legislation of 2003 and 2007

Senators and representatives from those states with a high percentage of high out-migration counties have periodically proposed "New Homestead Acts" to help restore a sense of community, place, and vitality to rural lands by federally subsidizing those who agree to remain in these counties through alternate businesses. The new legislation would achieve its goals by offering a number of financial incentives to people willing to commit to live and work in high out-migration rural areas for at least five years. Including helping them buy a home, pay for college, and start a business.

Two Senators from North Dakota, Byron Dorgan (D)-in Congress since 1980, and Kent Conrad (D)- in Congress since 1986, along with eight other senators, introduced a bill called the New Homestead Act in 2003, specifically targeting communities with declining populations. This bill's aim was to "rekindle the spirit of the Homestead Act of 1862...and enact policies that offer hope and opportunity to the Heartland once again [including] incentives to buy a home, pay for college, and get the financing [needed] to launch or expand a business."¹²⁰

To some, the idea of a new Homestead Act brings back images of boom and bust, and the disastrous agriculture that led to the Dust Bowl. To others, it means recreating the legislation from which rural America was born, and thus the only way rural America can be revitalized and renewed. Democratic Sena-

tor Byron Dorgan has pushed the bill with the view that,

"history has already provided us a model for how to help communities in the Heartland that are hurting – and that's the Homestead Act of 1862. If we are going to reverse the effects of out-migration, and help bring prosperity back to the Heartland, we need to rekindle this spirit. We need to launch a new and equally bold initiative that challenges a new generation of Americans. And we need to do this not just for the sake of the Heartland, but for the entire nation."¹²¹

The 2003 New Homestead Act proposal claimed to benefit not just the Heartland, but America as a whole. Congress did not buy it, as the bill could only muster 16 supporters in the Senate. In 2005, Senator Norm Coleman(R) from Minnesota proposed the Rural Renaissance Act, which addressed infrastructural deficiencies in rural America and proposed allocation of \$50 billion in grants and loans for water and wastewater plants, telecommunications, police and fire facilities, hospitals and nursing homes, not to mention, renewable fuels projects. Despite the innovative infrastructural change that this bill proposed, it similarly went down to defeat in Congress.¹²²

Many opposed to the New Homestead Acts do so in opposition to further human settlement and the impacts of development on native prairie, and favor alternative energy proposals or conservation as a way to maintain vitality of the region. Others are hostile either to the expenditure of federal dollars or the presumed ineffectiveness of federal bureaucracies. Some believe "market forces" should be allowed to work themselves out in regions like the Great Plains, and find the outcome acceptable even if continued decline and abandonment is the result.

Conclusion

What then, is the best way to revitalize a declining region and its communities? What incentives can be put in place to assure a viable and healthy population, workforce, economy, and environment? Related but more profound questions arise: should these communities and region be rejuvenated by government? Or should "market forces" and profound swings in demographics and global economic forces determine what is saved and what is allowed to die? Many counties across the Eastern Plains Agricultural Zone have communities that are on the verge of, if they are not already, becoming ghost towns. Shall they be returned to near pre-Anglo conditions largely devoid of human population, as the Poppers have proposed? Or shall actions and policies be put in place to ensure that new businesses and homes and schools form the next generation "Great Plains"? While the New Homestead Act of 2007 was meant to "reward the hard work and risk of individuals who choose to live in and help preserve America's small, rural towns," legislators must also take into account the profound lessons and major failures from our past settlement efforts of the Great Plains if the nation is to plan wisely for our future.

¹ President Lincoln signed the original Homestead Act into law in 1862, which entitled citizens over 21 or the heads of households to apply for plots of land up to 160 acres, which they would then cultivate and improve for five years, after which they would be fully entitled.

² S.C. Forrest, et al., *Oceans of Grass: A Conservation Assessment for the Northern Great Plains* (Bozeman: WWF-US, 2004), 53, 20

³ Fritz L. Knopf and Fred B. Samson, editors, *Ecology and Conservation of Great Plains Vertebrates* (New York: Springer-Verlag, 1997), ?

⁴ S.C. Forrest, *Oceans of Grass*, 12-30, 26,24

⁵ Dan Licht, *Ecology and Economics of the Great Plains*, (Lincoln: University of Nebraska Press, 1997), 19.

⁶ S.C. Forrest, *Oceans of Grass*, 26-27, 29, 37, 37, 37, 37, 36

⁷ S.C. Forrest et al, 19.

⁸ *American Serengetti*, DVD, (Washington, D.C.: National Geographic Society, 2010).

⁹ Fred B. Samson, Fritz L. Knopf, and Wayne R. Ostlie. "Great Plains Ecosystems: Past, Present, and Future." *Wildlife Society Bulletin* 32, no. 1 (2004): 6-15.

¹⁰ Dale G. Brockway, Richard G. Gatewood, and Randi B. Paris. "Restoring Fire as an Ecological Process in Shortgrass Prairie Ecosystems: Initial Effects of Prescribed Burning during the Dormant and Growing Seasons." *Journal of environmental manage-*

Case Study:

Judith Gap, Montana



© Russell Clarke, Judith Gap, MT

In the center of Judith Gap sits the Mercantile, which appears to be the only operating service concession in a 20 mile radius and home to arguably the “world’s best milkshake.” A short walk down the street lives Harry Peck, Judith Gap’s resident historian. Harry Peck’s life has revolved around this small town that like many other small towns west of the Mississippi came alive with the railroad industry. In 1908, the Great Northern railroad opened up a slew of railroad stations across Northern Montana including Judith Gap. In August of that year, the Great Northern sold their property to the community; Judith Gap became a change over stop for train crews and a refueling station between Great Falls and Billings, Montana. A new wave of Homestead legislation, like the 1902 Newland Reclamation Act, sought to open up the land for settlement, encouraging irrigation in more arid regions of the West. Settlers and immigrants, particularly of Scandinavian and German descent, boarded those trains to claim land that they could till in hopes of making a living and profit.

Thus Judith Gap was born in 1908; becoming known as the “biggest little town between Billings and Great Falls,” home to a movie theater, bar, prosperous Main Street, and about 1,500 residents.¹ It was a small town economically driven by the railroad industry and supported by agriculture, but by the middle of the 20th century, Judith Gap began to see major changes as a result of shifts in those industries. The switch to diesel fuel for trains and the advent of the automobile saw the removal of the Milwaukee Railroad in the late 1960’s; the harsh effects of this departure were immediately felt in this small town. Another major economic lifeline, Judith Gap’s agricultural productivity, also began to shrink with the mechanization of agriculture, and the end of homestead legislation. Mr. Peck explained that his

father was one of the first to have a four wheel drive tractor in the area, increasing the number of plowed acres per day from two to three, to 200 to 300.² Ironically such modern agriculture both reduces employment and expands output simultaneously.

Without the railroad lifelines, however, markets for agriculture were dramatically reduced. Farmers and ranchers had to travel many miles to get their product to the consumer. “There was not much to draw people to the area,” explained Mr. Peck, who in 1985 sold the family owned farm where he was born and raised, to a neighbor.

Development of Wind Farm

Prosperity in Judith Gap in the second half of the 20th century was hard to come by. Many residents packed up and left, some stayed, and those who did were not getting any younger. Little economic innovation had been brought to the community until the development of the Judith Gap Wind Farm, developed with the help of a farmer named Bob Quinn, from Big Sandy, Montana. In 2000, Quinn tracked his German ancestry and on a visit to Germany he found that distant relatives were using wind energy to turn a profit. Quinn saw the same potential for Montana, which boasts outstanding areas of wind energy potential all across the state including places like Judith Gap. In 2004, Quinn sold his project to Invenergy, a Chicago-based energy company, which was approved by the Montana Public Service Commission to sell power to NorthWestern Energy in 2005, central to the success of the project. A 20-year contract was established, where Invenergy will sell their power to NorthWestern Energy for \$31.75 per megawatt hour.³

At the Judith Gap wind farm, the 90 turbines antici-

pate providing approximately seven percent of the energy for Northwestern Energy's 300,000 customers.⁴ This means that in total, the wind farm capacity is 135 megawatts with an expected annual output of 450 million kW hours, with possibility for expanding to 188 megawatts in the future. The power produced by the wind farm enters the Norwest Energy grid. The wind speed minimum for the turbines is 10 mph and the maximum is 55 mph, with the ideal production speed being 24 mph.⁵

The Invenergy Wind Farm entrance sign off of Highway 191 points out the role of wind farms in job creation and economic stimulation. There is no doubt that the wind industry has opened up new jobs, particularly as more and more domestic manufacturing facilities have opened up in the U.S.. The American Wind Energy Association reported in June 2010, that when known announced facilities come online to join existing facilities running at capacity, more than 14,000 additional jobs will be created in the wind manufacturing sector, bringing total employment to over 30,000 jobs in the United States. Overall, the industry employed around 85,000 workers directly and indirectly in 2009.⁶

A trip to Judith Gap, however, called into question the benefits that wind farms have on employment and economic opportunities in rural communities like Judith Gap. Is a wind farm enough to revitalize a community? (Probably not.) After diesel replaced the railroads, larger homes started to be built in Harlowton, Montana, the neighboring town about 20 miles south of Judith Gap. More townspeople began to migrate from Judith Gap to Harlowton. Today many of the permanent employees at the wind farm live in Harlowton.⁷ Thus it is worth asking, which communities is the wind farm benefiting and how is it contributing to the notion of "self-sufficiency" in the West? The wind farm takes all of 12 people to operate, yet the manufacturing and assemblage of the turbines for the farm is a multi-corporation effort. About 300 temporary workers were employed during the construction, mostly coming from Harlowton, Montana and the areas surrounding Judith Gap.

Many components of wind farm equipment, as with many other wind farms in the United States, are produced by

numerous foreign manufacturers. However, in 2009, the German company, Fuhrlander AG, opened up a wind turbine manufacturing site in Butte, Montana. Other manufacturing operations close to the Judith Gap wind farm are in North Dakota, Colorado and Canada, though some components have come from Europe and Brazil. Still, these manufacturing operations employ most people from cities where there are already large manufacturing industries established. Furthermore, Montana's aging population and labor shortage that is expected with the coming generation, leaves little motivation for manufacturing companies to open up long term employment opportunities in places like Judith Gap.

Despite growth in the past few years in domestic wind turbine manufacturing, the demand for foreign manufacturing is due in large part to the incentivized manufacturing operations from the Chinese government and from European Renewable Energy standards. In 2001, The EU passed the RES-E directive, indicating a target that 21 percent of electricity comes from renewable energy sources by 2010, which has been argued to be the single most globally important case of legislation for wind energy. The EU legislation sparked many European countries, outside of the original pioneers of Germany, Spain, and Denmark, to adapt legal frameworks for investments in wind power and other renewable electricity sources. European companies have not only become leaders in wind power, but Europe is receiving commercial benefits from exports and environmental benefits, while also creating employment and spurring innovation⁸. In the U.S., statewide incentives for renewable energy, like Montana's 2007 "Clean and Green" energy law, have provided some incentive for wind energy companies by reducing property taxes for those businesses. This has allowed for the planning of more than 50 wind energy projects in the state. The wind farm in Judith Gap has certainly been a major step in the push that legislative efforts, at all levels, have made toward renewable energy.⁹

Coincidentally, the wind farm sits next to one of the 450 intercontinental ballistic missiles (ICBM) that dot the landscape across Wyoming, North Dakota, and Montana. Con-

cerns were expressed during the initial construction of the site, that the farm would be constructed on the land that held the ICBM silo. These silos are maintained by military men and women, who pass through Judith Gap daily to stop for a milkshake or food at the Mercantile, usually coming from Great Falls.¹⁰ There had been concerns that wind farm development would impede the ICBM silo site. As it is today thankfully, the Judith Gap wind farm and the intercontinental ballistic missile can both stand in harmony.

About 300 jobs opened up during the installation of the wind farm in 2005, employing people from



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Lewiston, Harlowton, and Judith Gap, the three interconnected communities in the area. “The wind farm,” Mr. Peck explained, “was good for several months.” These jobs were mainly construction jobs building roads and ditches, employees coming from different unions in the area. This type of labor brought in “transient type workers,” who did not bring their kids with them to Judith Gap. When the industry came, they hired as many locals as they could. However, many employment opportunities only lasted as long as it took to finish the project, which was just a few months.

The question still remains, how does Judith Gap benefit from the wind farm operation? Mr. Peck could only tell us what he knew from hearsay. Those who owned the land where the wind turbines were established supposedly received \$3,000 for every site and every tower. These people also received a minimum royalty for the power generated, plus a bonus if more power is generated from the turbines. They were required to set up a local impact fund that they pay into (which programs then apply to every year to for funds for community development). The Judith Gap school, of about 30-40 students, received \$50-60 thousand in funds for renovations. With the larger



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school in Harlowton attracting many children from Wheatland County, the Judith Gap school remains “awfully hard” to maintain.¹¹ As for the future of Judith Gap? Mr. Peck said that he didn’t see any real hope of economic rejuvenation. He described Judith Gap, “without any economic activity locally, it’s just the farmers and their kids. The kids move on to another program, then college, then a job elsewhere. Most of the farms that are here have descendents that are running them, but there is nothing really to increase the area.”¹² He and his wife did however, offer us a homemade cookie, and asked us to stay.

Judith Gap has a limited benefit from the wind farm, temporary jobs during construction and royalties from the production. One might ask if Judith Gap is not the sole benefactor, who else is? Mr. Peck laughed when he told us about the

repair crew that was sent from Brazil to fix a turbine that had gone down early on in the project, but what effect does that have on the potential benefits of wind farms to rural areas in the Rockies? In Colorado, statewide incentives are leading the development of solar panel factories in rural areas, like Fowler, Colorado. Though Montana does have a Renewable Energy

Standard, much more could be done to utilize Montana’s renewable energy capacity. Montana boasts the fifth best wind resource in the nation, but still ranks only 16th in terms of installed capacity.¹³ In a town like Judith Gap, with a population of 164 people, and a county like Wheatland, whose median age is 42 years old, rejuvenation may not amount to a new Main Street and dollar signs. Rather, vitality may mean letting turbines set sail on Montana’s “ocean of grass,” breathing life and vitality, and letting the tissue of the Eastern Plains restore and repair.

¹ Interview with Harry Peck, Judith Gap, MT, July 17, 2010.

² Interview with Harry Peck, Judith Gap, MT, July 17, 2010.

³ “Judith Gap Wind Farm: Montana’s Gap in wind production” *Department of natural resources and conservation*. http://dnrc.mt.gov/trust/wind/judith_gap.asp

⁴ “Judith Gap Wind Farm: Montana’s Gap in Wind Production” *Mt.gov*. Montana’s official state website. http://dnrc.mt.gov/trust/wind/judith_gap.asp. accessed 11/11/10

⁵ Judith Gap Wind Farm Tour, July 17, 2010.

⁶ “Winds of Change: A Manufacturing blueprint for the wind industry” *American Wind Energy Association*. June 2010

⁷ Interview with Karena Dale, Judith Gap, Montana, July 16th, 2010

⁸ “Legal Framework for Wind Energy” *European Wind Energy Association - EWEA asbl, 2005-2010* <http://www.ewea.org/index.php?id=197>

⁹ “Less Carbon, More Jobs” *Environmental Defense Fund*. February 20, 2009 <http://www.edf.org/page.cfm?tagID=36069>

¹⁰ “Town Hosting Missiles Anxious about Nuke” *Cuts*” *Air Force Times* Matt Volz, http://www.airforcetimes.com/news/2010/04/ap_airforce_missile_towns_040310/4/3/10.

¹¹ Interview with Harry Peck, Judith Gap, MT, July 17th, 2010

¹² Interview with Harry Peck, Judith Gap, MT, July 17th, 2010

¹³ *Renewable Energy Standard 2008 Progress Report*. Montana Environmental Information Center http://meic.org/energy/energy_policy/renewable-energy-standard-progress-report

Case Study:

Phillips County, Montana



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Phillips County, Montana, lying along the U.S.-Canadian border, rests on one of the most intact grassland eco-regions left in the world.¹ The county's communities, including the county seat Malta, have long been viewed as isolated communities. However, the grassland ecosystem of Phillips County has been at the center of debate regarding the preservation of natural prairie. Since 2002, the American Prairie Foundation (APF) and the World Wildlife Fund (WWF) have been establishing the American Prairie Reserve (APR) adjacent to the Charles M. Russell National Wildlife Refuge. 3.5 million acres of potential land has been chosen by APF for the development of the reserve; this area has been deemed large enough to function as a prairie ecosystem by scientists from the Oceans of Grass ecological assessment.

The history of Phillips County followed a trend similar to the rest of the Rockies Eastern Plains communities. The land was settled throughout the 1800's with the help of James J. Hill's railroad, known as the "Hi-line", which connected a string of towns in northern Montana, including Malta, Havre, and Glasgow. The demand for hides and raw materials back East brought settlers, hunters, and trappers out West, where the Great Plains were teeming with bison. The federal government, though the Homestead Act of 1862, the Desert Lands Act of 1877, and the Enlarged Homestead Act of 1909, provided encouragement and incentives for settlement of these lands (which conveniently bolstered use of the railroad industry).² Despite opposition advice from explorer James Wesley Powell, who warned that the arid conditions of the West would not tolerate the same patterns of agriculture and settlement that had proven successful further east, settlers were dropped off in communities on the Hi-line, eager, yet ill-informed about the conditions ahead. Richard Manning quotes historian Joseph

Kinsey's account of Montana settlement, "Thousands of men, women, and children have had their lives permanently blighted by poverty—hundreds have actually starved—thousands of head of livestock have perished, acres of soil have been lost or damaged since Powell presented his plans for the plains—because Congress and the American people paid no attention whatever."³

A large influx of cattle swept into the Northern range during the early 1880's, along with capital for farming. American and European investors sought fortune in the western frontier. The later 1870's had seen a boom in American meat imported into the British Isles, stirring eagerness in English capitalists to begin farms in Montana. The cattle, (and the farmers no doubt) were not accustomed to the harsh weather on the plains, a drought in the summer of 1887 followed by a harsh winter killed off an estimated 60 percent of the Montana herds.⁴ The homesteaders who arrived near the Missouri Breaks around 1909 were among the last, for homesteading in Montana was ending fast. During the 1890's the big ranches of Kohrs, Coburn, Sieben, and Phillips had filled fifteen hundred to two thousand of Jim Hill's railroad cars with cattle every year. By 1908 the range was practically deserted.

The explosion of the sheep industry in Malta changed the concept of the open range dramatically. As many as one hundred thousand sheep came to the Missouri Breaks region each spring for shearing. Not only did this result in legal disputes between sheep herding men and women, but between farmers and ranchers. Disputes between unsettled public lands, homesteaded lands, and most importantly water occupied the courts.⁵ Water was highly disputed around the Missouri breaks, where irrigation was being experimented with, and falsely advertised to settlers. Despite how inconceivable the concept of

robust agriculture was in such arid land, Jim Hill's railroad was flooded with settlers under the false illusion of open virgin lands.⁶ Several federal acts encouraged the settlements along the "Hi-line" that some suggest should never have been created. The Enlarged Homestead Act and Desert Lands Entry of 1909 and Stock Raising Homestead Act of 1915, meant to stimulate irrigation, brought another rush of settlers along the Hi-Line.⁷ However, Manning points out how unsuccessful the results of government encouraged settlement were: "Between 1913 and 1915, five thousand settlers moved into Phillips County, which today has a population of just over four thousand."⁸

Settlers continued to realize the difficulties of making a living off the land of Montana's plains as the years progressed. Multiple years of high rainfall and the boom of World War I, followed by a drought and post-war decreased demand resulted in a fifty-million-dollar loss in Montana alone during 1919.⁹ Settlement would continue in Phillips County, but at an ever decreasing rate. Today's inhabitants have found their economic niche and thus a livelihood, often through ranching, but only after years of prior generation's toil with the elements of the high plains.

The history and current conditions of Phillips County have led to many inquiries about its future. In 1999, The Nature Conservancy published *Ecoregional Planning in the Northern Great Plains Steppe*, which located the most important regions of the Great Plains for restoring the biodiversity of the ecoregion. The World Wildlife Fund then took steps to begin this conservation plan. In 2001, the Montana based, American Prairie Foundation was formed, with goals of acquiring enough private land to maintain and create a fully functioning prairie ecosystem on the Northern Great Plains. The reserve was established just north of the Missouri Breaks in Northern Montana, in Phillips County.

American Prairie Reserve

The American Prairie Reserve (APF) has three main goals: to accumulate and wisely manage, based on sound science, enough private land to create and maintain a fully-functioning prairie-based wildlife reserve; to provide a variety of public access opportunities to this wildlife amenity; and to ensure that the land remains productive in a way that contributes significantly to the local economy.¹⁰ The land around Phillips County was chosen largely because 90-95 percent was already intact grassland ecosystem. Since 2002, APF has worked to reintroduce endemic species like the bison and the black-footed ferret, to the area. Since the beginning of its preservation efforts, APF has contributed \$18.3 million dollars to the local county economy including the creation of local jobs, purchase of land and restoration of historic locations.¹¹

The American Prairie Foundation is located in Bozeman, Montana where its employees have easier access to large urban areas for development purposes. APF officials have been working with ranchers in Phillips County, buying up land that will become part of the Prairie Reserve, and working to encourage the economic opportunity that they hope the Prairie Reserve will bring to the area. Gaining the support of the community and policy makers has been of central importance and the subject of much debate.

Among the issues that the Prairie Reserve faces are those concerning the infrastructure, environment, and logistics

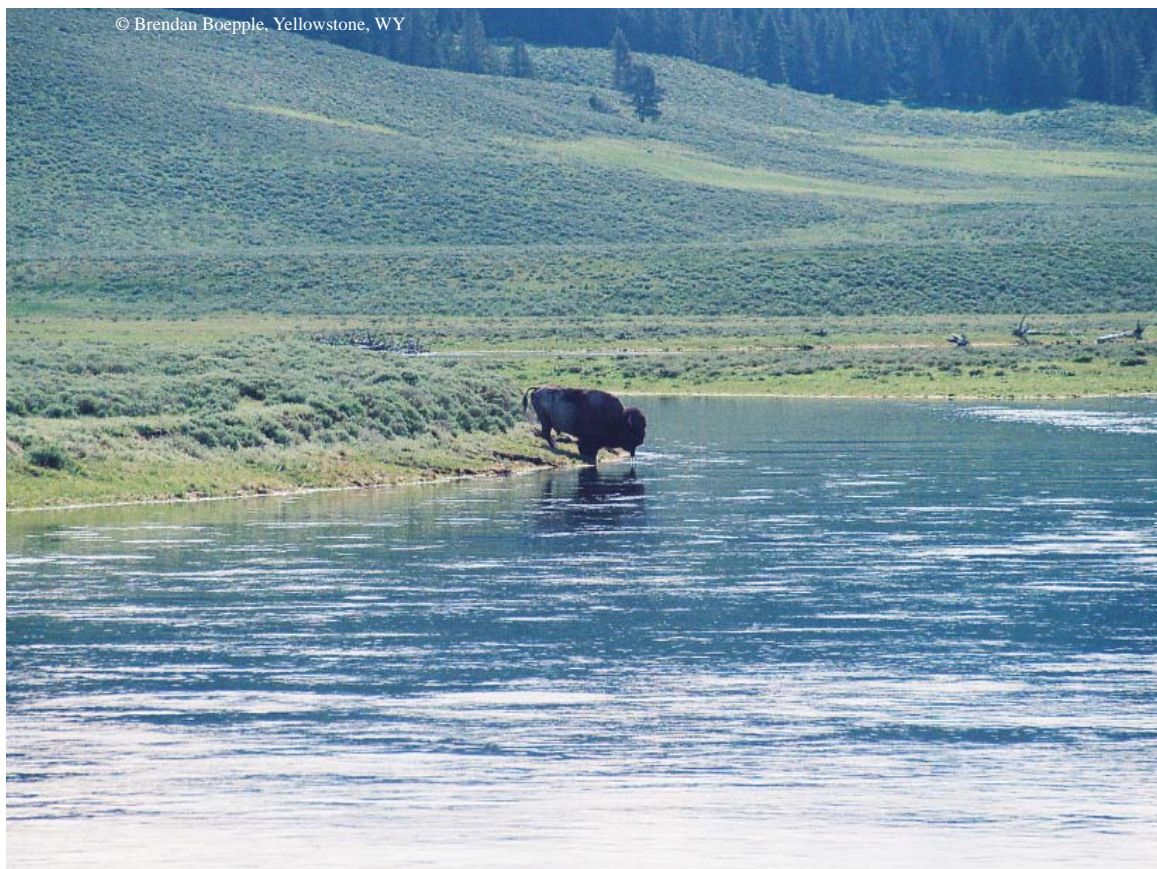
that such a project requires. Malta, Montana, the nearest town, is 60 miles from the Reserve. It still stands as a stop on the "hi-line", (serviced by Amtrak), but as of yet, has no rental car facility. Neither are there commercial airports in Malta, though airports are located in Billings, Bozeman, Great Falls, and Lewistown.

The American Prairie Foundation strongly recommends that visitors use four-wheel drive vehicles with plenty of ground clearance, given that roads on the reserve are "graveled at best and unmaintained at worst." Extreme weather conditions characteristic of the Missouri Breaks region subject the Reserve to environmental conditions that can not only be undesirable to visitors, but heavy rain and wind can even have the potential to break down infrastructural elements that connect visitors to the remote reserve. Cars have the potential to get stuck in unmaintained dirt roads when wet, which can be incredibly dangerous for visitors. The Reserve also lacks cell phone coverage, which may add to the remote experience that visitors seek in the American Prairie, may be helpful and even necessary in unexpected situations. Also absent on the reserve are gas station, the nearest reliable gas station being in Malta, Montana.¹²

The American Prairie Foundation has encountered certain obstacles in its revitalization efforts that Fowler, Colorado did not, particularly in gaining local public support. A recent incident earlier this year brings to light some of these issues. Early in 2010, an internal U.S. Department of the Interior document, that identified fourteen new sites for possible national monument designation, was leaked to Congressional Representatives. The document identified 2.5 million acres in Montana, a stretch of land from the Charles M. Russell National Wildlife Refuge to the edges of Grasslands National Park, as an area to possibly be restored and conserved as a national monument. The area includes large parts of Phillips and Valley counties. The article ignited angry responses and uproar from Montana policy makers and community members alike, and has been seen as a threat by both the community members of Phillips County and the American Prairie Reserve efforts.¹³

Federal officials and American Prairie Foundation have been working to calm outcry at the leaked document, referring to the document as "internal brainstorming." Federal officials deny that there are motions to seize these lands as a national monument, hoping to alleviate public concern. "As long as I am Secretary of the Interior, there will be no recommendation for designation of national monuments in Montana unless there is significant public involvement, discussion, and debate over any such proposal," Ken Salazar, Secretary of the Interior, wrote.¹⁴

The American Prairie Foundation has made efforts to give back to the community of Phillips County through the Community Involvement Fund. The fund, which takes the form of grants from the APF, has made contributions that stretch beyond the environmental aims of the preserve, providing the Malta High School science department with science equipment and a weather system, increasing student understanding and participation with of weather patterns and environment of the reserve. Despite these community outreach efforts, public support and involvement on the preserve may be difficult to come by. The new economy that the American Prairie Reserve hopes to establish is mainly service based, centered on prospects of eco-tourism. The idea of a "tourist" type economy has found



reiterated the notion that “preservation pays”.¹⁷ Only time will be able to tell us what the future of the Northern Great Plains holds, but it seems residents and visitors can certainly prepare by protecting its natural resources. It remains to be seen what the vision of American Prairie Reserve means for Phillips County. The value of environmental preservation has been recognized by other landowners across the Plains who are finding innovating, entrepreneurial opportunities in preservation. In Nebraska, the Switzer family has altered their cattle operation to diversify bird populations. The family has seen environmental benefits and

difficult acceptance in a county where some families have lived and farmed since their ancestors homesteaded there. Regardless of what the census numbers say about depopulation, low-income levels, and government subsidies, the agricultural tradition and identity of Phillips County has a strong influence on its willingness to become a necessary part of a Prairie Reserve. Ganay Johnson from the American Prairie Foundation noted realities and reasons for this lack of public support. Residents of Phillips County don’t live there so that they can “make latte’s for tourists.”¹⁵ Despite reluctance from certain sectors, APF has continued the project of expanding the reserve to make the idea of prairie restoration both a political, economical, and environmental reality.

The American Prairie Foundation aims to expand the Reserve to reduce the habitat fragmentation caused by agricultural and ranching usages, and to open up the Reserve’s wildlife to a greater possibility of range. The APF does so by purchasing pieces of private lands, with the intent of preserving it for public enjoyment and access. The APF representatives make it their goal to negotiate agreements with ranchers and private land-owners about the Reserve. APF’s deeded lands will eventually be put into conservation easement agreements to ensure the future protection of these lands. For some land-owners, who have long since found little utility in their land, the opportunity to sell their land to the APF is a great offer. For others, the ranches and farms they live on hold great value, having been in their family for generations. For these residents, some being ancestors of the homesteaders who first set out on the Hi-line, the prospect of giving away a piece of their home and heritage becomes a more contentious issue.¹⁶

In an interview with Frank and Deborah Popper, professors and authors of the “Buffalo Commons” proposal, Deborah

increasing returns to their ranch, in addition to be awarded Important Bird Area Status from the Nebraska Audubon Society.¹⁸ By reintroducing native species to the Prairie Reserve, and rethinking what the role that environment plays in our economy, perhaps the Poppers vision will become realized through the work of the American Prairie Foundation, and preservation will come to benefit both land and people.

¹ American Prairie Foundation

² Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 58.

³ Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 57.

⁴ Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 52-54.

⁵ Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 86.

⁶ Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 90.

⁷ Mark Harvey *Western Lives: A biographical history of the American West*. 291

⁸ Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 99

⁹ Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press, 2009. 99

¹⁰ American Prairie Foundation, <http://www.americanprairie.org/goals.html> Oct. 27th, 2010

¹¹ American Prairie Foundation, <http://www.americanprairie.org/economicOpportunity.html> Oct. 27th, 2010

¹² American Prairie Foundation Self Guided Tour. <http://www.americanprairie.org/visit/AutoTourOnline.pdf> American Prairie Foundation.

¹³ John S. Adams, “Interior officials involved in national monument ‘brainstorming’” Tribute Capitol Bureau July 6 2010 [Greatfallstribute.com](http://www.greatfallstribute.com)

¹⁴ John S. Adams, “Interior officials involved in national monument ‘brainstorming’” Tribute Capitol Bureau July 6 2010 [Greatfallstribute.com](http://www.greatfallstribute.com)

¹⁵ Interview with Ganay Johnson, Bozeman, MT, July 15, 2010

¹⁶ http://www.americanprairie.org/about/annual_reports/SothebysBrochure.pdf 14)

¹⁷ Phone interview with Frank and Deborah Popper, June 21, 2010.

¹⁸ Hill, P.J. and Shawn Regan. “The Great Plains: Tragedy or Triumph.” *PERC Reports for Free Market Environmentalist* 28, no. 3 (2010): 11.

Case Study:

Powder River Basin, Wyoming



© Russell Clarke, Black Thunder Mine, Gillette, WY

The Powder River Basin of northeastern Wyoming, the country's largest coal producing state, is home to the Black Thunder coal mine, one of the largest surface coal mines in the Powder River Basin and in North America.¹ The mine, owned by Arch Coal Inc, sits atop the largest known reserves of coal bed methane in the world.² The entire operation occurs within the Thunder Basin National Grassland, the land being leased from the U.S. Forest Service. The closest town to the mine is Wright, Wyoming, with the neighboring town of Gillette 60 miles to the north in Campbell County, and Douglas located some 80 miles to the south in Converse County. Together, these towns are home to Black Thunder's 1,600 employees. The economic activity of the mine has made it one of the most prosperous areas of the Rockies' Eastern Plains.

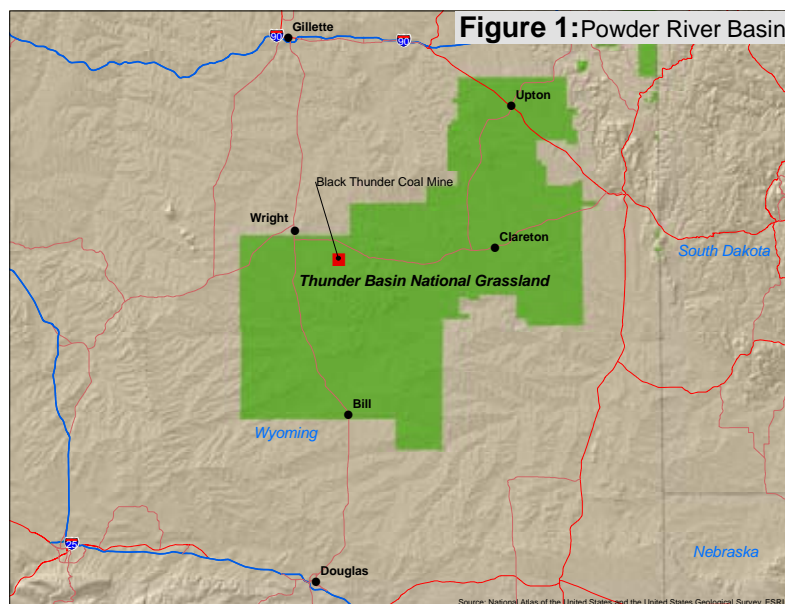
The Black Thunder Coal Mine produces low-sulfur, sub-bituminous coal used for electricity production. Wyoming coal typically has a sulfur content of 0.40 - 0.06 percent; Eastern coal typically ranges from three to five percent.³ With a heating value of 20.3J/kg in addition to the coal's moisture content, Powder River Basin coals have increased reactivity and likeliness to combust if not handled properly.⁴

Since opening in 1977, the Black Thunder Coal mine has mined and delivered nearly 2.2 billion tons of coal to America's electric generation plants.⁵ Every day at Black Thunder Mine, about 20 trains, with 120-150 cars, each holding approximately 80 tons of coal, deliver low-sulfur coal throughout 25 states. Among the mine's customers are over 115 coal-fired power plants, nearly all of whom use the coal to generate electricity for consumers. Every year, over six percent of the electricity generated in the United States comes from Black Thunder Mine.⁶ The mine has made great contributions to

America's affordable energy supply, in a nation where roughly fifty percent of the fuel for electricity comes from coal. The high economic demand for coal has allowed rural Wyoming to become something of an anomaly compared to its rural agricultural counterparts on the rest of the Eastern Plains.

As with many parts of the West that lie atop coal, oil, and natural gas, the Powder River Basin of Wyoming saw a period of economic boom during the 1970's during the world oil market crisis. Demand for domestic energy sources was accelerated by the 1973 OPEC oil embargo and the Iranian revolution in 1979. Coal beds in places like the Powder River Basin were quickly discovered and capitalized on to meet our nation's energy demand. Campbell County and Converse County saw the birth of "energy boom towns", witnessing enormous growth with the development mines across northeastern Wyoming. Campbell County, which hovered around 5,000 people, from 1920-1960 doubled to 12,957 people in 1970, and doubled again to 24,367 by 1980. In 2009, Campbell County, thanks in large part to the region's coal deposits, maintained a population of 43,967 people. Converse County, Wyoming, where Douglas is located, saw an increase in population from about 5,938 in 1970 to 14,069 in 1980. In 2009, it hosted a population of 13,578.⁷ These rural communities have retained their residents despite the recent trends throughout the rest of the Eastern Plains Region of the Rockies.⁸

While a steady flow of energy extraction has resulted in a fairly stable population for this region in recent years, the volatility of coal prices might make the region susceptible to economic vicissitudes that are often associated with the market for energy resources. However, when prices are compared with energy sources such as natural gas and oil, coal can seem



advantageous to the totality of the rural area, including the environmental effects.

Despite providing jobs for thousands of employees, and coal to fuel homes across America, mining in the Powder River Basin comes with a host of externalities that may negatively effect the environment and communities. One of the most controversial aspects of mining is the extraction of coal bed methane. Extracting the methane for natural gas requires that water be pumped from the target coal seam at rates up to 100 gallons per minute.¹⁰ Discharging this water causes extensive erosion and in some cases irreversible soil damage from high salt and sodium content. Excess sodium in soils alters its physical and chemical conditions, depriving plants and vegetation that depend on it from adequate nutrition. Excess sodium causes dispersion of clay, which lowers the permeability of the soil to air and water, while creating dense, impermeable surface crusts that greatly hinder the emergence of seedlings. Exchangeable sodium also alters pH levels in soil. High acidity or alkalin-

ity alters the ability of plant species to thrive. High salt content in water increases its salinity, making it difficult for plant membranes to absorb water, threatening the regions vegetation and biodiversity.¹¹ Each coal bed methane well produces about 20 tons of salt per year. Knowledge of sodium adsorption rate and soil types are critical for gauging the impacts of discharge water on land, particularly because water quality deteriorates substantially as it flows north, west, and south of Gillette.¹²

Energy Towns

Additionally, the Black Thunder Mine and its employees are a powerful force for their communities, supporting local economies along with education. The mine has taken efforts to support and appreciate education programs in the area, establishing a statewide K-12 classroom teacher recognition program, the Arch Coal Teacher Achievement Award. Black Thunder Mine also provides financial support to the University of Wyoming and the Gillette campus of the Sheridan Community College. We might take this cooperation between a rich industry and education to be a sign of vitality in this rural area.

The median age in Campbell County, home to Gillette and Wright, is about 33 years. The youthful population and steady employment make this rural community stand out amongst the rest of its Eastern Plains counterparts in the region, which in total has a median age of about 38. Thus the region is able to attract a youthful population to the community through its robust industry, a challenge that other communities on the Plains have struggled with. With the January 2007 price of coal at \$10.47 per ton, the United States Geological Survey (USGS) estimated that there were 10.1 billion short tons remaining in the Gillette Coal Field reserves.⁹ This estimate of the reserve is based on the current price of coal, and as demand increases price, it may become economically viable to try and mine new reserves. This may imply that so long as demand for coal keeps growing, those laborers of the coal mine will maintain their jobs, and have no reason to vacate their towns. However, given the non-renewable nature of extraction industries, and the threats to coal from the development of other energy resources, how long can we expect this rural vitality to be able to last? One must also bear in mind whether this interaction is

The Wyoming State Department of Environmental Quality is responsible for issuing water discharge permits to reduce the negative impacts to the water supply. In March 2010, the Wyoming Environmental Quality Council sided with Marge and Bill West in a case contesting one such permit held by Stephens Energy Company. The couple argued that the permit was issued under rules that the Environmental Protection Agency regarded as “unscientific.” The salt buildup from the coal-bed methane water discharge caused the destruction of 100 acres of hay meadow and 200 cottonwood trees.¹³ Such legal battles may help save land from continued damage, but this could come at an economic cost to large names in the Powder River Basin extraction industry like Arch Coal and those who benefit local employment and communities.

¹ U.S. Energy Information Administration “Quarterly Coal Report.” June, 2010. http://www.eia.doe.gov/coal/quarterly/qcr_sum.html (accessed July 27, 2010).

² Interview with Mark Vigil at Black Thunder Coal Mine July 17, 2010

³ Wyoming State Geological Survey “Wyoming’s Low Sulfur Coal.” 2002. <http://www.wsgs.uwyo.edu/coalweb/WyomingCoal/sulfur.aspx> (accessed July 28, 2010).

⁴ Mining-technology.com “Black Thunder Coal Mine, WY, USA.” <http://www.mining-technology.com/projects/thunder/> (accessed July 28, 2010).

⁵ Arch Coal Inc. “Black Thunder Mine: Delivering Coal to America.” <http://www.archcoal.com/aboutus/BT%20Brochure.pdf> (accessed July 28, 2010).

⁶ Arch Coal Inc. “Black Thunder Mine: Delivering Coal to America.” <http://www.archcoal.com/aboutus/BT%20Brochure.pdf> (accessed July 28, 2010).

⁷ City of Douglas, Wyoming “Historical Background.” http://www.cityofdouglaswy.com/index.asp?Type=B_BASIC&SEC={49979B11-FDE3-413D-97DF-00056590E20E} (accessed July 28, 2010).

⁸ US Census Bureau.

⁹ United States Geological Survey “Assessment of Coal Geology, Resources, and Reserves in the Gillette Coalfield, Powder River Basin, Wyoming.” 2008. <http://pubs.usgs.gov/of/2008/1202/pdf/ofr2008-1202.pdf> (accessed August 2, 2010).

¹⁰ Powder River Basin Resource Council, “CBM Overview.” <http://www.powderriverbasin.org/cbm-overview/> (accessed August 2, 2010).

¹¹ Powder River Basin Resource Council. *Erosion and Soil Damage Caused by Coalbed Methane Discharge Water 2009* <http://www.powderriverbasin.org/assets/Uploads/files/CBMsoildamage.pdf> Accessed August 2, 2010.

¹² Powder River Basin Resource Council. *Erosion and Soil Damage Caused by Coalbed Methane Discharge Water 2009* <http://www.powderriverbasin.org/assets/Uploads/files/CBMsoildamage.pdf> Accessed August 2, 2010.

¹³ Gruver, Mead “Wyo ranchers prevail in state CBM water case: State officials doubt ruling will have major effect on industry” March 13, 2010 http://trib.com/news/state-and-regional/article_61a9ee4e-eeb3-5fc6-b511-32112ccdf72.html

Case Study:

Fowler, Colorado



“Broad public policy and planning initiatives are interesting, and in some cases, necessary, but in the end the success of most communities individually, and of rural America as a whole, will depend more on the actions and commitment of the people who live there.”¹

“In 2008, urban population on the planet outnumbers rural for first time.”¹

Richard Wood, an astute observer of rural growth and change, argues that economic, demographic, and population statistics are not indicators of dying rural communities. What measure should be used to gauge a community’s health? Where should we put our finger if we are to find the pulse of rural communities like Fowler, Colorado and assess possible solutions? An initial hypothesis began with a set of U.S Census Bureau data documenting population decrease in counties across the Eastern Rockies Region of 10 percent or more over the past twenty years. To quote Richard Manning, author and reporter who has investigated similar questions to an extensive degree, “Depopulation is simply another abstraction trapped in numbers until it manifests itself in a community’s stories.”²

History

In 1887, the phrenologist Orson Squires Fowler stepped off the Atchison, Topeka, Santa Fe railroad at a depot just south of the Arkansas River. Appraising the land, he envisioned its potential to manifest as a fruit colony. The

fertile land around the Arkansas, surrounded by wide, open space, short-grass, and desert, appealed as the perfect and lucrative place to build irrigation ditches and raise crops.³ Thus the land was established as the town of Fowler, founded in the name of the famous pseudo scientist.

Anyone driving southbound on I-25 can imagine the phrenologist’s delight at having stumbled upon the area of what is now Otero County. Stretches of dried up short-grass, wheatgrass, and shrubs coat the landscape, drenched by an annual 300 days of sunlight a year. The desert landscape of southeastern Colorado is soon met with an oasis of green vegetation as the Arkansas River draws nearer. Today, crossing the Arkansas towards Fowler the land opens up into a farmland; large expanses of corn fields, onion crops, sheep, goats, and a charming rural town of about 1,200 people who call Fowler home. This population has remained relatively stagnant since the 1920’s.

Throughout the recent years the small town of Fowler, Colorado has been receiving more and more attention from media, policymakers, and environmentalists alike.

Fowler stands out as not just another decaying Great Plains town, but rather is embracing innovative environmental and business measures to revitalize their economy, so that this rural community can maintain a vibrant engagement with their land for generations to come. Located in Colorado's southeastern plains, Fowler stands as a pioneer of rural sustainability, dedicating itself to greener industries, community, and environment. Otero County and Fowler sit just south of the Arkansas River, thirty-four miles east of Pueblo, Colorado. To save money and create jobs the town of Fowler is moving away from the traditional electric grid, and plans to generate its own electricity, including solar, wind, bio-fuel from algae, and manure-based methane gas. It is even turning an abandoned canning plant into a new solar-panel factory for the company Helios LLC, which will open up more job opportunities.

What role will Fowler's economic shift play in the dynamic of Eastern Plains history? The story of the rural Plains, as history has told us, has been characterized by economic, environmental, and societal boom and bust, a fluctuating economy that gains and loses life. With the shift to renewables, many hope to stabilize this manic cyclical fluctuation of boom and bust, and come to a sustainable economy. Mitigation of this harmful cycle then, for a rural agricultural town on the Eastern Rockies Plains, is a matter of "becoming your own utility."⁴

A great irony of this of course, is that "becoming your own utility", means breaking away from old habits and dependencies, and requires a great deal of help. Part of what makes Fowler such an anomaly amongst rural towns across America is that it is in Colorado, which has undoubtedly the most progressive state alternative energy policies and commitments in the nation. Colorado's renewable energy industry has been driven in part by incentives put in

place by the state by the referendum—amendment 37. The state mandated that its largest utilities companies (Black Hills and Xcel) put incentive programs in place to incentivize renewable energies.⁵ Luckily, Fowler finds itself as part of a network where help is offered through power-purchase agreements. The Governor's Energy Office and a host of renewable energy companies are helping Fowler make this industrial shift.⁶ Rural towns are especially appealing for utilities companies because they can receive a great deal of financial help through USDA subsidies, which makes mid-size projects achievable.⁷

"Typically utility company pays for renewable energy credits, either up front or over time. They use those renewable energy credits to prove to the State that they are meeting renewable energy standards (financial fiction). Value of energy (value of the electricity), and environmental value get assigned financial value. These utilities need to meet their renewable energy portfolio standards, which is 30 percent of all power supplied by 2020 has to come from renewable sources. There are some fairly large negative incentives for failure to meet these targets. They use these renewable energy credits to prove to the state that they are meeting renewable energy standards. New Mexico may be doing something similar."⁸

The current economic climate that Fowler (along with the rest of the country) finds itself in makes cheaper and local utilities seem like a far better alternative than the continued dependence on fossil fuels. Political and global pressures for greener industries aside, Fowler's shift toward renewable energy began when powering the municipal buildings became too expensive. Maintaining governance and vibrancy in the community became dependent on finding cheaper, renewable energy. Town Manager, Wayne Snider has been working in partnership with the Denver based Vibrant Solar, Inc, and its sister company Helios LLC, to shift the town toward renewable energies and in the process to sustain its public services, economy, environment, and community.

Mr. Snider, on a June 2010 tour of Fowler, highlighted the eight new solar panel sites that were to begin construction in coming weeks. All but one of the eight renovation sights were funded through power purchase agreements, while the last (Fowler's golf-course) received grants from the US Department of Agriculture. The town park just off Main Street, now retrofitted with solar powered streetlamps and waterless toilets, is bringing back some of the life to the community. Until the park was renovated with funds from Go Colorado, Mr. Snider



© Russell Clarke, Fowler Train Station, Fowler, CO

joked, “Residents had no idea there were so many kids in Fowler.”

In some places, renewable agriculture may seem like an oxymoron. Fowler is home to one of the largest grain combines in the United States and has historic roots in corn, wheat, onions, cattle and sugar beets. But in a town like Fowler, whose last big economic boom was in the 1940’s with sugar beet production, improving the utilization of natural resources while maintaining the tradition of rural agriculture is of central importance. Interestingly enough, 2010 was one of the best for agricultural harvests in Colorado’s history. Retaining the history while utilizing new resources means not only implementing renewable solar and

in the town with one production line, which will possibly grow to 412 new jobs for the factory. Fowler needs not only cheaper utilities costs, but also innovative industries. Fowler watches 38 coal trains travel through the town every day. None of these trains stop in the town, the old train station being nothing more than a historic monument. Now Fowler will be part of a *new* energy industry.

Why is actual structural change occurring in this community? The infrastructural renovation in town seems to indicate that Fowler is pioneering a major industrial shift. What approach will help us sustain the vitality of these communities? Fowler’s answer is loud and clear; a rational, economic approach to renewable energy has won the hearts and



© Russell Clarke, Fowler Main Street, Fowler, CO

wind structures and facilities but also increasing the town’s water supply and strengthening the people’s shared efforts around the new economy through public involvement and curricula changes in the local schools. This includes developing the human amenity capacity to facilitate the use of these resources.

Excitement and initiatives once again permeate the community. In the fall of 2010 Fowler started a new a sixth grade class focused around renewable energy as a unifying theme. Such renewable energy is helping power their community and increasingly often, homes. Along with cheaper utility bills, renewable energy industries in Fowler bring the prospect of new jobs. The company Helios LLC is looking to build solar manufacturing facilities in the old abandoned canning factory in Fowler, opening up as many as 160 jobs

minds of its citizens. The town’s advisory board now has 38 members, evidence to an active and involved community, mirroring the enthusiasm of ranchers and ‘nesters’ seen in the early homesteading years. The community increasingly wants a voice in what is going on. Robert Quist, a sales representative for Vibrant Solar, explains that encouraging the shift to renewable energies in rural communities isn’t accomplished through “tree-hugging” rhetoric. Rather, Vibrant has been able to sell the shift from a hardnosed financial perspective, which is, “do business with us and we will save you money. Don’t do business with us, keep doing what you are doing and you will spend more than if you want to play with us”.⁹ Wayne Snider, more than anyone, has gained support for the utilities shift by pushing the economic incentive to the community. The huge feedlots of Rocky Ford are

coming on board as well, planning to build a methane capturing system to produce electricity from the manure from the 35,000 head feedlot.

What lessons can we learn from this small town? For Fowler to “become its own utility,” it seemed to require two prongs—the recognition of economic necessity from community members, as well as environmental necessity from governing bodies. One powerful catalyst has been the economic need from a small rural community for cheaper utilities—emptying pockets could not afford to power the town—. Wayne Snider states, “We are trying not just to save money, but also create a new revenue stream.”¹⁰ However, also essential to this industrial shift is Colorado’s environmental policy. Colorado has one of the most progressive energy policies in the country with established bodies like the Governors Energy Office, as well as metropolitan and intellectual hubs like Boulder, Denver, and Fort Collins. Colorado has been active in working to incentivize these energy shifts. We might be tempted to ask, is the economic good alternative energy utilities that Fowler is embracing the same good that is at the heart of renewable energy? Are we missing a point that is fundamental to the rationale behind the industry shift? Isn’t there something unjust about non-renewable energy supplies that we are ignoring, aside from their economic burden that seems to be lost in Fowler’s current political deliberation? While we may not have answers to these questions, we can certainly recognize how Fowler is an example of local interest, state government and growing industries, working to restore a rural community.

Wayne Snider hopes that Fowler can act as a template for other Eastern Plains towns trying to find new sources of income while, “maintaining their identities.” While Fowler is on a large upswing, a few miles down the road sits the town of Manzanola, a community apparently not as lucky as Fowler. Unlike Fowler, Manzanola has the appearance and feel of a dying community. Many of the older people and children alike are moving to Fowler. While Manzanola is disappearing, Fowler is benefiting from the new residents and the enthusiasm and skills they bring. The dying of some communities and movement to larger clusters benefiting the mid-size or select towns is a trend visible all across the Eastern Plains of the Rockies and Fowler is intent on being a part of the surviving “mid-town clusters.”

As Fowler continues pursuing wind turbines, algae bio-fuel, solar panel production and methane capture projects, many small communities continue to dwindle. What Fowler has done with the help of Wayne Snider’s enthusiasm is to involve both youth and the elderly in charting a future for the town. Through this involvement and education Fowler has taken a giant stride in securing its place on the

Eastern Plains of Colorado for generations to come.

¹ Wood, Richard E. *Survival of Rural America: Small Victories and Bitter Harvests* (Lawrence: University Press of Kansas) 2008.

² Manning, Richard. *Rewilding the West: Restoration in a Prairie Landscape*. (Berkeley: University of California Press) 2

³ Fowler, Co- Community Powered! History <http://www.fowlercolorado.com/history.html>



© Russell Clarke, Fowler Town Bank, Fowler, CO

⁴ Mark Jaffe. “Fowler diving headfirst into renewable energies.” *Denver Post*. April 18, 2010. Accessed June 2010.

⁵ Phone Interview with Robert Quist, July 1, 2010.

⁶ Mark Jaffe. “Fowler diving headfirst into renewable energies.” *Denver Post*. April 18, 2010. Accessed June 2010.

⁷ Phone interview with Robert Quist, July 1, 2010

⁸ Phone interview with Robert Quist, July 1, 2010.

⁹ Interview with Robert Quist, July 1, 2010.

¹⁰ Interview with Wayne Snider, June 30th, 2010

Overview Section: Infrastructure

Essential Services in Need of Attention

By Jeremiah Cox and Anna Johnson

THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

Key Findings:

- In 1919 it took 62 days for the US Army's Transcontinental Convoy to cross the nation, with Dwight Eisenhower, future President and champion of the Interstate Highway System on board.
- Roads in the Rockies are in better condition than nationwide: only 3 percent are in poor condition vs. 7 percent in the U.S.
- Commuting time in the Rockies is everywhere below the national average of 25.3 minutes.
- Rural America's adults have 50 percent access to broadband vs. 68 percent nationally; 75 Rockies census tracts have no access.
- In 2008 the Rockies consumed nine percent of national electricity with only seven percent of U.S. population.
- Burying major transmission lines costs \$6 to \$10 million per mile vs. overhead lines costing \$0.5 to \$1 million.
- Six of eight Rockies states have Renewable Portfolio Standards.
- Rural airport subsidies in 2006 included \$255 per passenger from Pueblo to Denver Colorado and \$473 from Lewiston Montana with an average of 3 passengers per flight.
- Six of eight Rockies states are net federal tax recipients.
- In 2008 Montana, at \$282 per person, and Wyoming, at \$212, received more back in Federal Highway Trust Funds than sent to Washington; for the Rockies the surplus received back stood at \$45.

About the Authors:

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The Rocky Mountains serve as a “spine” for the eight states comprising the Rockies region, the regional focus of The Colorado College State of the Rockies Project. Historically this mountain chain, forming the Continental Divide, has been an immense obstacle to westward expansion and regional development. After the exploration by Lewis and Clark (1804-1806) and other pioneers, waves of settlers swept into the region in search of fortunes (or at least sustenance) in mining, agriculture, and commerce. Along with the settlers came efforts to overcome the region’s topographical obstacles: first overland stagecoach routes and the Pony Express, followed quickly by the telegraph and transcontinental railroad, then a growing network of rail, highways, communication technology, and pipelines. At first these projects were created with the intention of linking California and the Pacific coast with the other established population centers in the Midwest and the East. The formidable Rocky Mountains also caused development of infrastructure in the Eastern Front Range and Western Wasatch Front Range on a North-South direction, with relatively few transportation corridors running East-West or North-South through the mountains.

Presently this network of major interstate highways and often parallel railroads and pipelines provides constrained and often congested transportation infrastructure, thus inhibiting the region’s internal circulation and linkages to areas outside of the Rockies in all directions. Federal subsidies were infused in a haphazard fashion, often to tackle the most immediate problems rather than to develop a logically designed “grid” girdling the Rockies region. Thus, we were left with patterns of infrastructure poorly designed to stimulate opening the region to settlement, commerce, and the general taming of nature for human benefit.

Today, across the U.S., it is easy to take regional infrastructure for granted. The ease of communication and travel within the country, thanks to the availability of telecommunications, roads, and airports, has played a pivotal role in how the U.S. has developed. However, the interstate highway system, an unprecedented project authorized by Congress in 1956 that once gave the U.S. an advantage, is aging, while the rail system has evolved into primarily slow-moving freight, with passenger services existing chiefly in large coastal urban corridors and around Chicago. The newer high-speed rail infrastructure of Europe and Asia makes the U.S. interstate highway system and rail network appear increasingly outdated and inefficient. These national trends are amplified for the eight-state Rockies region. Antiquated infrastructure is significant because the economic health of the region and its communities is directly related to the strength of available transport and communication. A healthy, modern infrastructure can lead to a community or region’s economic success, while a lack of infrastructure can be a weakness that leads to its stagnation and decline.

Presently the transportation infrastructure in the Rockies is in decline, following similar trends nationwide. The average age and percentage of structurally deficient roads and bridges

Table 1: Rockies Roads and Bridges

	Road Condition (2008)					Bridges (2009)		
	Very Good	Good	Fair	Mediocre	Poor	Percent Deficient	Average Age of All Bridges (Years)	Average Age of Deficient Bridges (Years)
United States	14%	27%	41%	11%	7%	24%	39	55
Rockies	17%	32%	37%	12%	3%	16%	35	46
Arizona	36%	24%	30%	7%	3%	12%	37	45
Colorado	11%	31%	45%	9%	3%	17%	32	47
Idaho	6%	33%	26%	31%	4%	19%	37	48
Montana	12%	52%	29%	4%	3%	18%	41	51
Nevada	39%	24%	28%	5%	5%	12%	26	40
New Mexico	20%	20%	31%	23%	6%	18%	40	47
Utah	6%	24%	62%	7%	1%	15%	31	44
Wyoming	8%	40%	44%	7%	1%	22%	37	45

Source: Roads: U.S. Department of Transportation, Bridges: U.S. Department of Transportation, Federal Highway Administration

is compiled in **Table 1**. It shows that the Rockies region is doing relatively better than the nation as a whole. The region’s bridges are newer and the average age of those that are deficient is younger. The roads in the Rockies are also in much better condition than the nation’s roads (only three percent rated poor compared to seven percent for the U.S.), with more in the region ranked very good and good. The data does show that some Rockies states have high proportions of roads ranked mediocre (such as Idaho 31 percent and New Mexico at 23 percent) and without new improvements, more Rockies states are going to have a major decline in the quality of their roads in the near future. In addition to upgrading deteriorating roads and rail, investing in this infrastructure is extremely important because the Rockies region’s rapid population growth is expected to continue. In 2000 the U.S. Census predicted a 64 percent increase in population by 2030 for the region compared to 32 percent for the United States as a whole.¹ In more recent years, between the 2000 and the 2008 censuses the Rockies region had 20 percent increase in population compared to 8 percent for the United States as a whole.²

The history of the development of the Rocky Mountain Region has been shaped largely by advances in transportation that connected the Eastern and Western United States and allowed settlers to inhabit and travel through the region. Today modern infrastructure plays the same role as it did for the first Europeans that settled the region: connecting people and places by allowing them to communicate with each other and the rest of the world, in the process transcending the obstacles of the Rocky Mountain spine.

Although the transportation-based infrastructure of the Rockies is in decline, the opposite is true of power transmission infrastructure. The Federal government is investing billions of dollars to upgrade our basic level electric transmission grid operation. This technology will make electricity transmission more reliable, secure, and will assist in promoting conservation habits. These funds will incorporate digital technology to make the grid “smart.” It will also provide a needed upgrade to

a century old system. Privately funded transmission projects to deliver renewable energy and traditional energy are also underway to meet increasing demand in the region and nation as well as to help ensure electricity reliability.

In addition, the federal government is fully committed to providing high speed broadband access to the entire country. They refer to universal broadband access as “the great infrastructure challenge of the early 21st century” and have launched the National Broadband Plan – a highly ambitious project – to achieve this goal.³ Private funds are facilitating this upgrade of communications capacity: including fiber optic, microwave and satellite facilities.

This infrastructure section of the *2011 Rockies Report Card* will first provide a summary of the history of infrastructure in the region, including transportation and communication. This will begin with the first explorers, the use of wagon roads, mail, and stagecoach routes, moving on to the opening of the transcontinental telegraph lines and railroad, and finally the evolution of the motor car and the building of the Interstate Highway System. The next section will be an evaluation of the current infrastructure and its usage: commuting patterns; rural transportation options; aviation and commercial flight options; the movement of goods and freight; electricity transmission; and telecommunications in the Rockies. We will then consider whether the Rocky Mountain eight-state region has historically and is currently receiving its “fair share” of federal funds compared to the rest of the nation. Throughout this section of the *2011 Report Card* various suggestions for improving the vitality of the region’s infrastructure will be discussed.

History of Transportation and Infrastructure in the Rockies

It is hard to determine when the building of infrastructure to connect people and places began in the Rocky Mountain West. Do we begin with the trails built by the prehistoric peoples of the Southwest, simply by following the same path of least resistance over and over again? Or does creating a path require a conscious effort at surveying and clearing out the land to connect regions? This section of the *Report Card* will follow the latter approach to defining infrastructure, although it will also discuss the various pioneer explorers and historic albeit primitive trails taken by them, across the region. For many generations, the Rocky Mountains were considered an intrinsic obstacle to travel and connectivity by persons trying to cross overland from the East Coast to the Pacific Coast. The successive waves of investment in infrastructure gradually helped provide faster transcontinental travel as well as provide the requirements for the region to flourish as a whole.

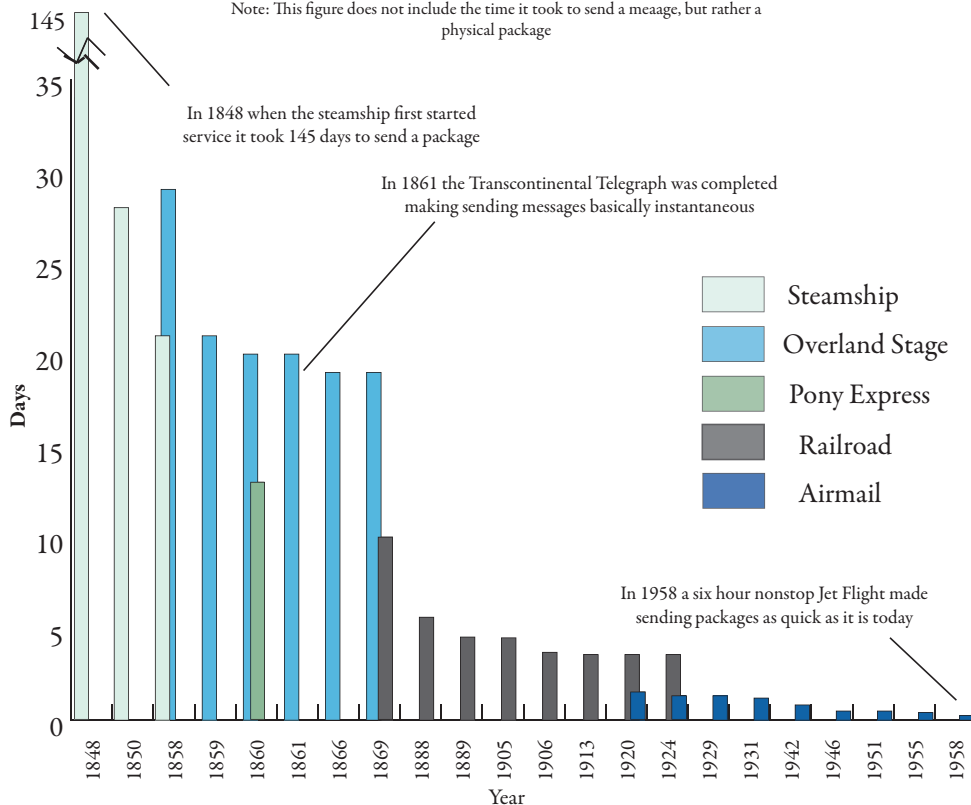
To highlight just how much faster communication has become through the region (or over the region in the case of air

travel), the travel times of sending a package from New York City to San Francisco using the fastest possible means of the time period have been evaluated, along with the primary mode used to send that package across the continent. **Figure 1** shows the results of this study. This graph begins with the first west-bound mail, a steamship running via the Straights of Magellan at the tip of South America that took 145 days in the winter of 1848-1849. This travel time was eventually reduced to about four weeks during the 1850’s by transporting the mail overland via the Isthmus of Panama.⁴ In 1858 the first Overland Stage

Figure 1: Sending a Package

This figure represents the time required to send a package between New York City and San Francisco using the fastest means possible

Note: This figure does not include the time it took to send a message, but rather a physical package

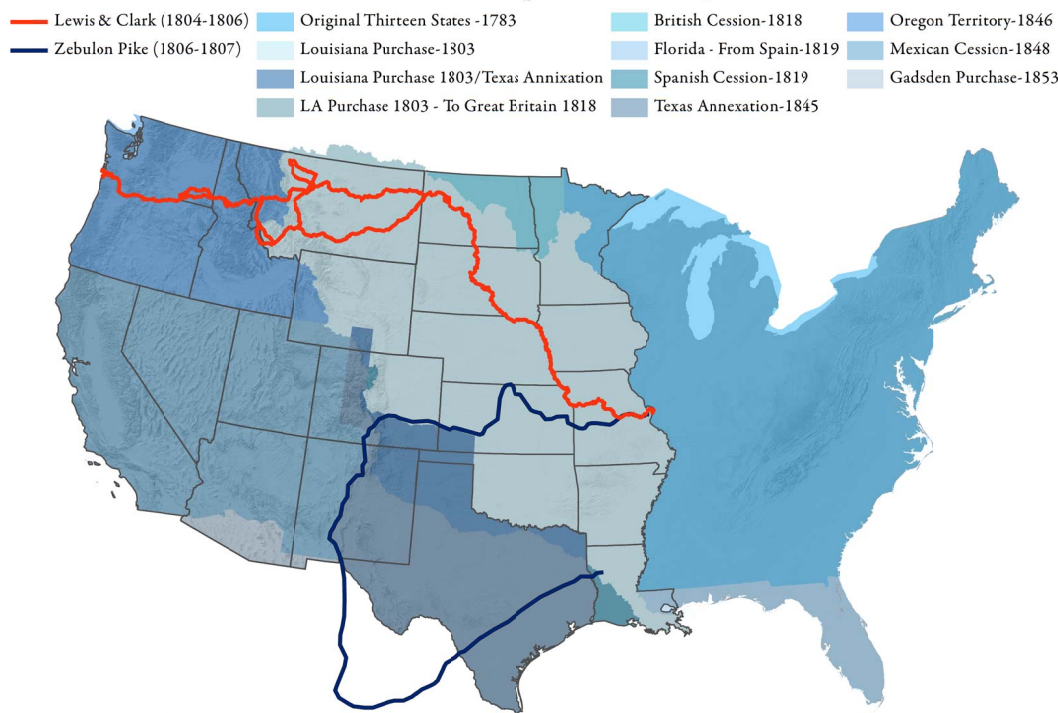


Source: For a full explanation of methods and sources please visit, www.stateoftherockies.com

Coaches were used, and once operations were perfected these became faster than the steamships (at least in summer). On April 3, 1860 the first Pony Expresses commenced, providing the fastest mail service yet. The news of President Lincoln’s election left Fort Kearny, Nebraska—then the Western end of the Eastern telegraph network—on November 7, 1860 reaching Fort Churchill, Nevada on November 13 where the news was relayed by telegraph in time for the California papers on November 14, (thus taking just six days, to transmit *information* cross-country). On October 24, 1861 the Pony Express was rendered obsolete by the completion of the transcontinental telegraph line, making the sending of messages virtually instantaneous.⁵ The next step was the completion of the Transcontinental Railroad in 1869, and then airmail in 1920 taking 37 hours.⁶ Presently, this flying time has decreased down to fewer than seven hours, the time it takes for a non-stop jet to cross the continent.

Before European contact, ancient Indian trading trails covered every corner of the West; most of these were extremely primitive trails,⁷ although the Ancient Puebloans built efficient, long, straight, roads in and around Chaco Canyon to connect their Kivas and Great Houses.⁸ The first European road built in the region can be attributed to the Spanish that established the City of Santa Fe in roughly 1610.⁹ To connect Santa Fe with the rest of their vast Mexican Empire they built the El Camino Real de Tierra Adentro, *The Royal Road to the Interior*. This trail went from Veracruz on the Mexican coast, across to Mexico City before heading North through the interior, reaching Santa Fe, New Mexico in 1603. The road ran a distance of 1,500 miles.¹⁰ For over 200 years it provided the only established connection from Santa Fe; the Santa Fe Trail did not come into use until 1821.¹¹

Figure 2: Territorial Expansion of the Lower-48 and the Routes of Lewis and Clark's Corps of Discovery and Zebulon Pike



United States Control: History of Expanding the Frontier and Early Explorers

The beginnings of United States control of the Rockies region came with the Louisiana Purchase from France in 1803. This Western expansion is seen in **Figure 2**. Expansion continued with the Treaty of 1818 that established the Northern border with Canada (then England) along the 49th parallel from Minnesota to the Rocky Mountains, in the treaty called "Stony Mountains."¹² In 1846, the border with English Canada was continued along the 49th parallel all the way into modern-day Washington state, with the passage of the Oregon Treaty. Interestingly, the treaty includes a provision that the Columbia River through the U.S. remain open to navigation by British subjects and the Hudson Bay Corporation.¹³

After the Louisiana Purchase, a pattern of land exploration first helped to open up the Rockies frontier. The early major explorers of importance to the opening of the Rockies, and probably the most well known, are Lewis and Clark and their Corps of Discovery, sent to explore the Louisiana Purchase. The route is shown in **Figure 2**. Their journey took place from 1804 to 1806, going up the Missouri River, reaching the Pacific Ocean, and returning back to St. Louis, Missouri. James Colter left the group and became the first American to experience what is now Yellowstone National Park.¹⁴ The next major exploration expedition came from Zebulon Pike, who on July 15, 1806, started out due West from Saint Louis and followed the Arkansas River into Colorado as far as its source, passing the peak that bears his name on the way. His route is depicted in **Figure 2**. Zebulon Pike's instructions were to find the source of the Red River, but instead he proceeded to cross the Sangre de Cristo Mountains into the San Luis Valley in what is now Colorado but in 1806 was Spanish Territory. Here his group was captured by the Spanish and sent South to Santa Fe, New Mex-

ico and then to Chihuahua, Mexico before being released and deported back to the U.S., arriving back on U.S. soil on June 30, 1807.¹⁵ Other explorers of note included James Bridger, a mountain man who was the first westerner to visit the Great Salt Lake in 1824 and discover Bridger Pass through the Rockies in 1850. This pass became a crucial route across the continental divide for wagon trains, the transcontinental railroad, and eventually Interstate Highway 80. Various explorers went through the region, particularly other mountain men who spent their time gathering, trading, and selling furs and other natural resources when they left the wilderness.

The rest of the Western territory was transferred from Spain. Most of it was acquired through the Mexican-American War from 1846 to 1848, which was ended by the Treaty of Guadalupe in 1848. After this treaty, a previously surveyed Southern Transcontinental Railway Route became unfeasible, since some of the route was located in Mexico. The portion of U.S. controlled land after this treaty was in present day Arizona and New Mexico and was found to be too mountainous and unsatisfactory for the Southern railroad. In 1853, James Gadsden negotiated with President Santa Ana of Mexico for a treaty of sale for the acquisition that bears his name. The Gadsden Treaty was ratified by Congress in 1854. The South though lost its proposed railroad in the 1850's because of the issues of slavery, land grants, disagreements about an Eastern terminus, and a lack of cooperation with Northerners among other reasons.¹⁶ A Southern Railway across the Gadsden Purchase was finally completed in 1883.¹⁷ After this land acquisition, one of the last great explorers of the region was John Wesley Powell who floated down the Colorado River in 1869 and visited one of the few remaining unexplored areas of the Rockies region. In 1890, the U.S. census officially declared the U.S. frontier settled.¹⁸

Pioneer Roads and Trails:

As soon as the West was acquired for exploration settlers began coming through the region in covered wagons and wagon trains. **Figure 3** shows many of the important trails used by settlers and travelers, although many smaller trails were also used. Most of the trails the settlers followed converged through the center of Wyoming and Bridger Pass, a low elevation pass through the Rockies on their way West.

The first trail to see widespread use was the Santa Fe Trail (various routings are shown in **Figure 3** including the Cimarron Cutoff) which began in 1821 and was primarily a commercial highway; before 1846 it was the main international “highway” between the United States and Mexico. It also became a major military highway during and after the Mexican-American War, as well as during the Civil War when the Confederates tried to take the Western Territories. In 1880 the trail was rendered unnecessary by the arrival of the railroad.¹⁹ Also used by the previous Mexican residents, as shown in **Figure 3** was the Old Spanish Trail whose usage started in 1829 between the Mexican Provinces of New Mexico and California; its use was almost entirely a trade route for the Spanish, and made Santa Fe less isolated by giving it a closer connection to the sea.²⁰

Three of the other trails shown in **Figure 3** were primarily pioneer trails through the West that were used by settlers and prospectors, particularly the California trail used by ‘49ers when gold was discovered there. The Mormon Trail was first followed in 1847 by Brigham Young to bring his persecuted Mormons from the East to Utah where he initially established their settlement in Salt Lake City. Eventually more than 70,000 Mormons used the trail to reach Salt Lake City until the transcontinental railroad replaced it in 1869.²¹ The Oregon Trail opened up Oregon for settlement; Lewis and Clark’s original route was seen as too treacherous for families. The first major group of about 1,000 people to use the trail left Independence, Missouri in the spring of 1843 and made their way to Oregon’s Willamette Valley. It is estimated that 80,000 people used the trail before usage declined after the opening of the transcontinental railroad in 1869, and in 1884 by a branch rail line to serve Oregon directly.^{22,23} The California trail was the most used trail in the region (it followed the Oregon trail until it branched off to the Southwest); it was used by over 250,000 gold seekers and farmers journeying to California, although the depiction in **Figure 3** is a crude approximation because various parties used alternate routes that they believed provided faster and easier passage not only through the Rockies but the equally difficult obstacles of the Sierra Nevada Mountains.²⁴

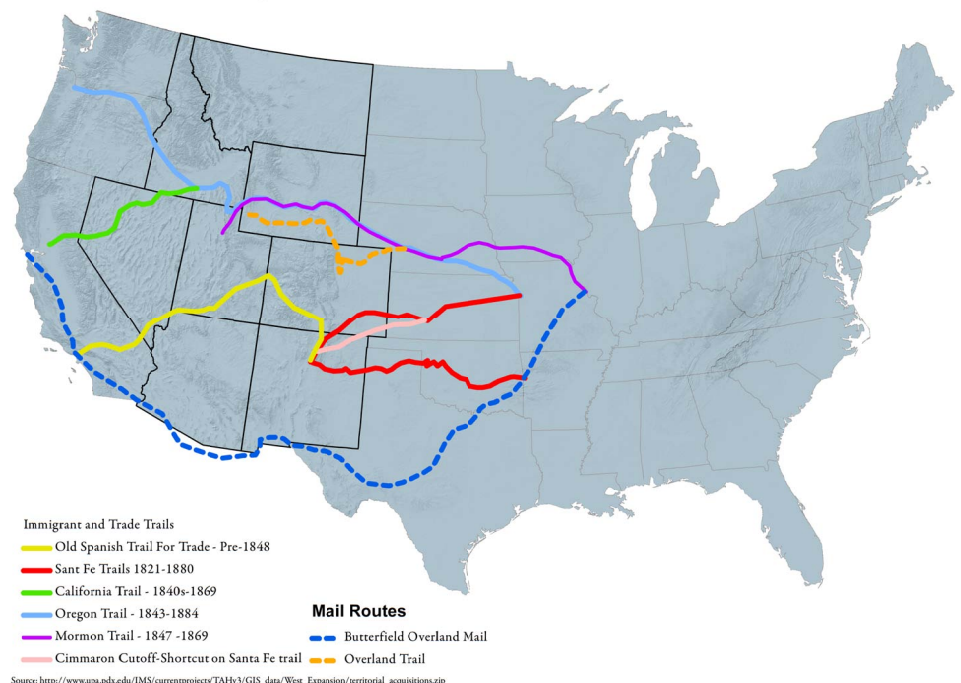
The first mail communication in the West came in 1849 as bi-monthly mail from the East to Salt Lake City after the Mormons

had settled there. This route simply consisted of a team of pack animals and was extremely slow. In 1851 a similar mail route was created between California and Salt Lake City.²⁵ The first stage-coach route in the West that was formally established was the Butterfield Overland Mail Route, shown in **Figure 3**. It was the first transcontinental overland mail route designed for communication with California itself. The route went via El Paso, Texas to the South in order to be snow free and avoid the obstacles of the Rocky Mountains. This was subsidized by the federal government in order to provide California with a faster means of communication after it became a state in 1850.²⁶

What constituted a stage route exactly? A prime example is the Butterfield Overland Route, authorized by Congress in 1857. Before it could begin operations a year later, 141 stations were built along the route between 10 and 25 miles apart to provide for changing horses and drivers as well as ticket offices, restaurants, and lodging for passengers.²⁷ Eventually this stage was replaced by the Central Overland Route to California in 1861, because of the Civil War, it is the latest trail shown in **Figure 3**.²⁸

The form of communication in the interior West that was a legend and has the most present day mystique —although it only was in operation for eighteen months and was a business flop—was the Pony Express. The first Pony Express service left San Francisco, California on April 3, 1860. In summer, letters took 13 days between New York and San Francisco and telegraphic dispatches took nine days (messages were relayed via telegraph where lines existed).²⁸ **Figure 1** shows these times compared to the conventional mail service. The price was \$2.50 per half ounce, or approximately \$60 in 2009 dollars.²⁸ The fastest time for communication yet was a special Pony Express run in 1860 that went from Fort Kearney, Nebraska to Fort Churchill, Nevada in 6 days carrying the news of Lincoln’s Election.²⁸ The trip took 13.8 days in winter

Figure 3: Historic Trails through the West



between the two ends of the telegraph network.²⁸ Communications finally became instantaneous with the completion of the transcontinental telegraph along the Overland Route to Salt Lake City, and the first message was sent to President Lincoln on October 24th, 1861. This led to the immediate demise of the Pony Express.²⁸ The stage coach's days along the major routes were equally numbered because of a new form of transportation: the iron-horse.

Railroads:

The next form of technology to dominate transportation and infrastructure in the American West was the railroad. In the 1820's, the first steam powered locomotives were manufactured on the East Coast. In 1845 Asa Whitney made the first proposal to Congress to build a transcontinental railroad.²⁹ Like most infrastructure projects of this day, the railroad was to connect California with the settled East Coast; there was little or no consideration given to connecting the few communities in the Rocky Mountain West. In 1854 the first Eastern railroad line reached the Mississippi River,³⁰ but disagreements in Congress over building a Northern or Southern route hampered the railroad's progress. The Civil War and Southern secession settled the matter and the Pacific Railroad Acts passed in 1862 and 1864, which directed the Union Pacific to begin constructing a line West from Council Bluffs, Iowa (across the Missouri River from Omaha, Nebraska) to meet up with the Central Pacific starting from California. In 1864 another act authorized the Northern Pacific Railroad from Duluth, Minnesota to Puget Sound, Washington.³⁰ Under these acts, through land grants and bonds, the federal government gave the railroads huge financial incentives to build the routes. For example, the Union Pacific and Central Pacific were given ten alternate sections of public land on each side of the railroad right-of-way per straight line of railroad. They also had access to "cheap" capital from low-interest six percent government bonds intended to help fund the lines. Most of the other transcontinental railroads received similar incentives,³¹ so that by 1930 the federal government had given the railroads 205,000 square miles of land throughout the country. The railroads thus became a primary landowner and broker of the land along their routes.³¹

Over the next half century, more transcontinental routes were built through the region. The Northern Pacific Route through Southern Montana and the Southern Pacific's "Sunset Route" through the Gadsden Purchase were completed in 1883.³² In 1887 the Atchison, Topeka and Santa Fe reached Los Angeles, and in 1893 the Great Northern Railroad completed the 'Hi-Line' through Northern Montana. In the first quarter of the 20th century, railroad expansion continued to impact the Rockies. In 1909 the Milwaukee Road opened its transcontinental route from the Northern Plains to Seattle and Tacoma, running through the center of Montana with a route shorter than the two other lines through Montana. To attest to the profitability of the railroads, this route was built without any land grants; the railroad simply purchased the land outright. Major portions of this line were also electrified for more efficient travel through the mountains.³³ Throughout the early 1900's, the railway network continued to expand; in 1916 the number of railway track miles reached their peak in the country at 254,251

miles; subsequently since then, more track has been abandoned than built nationwide.³⁴ The final major railway achievement in the region was the finishing of the Moffat Tunnel, completed in 1927, which gave Denver, Colorado a viable and direct path through the Colorado Rockies, instead of the more circuitous routes via Cheyenne, Pueblo, or Rollins Pass.³⁵

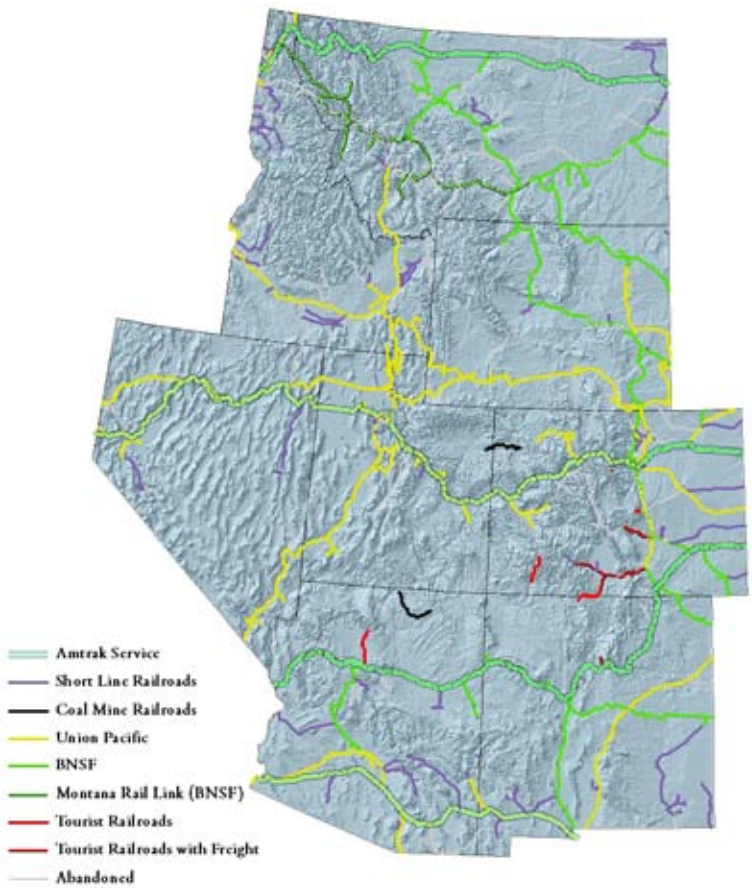
The next major chapter in the history of the railroads in the Rockies came after they experienced huge usage in World War II; this was followed by an increasingly competitive environment with trucks and aviation. Unfortunately, railroads were locked into heavy government regulations under the Interstate Commerce Commission Act (ICC) of 1888 which regulated the railroads as a 19th century monopoly on transportation. These regulations had never been updated because of the increased competition from planes and trucks, leaving in place obsolete requirements for railroads to run unprofitable passenger routes, and most importantly controls on minimum and maximum rates for shipments. These minimum rates were harmful to the railroads because they were generally high enough to make trucking a competitive alternative and did not allow railroads to take advantage of their huge efficiencies in cost.³⁴ For example, railroads at present are three times as fuel efficient as trucks and in 2008, moved a ton of freight 457 miles on average per gallon of diesel.^{36,37} In addition, the ICC made it extremely hard to abandon redundant and poor performing lines because all of its decisions were affected by politics. Even in the railroad "dark ages" of the 1960's, national ton-miles increased from 573 billion to 765 billion; by 1998 this figure had reached 1,365 billion.³⁸ Unfortunately the low, regulated rates caused the railroads to continue to lose money, and slow speeds from the process of switching railroad cars on and off the tracks (intermodal trains and the use of containers were just beginning) reduced speeds from loading dock to loading dock to a rate of just 20 miles per hour.³⁸

The railroads were also unprofitable on their passenger trains in the 1960's, due to the requirements regarding passenger traffic. In 1962 the earliest streamliner operation across the West, the Milwaukee Road's *Olympic Hiawatha* was discontinued. In the next decade, trains became even more unprofitable; in 1967 the U.S. Post Office decided to discontinue its railway post offices and sent mail via planes and trucks.³⁸ Eventually, as a way to save passenger train service, Amtrak was created and assumed all intercity train operations effective May 1, 1971. This resulted in the discontinuation of more than half of the passenger rail routes in the country, with only 21 percent of the route-miles of a decade earlier surviving.³⁹ In the Rocky Mountain West, the route map went from six different transcontinental routes at the end of 1970—with North-South service going from Las Vegas, Nevada as far North as Butte, Montana,⁴⁰—to basically how it looks today in **Figure 4**.

From 1970 through 1995 the landscape of the railroads in the Rocky Mountain Region changed drastically through abandonments and consolidations that have resulted in the Union Pacific and Burlington Northern Santa Fe (BNSF) as the only large railroads presently operating. **Figure 5** shows the railroad network in approximately 1970 with all the various historical railways indicated, as well as the year that they were consolidated into BNSF or Union Pacific. Those lines that were

Figure 4: Modern Day Railroads in the Rockies

abandoned or became minor independent short line railroads are shown in **Figure 4**, the present day network as shown in 2006. In the 1970's the railroads continued to decline, although in 1970, the ICC approved the merger of the Great Northern, Northern Pacific, and Burlington Route, becoming the Burlington Northern Railroad.⁴¹ This merger was approved because of the existence of the declining Milwaukee Road; otherwise it would have been defeated on antitrust grounds. In 1974 the Milwaukee Road discontinued electrification and in 1980 its transcontinental line was abandoned.⁴² The passing of the Staggers Act of 1980 allowed railroads to become the profitable businesses they are today. Briefly, this act deregulated railroads, and allowed them to easily abandon lines, as shown on **Figure 4**.⁴³ With the use of container trains and intermodal operations, the railroads returned to profitability; in 1979 the rate of return for the railroad industry as a whole was one percent, by 1981 it was five percent, and was eight percent in 1990.⁴³ Today its profitability has even caught the attention of billionaire investor Warren Buffett, who fully purchased BNSF in 2009. The Staggers Act of 1980 also made mergers much easier, harder to protest on anti-trust grounds, and led to consolidation that resulted in the region having just two Class-I main line railroads today. As shown in **Figure 4**, the present day railroad map illustrates an increase in smaller Short Line Railroads, since mainlines that were not abandoned were sold to local interests.⁴³



Source: Federal Railroad Administration (FRA), Research and Innovative Technology Administration's Bureau of Transportation Statistics (BTA/BTS), Data as of 2006

Figure 5: Railway Consolidation in the Rockies Since 1970

The Motorcar and Road Era:

The beginnings of automobile travel in the Rocky Mountain West can be traced back to the turn of the 20th century. In 1903 Dr. Horatio Nelson Jackson and his mechanic Seawall Croker traveled in a motor-car named *The Vermont*, after Dr. Jackson's home state, and spent 63.5 days driving from San Francisco to New York. They became the first people to drive cross country in a horseless-carriage.⁴⁴

Since 1880 when the League of American Wheelmen was established to champion good roads for bicycling, the general public has not ceased complaining about traffic and poor road conditions.⁴⁵ In 1909, for example, Colorado established its State Highway Commission (what has evolved into the Colorado Department of Transportation - CDOT); in 1910 when the commissioners went on a road trip to assess road conditions they were often stuck in the mud on "roads that were never meant for anything but a horse drawn vehicle." These commissioners first realized the potential for economic development from motorcar tourists if the state had improved roads.⁴⁶

Through the early 1900's, road building was mostly a local affair; various auto trails were constructed through the region and these were maintained by private organizations. By far the most prominent organization in the region was formed in 1913 to set the course of the transcontinental Lincoln Highway. This organization still exists and calls itself "Celebrating the First Road Across



Railway Lines and Absorbed (or abandoned) Network

Other Railroads	BNSF	Union Pacific
Chicago & Northwestern - Sold off by 1995	1970-Great Northern	Pre-Mergers Union Pacific
Rock Island - Sold Off/Abandoned 1980	1970-Northern Pacific	1983-Western Pacific
Milwaukee Road - Mostly Abandoned 1980	1979-Chicago Burlington & Quincy	1995-Denver, Rio Grande*
SOO Line**	1995-Santa Fe	1988-Southern Pacific*
Sell Independent Shortlines	*First merged into DMRGW in 1988, then merged with UP in 1995	Tourist Railroads
New Coal Mine Routes	**Technically SOO Line, name for CP's US operations	
Other Shortlines, now Abandoned		

Source: Federal Railroad Administration

America.”⁴⁷ This road crossed the region through Southern Wyoming, Northern Utah and Nevada with a spur route detour to Denver on its way between New York and San Francisco.⁴⁸ There were many other routes too, although it is nearly impossible to know the exact number because of the many different clubs erecting signs on the roads. Barely existing roads were often identified, named, and marked by numerous types of signage. Many roads had multiple signs for overlapping auto trails that were built by competing auto clubs (each supported by different constituency along their route). One road in Southwestern New Mexico carried markers for five different auto trails. The routes could also change from time to time depending upon their backers.⁴⁹ In 1919 the US Army sent its first Transcontinental Army Convoy across country, taking 62 days; many roads were nearly impassable. Most important was Dwight Eisenhower’s participation on this trip; seeing the road conditions made him realize the importance of good roads and influenced his later role as the founder of the Interstate Highway System.⁵⁰

In 1916 the Federal Government started funding the road system for the first time with the passage of the Federal-Aid Road Act, for highway building in cooperation with the states.⁵¹ This led to every state forming a State Highway Department to use the federal funds and these state organizations joined together to create the American Association of State Highway Officials (AASHTO). These steps then led to the creation (with the help of the Federal Government) of various standards for highways in the country, especially the designation of coordinated route numbers to replace the numerous ad hoc names. The primary reason for disagreements during the 1925 meetings, intended to select names and numbers for our highway system, was what routes to designate – a few transcontinental routes or any route that went between two neighboring states. Eventually the states agreed to have many roads but with the numbering system that exists to this day, even numbered designation for roads going East and West (with the lowest in the East), odd numbered designation for roads going North and South (with the lowest in the North). The interstate highway numbers follow these rules in reverse. There was public uproar throughout the country from locations that felt they had been left out of the

new highway system. The network covered over 96,626 miles of federal highways in 1926, but many members of the trails associations complained that simply numbering the roads was too dull. AASHTO adopted the numbering system on November 11, 1926. Slowly, with some federal assistance, the roads of the Rockies were improved from dirt tracks to gravel and paved roadways.⁵²

The final major transportation development came in the form of planning and then implementing the National System of Interstate Highways. The first steps consisted of reports in 1939 and 1944 to Congress; these documents all accumulated in one particularly well known document called the “yellow

book,” partially seen in **Figure 6**.

This booklet consists of maps of most metropolitan areas, showing various interstate highway extensions into urban areas and was delivered to every Congressman’s desk in 1955.⁵³ What these plans meant to the relatively small Rockies region, with a total population of just five million people in 1950, can be shown by the fact that only six of the 100 maps of metropolitan areas in the booklet are cities in the Rockies region. **Figure 6** provides some examples. Some interesting observations from the book can be found in the fact that none of the included cities in the Rockies were designated to receive beltways encircling their urban cores, as many Eastern counterparts were receiving. The only city in the region included in this booklet to receive anything comparable was Denver, Colorado with what has become I-225. All the other cities included in the region (Phoenix and Tucson, Arizona; Pocatello, Idaho; and Butte and Great Falls, Montana) simply received one short spur route off the proposed intercity route(s) to

connect these urban area to highways that bypassed the cities and their downtown cores.⁵⁴ Interestingly enough, cities that were missing insets completely included Clark County, Nevada (Las Vegas), which only had a population of 48,000 in 1950. In addition, Salt Lake City, Utah was missing a page but it did receive its ‘Belt Route’ of I-215 added in some last-minute additions to the system. This addition made Salt Lake City the only city in the region that received a full beltway as part of the interstate highway plan and the full federal funding amounts to build it. Out of the approximately 60 cities in the yellow book given interstate highway bypass routes to avoid downtown cores, only one was in the Rockies region.⁵⁴ The small size of Las Vegas, Nevada at the time also explains why



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there is no interstate route connecting it with Phoenix, Arizona to the Southeast, although there are currently long-range plans to upgrade US-93, the road connecting those two cities to interstate standards. This new Interstate has been named I-11.⁵⁵

A final, even more glaring omission from the early Interstate Highway System planning in the Rockies concerns Colorado's current I-70. The plan adopted for the National System of Interstate Highways in 1947, as seen in **Figure 6**, shows what is now I-70's western terminus in Denver. There was no East-West interstate crossing the Rockies in Colorado; the main reason was the Bureau of Public Roads' fear about the financial resources required to build an interstate through the Rockies. Colorado's Governor at the time, Edwin C. Johnson, of course wanted the road to be built.⁵⁶ He offered to have Colorado fund a tunnel (now the Eisenhower-Johnson Memorial Tunnels) beneath the Continental Divide if the Interstate was extended through the mountains and funded with federal dollars. These tunnels had been part of a plan from the 1950's which included a toll tunnel beneath the Continental Divide.⁵⁷ Johnson even went so far as to personally lobby President Eisenhower who had complained about the traffic between Denver and the mountains when he came to Colorado on fishing vacations.⁵⁶ Eventually, in 1957, the road was added to the Interstate Highway system, although not without further controversy. Utah wanted I-70, after leaving Colorado, to curve North to Spanish Fork and into Salt Lake City. The Defense Department got on board and vetoed that request stating that there was already a connection between those cities (I-25 to I-80 via Wyoming) and that the road would provide a better use for defense purposes by creating a direct link to Southern California, ending in the tiny town of Clove Fork, Utah. In addition, the road West of Green River followed a completely new highway alignment, giving access to an area of Utah that had been previously without roads.⁵⁸

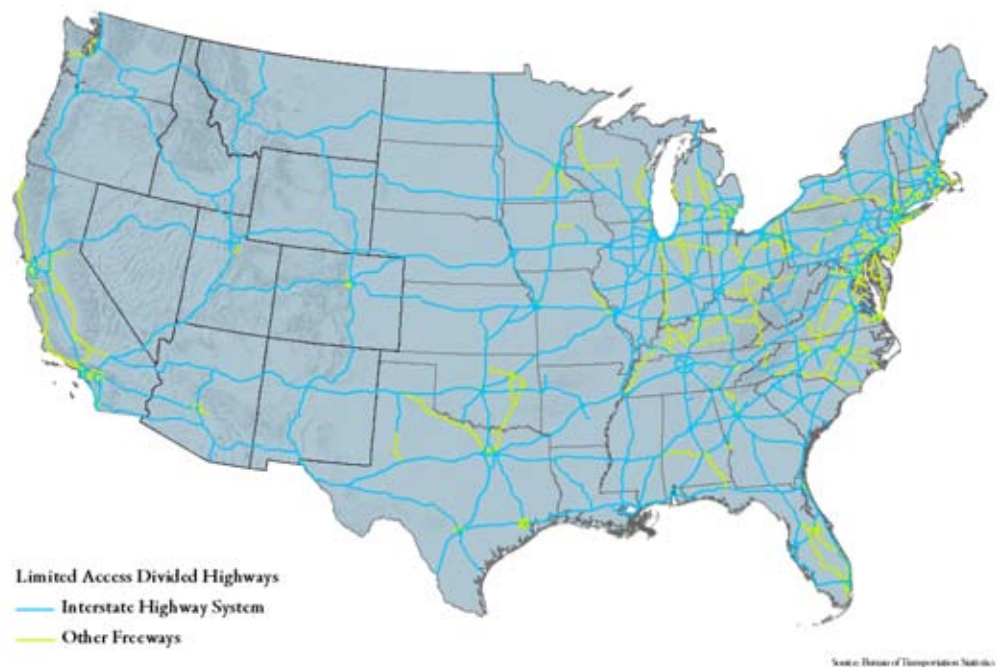
After the interstates were designed—the National Interstate and Defensive Highway Act passed on June 29, 1956—they had to be built, which took quite a bit of persuasion and compromise. **Figure 7** shows a map of the existing interstate highway system with an emphasis on the region, showing fewer routes than in the rest of the country. One possible reason for this was that the Colorado Front Range was the only region that had built any substantial distance of freeways by 1956; it had already built the Denver-Boulder Turnpike (US-36) a limited-access highway which was completed in 1952 and the tolls removed after the bonds for construction were fully paid off in 1967. In addition in 1949, the state began a ten-year project to build the four-lane highway that became I-25 between Denver and Pueblo; it was

Figure 6: Yellow Book Scans



completed by 1960.⁵⁹ For the other Western states this was not the case; none of them had any large-scale experience building limited access highways. In Utah, for example, as is illustrated in the book *Divided Highways*, the state had built practically no limited access divided highways, and residents in its small towns thought that the existing network of roads was adequate and superhighways were only necessary in large cities. Questions were also raised on why seldom-traveled crossroads needed overpasses, what would happen to properties bisected

Figure 7: Current Interstate Highway System and Freeway Infrastructure of the United States



by roads, and why did the right-of-way upon each side have to be so wide? The residents of main streets in small towns did not understand why they and their businesses were being bypassed by limited access highways instead of the state improving the roads that ran through the “main streets” of these small towns. Towns and cities that had the interstates nearby generally prospered economically, while those completely bypassed witnessed population and economic decline, an effect similar to those towns bypassed by the railroads.⁶⁰

After the building of the interstate system in the Rockies, urban populations started to increase and sprawl increased dramatically in many cities. Three cities in the region put together interesting and innovative solutions to building more freeways, particularly beltways and routes connecting their suburbs. The first city was Phoenix, Arizona, whose effort started when a ballot initiative passed in Maricopa County in 1985 for a half-cent sales tax to construct new limited-access highways and freeways; this was extended in 1994 and 2004, and will be in effect for building new freeways until 2025.⁶¹ This sales tax revenue has paid for two three-quarter ‘loop freeways’ Loop-101 and Loop-202 around different portions of the Valley of the Sun, in addition to other freeway improvements; a third partial Loop, 303 is currently in development. All of these highways are built to Interstate standards, meaning they are eligible to be designated as interstates but Arizona’s Department of Transportation (ADOT) has decided to number them independently, not giving them three digit offshoot designates as spur routes of I-10 and I-17. Arizona does not have any auxiliary interstate routes. An example of the breakdown of funding for Highway/Freeway Improvements in Maricopa County from 2006 to 2026 consists of 53 percent from the sales tax, 45 percent from ADOT funds (which includes some state-appropriated federal funds), and just two percent from direct federal funding.⁶² This funding breakdown is a far cry from the 90 percent federal funding of the original interstate highway system.

The next metropolitan area in the West that decided to build a beltway was Denver, Colorado. In 1968 it received federal approval to build I-470 as an interstate highway for at least its South-West portion (what is now designated as C-470). In the 1970’s attempts to write environmental impact statements for the highway failed and in 1976 the plans were withdrawn. Some federal funds were still available and financed what has become the C-470 portion of the beltway that forms the Southwest quadrant. It opened in stages between 1985 and 1990. In November 1988, voters in the area of the Eastern-half of the Beltway approved a ten dollar per year car registration fee increase and along with bonds guaranteed by toll revenue, the E-470 toll road was constructed and opened in stages between 1991 and 2003. A similar movement was afoot to build a W-470 portion in the Northeastern quadrant, but its referendum was heavily defeated in 1988. Eventually, the northern most portion through Broomfield was built as the 11-mile Northwest Parkway Extension in 2003; it was entirely privately funded, thus not requiring a referendum.⁶³ This leaves 86 miles of 106 planned miles of Denver’s beltway completed according to the Beltway to Tomorrow Coalition run by the Jefferson County Economic Council Business Group. This group proposes fin-

ishing the beltway with half as tolled portions and half as an expressway instead of freeway standards.⁶⁴

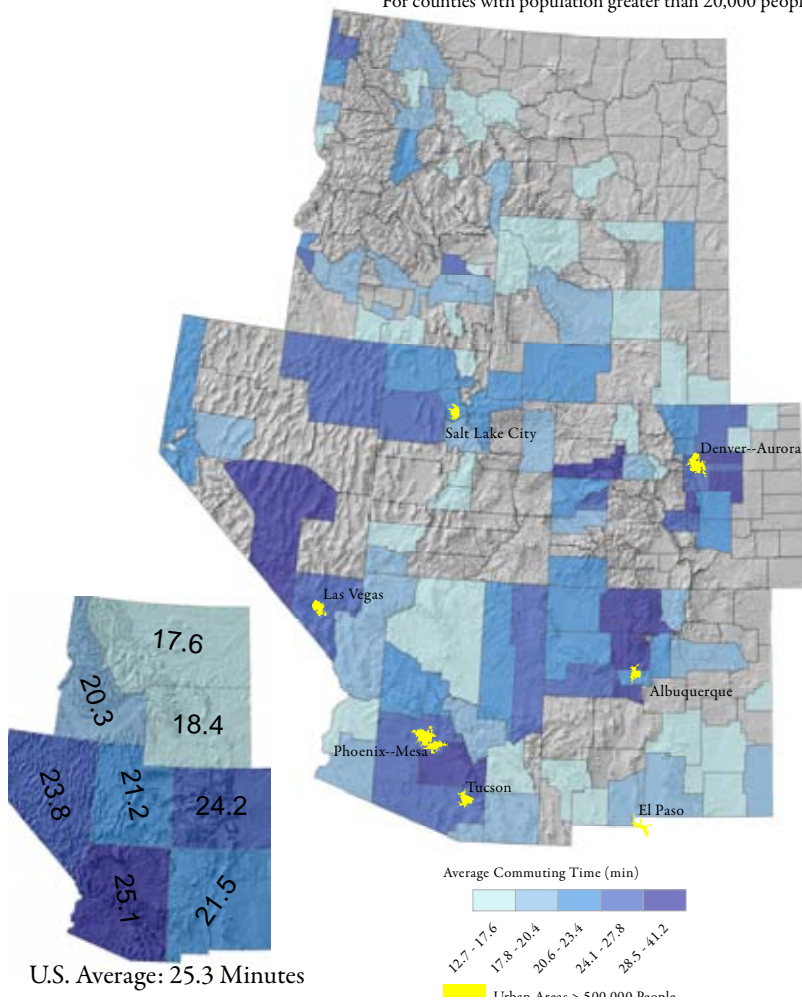
Las Vegas, Nevada was the last major city in the Rockies to begin building a beltway system with the construction of the Bruce Woodbury Beltway I-215 (with signs Clark County-215 for the sections not up to interstate standards); work slowly continues to this day. The frontage roads of the beltway were completed in 2003. These frontage roads are being upgraded and expanded to freeway standards as funds allow and traffic warrants. Incremental work continues with 2025 being the ultimate completion date for the 53-mile circle roadway around three-quarters of the Las Vegas Valley. The most unusual feature of this project is its funding structure, originating almost entirely from Clark County, making it the first interstate highway in the nation to be funded without federal or state funds.⁶⁵ If these three metropolitan areas had had bigger populations in the 1950’s when the interstate highway system was being planned, all of these belt freeways would have been designated as interstates and been eligible for the 90 percent federal funding, instead of relying so heavily on local sales taxes or tolls.

Metropolitan Areas and their Infrastructure:

The Brookings Institute’s *Mountain Megs* report classifies five-megapolitan regions in the Rockies: Las Vegas, Northern New Mexico, the Sun Corridor (Phoenix), Wasatch Front (Salt Lake City), and the Front Range (Denver), and highlights some very interesting facts about these urban areas, most importantly the density of the region’s population. These regions are included in **Figure 8**. In 2000, for example, 93 percent of the megapolitan population lived in urban areas—containing 1,000 persons per square mile minimum, while 79 percent is the national average. These megapolitan regions had an average urbanized density of over five persons per urban acre. Las Vegas had seven, and Denver and Salt Lake City each had six—the same as urban Chicago, far above the 3.6 persons per acre of urban Boston.⁶⁶

One of the easiest ways to quantify transportation infrastructure usage in regions is by evaluating the commuting trends of the workforce to and from work. This information is collected by the U.S. Census’s American Community Survey 2006-2008 three year report. The mode of transit used per percentage of the workforce is shown in **Table 2**. The results show that on average a similar number of people drove alone to work in the region compared to the national average, with more in the region car pooling, taking other means, and working at home. The most staggering trend this data shows is how few people in the Rockies Region take public transit (not including a taxicab) to work; the number is half the national average. With the metropolitan Rockies densities so high, there is room for public transit usage to increase and most of the megapolitans are building new public transit infrastructure. In 2008 alone, the first regional rail lines in the region were completed between Salt Lake City and Provo, Utah, and Albuquerque and Santa Fe, New Mexico. Phoenix also opened its first Light Rail Line in 2008, complementing Salt Lake City and Denver lines that have been open since 1994 and 1999 respectively. Expansion continues: for example, Denver’s FasTracks program is scheduled to build 122 new miles of commuter and light rail lines by 2018,⁶⁷ and Salt Lake City’s Front-

Figure 8: Average Commuting Times In the Rockies
For counties with population greater than 20,000 people



Lines program will build 70 new miles of rail by 2015.⁶⁸

A final way that commuting in the Rockies region is evaluated in the American Community Survey is by measuring the average commute time one-way to work for adults over 16 who did not work at home. These are analyzed for the region on a county by county basis for those counties with a population of over 20,000. **Figure 8** shows these results for the Rockies. Every state in the Rockies is below the national average of 25.3 minutes per each direction of their commute, with the more rural Northern Rockies states being much lower; Montana, for instance, has the third-lowest commute time in the nation behind only the Dakotas.⁶⁹ In Germany, one researcher has shown that people with longer commute times to and from work are systematically worse off and report a lower life satisfaction and increased stress.⁷⁰ This may well mean that short commute times contribute to a higher quality of life in Rockies communities. In the future, if Rockies infrastructure in urban areas becomes too congested, it threatens not just to limit productivity, but also possibly to increase stress and make the Rockies a less appealing region in which to live and visit. Then local, regional, and national action may well be focused on mass-transit solutions.

Broadband Access

In addition to transportation access, it is also important to consider the accessibility of information in the discussion of the state of infrastructure in the Rockies. The current era has been referred to as “the age of information” and “the digital age”

thanks to the Internet’s ability to disseminate vast amounts of data, facts, and figures and reduce geographic isolation by connecting people from far-reaching corners of the world instantaneously. Internet use worldwide passed the 1.5 billion person mark in 2008 – about 22 percent of the world’s population.⁷¹ Businesses and economies are increasingly relying on speedy communication to reach more customers and sell more products and services with increasing efficiency.⁷² Reliable high-speed Internet has thus become the prerequisite for economic growth, job creation, and greater quality of life.⁷³

Internet access not only makes the U.S. globally competitive, it also has small scale local and regional benefits that go beyond improving businesses and local economies; Internet access enables distance-learning, provides entertainment, enhances healthcare through telemedicine, facilitates civic participation, and improves quality of life.⁷⁴

High speed connection allows businesses to thrive. Broadband enables the use of multimedia uploads and downloads and online applications.⁷⁵ The faster the service, the less time it takes to utilize these benefits, and it allows productivity to increase. Broadband also provides online storage and greatly enhances telecommunications; video conferencing is especially beneficial as it allows people to interact face-to-face from miles away. This economic boost that broadband provides for a single company can translate into local and regional economic benefits.

Internet access alone does not translate to providing its full benefits. The transmission speed, or bandwidth at which a person or business is able to upload and download information to and from the Internet, greatly influences its usefulness. The slower the connection, the less beneficial it is.⁷⁶ The term “broadband” refers to high speed Internet. The Federal Communications Commission has historically defined broadband as having a minimum of 200 kilobytes per second in one transmission direction; however, the FCC’s current definition of high-speed Internet is 20 times faster, at four megabytes per second.⁷⁶ Dial-up is the slowest way to connect to the Internet, with a maximum capability of 56 kilobytes per second. **Table 3** outlines the differences between internet options.

Table 2: Workforce Commuting Modes

	Arizona	Colorado	Idaho	Montana	Nevada	New Mexico	Utah	Wyoming	Rockies	United States
Drove alone	75%	74%	76%	73%	77%	77%	75%	75%	75%	76%
Carpooled	14%	11%	12%	11%	12%	13%	13%	13%	12%	11%
Public transit	2%	3%	1%	1%	4%	1%	3%	1%	2%	5%
Walked	2%	3%	3%	5%	2%	2%	3%	4%	3%	3%
Other means	3%	2%	3%	3%	2%	2%	2%	2%	2%	2%
Worked at home	5%	6%	5%	7%	3%	5%	5%	5%	5%	4%

Source: United States Bureau of the Census. American Community Survey. *Means of Transportation to Work by Selected Characteristics 2006-2008 3 Year Estimates*

According to a study done in 2009, 78 percent of American adults use some form of Internet from home. Similarly, 65 percent of American adults use broadband to access the Internet from home.⁷⁷ Socioeconomic status and education levels strongly impact whether an adult uses broadband from home. Of those with a college education or higher, 82 percent use broadband at home, versus 46 percent of adults whose highest level of education is a high school degree.⁷⁷ Moreover, 52 percent of Americans who earn \$50,000 or less annually use broadband at home versus 87 percent of those who earn more than \$50,000.⁷⁷ Race, age, and disabilities also play a role in broadband adoption. Also noted is that 59 percent of African-Americans and 49 percent of Hispanics use broadband from home. Of Hispanics who opted to take the survey in English, 65 percent use broadband at home, while those who chose to take the survey in Spanish use broadband from home at a rate of 20 percent. Among adults who qualify as having a disability, 42 percent use broadband at home. Senior citizens have the lowest broadband adoption rate of 35 percent.⁷⁷ These statistics are displayed in **Table 4**.

Rural Broadband Use

While urban centers like Denver are in the process of upgrading to 4G wireless networks, many rural towns are ignored in terms of Internet upgrades, relying on the crawling pace of dial-up access or lacking any Internet access at all.⁷⁸ The Federal Communications Commission calls Internet “the great infrastructure challenge of the early 21st century.”⁷⁹ Similar to electrification when it was being widely developed and adopted, it is profitable for private companies to develop broadband in urban areas where denser populations mean reaching more customers, with minimal costs per customer to implement the requisite infrastructure. Conversely, in rural centers, “the last mile” of infrastructure is costly, especially if the payoff must be spread over a few customers. Fourteen million Americans throughout the U.S. do not have access to infrastructure that can support broadband, and access to infrastructure that can support high speeds does not necessarily mean Internet service providers will offer Internet at the highest speeds the infrastructure can manage.⁷⁹

According to a 2009 survey by the Federal Communications Commission, rural residents adopt broadband at a much lower rate than their urban and suburban counterparts. In rural areas 50 percent of American adults use broadband at home, versus 68 percent of American adults nationally.⁸⁰ This smaller proportion represents the demographics of rural places (older people with less annual income), but also reflects inadequate access to modern infrastructure. Rural dwellers cited reasons for not adopting broadband at rates similar to the national average, except in two categories. Rural residents are less likely to cite cost as a barrier for using broadband at home (31 percent of respondents of rural residents versus 38 percent nationally), while they were more than twice as likely than the national average to say that broadband service was not available where they lived; one in ten respondents from rural areas said they were unable to implement broadband in their homes versus four percent of respondents nationally as shown in **Table 4** and **Table 5**.⁸⁰ This reflects the physical difficulty and high cost of building the infrastructure

Table 3: Types of High Speed Internet

Type	Speed	Required Infrastructure
Digital Subscriber Line (DSL)	Several hundred kilobytes per second (kbps) to millions of kilobytes per second (mbps), depending on distance from the closest telephone company facility	Existing, traditional copper telephone lines
Cable modem	1.5 mbps or more, comparable to DSL	Cable television lines and a cable modem device that connects to an outlet and a computer
Fiber optic	Tens to hundreds of Mbps, depending on configuration of the service and distance of the fibers from the computer	Fiber optic cables and technology that are capable of converting data-carrying signals to light and transmitting them through glass cables
Wireless	Several hundred Kbps to millions of bytes per second; similar to DSL and cable	A radio link connects a transmitter and receiver (phone or personal computer)
Satellite	Depends on the package purchased, the line of sight to the satellite, and the weather; 500 Kbps is normal	Uses existing satellites
Broadband Over Powerline (BPL)	Several hundred Kbps to Millions kilobytes per second; similar to DSL and cable modem	Uses existing powerlines and outlets. Availability remains very limited because the technology is developing, but has potential to be very useful to rural communities

Source: Federal Communication Commission, at http://www.broadband.gov/broadband_types.html

necessary to connect rural areas with high speed Internet

The rural dwellers who do use broadband from home use it for shopping and taking online classes at rates comparable to those living in urban and suburban settings. This suggests that people who live in rural areas use broadband as a way to access the benefits that come with living in densely populated areas.⁸⁰

Dial-up Internet requires no additional infrastructure for connection, other than a telephone line,

and in many rural areas dial-up remains either the only option or the only affordable option for Internet access. Residents can be stuck with 14 kilobytes per second, which is 1.3 percent the speed of a standard, four megabyte high speed connection; this crawling pace can be used for text e-mails and little else, making most of the Internet inaccessible.⁸¹ This is especially relevant in the Rockies, where population distribution is characterized by megapolitans surrounded by large rural tracts.

The American Recovery and Reinvestment Act of 2009

designates \$7.2 billion in grants, loans, and loan guarantees to the U.S. Department of Agriculture’s Rural Utilities Services Department and the Department of Commerce’s National Telecommunications Information Administration to help solve this conundrum and give a boost to rural areas across the country.⁸² These funds alone however will not achieve the Federal government’s goal of universal, affordable broadband access. The Farm Bill of 2008 required the chairman of the Federal Communications Commission along with the secretary of the USDA to produce a comprehensive

Table 4: Broadband Adoption from Home, 2008

	Rural Residents (Percentage)	All others in sample (Percentage)
All	50	68
Ages 18-29	56	78
Ages 30-49	63	76
Ages 50-64	51	67
Ages 65+	29	37
Group	Percentage of group which uses broadband	
American Adults	65	
African Americans	59	
Hispanics	49	
>\$50,000 annual income	87	
<\$50,000 annual income	52	
Rural Dwellers	50	
College Education or higher	82	
High School educated or less	46	
Disabled	42	
Senior Citizens	35	

Source: John P. Horrigan, Broadband Adoption and Use in America, Federal Communication Commission, 2009; page 39. Available at <http://online.wsj.com/public/resources/documents/FCC.Survey.pdf>.

national strategy to deliver broadband to rural areas. The result is the National Broadband Plan of 2009 to further “promote world-leading mobile and broadband infrastructure and innovation.”⁸³

Figure 9 highlights increased broadband use around urban centers. Areas around the megapolitans are dark blue, indicating that upwards of 800 households per 1,000 households use high speed Internet.⁸⁴ There are some census tracts that reveal much lower usage, with between zero and 200 of every 1,000 households with broadband access.

One of the most striking patterns that emerge from mapping broadband usage on a census tract level is that Native American reservations consistently rank near the bottom in regards to rate of broadband usage. **Figure 9** also highlights this correlation by outlining Bureau of Indian Affairs land; one of the largest concentrations of these areas is around the Northern half of the border between Arizona and New Mexico, which is the site of the Hopi and Navajo Nations. This finding is consistent with historical trends; tribal lands have historically lagged behind the rest of the nation in telecommunications development. The 2000 census found that a mere 69 percent of Native American households on tribal lands in the continental U.S. had telephone service, compared to the national rate of 98 percent.⁸⁵ A 2006 report by the Government Accountability Office found that the most commonly cited barriers to telecommunications development were the rugged nature of the terrain of tribal lands and the tribes’

limited capital resources.⁸⁵ For these reasons, the costs of developing the necessary infrastructure often became too high for companies to recover investment costs.⁸⁵

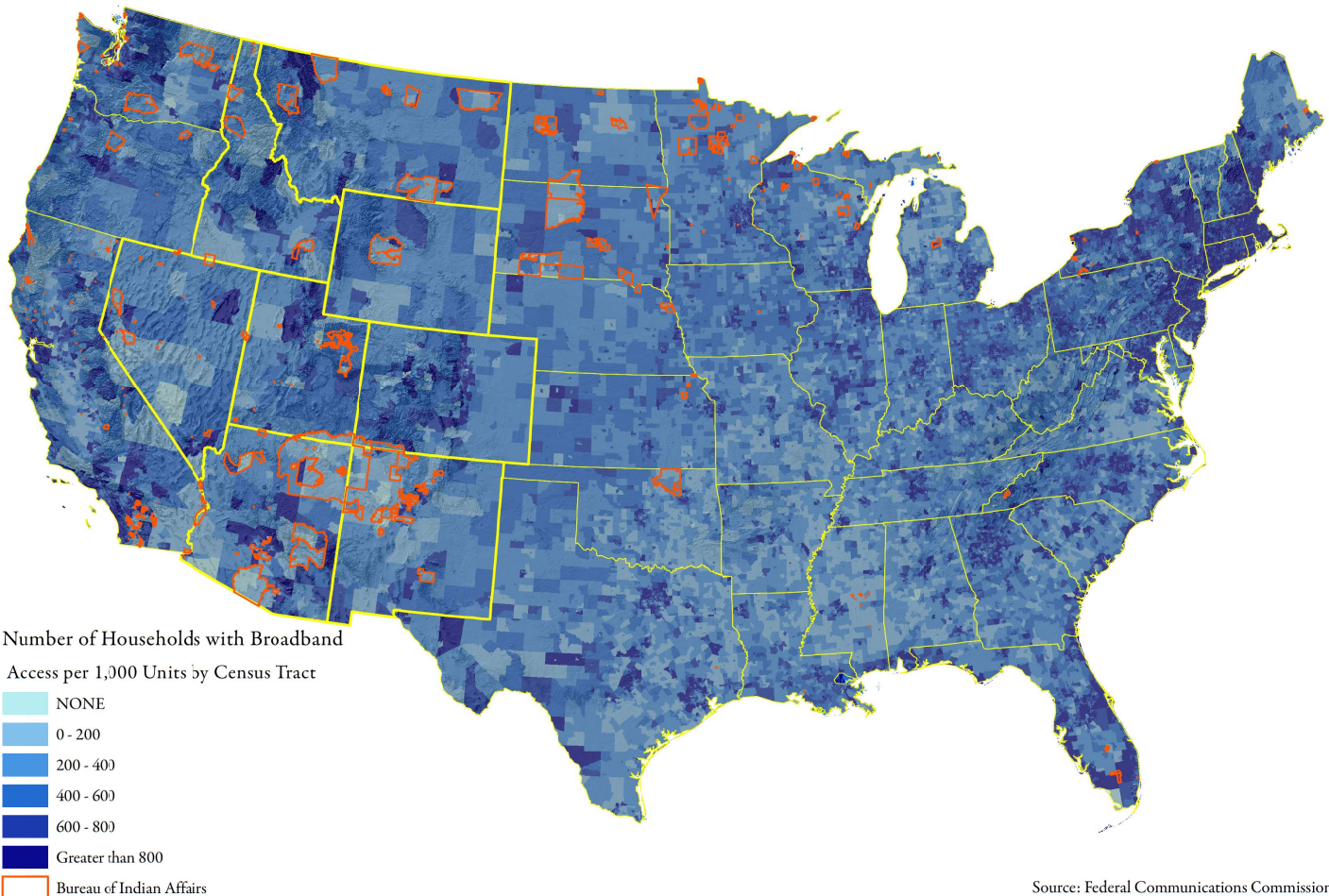
The study also cites the lack of technically trained tribal members and the difficulty to

obtain rights of way for projects as barriers to telecommunications development.⁸⁵ New Mexico has the lowest average number of high speed Internet connections per 1,000 households in the region, averaging somewhere between 200 and 400. Both the U.S. and the Rockies have an average of somewhere between 400 and 600 out of 1,000 households with broadband access, although the Rockies average is slightly lower. Colorado has the highest average broadband penetration, better than the national

Table 5: Barriers to Broadband Adoption		
Main reason cited for not having Internet or broadband (percent of total)		
	Rural	National Average
Cost	31%	38%
Digital literacy	23%	21%
Relevance	19%	18%
Service not available	10%	4%
Other	18%	19%

Source: John P. Horrigan. Broadband Adoption and Use in America. Federal Communication Commission, 2009: page 39. Available at <http://online.wsj.com/public/resources/documents/FCCSurvey.pdf>.

Figure 9: National Broadband Penetration 2008



average.⁸⁶

The Rockies contain 4,298 census tracts, of which 75 contain zero household units with broadband access. Every state has at least one tract that falls into this category. As **Figure 9** shows, the Rockies has a higher proportion of census tracts that fall into the lowest three rates of broadband penetration. The region has a lower proportion of census tracts that fall into the 601 to 800 and greater than 800 categories, the highest rates of broadband penetration.

New Mexico has both the largest number of tracts that have between one and 200 households with broadband in the region, as well as the highest proportion that completely lack broadband capabilities; 22 out of 455 tracts (five percent), in the state have zero households with broadband.

Despite the fact that, on average, the Rockies is home to fewer households out of 1,000 with broadband access, the region scores higher than the national average in number of providers for fixed high speed connections, residential fixed high speed connections and mobile high speed connections per census tract. These numbers suggest that areas that do have broadband access have a wider selection of Internet service providers. This could also be attributed the population clusters of the Rockies.

Cell Phone Coverage in the Rocky Mountain West

In our increasingly mobile world, cell phone use continues to play an important role. Like all types of infrastructure covered in this section, wireless phones help connect people and places efficiently. As the use of smart phones grows and wireless broadband technology develops, cell phone coverage becomes even more relevant. An area without cell phone coverage is less likely to attract business and residential development as shown in **Figure 10**. As expected, the areas without cell phone coverage tend to have lower population density.

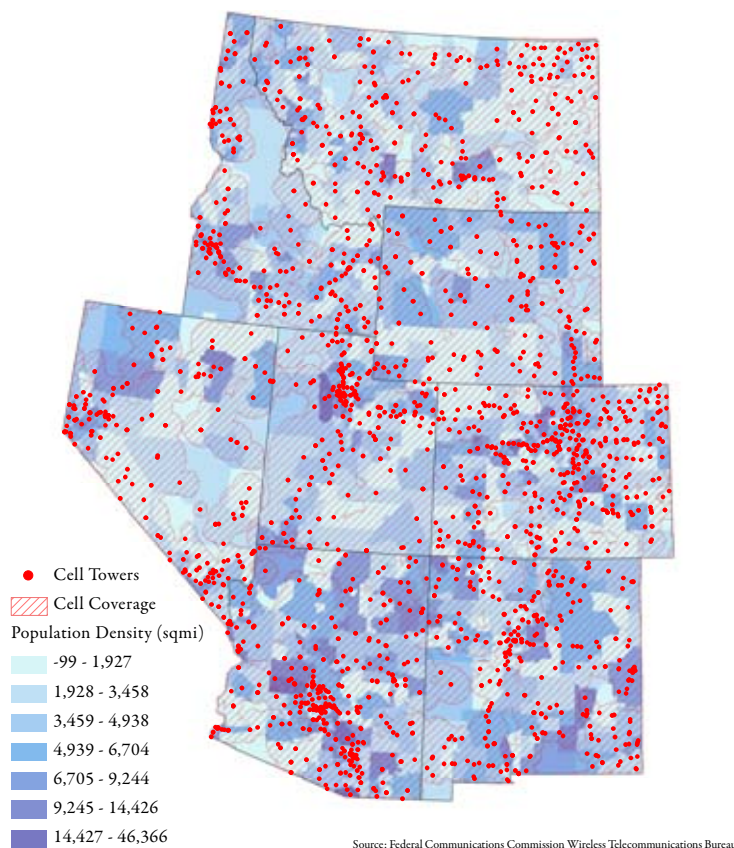
Electricity in the U.S.

In the U.S., electricity is ubiquitous. Widespread availability allows Americans to take its services for granted, even as it plays an increasingly important role in our everyday lives. We have come to not only rely on its ability to light homes, power refrigerators, air conditioning, and heating systems, but also to power the computers and devices that we now rely upon to stay connected economically and socially and to have access to the “information age” that links people to what is going on in the rest of the world.

Electricity is an unusual commodity. It is generated from many sources: coal, natural gas, uranium, underground heat, water, wind, and the sun. The amount that it costs to produce often depends upon the time of day and year. Electricity must be used the moment it is produced because, as of yet, there is limited ability to store unused power on a large scale. It behaves much like water, flowing through transmission lines instead of pipes, but zipping around much faster. As a nation, we invest 40 percent of the total energy we use into producing electricity.⁸⁷

The century-old electric grid that is woven throughout the U.S. is intricate and vast. It is the biggest interconnected machine on earth, and includes 9,200 electric generating units as well as tens of millions of miles of wire capable of delivering

Figure 10: Cell Towers and Coverage in the Rockies



over a million mega watts of power.⁸⁸ The National Academy of Engineering declared the American grid the greatest engineering achievement of the twentieth century.⁸⁹ However, this system still uses the same technology it did in the 1960's. It was sufficient in the past, but as population and demand increase into the 21st century, an upgraded grid means increased reliability, better management of electricity to reduce consumption, and integration of new renewable energy sources.

The technology that delivers electricity to consumers has remained largely unchanged since it was first installed. In many places, a mechanical meter measures how much electricity a home uses and a meter reader walks around to record those numbers.⁹⁰ Most utility companies do not have the ability to see instantaneous changes in demand. That can become a big problem very quickly, because, due to the nature of the system, the amount of electricity produced must match the amount of electricity consumed. If that delicate balance is tipped, it can cause blackouts.⁹¹ As we saw in 2003, when a single wire spurred a blackout in eight states and two Canadian provinces, cutting off power to 50 million people for up to three days, there is plenty of room for improvement. Each year, blackouts cause an estimated \$150 billion in losses due to factories that are forced to idle, businesses that are not able to run, and the spoiling of products that rely on electricity, such as refrigeration.⁹²

Electricity Demand in Region Grows Twice as Fast as the National Pace

Figure 11 and **Figure 12** illustrate the growing demand for electricity in the U.S. and the even higher growth of de-

mand for electricity in the Rockies. Between 1960 and 2007, the U.S. went from consuming 163 trillion British thermal units (Btu) per state to consuming 804 trillion Btu per state, an increase of 392 percent over the 47 year period. Demand for electricity in the Rockies grew at a rate about twice as fast as the state national average. On average, Rockies states went from consuming about 52 trillion Btu annually in 1960 to consuming 463 trillion Btu in 2008; an increase of about 797 percent.⁹³ In 1960, the Rocky Mountain West accounted for five percent of total national electricity use compared to just under four percent of the national population; by 2008 the Rockies were responsible for nine percent of total national electricity consumption compared to seven percent of the national population. According to The Brattle Group, a research institution on economics and policy, \$1.5 trillion in electricity infrastructure investment will be required between 2010 and 2030 to accommodate growing electricity demand in the U.S.⁹¹ At least \$135 billion of electricity infrastructure investment will be required in the Rockies over the same time, calculated as nine percent of the \$1.5 trillion.

This accelerated rate in electricity demand in the Rockies is a result of a faster rate of population growth in the region relative to the rest of the country. More people in the region translate to higher demand for resources such as water, natural gas, and electricity. Such growth strains the existing infrastructure and requires new projects to increase capacity to meet growing demand.

The Western Interconnection

There are three major grids in the U.S., each nearly independent from one another: the Eastern, Texas, and Western Interconnections.⁹⁴ The electric grid that delivers power to the Rockies states is known as the Western Interconnection. This grid covers the eight-state region, the West Coast states, portions of Texas, South Dakota, and Nebraska, parts of British Columbia and Alberta, Canada, as well as the Northern part of Baja California, Mexico. The webbing of this system traverses 1.8 million miles and delivers electricity to 22 million people.⁹⁵ **Figure 13** shows the existing transmission interconnections in the broader U.S. region. The Rockies region is a net electricity exporting area, while California is a net importing area; both are part of the Western Interconnection (WECC). The Pacific Northwest, also part of WECC is a net exporting area in the spring and summer, and is neutral in the fall and winter.⁹⁶

The mountainous geography and the sheer size of the region that have historically presented challenges to settling the Rockies also affect electricity delivery. Electricity requires transmission infrastructure. This infrastructure may take the familiar form of power lines, but also includes underground power lines. The great distances between population centers and the vastness of the region mean that the Western Grid is made up of transmission corridors that are much longer than their Eastern counterparts. The Rocky Mountains also present

Figure 11:
Change in Electricity Consumption

Source: Energy Information Administration

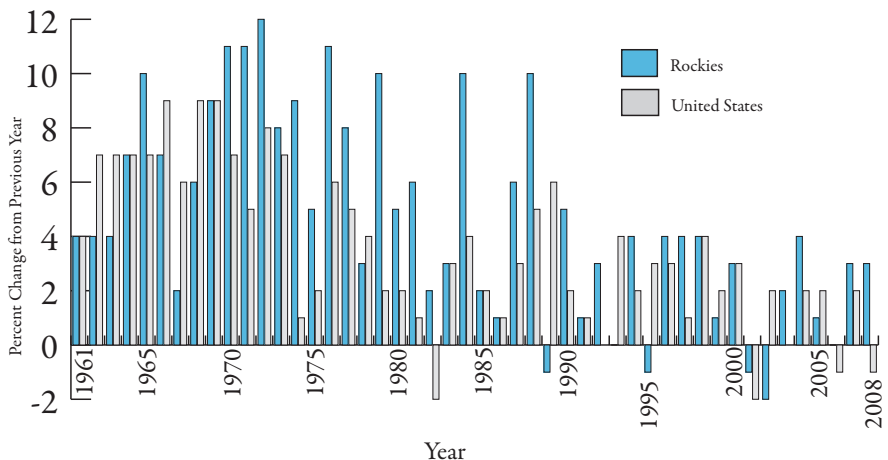
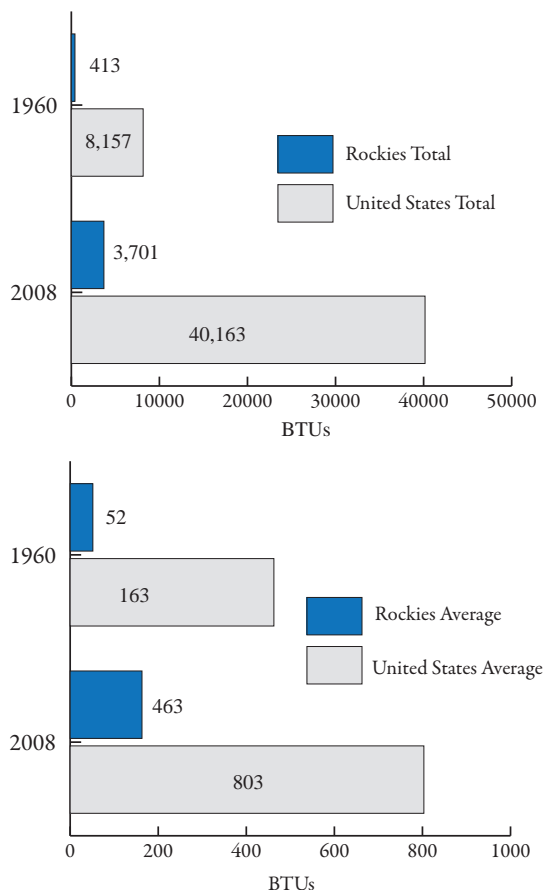


Figure 12:
Electricity Demand Change

Source: Energy Information Administration



a physical challenge to connecting electricity sources to consumers, since it is difficult to place transmission lines that cross over mountainous areas.

Renewable Energy Development in the Western Interconnection

In addition to its physical characteristics, the potential for development of renewable energy also makes the region



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unique. The area served by the Western Interconnection is the most prolific source of undeveloped renewable energy in the country that current technology is able to capture.⁹⁷ **Figure 14** displays the renewable energy potential in the Rockies region of the Western Interconnection.

Table 6 lists renewable energy potential in the West. These numbers are based on a report completed by the Western Governors' Association and the U.S. Department of Energy. They reflect high quality renewable energy zones with generating capacity of at least 1,500 megawatts in areas that are within 100 miles of a connection to the grid. Areas where statutes and regulations forbid development, such as on designated wilderness areas and national parks, are excluded. The study also excluded areas whose established purpose does not align with renewable energy development, such as state parks, as well as areas that are not compatible with development, such as urban areas, wetlands, and extremely sloped places.⁹⁸ Based on this analysis, there is about 126,000 gigawatt-hours per year of renewable energy potential in the Rockies.⁹⁹ For comparison, in 2008, the Rockies consumed 1,085 gigawatt-hours and the U.S. consumed 11,770 gigawatt-hours of electricity.¹⁰⁰ As **Table 6** shows, Wyoming and Montana have the largest amount of high grade wind, while Arizona has the greatest potential

for generating solar electricity.

Even though the technology to utilize these potential sources of renewable energy exists, there are multiple reasons why they remain a largely untapped energy resource. Sources of renewable energy tend to be concentrated in remote areas that do not have existing transmission infrastructure, sometimes hundreds of miles from a load center. **Figure 15** on the

^a Figure 13 : North American Reliability Corporation Interconnection Region

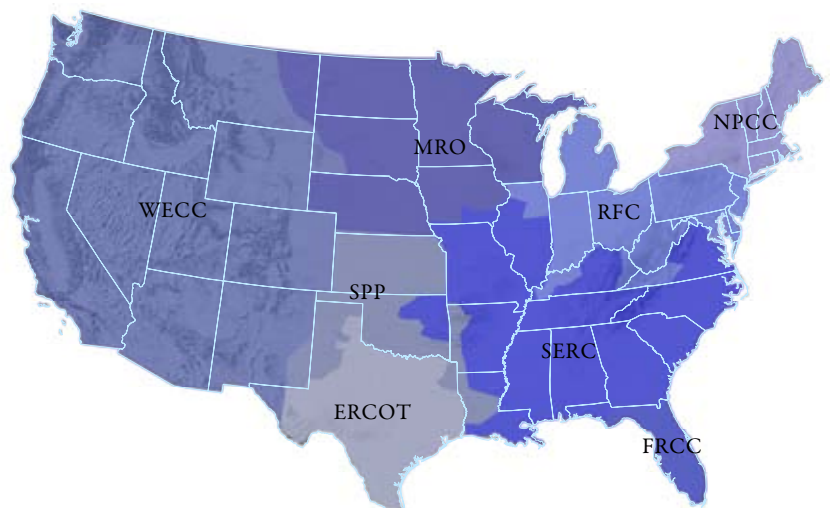


Table 6: Renewable Energy Generation Potential in the Rockies (GWh/yr)

Source	Arizona	Colorado	Idaho	Montana	Nevada	New Mexico	Utah	Wyoming	Rockies Total
Solar	19,780	2,303	0	0	18,582	13,718	7,202	0	61,585
Wind	3,717	15,679	1,603	10,059	431	13,184	1,678	14,854	61,205
Discovered Geothermal	0	0	279	0	1,368	0	225	0	1,872
Undiscovered Geothermal	1,043	1,105	1,872	771	4,364	1,484	1,464	174	-
Hydro	0	0	8	0	2	0	0	0	10
Biomass	327	153	358	147	300	223	91	16	1,615
Total	28,824	18,135	2,249	10,206	20,683	27,124	9,196	14,869	126,286

Source: Western Governors' Association and the U.S. Department of Energy, Western Renewable Energy Zones Phase 1

Gary Graham, the transmission director for the environmental firm Western Resource Advocates states, “We can’t do any energy development without there being some impact, that’s just impossible. Denver and the Front Range is a huge market for energy, period. You can’t meet that demand and retire dirty sources of electricity without identifying some place to do utility scale generation.”¹⁰⁶ Since renewable energy is in the early stages of development

next page shows broadly the areas that contain renewable energy potential but that often lack the necessary infrastructure for their development. This means that new transmission lines must be built to connect the source of electricity to the grid. However, if the source of energy is more than 100 miles from a connection to the grid, the costs of building the requisite infrastructure start to become unreasonably expensive.¹⁰¹

In order to build transmission lines, a company must acquire the right-of-way to the land area required to build the lines. This is done by obtaining easement permits and government leases. An easement allows a company to permanently own a corridor across the land required to build and maintain the transmission line. However, this process is not simple. If transmission lines cross state lines, public land, and private land, as is often the case when connecting renewable energy to the grid, the permitting process becomes increasingly complicated. Environmental Impact Statements must be submitted to multiple Federal agencies. On non-federal lands, projects must obtain authorization from state and local governments, as well as environmental, regulatory, and land-use approvals.¹⁰² If transmission projects must involve numerous different agencies, as they usually do in the West, it is more likely that regulatory requirements conflict with each other and that the process becomes increasingly intricate and lengthy.¹⁰¹

Electricity providers are also likely to run into local opposition. This may come in the form of conservation groups and citizens that are concerned about how the transmission lines will impact the health of the ecosystem they cut through. For example, transmission projects may threaten landscape species (species that require large tracts of territory to survive) such as the sage grouse; it is unclear how the activity, noise, and disturbance of a wind farm will affect this grasslands bird.¹⁰³ There is also concern about the effects that industrial wind farms have on birds and bats, but again, there is very little scientific evidence as to exactly how detrimental wind farms are to wildlife.¹⁰⁴ Wind farms may also pose a different type of threat. The air disturbance from wind farms can create blackout zones in radar systems; this interference can prevent air traffic controllers from being able to locate a plane’s position, which may also post a security threat.¹⁰⁵

in the region, there is little scientific research on how the requisite infrastructure, such as wind turbines, will impact wildlife and habitat, which makes environmentalists wary of new construction.

Utility companies are also likely to face opposition from local residents. Residents may protest because of sentimental ties to the land, or because the unsightly power lines would detract from their view, property values, and quality of life. Residents that live near wind farms sometimes complain that the low-frequency noise causes nausea and dizziness and that the noise of the turbines sometimes exceeds urban noise pollution standards.¹⁰⁷ It is possible to avoid some opposition by placing transmission lines underground, but this procedure costs a great deal more than placing a transmission line over-

Figure 14: Renewable Energy Potential

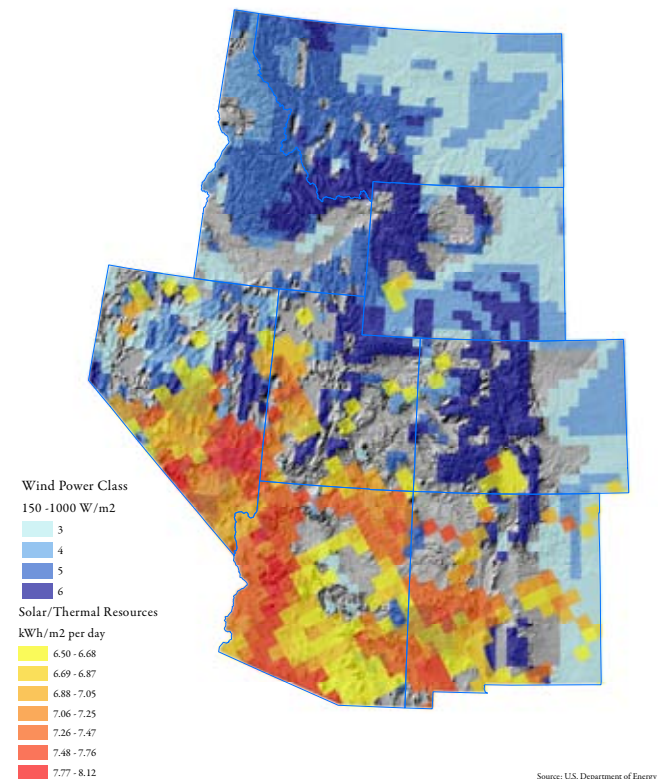
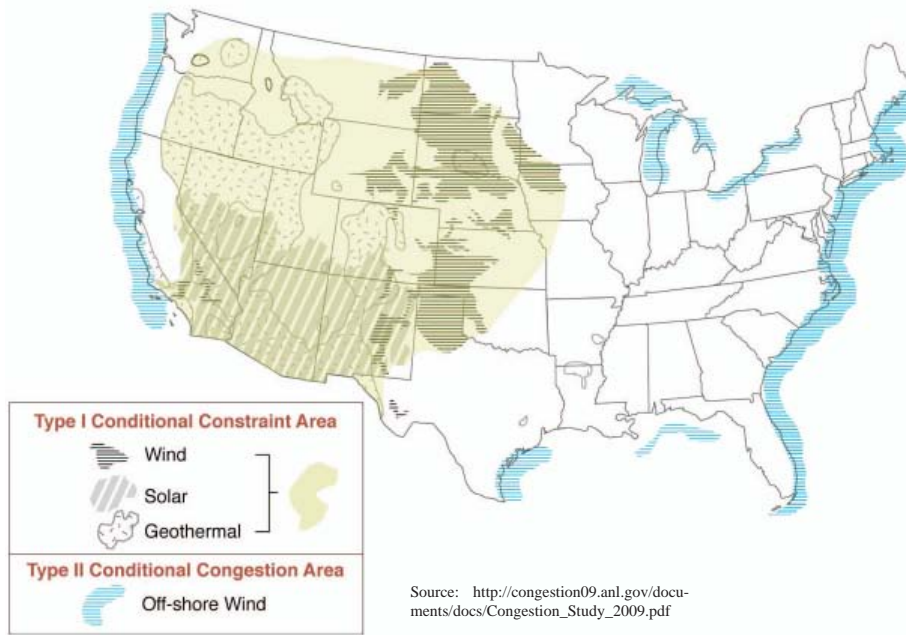


Figure 15: Conditional Constraint Areas



Source: http://congestion09.anl.gov/documents/docs/Congestion_Study_2009.pdf

head. For instance, for Lower Valley Energy, an electricity cop serving the Jackson Hole, Wyoming area, burying a transmission line costs about \$6 million per mile, while placing an overhead line costs about \$600,000 per mile.¹⁰⁸ Underground transmission lines translate to rate increases to the consumers to cover the difference – another unpopular strategy. NIMBYism (“not in my backyard”) continues to be a major issue in the West. In many cases, the local response to renewable energy development is similar to the response that fossil fuel extractors face. As Seth Wittke, the lead geothermal researcher at Wyoming’s State Geological Survey, puts it, “They’d like to see the energy produced in a green or renewable manner, but they don’t want to see the facility that is producing it across the valley or near their house.”¹⁰⁹ Not only is development stalled by opposition falling into the “NIMBY” category, a new acronym is now being used to describe another type of opposition: BANANAism – Build Absolutely Nothing Anywhere Near Anyone.¹⁰⁷ However, not all projects face local opposition. In fact, some communities welcome the economic boost that transmission development can provide. A great example is Fowler, Colorado which is discussed at length in the Rockies Eastern Plains section.

Companies sometimes have the power to condemn private land for the sake of public good using eminent domain. This means that if a company is not able to reach a reasonable settlement with landowners, the company may seize the land as long as they provide just compen-

sation that reflects the current value of the property. Eminent domain has historically been used to obtain land for projects such as the interstate highway system and military bases. Most companies go out of their way to avoid this option in favor of diplomacy. In some cases, the company will even call off a project in the face of strong opposition rather than using eminent domain.

Since renewable energy is frequently located in regions that do not have existing transmission infrastructure and are far from load centers, the projects to utilize the renewable energy must span many miles. The longer the transmission line, the more likely it is that the permitting process becomes long, costly, controversial, and litigious.¹¹⁰

Another major obstacle to developing renewable energy is financial capital. It can cost up to \$1 million per mile to build a transmission line, and much more to place lines out of sight, or underground.¹¹¹ In addition, the time frame within which a transmission project goes from the conceptual stage to being fully operational is seven to ten years.¹⁰⁹ Developing a transmission plan that becomes widely accepted requires technical, engineering, economic, and environmental analyses as well as stakeholder input. With such a costly initial investment of building, citing, and permitting transmission projects, and a seven-to-ten year period before the project begins to generate capital, individual, independent renewable project developers who may be interested in completing these projects often do not have the financial means to do so.

In addition, until recently transmission planning was done on a local scale rather than a regional scale. Therefore there was little analytical evidence to support how opening up broad regions of renewable energy would affect the grid.¹¹² Figure 16 gives a typical schedule for developing a major

Figure 16: Generic Schedule for Major Transmission Projects

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Issue ID							
Planning Analysis							
Plan of Service							
Planning Approval							
Planning							
Pre CPCN Activities							
CPCN							
Post CPCN							
Permitting							
Preliminary Engineering							
Engineering and Material Procurement							
Construction							

Source: Western Governors’ Association; Renewable Energy Transmission Roadmap, June 2010, p.6
 Notes: This is a general timeline. It can generally be applied to projects 30 to 150 miles long, involving more than three jurisdictions, two to three federal agencies, one to three state agencies, and more than 30 land owners. This timeline assumes a certificate of public convenience and necessity (CPCN) is needed. The Issue ID relates to why the project is needed. Pre-CPCN activities include a) project scope definition, b) project study area definition, c) environmental information identification and compilation, d) informational exchange with community leaders, e) consultation with land use and natural resource management stakeholders, f) preparation of Proponents Environmental Assessment, and g) preparation and filing of permit application. CPCN Process: Actual schedule depends on a) environmental setting and potential impacts, b) project complexity and c) level of public interest. Post CPCN activities include right-of-way acquisition and resource agency permits acquisition.

transmission project.

The demand for renewable energy, however, is increasing. According to a 2009 Gallup Poll on the environment, 77 percent of Americans would like to see increased government action to encourage energy production from alternative sources.¹¹³ In addition, many states are setting renewable energy goals and implementing Renewable Portfolio Standards which are displayed in **Table 7**. Six of the eight states in the Rockies region have Renewable Portfolio Standards (Idaho and Wyoming being the exceptions.) These standards require electricity providers to supply a minimum amount of electricity from eligible renewable sources. The goal of a Portfolio Standard is to create market demand for renewable energy and technology so that it will be competitive with nonrenewable sources of electricity.¹¹⁴ Each state has different specifications of which sources qualify as acceptable based on whether they fit with the goals of the Renewable Portfolio Standard.

Congestion Areas

The Department of Energy’s “Electricity Transmission Congestion Study” of 2009 used multiple resources to do a comprehensive analysis of the Western Interconnection. The study identified the most used transmission paths on the western interconnection, as is shown in **Table 8**. The study considers a transmission path congested if it operates at or above 75 percent of its rated capacity.¹¹⁰ Looking at trends from 1998 to 2007, the study concluded that while congestion has been variable in the past for the region, it has remained relatively stable in the last eight years.¹¹⁰

The congestion study also looked at analysis done by the Western Interconnection Regional Advisory Board. The researchers looked at what would be the implications of increasing renewable energy production to 15 percent of regional total production. The report found that the most heavily loaded transmission paths under these conditions would be Path 35 (TOT2C Southwest Utah to Nevada), Path 23 (Four Corners 345/500 kV Transformers), and Path 8 (Montana-Northwest), which are listed in **Table 8**.¹¹⁰ In addition, more electricity would flow from Colorado, Wyoming, Montana, and Idaho

towards Washington and Oregon, and Arizona, New Mexico, and California, increasing congestion.¹¹⁰ The proposed transmission projects would help alleviate this future source of congestion.¹¹⁰

As part of the same study, the Department of Energy referenced analyses completed by the Transmission Expansion Planning Policy Committee of the Western Electricity Coordinating Council. The study concluded that the lines currently most heavily used would be the source of most of the predicted congestion in 2017.¹¹⁰ The lines identified as being most congested were Path 20 (Path C Utah-Idaho), Path 31 (TOT2A Colorado-New Mexico), Path 35 (TOT2C Utah-Nevada), Path 23 (the Four Corners 345/500 kV transformers), and Path 8 (Montana-Northwest), in **Table 8**.¹¹⁰

In 2005, the Department of Energy funded a study that utilized National Energy Modeling Systems (NEMS), a simulation modeling tool that the Energy Information Administration uses to predict future energy demand, how new transmission projects will affect the grid, and impacts of new legislation.¹¹⁵ The study applied this model to county-level data. One of their results is a prediction of future electricity demand every five years through the year 2025. Based on this model, electricity demand in the Southwest will increase significantly by the year 2025, with the state of Arizona seeing some of the most dramatic increases.¹¹³ Areas around large cities in the Rockies were the other significant source of increased electric energy demand.¹¹³

According to Rich Halvey, the Energy Program Director at the Western Governors Association, the current recession will temporarily decrease electricity demand in the region and thereby expand the time frame for keeping up with demand. He predicts that the region has until 2015 or 2016 to build the necessary infrastructure and implement conservation initiatives to meet future demands.¹¹⁶ **Figure 17** shows proposed major transmission expansion projects in the Western Interconnection

A Smarter Grid

A “Smart Grid” is one that applies digital technology to the existing electric transmission grid. It reconfigures the current grid, which is centralized and supplier-controlled, to one that is decentralized and consumer-interactive.¹¹⁷ A good description of Smart Grids is in the quote below.

“Smart Grid advancements will apply digital technologies to the grid, and enable real-time coordination of information from generation supply resources, demand resources, and distributed energy resources (DER). This will bring new efficiencies to the electric system through improved communication and coordination between utilities, the grid, and consumers, which will translate into savings in the provision of electric service. Ultimately the smart grid will facilitate consumer transactions and allow consumers to better manage their electric energy costs.”¹¹⁸

Deploying Smart Grid technology has been compared to the construction of the interstate highway system and the development of the Internet in terms of the extent to which it will change Americans’ everyday lives. The expected results

State	Target	Specific Provisions
Arizona	15% by 2025	4.5% by 2012 from distributed energy resources
California	20% by 2010	
Colorado	Investor Owned Utilities 20% by 2020; electric cooperatives and municipal utilities 10% by 2020	Investor Owned Utilities: 0.4% solar by 2020
Montana	15% by 2015	
New Mexico	Investor Owned Utilities: 20% by 2020; rural electric cooperatives 10% by 2020	Wind: 4%; solar: 4%; biomass and geothermal: 2%; distributed renewables: 3% by 2020 (Investor Owned Utilities only)
Nevada	20% by 2015	1% solar by 2015
Oregon	Large utilities (>3% state's total electricity sales) 25% by 2025	Smaller utilities 5-10% by 2025 (depending on size)
Texas	5,880 MW by 2015	At least 500 MW from renewables other than wind
Utah*	20% by 2025	
Washington	15% by 2020	

Source: Environmental Protection Agency, http://www.epa.gov/chp/state-policy/renewable_fs.html
 Note: * Indicates Renewable Portfolio Goals, not required standards

**Table 8:
Most Used
Transmission Lines
in the West**

#	Path Name
36	TOT 3
20	PATH C
31	TOT 2A
78&79	TOT 2B
35	TOT 2C
23	FOUR CORNERS 345/500Kv
49	EAST OF COLORADO RIVER
46	WEST OF COLORADO RIVER
15	MIDWAY-LOS BANOS
3	NORTHWEST-CANADA
66	COI
65	PACIFIC DC INTERTIE
8	MONTANA-NORTHWEST
1	ALBERTA-BRITISH CO- LUMBIA
14	IDAHO-NORTHWEST
37	TOT 4A

Source: Western Electricity Coordinating Committee Transmission Expansion Report

of applying this technology, according to the Department of Energy, are: superior reliability, similar affordability, global competitiveness, the ability to accommodate traditional, renewable, and distributed energy sources, the reduction of environmental impacts, and the ability to incorporate technology not yet developed.¹¹⁵ It will be more sensitive and responsive when a system becomes overloaded, and will therefore be more effective at preventing blackouts.¹¹⁵ For example, if a transmission line becomes congested, a smart grid automatically redirects electricity around it to avoid an outage.¹¹⁹ It will also be more efficient, limiting the need to build more capacity infra-

structure and reducing environmental impact. That translates to a significant environmental impact reduction. For instance, if the grid were five percent more efficient, the energy saved would be the same if the fuel and greenhouse gas emissions from 53 million cars were permanently eliminated.¹¹⁵ Since it is capable of incorporating distributed power, a smart grid will be more resilient to attacks and natural disasters.¹¹⁵ Implementation of the Smart Grid will require widely adopted standards to ensure that all parts of a Smart Grid are capable of interoperability, similar to the way that the telecommunications network has adopted industry-wide standards.¹²⁰ A smart grid may also allow for distributed electricity storage. Plug-in hybrid vehicles could potentially provide a way to store electricity, and allow the customer to sell it back to the grid when it is needed.¹¹⁵ The following quote provides a good overview of the importance of a smart grid:

“In the short term, a smarter grid will function more efficiently, enabling it to deliver the level of service we’ve come to expect more affordably in an era of rising costs, while also offering considerable societal benefits – such as less impact on our environment. Long term, expect the Smart Grid to spur the kind of transformation that the Internet has already brought to the way we live, work, play and learn.”¹¹⁵

With electricity demand growing at twice the rate of national demand and abundant sources of renewable energy potential, implementation of smart grid technology in the Rockies would be especially beneficial. Smart grid technology can easily accommodate distributed electricity generation, so adding small-scale renewable energy projects would be much easier. Smart grid’s ability to manage itself would improve diffusion of renewable energy sources and would be more equipped to handle the sporadic nature of their production. The American Recovery and Reinvestment Act awarded \$3.2 billion to

43 states (including the District of Columbia), \$2.7 million of which went to six Rockies states, to fund Smart Grid technology deployment and Smart Grid technology demonstration projects.¹²¹

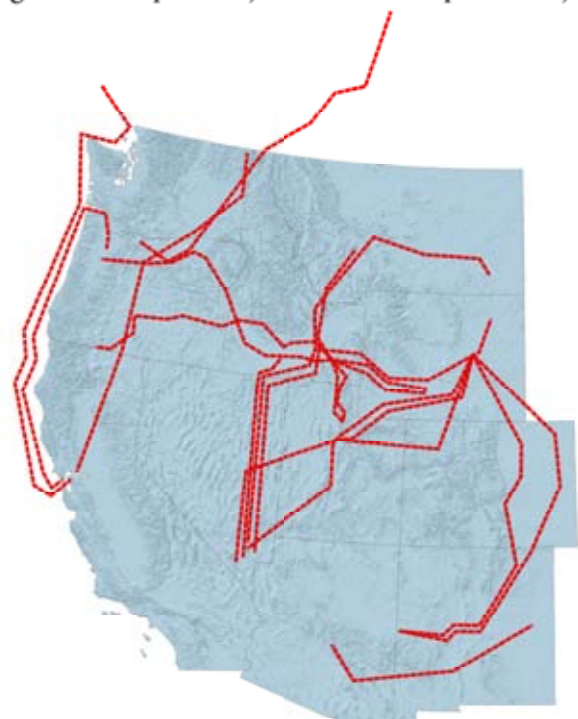
Demand Side Management

Demand side management refers to energy efficiency programs and demand response programs developed in order to increase electricity reliability, reduce costs, reduce consumption, and manage consumption to decrease the need to add generation units to the grid.¹²²

One way the region manages growing demand for electricity is through conservation efforts. New technology and incentives from utility companies help to stabilize electricity demand by lowering per capita demand. As **Figure 18** shows, many Rockies states use slightly less electricity per capita than the rest of the U.S., and conservation efforts are helping to lower per capita consumption further.

Many utility companies across the region and the country are finding creative ways to help households reduce their consumption and in turn reduce their operational costs. Lower Valley Energy, an energy cooperative that services the greater Jackson Hole, Wyoming region, offers a wide variety of incentives to encourage customers to reduce consumption. These incentives include rebates for using Energy Star appliances, rebates for installing geothermal heat pumps and photovoltaic cells, offering to pay for a home energy audit if the owner chooses to implement any of the recommended changes, and lighting evaluation for a reduced cost that includes replacement bulbs that use lower wattage.¹²³ In addition, many companies are willing to pick up an extra refrigerator or freezer from a home, recycle it, and pay the owner \$25 to \$50.¹²⁴

Figure 17: Proposed Major Transmission Expansion Projects



Advanced Metering Technology

Advanced metering is an example of enabling technology that is part of a smart grid. These smart meters allow two-way communication between the consumer and the utility provider. The meter records usage per hour for residential customers, and every fifteen minutes for non-residential customers. This information is transmitted via communication networks, such as radio, to inform the customer and the provider about their electricity usage. Advanced meters can be read remotely, so data collection is much more efficient than a person walking house-to-house to record meter activity.¹²⁵ Advanced metering technology enables customers to participate in demand-response programs, in which consumers are encouraged to reduce usage during peak demand hours when it is most expensive. The Federal Energy Regulatory Commission defines demand response thusly: “a reduction in the consumption of electric energy by customers from their expected consumption in response to an increase in the price of electric energy or to incentive payments designed to induce lower consumption of electric energy.”¹²⁶

Recently there has been some opposition to Smart Metering technology. Some recipients of Smart Meters say that the devices have inaccurately measured their electricity use, driving up their monthly electricity bills. There are now more than two million smart meters in the United States and numerous complaints to go along with them, with some even resulting in lawsuits.¹²⁷ Though it is new to the market this new metering system seems to be fairly accurate.

Demand Response Programs

The goal of demand response programs is to reduce peak electricity demand in order to increase electricity reliability, save the utility provider and the customer money, and to prevent the need to build new facilities to generate enough electricity to meet higher levels of peak demand.¹²⁸ There are multiple ways of doing this.

Dynamic pricing without enabling technology requires smart meters; energy consumption reduction occurs when the customer chooses to reduce usage when it is most expensive.¹²⁶ Dynamic pricing with enabling technology is similar to dynamic pricing without enabling technology, except that with this program, consumers have devices that automatically reduce consumption during peak hours. This may be done by cycling certain appliances, such as air conditioners on and off, or by running appliances, such as water heating systems, during non-peak hours.¹²⁶ Direct load control allows utility providers to instantaneously reduce customers’ consumption in the event that demand on the grid becomes dangerously high and the risk of failure is great.¹²⁶ This type of demand response is widely utilized in order to manage the grid and prevent power outages. Interruptible tariffs provide financial incentives to medium and large scale customers to reduce their consumption when the grid is being strained.¹²⁶

In practice, participating in a dynamic pricing program means that for a small fee per month a household can install an advanced meter that measures the price of electricity per hour. The customer is charged based on the instantaneous cost

Figure 18:
Electricity Consumption Per Capita 2008

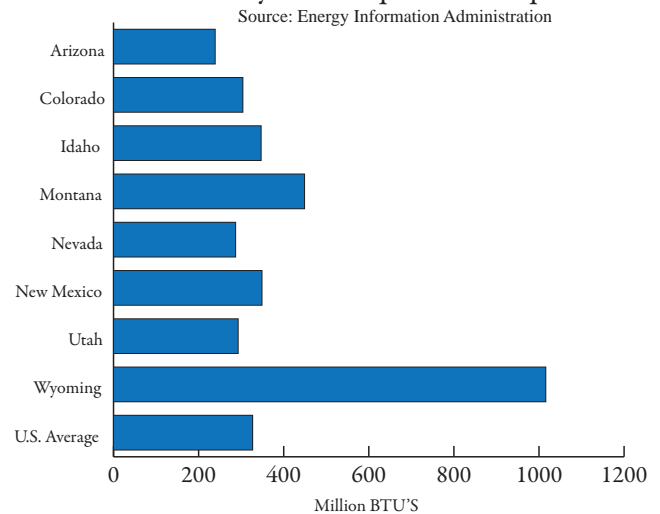
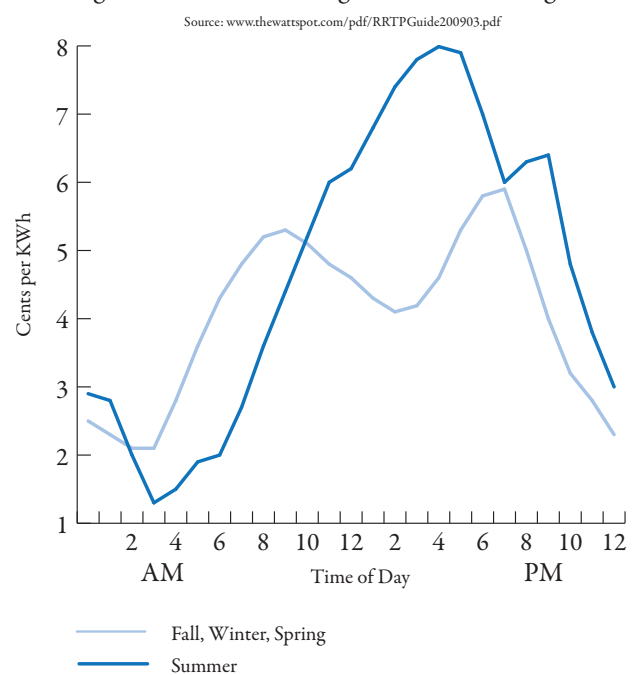
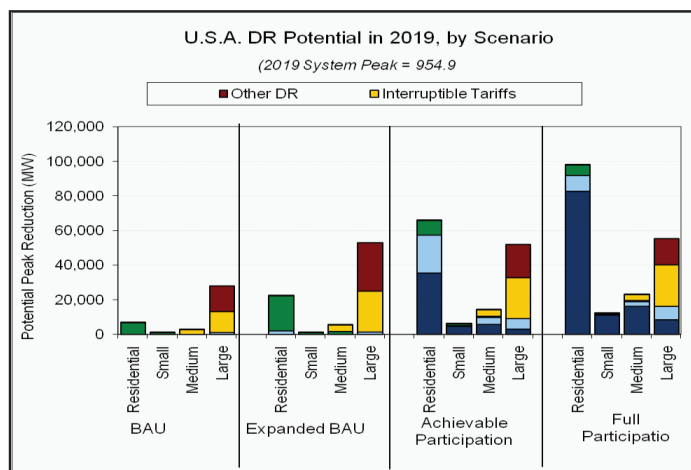


Figure 19: ConEd's Average Real Time Pricing Trends



of generating electricity, rather than a flat rate per hour. The utility may alert the consumer via e-mail, text, or phone when electricity jumps above a certain rate, inform the customers of predicted price highs for the following day, and provide online analysis tools to help customers manage and adjust their electricity use to increase savings.¹²⁹ This technology encourages consumers to reduce electricity usage during peak demand hours (in the evening between 5 pm and 10 pm) when the cost of electricity can spike to three times its lowest price.¹³⁰ This fluctuation can be seen in **Figure 19**. By reducing peak demand and making consumers aware of cost fluctuations and their own consumption, this technology often leads to reduced electricity usage and translates to cost savings for the customer and the utility company. Keeping peak demand stable prevents the

Figure 20: Demand Responses Potential by 2019 by Type



Source: FERC National Demand Response Potential Assessment results, <http://www.ferd.gov/industries/electric/inus-act/demand-response/NADR-models.xls>

need to build new, costly generation plants to meet increased capacity demands.¹³¹

Current Reach of Demand Response Technology

According to *A National Assessment of Demand Response Potential*, a report submitted to Congress in 2009 by the Federal Energy Regulatory Commission, current and planned demand response programs have the potential to reduce national peak demand by four percent.¹³² The same report also found that current demand response implementation, where it is cost effective, is less than a quarter of what it could be.¹²⁹ Therefore, there is a large gap between attainable peak demand reduction and current reduction if demand response programs were properly deployed.¹²⁹ Figure 20 shows how much electricity the nation could save by implementing various demand response scenarios. Definitions of scenarios analyzed in the *National Action Plan on Demand Response* are:

- **Business-as-usual:** existing and planned demand response programs continue¹³⁰
- **Expanded business-as-usual:** in addition to existing and planned demand response programs, current levels of demand response programs are expanded to all states and assume a the highest current rate of participation, advanced metering infrastructure is partially deployed, and five percent of customers choosing to participate in dynamic pricing¹³⁰
- **Achievable participation:** advanced metering infrastructure is universally deployed, everyone participates in a dynamic pricing unless the customer expressly chooses not to (the study assumes a 60 to 75 percent participation rate), and participating in load control opportunities were still available to the customer¹³⁰
- **Full participation:** advanced metering technology is universally deployed, and all customers participate in dynamic pricing where it is cost effective¹³⁰

Regions that have the highest potential to reduce per customer demands by implementing demand response programs are regions that have high central air conditioning saturation.¹³⁰ The Rocky Mountain West falls into this category. The Rockies contain a high concentration of central air condi-

tioning units. Therefore demand response programs are a cost-effective strategy for reducing electricity demand. The FERC predicts the universal deployment of advanced metering technology and demand response programs have the potential to reduce peak electricity demand by 20 percent in 2019.

Barriers to Implementing Demand Response

The *National Assessment* of 2009 identified four categories of barriers that prevent expansion of demand response to its full potential: regulatory, economic, technological, and other. Examples of regulatory barriers include financial disincentives for utilities, lack of retail competition, ineffective demand response program design, and lack of real-time information sharing between independent service operators (ISOs) and utilities. Examples of economic barriers include inaccurate price signals and lack of sufficient incentives to induce participation. Technological barriers include lack of advanced metering infrastructure, lack of cost-effective enabling technologies, and concerns about technological obsolescence and cost recovery. Other barriers include fear of customer backlash, lack of customer awareness and education, and perceived temporary benefits of demand response programs.¹³⁰

FERC Recommendations

Broad implementation of demand response practices means great expansion of advanced metering infrastructure, direct load control programs and interruptible tariffs to all states; therefore a means of information sharing among all groups participating and levels of government involved in the development, implementation, and analysis of such programs would help provide effective implementation.¹³⁰ The funding or incentives to participate in this type of program could come from national energy policy leaders, the electric industry, consumer organizations, governors, state legislatures, and local and retail regulators.¹³⁰ In addition, extensive customer education and awareness is required for demand response programs to be effective, and this information must be disseminated effectively by any or all of the entities listed above.¹³⁰



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Table 9: Rural Residents Within 25 Miles of an Intercity Bus, Rail, or Smaller Airport or Within 75 Miles of a Major Airport 2005

Location	Residents Served by At Least One Mode	Intercity Rail Service		Air Service		Intercity Bus Service	
		Access	ONLY Access	Access	ONLY Access	Access	ONLY Access
Arizona	82%	30%	0%	63%	6%	76%	13%
Colorado	91%	28%	0%	76%	7%	83%	10%
Idaho	84%	7%	1%	48%	3%	80%	30%
Montana	77%	17%	3%	50%	3%	66%	21%
Nevada	91%	36%	0%	84%	6%	86%	4%
New Mexico	88%	27%	0%	58%	6%	82%	21%
Utah	82%	38%	0%	71%	7%	78%	9%
Wyoming	77%	0%	0%	52%	7%	70%	26%
Rockies	85%	25%	1%	63%	6%	78%	16%
United States	93%	42%	0%	71%	3%	90%	16%

Source: U.S. Department of Transportation Research and Innovative Technology Administration: Bureau of Transportation Statistics June 2005

Rural and Intercity Travel Options in the Region

Public Transportation options and their availability for the rural Rockies are important for equity in mobility and preventing isolation of individuals unable to drive a private vehicle. The U.S. Department of Transportation in 2005 analyzed the number of people living in Rural America (outside of urban areas or clusters, these are urban places with a population greater than 2,500)¹³³ within 25 miles of an intercity bus or rail station or small airport, or within 75 miles of a medium or large airport. **Table 9** shows that for the entire Rockies region the percentage of residents served by at least one mode is eight percent lower than the US total, and in every state it is at least somewhat lower than the national average. Particularly striking is the low number in Montana and Wyoming with only the Great Plains States of the Dakotas and Nebraska having lower numbers (North Dakota has only 59 percent coverage).¹³¹

Train Coverage consists of only the four Amtrak east-west routes through the region, as previous **Figure 4** on page 62 shows. This service provides very little intercity connectivity within the region since these trains only run East-West but do provide a vital service particularly for rural residents living along the Empire Builder Line in Montana—this line gives Montana its three percent of residents with only rail access statistic—the highest in the nation.¹³¹ Intercity bus services, such as those provided by Greyhound, have been decreasing consistently over the past decade, particularly to rural communities. Between 2000 and 2005 Greyhound underwent a major restructuring, slimming down operations and cutting service to rural areas in an effort to save costs and provide faster service to its riders.^{134 135} A variety of local and regional bus companies have replaced some of this dropped service.

Aviation Travel in the Rockies

“Access to Markets through a Regional Airport is Critical to How Your Performing Economically”

-Mark Haggerty, Headwaters Economics

Presently the main way our region is connected to the world is through aviation and having affordable and easy access to such service. Using existing flight maps of the major airlines **Figure 21** was compiled showing all the airports in the region

with regularly scheduled commercial service as well as the largest aircraft-type to serve that airport. The one thing this map does not show is the region’s global air connectivity: only Las Vegas has multiple non-stop links to Europe and Asia, with many international airlines serving the airport.¹³⁶ Delta’s Salt Lake City hub does have limited non-stop service to its hubs in Tokyo and Paris,¹³⁷ Phoenix’s only transcontinental service is British Airways to London,¹³⁸ while Denver has non-stops to London and Frankfurt.¹³⁹ This map also shows how few airports have any full-size jet service (these are airports that airlines serve with their mainline operations), and with the exception of the hub-cities, the majority of service to even these hubs and other intermediately sized destinations is via regional jets. These

are jet aircraft with 75 seats or less branded by the major airlines as American Eagle, Delta Connection, United Express, or US Airways Express. These flights are not operated by the major airlines at all (with the exception of American Eagle, a fully owned subsidiary¹⁴⁰), but by separate regional airlines operating under contracts from the major airlines. By far the largest of these operators in the Rockies is SkyWest Airlines doing business as Delta Connection from its hub in Salt Lake City, and United Express from Denver using regional jets with between 76 and 50 seats.¹⁴¹

The next step down for airline service, shown by the Yellow hexagons in **Figure 21** is via Turboprop planes. Many people have a dislike of these aircraft caused by the increased vibrations, noise, and slow speeds compared to jet aircraft, but their biggest advantage is in fuel efficiency. For example a modern 76 seater Bombardier Q400 turboprop—planes used by Horizon Air (an Alaska Airlines subsidiary) on flights in the region to Idaho—claims to be 30-40 percent more fuel efficient compared to a similar jet aircraft.¹⁴² The rest of the larger turboprops used in the region are 30 seat Brasilia EMB120s.¹⁴³ The next size down for aircraft serving the smallest communities in the region are use of 19 seat Beechcraft-900D turboprops by Great Lakes Airlines (Blue Hexagons in **Figure 21**)—although the company also has 30 seat EMB120s that it operates to at least Sheridan and Riverton in the Region¹⁴⁴— these planes are



Figure 21: Rockies Airports with Commercial Service

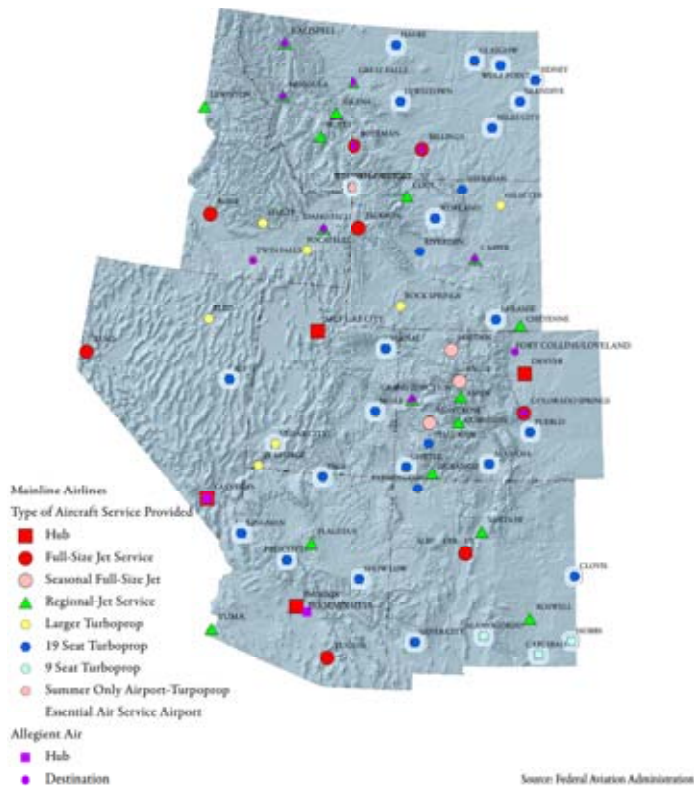
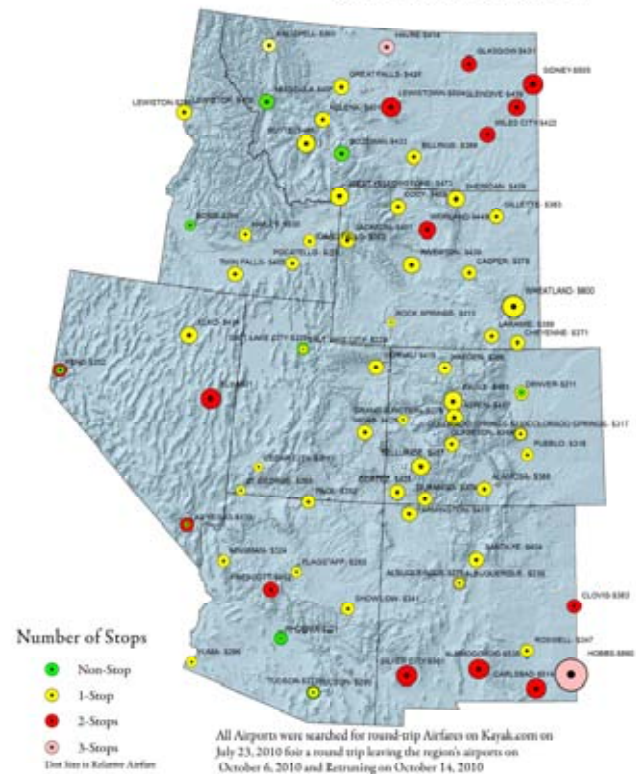


Figure 22: 2010 Airfares between the Rockies and San Francisco, California



so small that they do not have flight attendants. The smallest planes used in the region are nine-seat airplanes (pink hexagons in **Figure 21**) by New Mexico Airlines connecting Albuquerque with three small cities in southern New Mexico. Many of these smaller destinations are subsidized by the Essential Air Service Program.

The Essential Air Service (EAS) Program gives direct operating subsidies from the Federal Government (through the Federal Aviation Administration) to airlines to serve airports that had air service before deregulation in 1978, and would not be able to support air service on their own. As of May 1, 2010 there were 105 total EAS communities receiving subsidies outside of Alaska with 25 airports in the Rockies. Sidney, Montana receives the highest annual subsidy rate in the region with \$2,159,591 (the highest overall is Decatur, Illinois at \$3,082,403), with \$1,492,109 the national average and \$1,362,792 being the Rockies average.¹⁴⁵ This is a program that is often ridiculed by the national media as a 2006 article in *The New York Times* highlights, a single passenger on an EAS flight from Pueblo to Denver, required a \$255 per passenger subsidy (Pueblo is only 40 miles from Colorado Springs and 115 from Denver). Another example is a subsidy of \$473 per passenger from Lewiston, Montana in 2005, both of these flights averaged 3 passengers. One differing example in the article concerns the subsidies to Rock Springs, Wyoming that in 2005 had 45 passengers per day with subsidies of \$14 per person; by 2010 unsubsidized commercial service on this route was realized as viable and now is no longer subsidized.¹⁴⁶ This is the overall goal of EAS: to wean cities off of service subsidies.

The final airline that is also included in **Figure 21**

is Allegiant Air. It has its own designation because all of its flights are on mainline MD-83 or MD-87 jets that seat 150 and 130 passengers, but it only serves its destinations from its hub cities (additional destinations served from some of its destinations in the region are Los Angeles and Long Beach, California) with non-daily service (frequencies to cities in the region range from twice to five-days a week) and does not allow passengers to make any connections at its hubs. It considers itself a vacation and leisure airline, by default the airline's website is selected to book a flight and hotel. It does not enter into corporate contracts and is not designed for business travelers with its limited flight schedules. It does provide very low-cost leisure travel from the region to Las Vegas, Phoenix and Los Angeles for people with flexible schedules for its non-daily service.¹⁴⁷

Another relatively crude analysis was done in an attempt to analyze the region's airfares. For a hypothetical week-long trip from any of the region's airports to San Francisco, California in October 2010, every Rockies city with air service was searched on Kayak.com for the same dates.¹⁴⁸ The results are shown in **Figure 22**. Airlines use yield management to manage their fares, and maximize revenue so airfares are constantly changing. This map does show just how much cheaper it is to fly out of one of the region's major airline hubs compared to the regions smaller cities. But it does not show that travel times are also extremely long from the smaller communities on the map, particularly those in Northeastern Montana and Southern New Mexico that require two stops before reaching a one of the regions four airline hubs that offer frequent flights to San Francisco. For example, the shortest possible travel time from Hobbs, New Mexico is over eight hours (the non-stop

from Albuquerque takes two and a half hours, but only operates once a day leaving at 6AM, not providing for any connections). The travel-time would break even by driving the five-hours to Albuquerque.¹⁴⁹

The extreme travel times from these smaller communities and their infrequent air service are a major impediment to businesses that need to be connected in the global market place, and there are many examples of how these conditions determine where businesses locate. For example, when Ganay Johnson, Development Manager of the American Prairie Foundation was asked why their conservation group is based in Bozeman, Montana and not in Northeastern Montana closer to the prairie they are working to restore, she stated that the biggest reason was the fact their prairie region is four hours from the nearest major airport in Billings, and that she flies at least a couple times a month.¹⁵⁰ The nearest EAS airport is roughly two hours away in Glasgow or Havre.¹⁵¹ Headwaters Economics, a research group, has taken the closeness of a location to a metropolitan area with frequent air service even further in their study of *The Three Wests: a New County Typology Based on Transportation*.¹⁵² In this study they classified the counties of the West into Metro: those classified by the U.S. government's Office of Management and Budget as metropolitan statistical areas; Connected: "non-metro counties with population centers that are within a one-hour drive of the nearest major airport with daily passenger service;" and Isolated: counties further than a one-hour drive time of the nearest major airport. This study found that there is less income per person the farther the distance from airports, since fewer people are employed in service and professional jobs. This study concluded that the amenities of public lands in the West attract and retain people and business, particularly entrepreneurs that can work basically anywhere courtesy of our telecommunications infrastructure, but they still require some access to markets via transportation infrastructure, especially airports.¹⁵³

Freight Transportation and Infrastructure in the Rocky Mountain West

In addition to moving people, the other crucial component moved by our transportation infrastructure is goods. The U.S. Census measures how commodities are moved through the Commodity Flow Survey; this survey gives good indicators on how goods moving from each state are moved. The freight shipments by their state of origin in the Rockies were charted for travel by rail by the number of tons and the number of carloads in **Table 10**. By far the most striking result in **Table 10** is the amount of railroad tons that originate in Wyoming, courtesy of its coal mines. Over 52 percent of the nation's coal that is shipped via rail originates in Wyoming.¹⁵⁴ The opposite holds true for New Mexico and Arizona which are quite high in the nation for carloads carried, but only in the middle for rail tons.

The ton miles of truck shipments by state were also charted in **Table 11**. Again, New Mexico and Arizona have by far the most shipments. Much of this is also caused by the intermodal freight traffic that passes through these states going between the ports of California and the rest of the country. For example

Table 10: Freight Rail 2008

	Rail Tons Carried		Rail Carloads Carried	
	National Rank	Tons	National Rank	Carloads
Arizona	25	135,492,095	11	6,168,813
Colorado	18	177,255,564	23	2,636,425
Idaho	31	112,043,991	26	2,298,035
Montana	30	112,114,048	29	1,905,176
Nevada	41	41,155,213	41	825,428
New Mexico	23	148,168,555	5	6,347,788
Utah	39	59,819,554	40	1,099,206
Wyoming	1	536,030,087	12	5,506,985
Rockies Average		165,259,888		3,348,482
U.S. Average		160,140,051		3,040,557

Source: Association of American Railroads, US Freight Industry Snapshot: State Rankings 2008, http://www.aar.org/~media/AAR/InCongress_RailroadsStates/2009rankings.aspx (accessed August 5, 2010).

the ports in Los Angeles and Long Beach, California handle about ten times the amount of containers compared to the Pacific Northwest's Seattle & Tacoma Ports; this is a reason that Idaho and Montana's numbers for both the ton miles of truck travel and shipments by rail are significantly lower compared to Arizona and New Mexico.¹⁵⁵ This data also shows how Wyoming has a significant amount of through truck traffic in the region that is straining the infrastructure of the nation's least populous state. For example, on Interstate 80, 87 percent of the truck traffic on the road is passing through the state and the road currently has \$325 million dollars worth of repair needs, with \$100 million dollars worth of required maintenance. Currently the state is evaluating a gas tax increase or putting tolls on I-80 to fund these repairs; polls have shown state voters would prefer the tolls on out of state trucks instead of raising Wyoming's gas tax—the lowest in the contiguous U.S..¹⁵⁶ Another important increase in inter-country traffic is caused by goods flowing between Mexico and Canada because of NAFTA. One new major corridor has been developed straight through the region to provide these connections; it is called CANAMEX, the term used by the Federal Government when it was defined as a High Priority Corridor in 1995. The route begins in Nogales, Mexico and follows I-19 for its entire length to Tucson, Arizona then I-10 to Phoenix, US-93 (possible future I-11) to Las Vegas, Nevada and I-15 through Utah, Idaho, and Montana to the Canadian border. This is another possible freight corridor through the region that is still relatively undeveloped, especially the two-lane undivided sections of US-93.¹⁵⁷

Has the Rockies Received its Fair Share of Federal Funding?

A final topic that needs to be addressed is whether the Rockies region has received its fair share of federal funding for the region's infrastructure. Overall, according to the Tax Foundation, six of the eight states in the region as of 2005 are recipient states, meaning that those states get more in taxes back from the Federal Government than those taxpayers send to the Federal Government. The two donor states are Colorado, receiving 81 cents back per dollar sent, and Nevada, receiving just sixty-nine cents back in 2005. The other six states that are recipient states include New Mexico who receives the top amount in the nation at \$2.03 per dollar spent.¹⁵⁸ More impor-



© Emil Dimanchev, Black Thunder Coal Mine, WY

Table 11: Truck Shipments 2009

State	Leaving		Entering		Within		Local		Through		Total Millions of ton miles
	Millions of ton miles	% of total	Millions of ton miles	% of total	Millions of ton miles	% of total	Millions of ton miles	% of total	Millions of ton miles	% of total	
Arizona	4,297	10%	6,084	14%	5,798	13%	470	1%	27,495	62%	44,144
Colorado	3,118	12%	5,088	19%	11,234	43%	200	1%	6,471	25%	26,111
Idaho	1,539	10%	2,034	14%	2,933	20%	1,389	9%	6,992	47%	14,887
Montana	1,859	10%	1,741	9%	3,832	21%	36	0%	11,049	60%	18,517
Nevada	1,137	7%	2,210	14%	1,707	11%	57	0%	10,205	67%	15,315
New Mexico	1,710	4%	3,098	8%	5,390	14%	376	1%	27,881	73%	38,455
Utah	4,560	20%	2,247	10%	4,894	21%	62	0%	11,475	49%	23,238
Wyoming	2,522	10%	2,195	9%	2,530	10%	312	1%	16,915	69%	24,474
Rockies Average	2,593	10%	3,087	12%	4,790	19%	363	1%	14,810	58%	25,643
U.S. Average	6,022	15%	6,112	15%	14,914	36%	294	1%	14,112	34%	41,454

Source: Table 3 – 10 Ton Miles of Truck Shipments by State: 2002, "Freight Facts and Figures: 2009", Federal Highway Administration, Freight Management and Operations http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/09factsfigures/table3_10.htm

tant, though, is whether or not the infrastructure of the Rockies has gotten its fair share of federal funds. This section will evaluate past and present trends of federal spending on highways and aviation in the region.

To evaluate the federal spending on the region's highways, the differences in payments and appropriations were evaluated. The Federal Highway Trust Fund was created by the Federal Aid Highway Act and Highway Revenue Act of 1956, as an important component of funding the interstate highway system and other federal-aid highways. Its source of revenue is from taxes on gasoline (currently 18.4 cents per gallon), diesel (24.4 cents), and other fuels. In addition there are excise taxes on tires, truck and trailer sales, and heavy vehicle use.¹⁵⁹

Table 12: Highway Trust Fund Payments and Appropriations

	Arizona	Colorado	Idaho	Montana	Nevada	New Mexico	Utah	Wyoming	Rockies Total	Rockies Average	United States Total	United States Average	
2008 Only	Payments (Thousand of \$)	662,118	476,782	168,981	141,690	273,745	280,178	288,438	151,489	2,443,421	305,428	31,341,702	614,543
	Per Capita Payments (per \$)	102	97	111	146	105	141	105	284	112	---	103	---
	2008-Appropriations (Thousands of \$)	781,411	583,649	301,181	414,912	373,545	383,330	324,267	264,569	3,426,864	428,358	41,238,918	808,606
	Per Capita Appropriations (per \$)	120	118	198	429	144	193	119	497	157	---	136	---
	Differences (a deficit in Thousands of \$)	-119,293	-106,867	-132,200	-273,222	-99,800	-103,152	-35,829	-113,080	-983,443	-122,930	-9,897,216	-194,063
	2008 Differences Per Person	-18	-22	-87	-282	-38	-52	-13	-212	-45	---	-33	---
Since 1956	Payments (Thousands of \$)	11,529,368	9,081,753	3,495,333	3,155,385	4,364,699	5,689,431	5,286,099	3,070,373	45,672,441	5,709,055	674,403,446	13,223,597
	Appropriations (Thousands of \$)	12,156,866	10,497,445	5,754,107	7,626,949	5,539,173	7,250,319	6,925,590	5,290,046	61,040,495	7,630,062	757,429,157	14,851,552
	Differences (Thousands of \$)	-627,498	-1,415,692	-2,258,774	-4,471,564	-1,174,474	-1,560,888	-1,639,491	-2,219,673	---	-1,921,007	---	-1,627,955

Source: Federal Highway Administration, 2008
2008 Population values are taken from the U.S. Census Bureau

Table 12 shows the payments into the highway trust fund from gas purchases in each state and the apportionments for projects in each state in the Rockies, both for 2008 and all monies since 1956. Per capita amounts are included for the 2008 data. It may seem surprising that the highway trust fund runs a deficit. There are two reasons for this. First is due to interest earned which trust fund makes during the gaps of time between when funds are appropriated into the fund and later allocated to the states for their projects. The second reason is that over the decades of its existence the trust fund has seen infusions of cash from the general fund at various times when it was running a deficit;

the first instance was an infusion for three years right after the Trust Fund was created in 1959 to 1961.¹⁶⁰ The last time was in fiscal years 2008 and 2009, to shore it up against declining revenue.¹⁶¹ In terms of equity in access to money since the creation of the fund there is a guarantee to all the states of a relative rate of return; in 2008 and 2009, this rate was set at 92 percent, meaning that at least 92 percent of the amount of money contributed to the Federal Highway Trust Fund by a state will be returned for use in that state.¹⁶²

In terms of how the states have fared over the years, the main question that is relevant is how much more each state has received from the Highway Trust Fund compared to payments into it from gas purchases in their state. Since 1956 the average amount the Rockies have received is slightly more than was put into the fund, compared to the average state. In terms of states, the main benefactors have been the three rural Northern Rockies states, receiving a lot more for their many miles of roads compared to their payment of gas taxes and populations. In 2008, the average Montanans and Wyomingites ran a deficit of \$282 and \$212 per person respectively, while the overall American deficit was \$33, and \$45 per resident of the Rockies region. Unfortunately three states, Arizona (\$18), Colorado (\$22), and Utah (\$13) received less than their fair share of funds (\$33 is the national average). One hypothesis for this phenomenon was fewer federal-aid highway miles per person in those states. That is true for Arizona (\$.002) especially, but does not fully explain the phenomenon for Colorado or Utah. It does, however, explain why the statistics for Montana and Wyoming are extraordinarily high.

A one-time infusion of federal funds to the region came through the American Recovery and Reinvestment Act of 2009 that is distributing \$787 billion dollars to all fifty states and U.S. territories. This includes \$288 billion in tax benefits; \$275 billion in contracts, grants, and loans; and \$224 billion in entitlements. Based on the state totals in **Figure 23**, it appears as though the Rockies is not receiving its share of this additional federal funding; every state, except for Arizona, is receiving fewer funds than the national average. However, as shown in **Figure 24**, on a per capita basis the Rockies is indeed receiving its fair share. Based on state totals, the Act rewards \$858 per person on average, and citizens in the Rockies are receiving \$859 per person on average. Using these criteria, Montana and New Mexico are being awarded the most: \$1,184 and \$1,095 per person. Utah and Arizona bottom out the region with \$677 and \$658 per person.¹⁶³

A final way the Rockies Region was evaluated for its fair share of federal funds was by the amounts of Federal Aviation Administration's Airport Improvement Program Grants in FY 2009. These amounts are graphed in **Figure 25**. The funding source for these grants is from the Airport and Airway Trust Fund, which receives revenues from aviation-user taxes on airline fares, air freight, and aviation fuel, a similar approach as taken by the Highway Trust Fund.¹⁶⁴ The data shows that every state in the Rockies receives more out of the Aviation Trust Fund than it contributes, at least through Airport Improvement Program Grants, again with Montana and Wyoming so much higher than the national average since they have many airports

Figure 23:
American Recovery and Reinvestment
Funds Awarded Per State

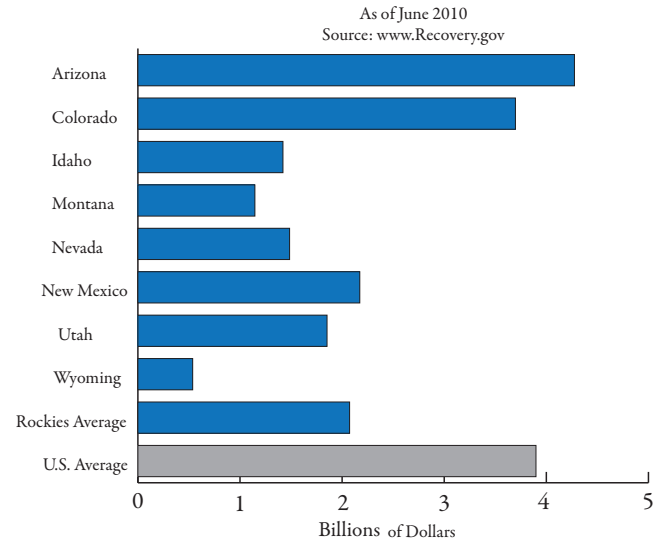


Figure 24:
American Recovery and Reinvestment
Funds Awarded Per Capita

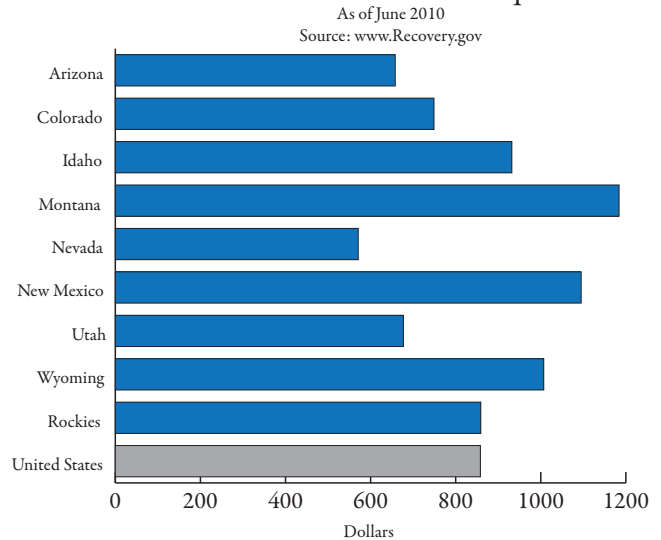
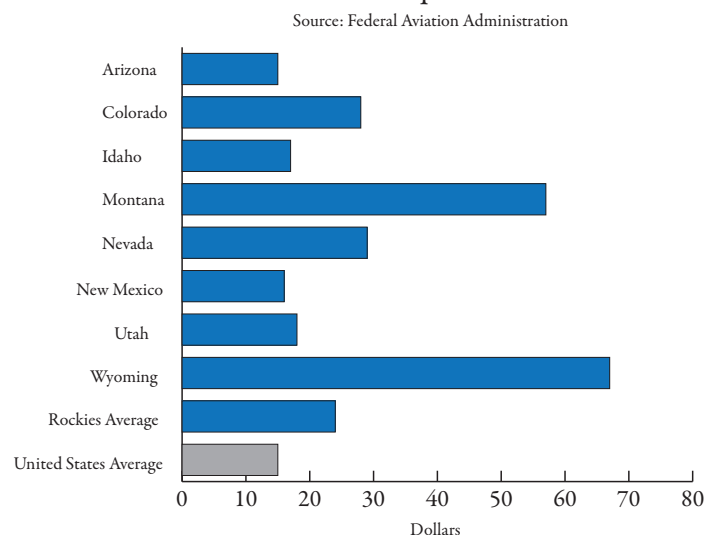


Figure 25:
FAA Improvement Program Grants
Per Capita, 2009



for their relatively small populations.

Overall, based upon these two small studies, it appears that the Rockies region as a whole is receiving its fair share of federal government infrastructure funds, if not more, of federal dollars from the Highway and Aviation Trust Funds. Some states like Arizona, Colorado and Utah themselves are not receiving their 'fair share' of highway trust and ARRA funds but the huge amounts from both funds being given out to other states, especially in the Northern states, makes this conclusion still applicable to the region as a whole.

Conclusion

The history of the Rockies has been defined by advances in infrastructure, without which the region would be much less hospitable. The condition of the different modes of infrastructure in the region varies significantly. Without continuous and significant investment, the roads and bridges of the Rockies are likely to become critically structurally impaired. The electric grid is outdated and nearing capacity as the population of the region continues to grow faster than the national average. Unlike roads and bridges, the Federal Government is investing in updating the grid to incorporate technology of the 21st century, while private entities are investing in bringing large-scale renewable energy projects onto the grid to meet increasing electricity demand. The Federal Government has declared the universal access to high-speed Internet "the great infrastructure challenge of the twenty-first century," and has launched a plan to see that goal to fruition. Providing access to high-speed Internet and public intercity transportation options to the entire region's residents is a problem that, if solved, would greatly improve social equity – especially as the overall population ages and the Rockies population continues to grow.

Infrastructure is the interconnected mechanism that ties everyone together. As a system, infrastructure physically connects people and goods with roads, railways, and airplanes. Our vast, interwoven electric grid keeps the lights on, the television glowing, and washing machines running, and the computers humming. Telephones and Internet remotely connect individuals and communities with information, entertainment, and other people. Maintaining this infrastructure is crucial to the region's prosperity. A failed infrastructure severs connections to a town or region's support system; without those connections, the flow of goods, people, and information grind to a halt, and may cause the town or region to wither. Conversely, an ideal infrastructure efficiently moves and connects people to each other.

Decades of exploration and development of the Rockies region have been driven, sometimes hindered, by its infrastructure. Whether it was the Pony Express and telegraph of the early days, or rail and highways of today, and wireless communication, as well as optic fiber of the future, the Rockies has presented huge physical challenges to its interconnections and access to the rest of the world. Determination and hard work have built the wonders of roads, bridges, pipelines, and transmission facilities. Sometimes the infusion of outside public and private investment have led the way; at other times sheer determination and local/regional/state funding have forged ahead.

A region's vitality is complex, consisting of the physical terrain, people and their settlement/production patterns, and investments in social needs such as infrastructure. The nation and the Rockies region continue to redefine needed infrastructure and ways to find public and private funds to maintain these essential support systems without which regions and their people languish and fall behind, rather than prosper and advance.

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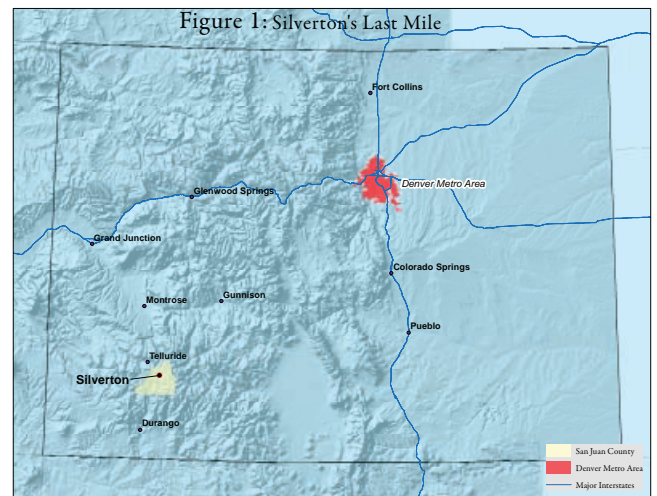
Case Study:

Silverton's Last Mile

By: Anna Johnson

Silverton, Colorado is located in southwestern Colorado near Telluride. Since 1874 It has historically been a Rockies mining town where hardy souls hoping to strike it big battled the harsh conditions and winters. After the Ute Indians were pushed out the residents had to deal with avalanches, poor working conditions and illness that quickly spread through the mining camps. After over a century of mining Silverton has ceased it's historic occupation. Today it is known for its recreational opportunities, specifically skiing. More and more people come to Silverton to enjoy these natural amenities and world-class recreation. Perhaps when mineral prices climb past a certain point mining will again ensue, but until that point Silverton is benefiting from the influx of tourists. Better infrastructure is needed to spur local economic growth and businesses.

Currently the residents are facing the realities of being at the end of "the last mile." Qwest signed a contract with the state of Colorado in 2000 – the \$37 million, state funded, Link-Up project – promising to bring high-speed fiber optic Internet to every county seat in the state. Qwest was also given a ten-year contract to construct and maintain the states fiber optic system.¹ Silverton, the county seat of San Juan, claims Qwest has not fulfilled their obligation. The connection was supposed to be finished in 2005.² For the past half century only one radio link has connected Silverton's communications to the outside



world.³ In July 2010, the city filed a complaint with the Colorado Public Utilities Commission, petitioning them to issue an order that would require Qwest to extend the fiber optic lines that stop 16 miles short of Silverton in order to deliver the same type of high-speed Internet that the other county seats have access to. Qwest claims that the company had an obligation to deliver a specific level of bandwidth, which they fulfilled. The petition expressed the town's concern that the lack of a fiber optic Internet connection disadvantages the community and prevents it from technologically developing at the same pace as the rest of the state, and that Qwest's failure, "deprives Silverton/San Juan the right to basic service."⁴

The longer this debate continues the greater will be the communication gap between Silverton and the rest of the state. Communication infrastructure is lifeblood to an isolated community like Silverton. With such a dated system Silverton's economic growth and residents comfort is at stake making its plea to the state even more timely.

¹ Esper, Mark. "Town, county take on Qwest." *Silverton Standard*. 01 July 2010.

² Esper, Mark. "Town, county take on Qwest." *Silverton Standard*. 01 July 2010.

³ Esper, Mark. "Town, county take on Qwest." *Silverton Standard*. 01 July 2010.

⁴ Dolan, Michael. "Qwest short changes Colorado jurisdictions by not bringing fiber, they say." *Communications Daily*. 10 July 2010.



© Jeremiah Cox, Empire Builder Train

Case Study:

The Hi-Line: Vital Artery or Bleeding Vein?

By: Jeremiah Cox

Amtrak's *Empire Builder* trains run east and west daily and are scheduled to take 45 hours eastbound and 46 hours westbound to run between Seattle, Washington or Portland, Oregon (the two different sections meet at Spokane, Washington and join as one train for the rest of the journey) and Chicago, Illinois.¹ By comparison the same journey takes approximately 33 hours when driven straight through, following interstates.²

Named for James J. Hill, the *Empire Builder* follows the Hi-Line through the northern reaches of Montana parallel to the U.S. Route 2 Corridor, spending approximately 711 of its 2,205 total route miles passing through the Rockies region. It makes 11 station stops in Montana, including three providing tourism access to Glacier National Park and one at Sandpoint, Idaho. It takes approximately 14 hours eastbound and 15 hours westbound to traverse the Rockies region, proportional to the distance traveled through the Rockies.³ The train's station stops in Montana are all in small towns stuck in the vastness of the Great Plains that rely on the train for their only public transportation access to the rest of the world. None of the station stops are in Montana's largest cities. **Table 9** on page 78 illustrates that three percent of Montana's rural residents are only covered by Intercity Rail Service. Only two station stops along the route in Montana have scheduled intercity bus service, Whitefish and Shelby. Shelby's is provided only twice a week by a county minibus service to Great Falls. Four station stops are in locations with regular scheduled air service, in all of these towns except for Whitefish (served by Kalispell Airport 17 miles south) service is provided by Great Lakes Airlines using Essential Air Service Contracts.⁴

What all of this means is that, the *Empire Builder* pro-

vides a transportation and economic lifeline to the small towns it stops in. While one rides the *Empire Builder* and talks to fellow passengers alighting and disembarking at the stations along the Eastern Plains, one of the primary purposes of their trips was to visit family.⁵ Trips like this contribute significantly to the train's ridership as well. In fiscal year (FY) 2009 a total of 515,444 passengers rode the train, of these passengers, almost a third, 152,253 boarded or alighted in Montana and Idaho. The number of passengers going to Eastern Plains stations (defined as the seven stops from Browning, Montana and eastward) in Montana is 54,623 passengers. This shows that a large contingent of passengers are accessing the recreation areas around Glacier National Park and ten percent of the train's riders are going to the rural towns on the Montanan Eastern Plains. North Dakota has similar high ridership statistics with 115,938 riders boarding or alighting in the state, but it should be noted that the train serves three out of four of North Dakota's largest cities.⁶

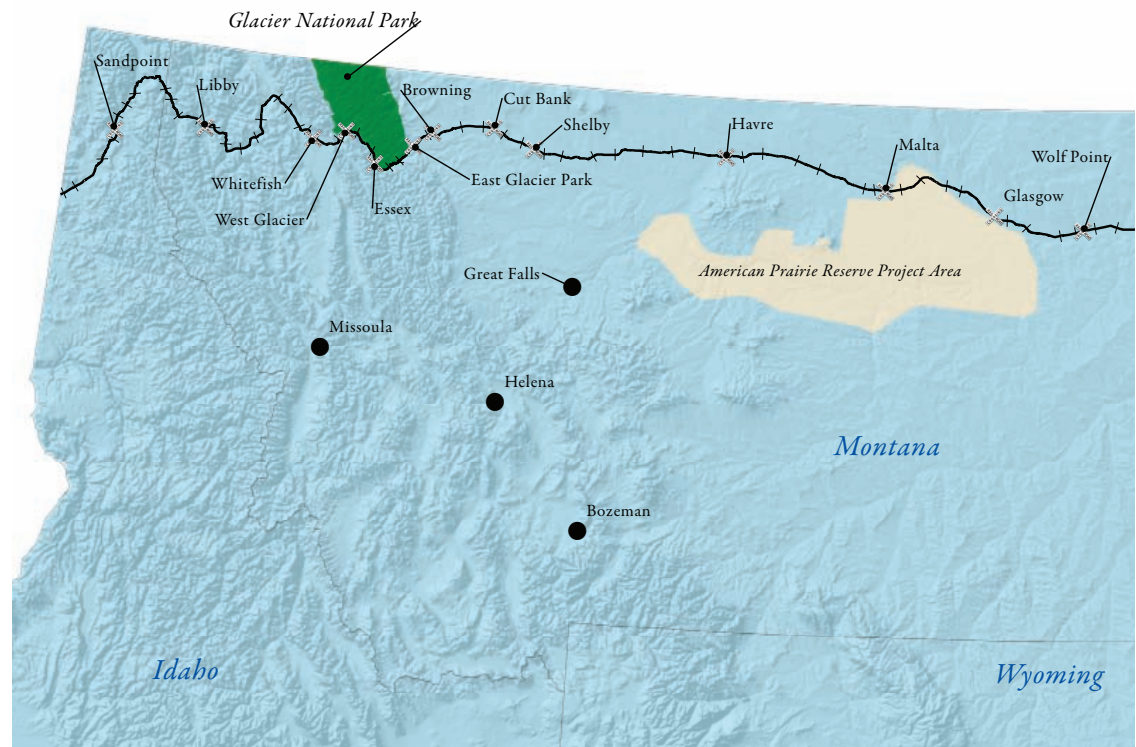
It can appear that the *Empire Builder's* lack of service to major cities would make it an extremely unprofitable route, but the opposite is true. It is Amtrak's most successful ridership of any long-distance route except for the Auto Train (a multi-modal train carrying passengers and their vehicles exclusively between Lorton, Virginia and Sanford, Florida). In FY2008 the *Empire Builder* had a fare box recovery ratio, a statistic used for the amount of costs directly covered by operating revenue, of 66 percent compared to 52 percent for all Amtrak routes system. It made \$64,816,255, the most revenue (passenger tickets, food, and beverages) of any Amtrak route. For comparison it cost \$98,625,440 to operate. This is

an operating subsidy of \$61 per passenger.⁷ In Montana alone it's estimated it provided \$14 million worth of economic benefits.⁸ The *Empire Builder's* ridership has increased in the past couple of years. From FY2009 to FY2010 ridership increased three and a half percent, while increasing ticket revenues over eight percent.

Attempting to compare this to Essential Air Service Subsidies in dollar amounts, the four towns along the *Empire Builder* route with airports had contracts for yearly subsidy rates totaling \$4,352,974, while only 6,784 passengers used these commercial Airports. This results in a subsidy of \$642 per passenger.^{9,10} These figures don't include other subsidies for required airport operations such as TSA security screening, it will cost \$11 million over five years to provide this service at Montana's small airports. Until 2008 these airports were a security risk for the country as the only ones left that didn't have TSA screeners, passengers were allowed to board planes in these small towns with simply a plane ticket and were not screened until arriving in Billings, Montana to make connecting flights to the rest of the country.¹¹

One could argue that it is more cost effective to dedicate funding to the *Empire Builder* to serve these various towns rather than subsidize air service for them if public transit access is in the item in question. The time and associated cost between the two types of public transit are hardly comparable. The different public transit services of rural Montana attract different types of travels, making accessing these remote communities easier for both the business travel and family member. What the *Empire Builder* has done for some of these communities is not build an empire but allow a remote community to subsist in regards to outside access to the outside world. It is a lifeline for a small number of people who would have to find new transportation solutions without its existence.

Figure 1: The Empire Builder



© Jeremiah Cox, Empire Builder stopped in Shelby, MT

¹ Amtrak's Empire Builder Timetable effective November 8, 2010 http://www.amtrak.com/servlet/ContentServlet?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1249213945362&blobheader=application%2Fpdf&blobheadername1=Content-disposition&blobheadervalue1=attachment;filename=Amtrak_P07.pdf (accessed November 3, 2010)

² Google Maps Search, Seattle, WA to Chicago, IL. http://maps.google.com/maps?f=d&source=s_d&saddr=Portland,+OR&daddr=Chicago,+IL&hl=en&geocode=FfyhtgIdERyw-CkndKl9CwuVVDGRhdH25rk2HA%3BFWICfwdGuDG-inty_TQPcWoiDEAwMAJrabgrw&mra=ls&ll=44.840291,-104.941406&sspn=91.956217,65.566406&ie=UTF8&ll=41.640078,-112.148437&spn=94.961287,65.566406&z=3 (accessed November 10, 2010)

³ Amtrak's Empire Builder Timetable effective November 8, 2010 (mileage to Seattle) http://www.amtrak.com/servlet/ContentServlet?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1249213945362&blobheader=application%2Fpdf&blobheadername1=Content-disposition&blobheadervalue1=attachment;filename=Amtrak_P07.pdf, and analysis on Goggle Maps for exact distances to and from the borders of the Rocky Region, and scheduled times for Spokane, Washington (approximately twenty miles from Idaho boarder) to Glasgow, Montana (approximately twenty miles before the North Dakota boarder)

⁴ Montana Department of Transportation, *Intercity Passenger Transportation in Montana, 2007* http://www.mdt.mt.gov/publications/docs/maps/intercity_passenger_map.pdf (accessed 3 November, 2010) and Toole

County Website: Northern Transit Interlocal schedule http://www.toolecountymt.gov/NTL_Schedule.html and schedule and Information from Great Lakes Airlines, <http://flygreatlakes.com> (accessed 3 November, 2010)

⁵ Personal trip on *Empire Builder* by the Author Jeremiah Cox, from July 12 to July 14, 2006, a full reencounter of the trip is available at <http://subwaynut.com/triplogs/amtrakalltheway/empirebuilder> (accessed November 10, 2010)

⁶ Analysis of Amtrak Fact Sheets FY2009, available online at http://www.amtrak.com/servlet/ContentServlet?c=AM_Content_C&pagename=am%2FLayout&cid=1241267288095 (accessed 4 November, 2010)

⁷ Amtrak, "Exhibit D: Long Distance Route Fair Box Recovery Table" p. 79 in P.R.I.I.A. Section 244: *Pioneer Route Passenger Rail Study*, Washington, DC: Amtrak. http://www.amtrak.com/servlet/ContentServlet?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1249200496429&blobheader=application%2Fpdf&blobheadername1=Content-disposition&blobheadervalue1=attachment;filename=Amtrak_PioneerServiceStudy.pdf (accessed November 10, 2010)

⁸ http://www.mdt.state.mt.us/tranplan/docs/empire_builder.pdf -> site seems to be down for some reason, add footnote later

⁹ Federal Aviation Administration, "Primary, Non-primary Commercial Service and General Aviation Airports by State" *CY 2009 Passenger Boarding and All-Cargo Data*, http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy09_all_enplanements.pdf (accessed November 10, 2010)

¹⁰ Office of Aviation Analysis Essential Air Service Program, US subsidized EAS Reports: May 1, 2010, http://ostpxweb.dot.gov/aviation/x-50%20role_files/100501nonalaska.xls (accessed November 10, 2010)

¹¹ Falstand, Jan. "Before March 2008, Travelers Needed Only a Ticket to Board a Plane: Screening at Montana's smallest airports costs millions" *The Billings Gazette*, January 10, 2010, http://billingsgazette.com/news/state-and-regional/montana/article_5caa4d2a-fd8f-11de-b379-001cc4c002e0.html (accessed November 10, 2010)



© Jeremiah Cox, I-70, Empire, CO

Case Study:

I-70: The Interstate *through* the Rockies

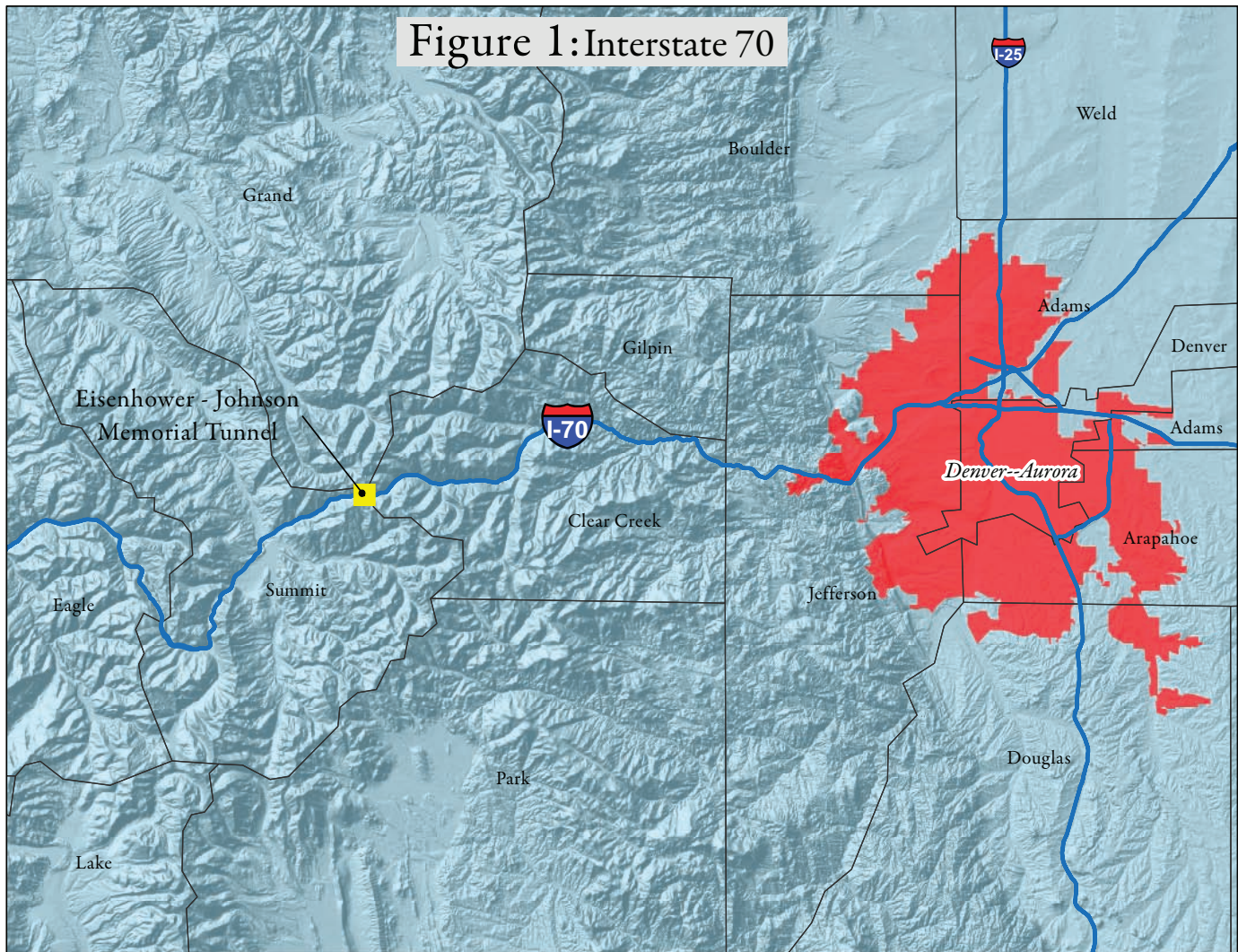
By: Jeremiah Cox

“Colorado without I-70 would be devastating. In some counties like Park it’s the lifeblood of the community for goods and services.”
-Chuck Attardo, Environmental Manager, Colorado Department of Transportation

Interstate 70 through the Rockies provides a vital link connecting those mountain communities and the Western slope with Denver. Once the Interstate and especially when the Eisenhower Memorial Tunnel was opened on March 8, 1973,¹ it started providing the transportation link that led to the ‘bonanza’ of development to various ski-towns such as Vail and Breckenridge.² The best example of how important this road is to recreation in the Rockies is the peak traffic times. Most typical highways reach their peak traffic loads during the weekday rush hour periods; the traffic patterns on the I-70 Mountain Corridor are completely different. It reaches its peak traffic congestion Eastbound during the PM of Summer Sundays, in winter there are similar amounts of traffic congestion on weekends, although the amounts of congestion are not quite as high compared to the summer.³ For example in 2000 there were approximately 60,000 people traveling on a summer Sunday, compared to forty thousand on a summer Weekday through the Eisenhower-Johnson Memorial Tunnel.⁴ The fact that congestion on the highway is during many fewer days of the year is because of so many recreation and leisure based trips rather than the standard work related commuting trips. Also responsible is the extremely sensitive area and complex engineering required to build the highway through mountainous terrain, and the fact that many portions of the roadway were not built to the ideal interstate standards such as narrower than standard shoulders to avoid the right-of-way impacts present many challenges to relieving congestion on the interstate.⁵ A large portion of this

highway, including the entire portion between the Eisenhower-Johnson Memorial Tunnel and C-470 are considered ‘problematic areas due to Capacity and Roadway Deficiencies.’⁶

The first step in the process of beginning improvements to corridor was the release of a Preliminary Environmental Impact Statement in 2004 by the Colorado Department of Transportation and Federal Highway Administration. Immediately during the public comment period there was public uproar over the various proposed improvements to the corridor that ranged from widening the many portions of the interstate from four to six lanes to building High Occupancy Vehicle/Toll Lanes, to a fixed-guide way rail, bus or monorail transit system,⁷ none of which local communities and interests were interested in. After this the I-70 Mountain Corridor Context Sensitive Solutions (CSS) process group was created. This group consists of 27 members whose affiliations range from CDOT to local government to environmental organizations like trout unlimited to the U.S. Forest Service to work together to recommend a transit solution for the corridor.⁸ Their recommendation is for multi-modal solutions, the biggest component of which is to implement an Advanced Guideway System, along with highway improvements.⁹ The advanced guide way system would most likely use basically unproven new monorail or magnetic levitation technology to run along the corridor as far west as the Eagle Airport. The Environmental Impact Statement identified the price as \$6.15 billion dollars,¹⁰ although a representative of CDOT told the Rockies Project an amount closer to \$20



billion dollars. The reason that a more conventional, proven steel-wheel high speed rail corridor would be less effective in the corridor is because of the extreme grades in the mountain terrain that would cause significantly slow train speeds.¹¹ Various ways to pay for the project haven't been completely identified but like all road projects it would be a combination of state and federal funds. Possible funding sources include: Federal congressional earmarking, rising gas taxes, or other motor vehicle fees, Tolls on the road either as a congestion pricing technique—making I-70 more expensive to drive on during peak usage times such as Sunday afternoons, or regular tolls along the entire corridor or just at the Eisenhower-Johnson Memorial Tunnels, or increasing local taxes along the corridor.¹²

One improvement to the corridor already implemented by CDOT has been more aggressive measures taken to keep the road clear of tractor-trailer accidents. These measures have included aggressive chain laws, and having tow-trucks on duty to get the road clear of accidents and blockages as soon as possible.¹³ The chain laws have included high fines, such as \$657 dollars for trucks not chaining up¹⁴ along with the addition of well-lit and safe chaining stations, at strategic locations throughout the corridor. This has resulted in many fewer back-ups along the roadway caused by accidents. In the 2007-2008 winter season 61 closings of at least one direction of the roadway caused 160 hours of no travel. These aggressive laws have

resulted in only 45 hours of no travel in the 2008-2009 winter season. Economic studies have shown that closing I-70 for just one hour results in \$800,000 lost from the ski and tourism industry.¹⁵

¹ Colorado Department of Transportation, Eisenhower-Johnson Memorial Tunnels, About CDOT: 50 Anniversary of the Interstate Highway System, <http://www.coloradodot.info/about/50th-anniversary/interstate-70/eisenhower-johnson-memorial-tunnels.html> (accessed July 30, 2010)

² Scotch, Lisa: "Putting a Five-Story Building through the Mountain: How the Straight Creek Tunnel Transformed Colorado" *Colorado Heritage: The Magazine of History Colorado, The Colorado Historical Society*: (July/August, 2010), 23-31

³ Interview with Chuck Johnson, Environmental Manager, Region 1, Colorado Department Of Transportation on July 29, 2010

⁴ Tier 1 Draft PEIS: Executive Summary, December 2004, http://www.coloradodot.info/projects/i-70mountaincorridor/programmaticEIS/00_Executive_Summary.pdf/ Pages ES-4 and ES-5

⁵ Interview with Chuck Johnson, Environmental Manager, Region 1, Colorado Department Of Transportation on July 29, 2010

⁶ Tier 1 Draft PEIS: Executive Summary, December 2004, http://www.coloradodot.info/projects/i-70mountaincorridor/programmaticEIS/00_Executive_Summary.pdf Page ES-9

⁷ Tier 1 Draft PEIS: Executive Summary, December 2004, http://www.coloradodot.info/projects/i-70mountaincorridor/programmaticEIS/00_Executive_Summary.pdf/at_download/file Page ES-10-13

⁸ I-70 Mountain Corridor CSS Process Working Group, List of Members, <http://i70mtnccorridorcss.com/pdf/css-process/CSS%20Process%20WG%20Members.pdf/> (accessed July 30, 2010)

⁹ Colorado Department of Transportation, Consensus Recommendations: I-70 Mountain Corridor, http://cdot.i70css.webfactional.com/cdot/pdf/Collaborative_Effort_Consensus_Recommendation.pdf/view (accessed July 30, 2010)

¹⁰ Tier 1 Draft PEIS: Executive Summary, December, 2004 http://www.coloradodot.info/projects/i-70mountaincorridor/programmaticEIS/00_Executive_Summary.pdf/at_download/file Page ES-11

¹¹ Interview with Chuck Johnson, Environmental Manager, Region 1, Colorado Department Of Transportation on July 29, 2010

¹² I-70 Tier 1 Draft PEIS, December 2004: Chapter 5-Economic Considerations, http://www.coloradodot.info/projects/i-70mountaincorridor/programmaticEIS/5.0_Chapter_5_Finance.pdf/ (accessed August 9, 2010)

¹³ Interview with Chuck Johnson, Environmental Manager, Region 1, Colorado Department Of Transportation on July 29, 2010

¹⁴ Colorado Department of Transportation, Chain Tips: Guide to Colorado's chain Law, <http://www.coloradodot.info/travel/library/Brochures/ChainTips.pdf> (accessed July 30, 2010)

¹⁵ Plunkeet, Chuck, "Chain Law Helps Clear Way on I-70" *Summit Daily News*, (April 1, 2010), <http://coloradosenate.org/home/inthenews/chain-law-helps-clear-way-on-i-70> (accessed)

Overview Section: Recreation

Nature Based Recreation in the Rockies: The New Value of the Region's Resources

By Emil Dimantchev with assistance from Zoe Osterman

THE 2011 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

Key Findings:

- The average American spent 15 percent more time on leisure activities in 2003 (36 hours) compared to 1965 (31 hours).
- Today, almost half of the Rockies' lands are under the jurisdiction of public agencies.
- In the Rockies region, recreation and tourism generated \$41 billion in income in 2007 and supported 1.4 million jobs.
- Recreation and tourism represent major sources of income, from six percent of private earnings in Idaho to 22 percent in Nevada.
- Businesses involved in recreation form 10 percent of all firms in the Rockies while those in the extractive industries are less than one percent.
- The average snowboarder spent \$3,073 in the Rockies, the average skier \$3,262, the average hunter \$2,447.
- National Park visitors in 2006 expressed a willingness to pay of \$57 per day.
- In 2009 55 percent of Rockies population participated in outdoor recreation, up from 53 percent in 2008 and the highest rate in the nation.
- Wildlife viewing grew 60 percent from 1996 to 2006 as the public turned from hunting animals to viewing them.
- The greatest decline in outdoor participants from 2006 to 2009 came among youth.

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The life and culture of the people in the Rockies region, from early settlers to current communities, have always been largely dictated by their close relationship with the region's natural environment. The Rockies economy, once centered on agriculture and natural resource extraction, has now shifted towards one based upon services as well as amenity-based recreation and tourism. The beauty of the region has become an economic engine for recreational businesses and for bucolic communities hosting relocation and retirement. The transition between different uses of the region's abundant lands challenges the very idea of how Rockies' resources are to be managed and passed along between generations. Population growth and high demand for the region's recreational areas provide new challenges for conservation efforts. How and whether the Rockies can accommodate the influx of visitors and new residents while maintaining a diversified economy are questions that will define the future of the region and the way it manages its public lands. The question then remains, how can the region achieve harmony between different interests and is it even possible to strike such a balance between economy and environment?

Across the U.S., Americans spend an increasing amount of time on leisure activities and outdoor recreation. They have boosted demand for the service industry and businesses involved in nature-based recreation activities. This report will discuss the growth of the service economy in the Rockies region and the increasing significance of recreation and tourism in particular as a source of regional income, jobs, and businesses. We also show that nature-based recreation plays a central role in the recreation and tourism industry in the Rockies region. The region's rich and diverse natural environment attracts a broad range of outdoor enthusiasts, fueling its service based economy. For the purpose of the report, outdoor recreation activities are those in which participants have direct interactions with the natural resources and environment of the West. In this analysis of nature-based recreation, we follow the definition of the Outdoor Industry Foundation and include the following range of activities: biking, paddling, camping, climbing, skiing (including downhill, cross country, and telemark), snowboarding, hunting, fishing, wildlife viewing, hiking, backpacking, and trail running.

Nature-based recreation also has a significant economic impact on local communities across the Rockies. In this report, we highlight the economic vitality of counties in the region, which are defined by the U.S. Department of Agriculture as economically dependent on recreation. The counties selected in this analysis are characterized by their proximity to public land, outdoor recreational opportunities, and abundance of natural amenities.

The popularity of nature-based recreational activities has changed through time. Participation trends also vary by type of activity, place, and demographic characteristics of the population. In this report, we discuss these trends in selected nature-based recreational activities. For the purposes of this analysis, we do not include indoor activities, team-based sports, those that occur in an urban setting, and other leisure time that is not primarily dependent on the natural environment.

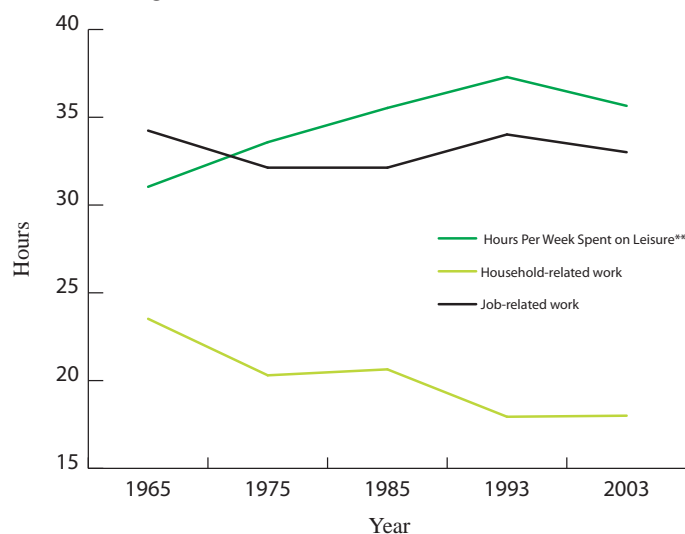
Finally, we will explore a few key issues currently related to outdoor recreation, including the actual and potential damages ill-managed outdoor recreation can have on the Rock-

ies region natural resources and environment.

Increase in Leisure Time in the U.S.

A transformation in the American way of life has occurred over the past 40 years. Devoting less time to work has allowed Americans to spend increasing amounts of time on alternative activities, including leisure and recreation. **Figure 1** depicts the declining trends in the number of hours per week spent on work between 1965 and 2003. Work here is represented by a comprehensive measurement of hours devoted to job-related activities and household-related chores. Job-related activities include hours spent on the job, commuting to and from work, meals and breaks at work, searching for a job, and applying for unemployment benefits. Household-related work includes indoor household chores: food preparation, indoor cleaning, laundry, etc.; shopping and obtaining goods and services; and outdoor household work such as vehicle repair, outdoor home maintenance, outdoor painting, yard work,

Figure 1: Weekly Leisure and Work Hour Trends



Source: <http://www.bos.frb.org/economic/wp/wp2006/wp0602.pdf>

pet care, gardening, etc. On average, Americans spent 33 hours per week on job-related activities in 2003, compared to 34 hours in 1965. Household-related work declined more dramatically from 24 hours per week in 1965 to 18 hours in 2003. In total, the average American spent 6.8 hours less on all work activities in 2003 compared to 1965.

The decline in work time per week was largely due to a decrease in household-related work, as evidenced in the figure. Job-related hours stayed relatively constant in comparison. According to a report by the Federal Reserve Bank of Boston, time spent on job-related work by men has fallen since 1965, but an increase in the time worked by women has resulted in the constant overall trend in job-related work hours. Work around the household, however, has decreased sharply. In particular, the average American spent 6.4 hours per week less on indoor household chores and food preparation in 2003 than in 1965.¹ The study reports that this trend also varies by gender. While women are spending less time on household-related work, men are engaging in these activities more than they did before. Overall, however, time spent on household related chores has fallen sharply, accounting

for most of the decline in hours per week spent on work between 1965 and 2003.² Increasing affluence, technological improvements in household appliances, and evolving gender roles are the most likely causes for the decline in household-related work. These factors have allowed Americans to devote time to leisure activities. **Figure 1** also depicts the average increase in leisure time across the nation. Leisure here is defined as time spent on “entertainment/social activities/relaxing”, which includes activities such as going to movies, watching television, reading for pleasure, talking on the phone, going to parties, etc. and “active recreation”, such as playing sports, walking and exercising.² The average American spent 15 percent more time on such leisure activities in 2003 (36 hours) compared to 1965 (31 hours). The upward trends in hours spent on leisure and downward trends in the working hours of Americans have direct implications for the eight-state Rockies region. Endowed with a rich natural environment, the region is a major attraction for visitors from the U.S. and abroad who seek opportunities for recreation. It is these natural resources that are attracting tourists and shaping the economy of the Rockies.

The Resource of the Rockies

From the glaciers of northern Montana to the deserts of Arizona, from the tall mountains to the deep canyons, the natural environment of the eight-state Rockies region is truly diverse. A variety of biota, topography and climates define multiple eco-regions as seen in **Figure 2**.

The short-grass prairie of the western Great Plains, what our report defines as the Eastern Plains Agricultural Zone of the Rockies, embodies the sense of freedom and open space that help characterize the region. From east to west across the Rockies region, the land rises from the flat eastern plains towards higher-elevation forests of fir, spruce, and aspens. Further up, the trees disappear into the daring heights of the mountain’s ridges and peaks, where only the toughest and most unique species of fauna and flora survive. These are the spectacular but fragile high alpine environments of the Rocky Mountains. They extend along the Continental Divide, what the Rockies Project defines as the “spine” of our region. The Rockies, tall and majestic, contain many peaks higher than 13,000 feet, found in Colorado, Wyoming and northern Utah; these ranges provide challenges that foster a sense of accomplishment and connection to the mountains. Many other peaks over 10,000 feet all across the Rockies also provide a range of recreational opportunities. Below tree line, evergreen-deciduous forests in the North and a variety of pines and firs in the Southern Rockies provide a canopy for large mammals including black bear, mountain lion, elk, moose, various bird species and many other life forms.

Further west, the mountains drop into the raw landscape of the North American deserts. This part of the region, defined by the Rockies Project as the “West and Southern Amenity Zone,” harbors the perpetual image of the dry and vast landscape of the Southwest. Its arid ecosystems evoke popular images of western blue skies and sunsets. Sagebrush

is among the most common flora in these lands, providing a welcoming home to pronghorn antelope and whitetail prairie dog. It is these lands that Edward Abbey declared as “the most beautiful place on Earth,” as he was witnessing an early morning in the deserts of Utah.³

The Rockies’ wild lands are home to a bountiful variety of wildlife that has captivated adventurers. The land and its animal inhabitants hold symbolic values for the region and the nation as a whole as the last standing frontiers of the American West. Regional planners and land managers have not always valued the land in its preserved natural state. The movement towards conservation of the land which provides opportunities for recreation and rejuvenation has emerged only recently with a change in the way humans view nature in the West.

The constantly evolving ways in which humans have interacted with the abundant natural resources of the Rockies has greatly affected the culture, economy, and society of the region. Although initially viewed as an obstacle to human settlement, the wild lands of the American West were also cherished as a refuge for individuals to grow both physically and spiritually away from the civilized world. In the words of the 19th century American philosopher, Ralph Waldo Emerson, “In the woods, we return to reason and faith...In the wilderness, I find something more dear and connate than in streets.”⁴ Similar to Emerson, early preservationist John Muir recognized the need to spend time in a place largely untouched by human influence. “Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul.”⁵ During the

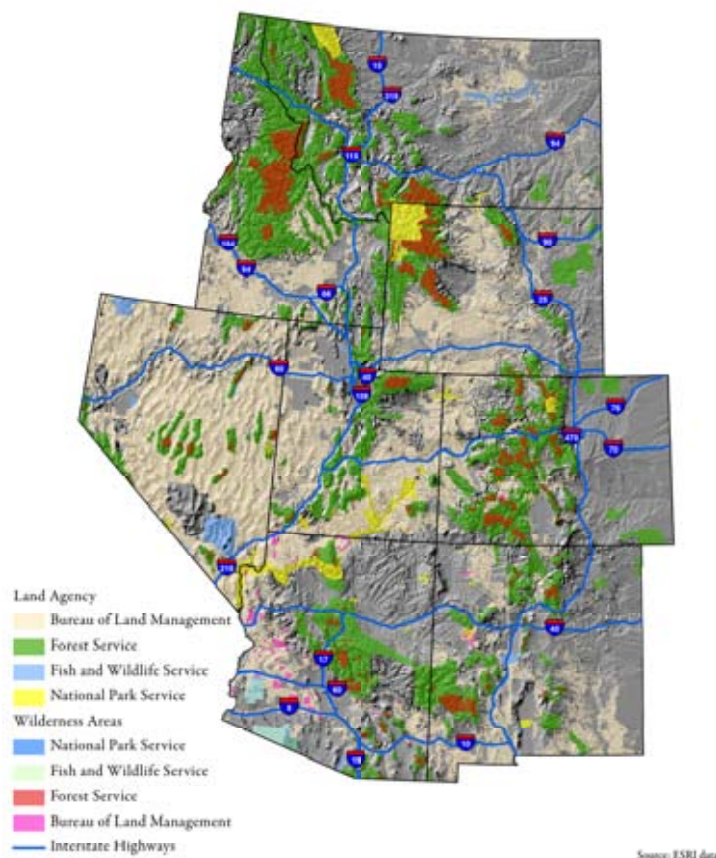
Figure 2: The Rockies' Resource



time of Emerson and Muir, the concept of manifest destiny also emerged. This philosophy is founded on the idea that Americans had an apparent duty to spread civilization and democracy across the continent. In an effort to promote this goal, Congress encouraged settlement through laws such as the Homestead Act of 1862, which transferred land title from the federal government to private owners as long as the individuals showed “improvement” (or development) of the land. The federal government also encouraged resource extraction through legislation like the General Mining Act of 1872, which to this day allows private citizens to mine minerals on federal land at a minimal cost. As a result of these and similar incentive programs adopted by the federal government, Americans began to bring about profound, large-scale changes to the Rockies region, viewed by many as “progress” or “development,” but viewed by others as having negative effects on the environmental quality of millions of acres of land.

As John Muir acknowledged, “God has cared for these trees, saved them from drought, disease, avalanches, and a thousand tempests and floods. But he cannot save them from fools.”⁶ Early environmentalists, who recognized the value of natural places, urged the federal government to place permanent protection on unique portions of the land before irreparable damage occurred. As a result of these efforts, Congress set aside large areas of land to be managed in a way that maintained the environmental quality of the land, while encouraging human enjoyment of the natural world. John Muir was at the forefront of this movement, success-

Figure 3: The Rockies' Public Lands



fully lobbying for permanent federal protection of Yosemite National Park. Similarly, F. V. Hayden advocated for the protection of the majestic and wondrous natural places that were untrammelled by humans. His report to Congress in 1871 led to the designation of Yellowstone National Park by President Ulysses S. Grant in 1872.⁷ The establishment of national parks, national forests, and other wild areas encouraged Americans to explore these areas. The protection of such areas within the public domain helped conserve the bountiful natural resources and environment of the Rockies. It was Arches National Park (then designated as a national monument), that inspired those famous words by Ed Abbey.

Today, almost half of the Rockies' lands are under the jurisdiction of public agencies, as illustrated in **Figure 3**. A mix of national parks, wilderness areas, national forests and Bureau of Land Management (BLM) lands, extend along the spine of the Rocky Mountains and across the Rockies desert environments. The BLM and the Forest Service manage 25 percent and 17 percent of all land in the Rockies respectively. Much of this land is open to multiple uses, including recreation, grazing, energy development, and timber harvesting. In places where recreation is allowed, a wide variety of outdoor enthusiasts use these lands, including campers, boaters, hunters, anglers, off-road vehicle drivers, climbers, skiers and snowboarders. Other treasured landscapes are protected under various protective designations, including national parks, monuments, historic sites, memorials, and wild and

scenic rivers. These places are under the Department of the Interior's National Park Service and account for two percent of the region's land. Restrictions on certain recreational pursuits vary by national park. Public lands that are prime habitats for wildlife and plants are additionally protected within the National Wildlife Refuge System, managed by the U.S. Fish and Wildlife Service. These lands contain around one percent of total land acres in the Rockies.⁸ Recreational pursuits on the refuges that allow them include hunting, fishing, and wildlife viewing. Some of the public lands of the West are designated as wilderness areas, which cover four percent of all land in the Rockies.⁹ Wilderness areas differ from other public land designations as they exclude any activities which require the use of motor vehicles, motorized equipment or mechanical support. Nevertheless, wilderness areas provide many recreational opportunities such as hiking, camping, horse packing, hunting, and fishing.

Rockies' Recreation Economy: The Natural Capital of the Region

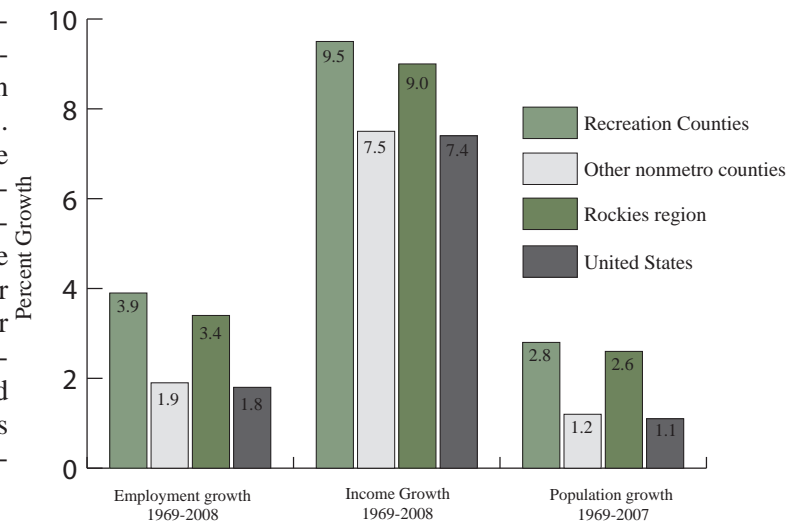
The ebb and flow of population and economic prosperity in the Rockies have always been dependent on the region's rich natural resources and their management. A dramatic transformation of the region's culture and economic opportunities has changed the way entrepreneurs see the region. The Old West, abundant in fertile land, timber, and energy resources, is increasingly being recognized for its other values, embedded in its natural environment. The scenic landscape and diverse recreational opportunities today largely define the region. They attract visitors, new residents, retirees, and second homeowners, who add to the Rockies' social mix and economic ventures. Fewer people come to the West today to extract the region's resources than to seek out deep powder, raging white water, abundant wildlife, scenic trails, tall peaks, and open space. What is their economic significance, however, and do the Rockies recreational opportunities, embedded in the region's public lands, deserve protection?

The vast numbers of people who come to recreate in the region's public lands create demand for recreation-related goods and services. People who participate in outdoor recreation support a variety of industries through their spending. They purchase gear, food, lodging, means of travel, and receive training from professional instructors. By spending money for outdoor recreation, hikers, campers, and skiers alike "vote with their dollars" and contribute to the economic value of the Rockies' natural resources left in their natural state as "amenities" rather than extracted as natural resources.

Our report shows that lands which provide recreational opportunities are an economic asset to the region, a form of "natural capital." These lands produce a high demand for goods and services. In the Rockies region, recreation and tourism generated \$41 billion in income in 2007. During the same year, the sector supported 1.4 million jobs in the Rockies.¹⁰

Outdoor recreation is a significant portion of the

Figure 4: Growth in Recreation Counties



Source: Regional Economic Information System, Bureau of Economic Analysis, US Department of Commerce

broader recreation and tourism industry. In 2006, outdoor enthusiasts spent \$44 billion dollars in the Rockies' economy, generating revenue and demand for a high quality environment and visitor services.¹¹ Visitors to national parks and national forests indicate that they are willing to spend \$57 per person per day to see these places, above and beyond the fees they pay to access these lands.^{12 13} Furthermore, many counties in the region are economically dependent on recreation. Such counties derive the majority of their employment and income from recreation-related industries and have a high proportion of housing units for seasonal or occasional use.¹⁴ Analysis of local economies indicates that these counties have experienced higher growth in income, employment and population than other rural areas, the region, or the nation as shown in **Figure 4**. The growing recreation sector is part of the emerging economy of the New West, defined as growth driven by natural amenities, quality of life, scenic vistas, and leisure activities. Today, the Rockies region's "natural capital," constitutes a major pillar of the Rockies' economic structure. The rapidly rising economic value of the recreation and tourism industry in the Rockies implicitly depends upon proper management and the conservation of the region's attractions, mainly its environmental quality and recreational opportunities.

Despite its strong presence, recreation and tourism is not an economic panacea. Under pressure from population growth, land in the rural West experiences continued development, replacing agricultural land and open space. The commercialization of the tourism experience can degrade the cultural characteristics of the bucolic communities that host thousands of visitors, simultaneously becoming centers of low-paid service jobs. Many workers in such towns as Aspen, Telluride, Sun Valley, Park City, and Jackson struggle to afford the high rent and housing prices and are forced to commute larger distances.¹⁵ Recognizing the economic importance and implications of recreation and tourism in the Rockies, many argue the need for increased planning and management. Although they are not as central



to the economy as recreation, traditional uses of the land such as agriculture, mining, and light manufacturing are still part of the life, culture, and historic heritage of the Rockies. An economy solely based on recreation and tourism lacks diversity and the economic health and resiliency that come with it.

Changing Magnitudes of “Resource Use”

Trails and recreation areas today are often spread over land that historically hosted mining operations and other forms of resource extraction. Communities where gold, silver and copper mining were central activities are increasingly recognizing the aesthetic and economic values of recreational opportunities and natural environments. The local government of Butte, Montana, once a mining town, constructed a trail that runs over a mine remediation site and along Silverbow Creek, creating a public amenity for local residents and visitors.¹⁶ Twenty years ago, residents of Leadville, Colorado could have hardly imagined that today the town would be positioning itself as a recreational haven. The county commissioners, the newly formed recreation department, and the local recreation-avid community are working hard to transform Leadville’s landscape and economy. They are building bike trails, cross-country skiing paths, a terrain park for skiers and snowboarders, and multiple other recreation areas.¹⁷ As these examples show, a transition is taking place in the Rockies, where cultural identities and economic strategies are increasingly based on recreation and scenic landscapes.

This transition from extraction to recreation can also provide some tangible hidden dangers. In 1872, Congress passed the General Mining Law in an effort to encourage the growth of the mining industry. According to the General Mining Law, any individual that discovers economically valuable minerals on public land has the right to mine that area for \$2.50 to \$5.00 an acre, an amount which has not changed since 1872.¹⁸ As a result, thousands of wildcat

mines were developed and then abandoned, creating numerous unmarked safety hazards for recreational users today. Without knowing the terrain, recreationists are subject to numerous dangers from these mines, included but not limited to, asphyxiation, exposure to hazardous chemicals and gases, and instable rock structures. These hidden hazards are a dangerous reminder of the past. Although this is a concern for those using the former mining areas, the shifting economy promises a positive future for the Rockies region, with recreationists enjoying the outdoor environment and strengthening the recreation economy in the Rockies.

The role of the extractive industries in the Rockies’ economic structure, although still significant, has declined since 1969. **Figure 5** depicts the transition away from traditional uses of the land for agriculture and mining and towards a service-dominated economy in the Rockies. In 2001, the service industry, the highest source of income in the Rockies, generated \$125 billion. Service businesses include those involved in recreation and tourism as well as enterprises which provide health, legal, education, finance, insurance, and real estate services. The dramatic rise in income from this sector was the largest contributor to economic growth in the region between 1969 and 2001. Data from the U.S. Bureau of Economic Analysis indicate that service businesses brought 48 percent of all new income generated in the Rockies during this time period.¹⁹ These trends reflect the transition in the Rockies region towards a service based economy.

In comparison, mining, agriculture, and forestry collectively added only three percent to the new income generated between 1969 and 2001.²⁰ As mechanization of these industries has reduced the need for human labor, local communities have turned to other sources of income. The boom and bust character of extractive industries has also made them an unstable source of growth. Only three percent of Western counties could today be classified as economically dependent on resource-extraction.²¹ In comparison, 31 percent of all counties in the eight-state Rockies region are

classified by the United States Department of Agriculture as economically dependent on recreation and tourism.

Retirees drawn to the region for its natural environment and slower pace of country living have become another major aspect of the region's economy. Income derived from non-labor sources such as dividends, interest, and rent has seen a rapid increase as witnessed by **Figure 5**. Nineteen percent of the growth in the region's personal income was generated by non-labor income. Retirees can also contribute to the local economy by increasing demand for services such as health care, finance, insurance and real estate.

The Economic Impact of "Recreation and Tourism"

Tourism traveling has been growing worldwide. Rising numbers of international travelers have resulted in increases in demand for tourism-based services. Before the economic downturn, international traveling stood at an all-time record of 924 million tourist arrivals in 2008.²² The U.S. economy, in particular, is strongly supported by tourists' expenditures as the U.S. ranks among the most popular destinations for travelers. In 2008, the nation was the second most visited destination with 57.9 million international arrivals, surpassed only by France, with 79.2 million.²³

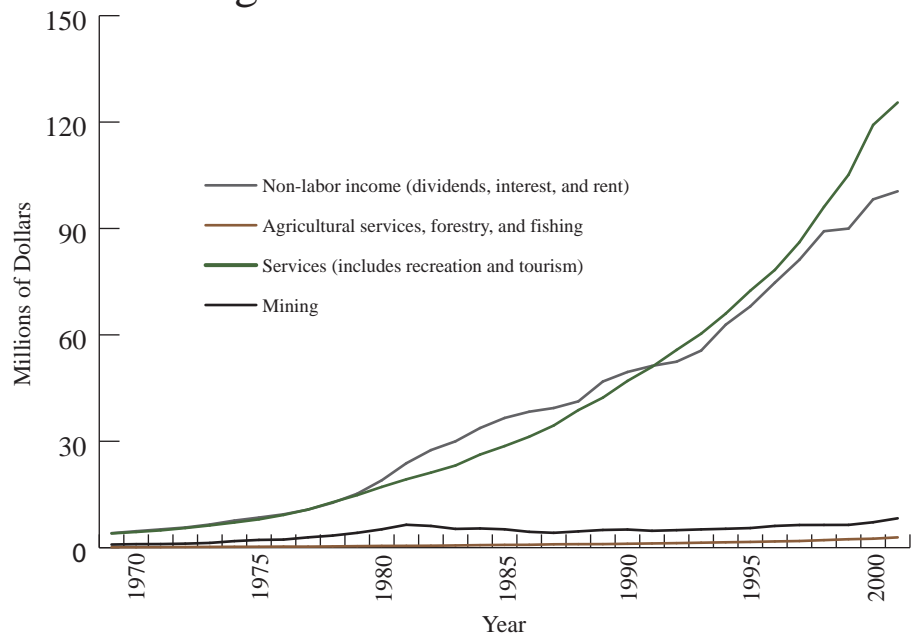
The American West has also always been a place for travel and exploration for travelers, from early 19th century explorers such as William Clark, Meriwether Lewis, and Zebulon Pike to the modern automobile driving tourist. Today's visitors to the region spend money and support a variety of businesses. Western communities have long felt and recognized the economic benefits of tourism.²⁴ It has had a significant impact on the economy of the Rockies, as it has had on the economy of the nation. The Rockies economy is today comprised of a diverse mix of service, construction, and manufacturing sectors. A look at how these sectors contribute to income, jobs, and businesses provides a comprehensive picture of the regional economy, one in which recreation and tourism plays a major role.

Tourist spending is dispersed across various sectors of the economy and no single definition of a "tourism industry" exists. Our report defines the "recreation and tourism industry" broadly as a combination of industry groups which produce goods and services consumed by travelers and local residents who participate in recreation and other leisure activities. Recreation and tourism includes all arts, entertainment, and recreation services, as well as all accommodation and food service businesses. In addition, the industry encompasses some businesses from other major sectors which support tourism and leisure activities. These include air, water, and rail transportation, sightsee-

ing transportation services, motion picture industries, and retail trade. Many of these sectors are not exclusively focused on tourism (for example, only a portion of retail trade is focused on goods which supply tourists and outdoor enthusiasts). The U.S. Commerce Department's Bureau of Economic Analysis provides estimates for the national average percentage contribution of tourism in each of these sectors. These percentages have been used to estimate how much the transportation, motion picture, and retail trade sectors benefited from tourism to estimate the total recreation and tourism economic impact.

Table 1 shows how the recreation and tourism industry compares to other major industries in the nation, region and each Rockies state according to their contribution to total private earnings in 2007. In the U.S., six percent of national private earnings were generated by recreation and tourism services. In comparison, the Rockies region relied more heavily on recreation and tourism as a source of income. Businesses involved in recreation and tourism collectively generated close to nine percent of all income in the Rockies. Tourists and local residents who participate in leisure activities are, thus, vital to the economy of the region. The recreation and tourism industry closely followed the largest sectors in the Rockies economy as a source of income. Construction generated the most income, at 12 percent, in the rapidly growing Rockies region, which experienced a population growth rate of 18 percent between 2000 and 2007, above the national average of seven percent.²⁵ Professional, scientific and technical services, comprised of high-paid consultants such as lawyers, designers, architects, engineers, advertising agencies and others, brought 11 percent of the total income to the region, followed by the finance insurance and real estate industry, at 10 percent and manufacturing at nine percent.

Figure 5: Income Trends in the Rockies



Source: Regional Economic Information System, Bureau of Economic Analysis, US Department of Commerce Table SA25

Table 1: Percent of Total Private Earnings in Selected Industries, 2008

	Recreation & Tourism	Extraction industries	Manufacturing	Construction	Finance, Insurance, Real Estate, and Rental and Leasing	Professional, scientific, and technical services
United States	6	2	13	8	11	11
Rockies	9	3	9	11	10	11
Arizona	7	1	10	11	11	10
Colorado	6	3	8	10	11	14
Idaho	5	2	15	12	7	10
Montana	7	5	7	13	8	8
Nevada	22	2	5	15	9	8
New Mexico	7	6	7	10	7	15
Utah	6	2	14	11	9	10
Wyoming	8	21	5	14	6	6

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, 2008

As illustrated in **Table 1**, the recreation and tourism sector represents a significant source of income for individual Rockies states as well, ranging from six percent of private earnings in Idaho to 22 percent in Nevada. In Nevada, recreation and tourism is dominated by gambling and golfing. Gambling accounts for 44 percent of the total revenue in the arts, entertainment, and recreation industry and golf courses account for eight percent of the same industry.²⁶ This inflates Nevada's recreation and tourism private earnings to 22 percent of private earnings, leading the Rockies region. Wy-

oming stands out because extractive industries comprise the second largest source of income, generating eight percent of total private earnings, more than in any other state in the Rockies. Oil and gas extraction continue to dominate the extraction industries in Wyoming, followed by coal mining.

Wyoming, however, also stands out with its strong recreation and tourism industry, based on its natural amenities. The volcanic activity of Yellowstone and the uplifting of the North American Tectonic Plate that continuously reforms the Tetons, give the region its unique geology. Combined with its rich wildlife and vegetation, the state attracted 7.3 million overnight visitors in 2009, 83 percent of whom state that their primary purpose of visiting is the state's natural environment.²⁷ Wyoming's recreation and tourism industry generated \$1,889 per capita in 2007, second only to Nevada among Rockies states. The lowest per capita income from recreation and tourism was observed in Idaho at \$990 in 2007.²⁸

Employment in recreation and tourism businesses in 2007 stood at 14.6 million jobs in the United States and 1.4 million in the Rockies. The industry was the largest employer in the region in 2007, as depicted in **Table 2**. Recreation and tourism accounted for around 11 percent of all jobs in the Rockies in 2007, indicating the central importance of the industry in the economy of the region. Businesses involved in this industry employed more people than other major sectors of the economy. Finance, insurance, and real estate were the second highest source of jobs, at around 10 percent, followed by construction, at eight percent, and professional services, at seven percent. In the nation, recreation and tourism supported roughly eight percent of all jobs, coming second only to finance, insurance, and real estate services. Across the Rockies states, recreation and tourism was among the highest sources of employment. In Montana, Nevada, and New Mexico, the industry generated more jobs



Case Study: Where to Draw the Boundaries? A Look at Skiing and Public Lands

As more and more members of the population travel to natural areas, places that were previously isolated become overcrowded. Coupled with this reality, certain outdoor enthusiasts' desires to explore the unexplored create conflict with those who support other land uses or have differing views on land's values. This is certainly the case with ski areas across the Rockies region. While businesses look for new market opportunities and participants seek new territory, the resulting land grab begs the questions: What is the limit of expansion? How far can (and should) nature-focused recreationalists push the boundaries of where they go and the limits of what they can do?

The majority of major ski resorts, particularly those located in the Rockies region, are operated on public land under a "special use" permit. It is therefore within the discretion of the federal agency managing the area to supervise land use, including the acceptance or denial of proposed expansion plans. Historically ski resorts have been granted requests to develop; although only after an environmental impact statement is produced.

In November of 2009, the Forest Service surprised the Colorado ski industry, when it rejected Crested Butte's request to expand the skiable terrain in the area by 262 acres.¹ This decision stands out as the first time when a federal agency didn't conduct any assessment of potential environmental impacts and instead flat out rejected a ski area's expansion plans.² Despite the Forest Service's insistence that the decision will not be under review, many ski industry members and government officials are fighting the ruling, as they fear that the result will set a new precedence that will severely damage future economic opportunities for the ski industry.

Backcountry skiers are an example of a group of athletes that are constantly pushing the limits of where they can recreate. In the words of Jon Schick, long time heli-skier and owner of High Mountain Heli-Skiing, "I often hear from some of the guests: best day of their lives".³ A more detailed look at the current dilemma facing High Mountain Heli-Skiing highlights the tension that exists between differing values as recreationalists push the boundary of where they can go. The conflict is often more intensified as it occurs in remote locations that are not primarily established as ski areas. There are eight operators that are members of the Heli-Ski U.S. Association, a nonprofit corporation that "represent(s) the very best helicopter skiing operators in the United States".⁴ Of the eight operators, five of them are located within the Rockies region (see endnote). High Mountain Heli-Skiing, based in Jackson Hole, Wyoming, is one of these premier operators. Owner since the beginning in 1974, Jon Schick now faces the possibility of losing his business as environmental groups have greatly restricted the places he can operate and the number of people he can take on any given day.

When the Wyoming Wilderness Act was passed in 1984, the company lost the ability to operate in roughly a third of their terrain as the land was set aside for conservation purposes.⁵ As a result, the company was now able to operate in 305,000 acres. In November of 2004, the Forest Service increased the number of skier days to 1,200.⁶ This decision upset local environmental groups who felt that the operation was causing significant ecological harm, particularly in the Palisades Wilderness Study Area, which is located on the border of Idaho and Wyoming just south of Jackson.⁷

In response, Earthjustice, along with other conservation groups, sued the Forest Service, arguing that the approval was in violation of The Wilderness Act.⁸ Under the Act, wilderness study areas must be managed "in a manner so as not to impair the suitability of such areas for preservation as wilderness."⁹ The environmental organizations successfully argued in court that in order to comply, the Forest Service needed to limit skier days to 100, which is the number permitted in 1984.¹⁰

The outcome forced High Mountain Heli-Skiing to operate in the less restricted 169,000 acres outside of the Palisades area and to dramatically reduce skiing in the wilderness study area. According to Jon Schick, this decision is incredibly destructive for his company as he argues that 98 percent of what he deems to be skiable terrain is located in this area.¹¹ Jon Schick's dismay at the situation he is now confronted with is only exacerbated by his view that he is not the greatest contributor to environmental harm in the area. He draws attention to the politic factors that prevent conservation groups from attacking larger lobbying powers, such as off-road vehicle users.

This case study underscores the common clash between recreationalists and conservationists. Although nature-based users are considered to be less detrimental to the ecological quality of the land when compared with extraction-based industries, they still do impact the environment. The result is a confrontation between differing, though equally worthy, values of land use: The perspective of recreationalists who seek to explore untracked territory and experience the natural world through an exhilarating experience. At times in conflict with this view, conservationists seek to protect the land for its ecosystem services and wildlife habitat. This case is just one, among many, that the state and federal government will be responsible for mitigating in the hopes of balancing multiple interest groups and unique values concerning public land management.

¹ Rappold, R. Scott. 2009. Crested Butte divided over its future. *The Gazette*. December 5. <http://www.gazette.com/news/town-90318-butte-crested.html#ixzz14gYY7yky>

² Rappold, R. Scott. 2009. Crested Butte divided over its future. *The Gazette*. December 5. <http://www.gazette.com/news/town-90318-butte-crested.html#ixzz14gYY7yky>

³ Schick, Jon. High Mountain Heli-Skiing. Accessed on November 3, 2010. <http://www.heliskijackson.com/>

⁴ The group is based in Utah. The 8 operators are Chugach Power Guides (AK), Points North Heli (AK), Telluride HeliTrax (CO), Sun Valley Heli-Ski (ID), Ruby Mountains (NV), Powderbird Guides (UT), North Cascade Heli (WA), and High Mountain Heli-Skiing (WY).

⁵ Helicopter Skiing Association and Guide Directory. "Who we are." Accessed on November 3, 2010. <http://www.ushelisking.com/index.php/home-mainmenu-1/who-we-are>

⁶ Hatch, Cory. 2007. Heli-skiing deal reached. *Jackson Hole News and Guide*. February 9. http://www.jhnewsandguide.com/article.php?art_id=1424

⁷ Royster, Whitney. 2006. Groups file suit against heli-skiing. *Star-Tribune*. January 11. http://trib.com/news/state-and-regional/article_09441cf7-9fcf-5eaa-a266-834a0bc1f91b.html

⁸ Royster, Whitney. 2006. Groups file suit against heli-skiing. *Star-Tribune*. January 11. http://trib.com/news/state-and-regional/article_09441cf7-9fcf-5eaa-a266-834a0bc1f91b.html

⁹ Earthjustice was joined by The Greater Yellowstone Coalition, The Jackson Hole Conservation Alliance, The Wyoming Wilderness Association, The Sierra Club, and two citizens from Idaho.

¹⁰ Royster, Whitney. 2006. Groups file suit against heli-skiing. *Star-Tribune*. January 11. http://trib.com/news/state-and-regional/article_09441cf7-9fcf-5eaa-a266-834a0bc1f91b.html

¹¹ Wilderness Act

¹⁰ Royster, Whitney. 2006. Groups file suit against heli-skiing. *Star-Tribune*. January 11. http://trib.com/news/state-and-regional/article_09441cf7-9fcf-5eaa-a266-834a0bc1f91b.html

¹¹ Hatch, Cory. 2007. Heli-skiing deal reached. *Jackson Hole News and Guide*. February 9. http://www.jhnewsandguide.com/article.php?art_id=1424

Table 2: Percent of Total Employment in Selected Industries in the Rockies, 2007

	Construction	Finance Insurance and Real Estate	Professional, Scientific and Technical services	Mining, Forestry, Fishing and Agriculture	Manufacturing	Recreation & Tourism Employment
United States	6	9	7	1	8	8
Rockies	8	10	7	2	5	11
Arizona	8	11	6	1	6	9
Colorado	8	11	9	2	5	9
Idaho	9	9	6	2	8	7
Montana	9	8	5	3	4	9
Nevada	9	11	5	1	3	22
New Mexico	7	7	7	3	4	9
Utah	8	12	6	1	8	7
Wyoming	9	8	4	9	3	8

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, 2007

than any other economic sector. In every state in the Rockies as well as the region itself, recreation and tourism employed a larger proportion of workers than in the traditional "extractive" industries of mining, forestry, fishing, and agriculture. This is convincing evidence of the current fundamental transition in the region to an amenity-based economy.

Businesses directly involved in the recreation and tourism industry make up a diverse mix of retail, transportation, entertainment, accommodation, and food establishments. In 2007, recreationists and travelers supported 59,927 businesses in the Rockies region and 812,802 in the nation.²⁹ **Table 3** presents the total number and share of businesses among the recreation sector versus extractive industries. These firms

Table 3: Establishments in Recreation and Extractive Industries, 2007

Region	Recreation and Tourism (percent of total)	Extractive Industries (Mining, Forestry, Fishing, Hunting and Agriculture) (percent of total)
United States	10.5	0.3
Rockies	10.2	0.3
Arizona	10.0	0.1
Colorado	9.8	0.2
Idaho	9.5	1.1
Montana	12.8	1.1
Nevada	11.7	0.1
New Mexico	11.1	0.1
Utah	8.3	0.1
Wyoming	11.3	0.4

Source: County Business Patterns, 2007

accounted for 10 percent of all businesses in the Rockies and 11 percent in the nation. In contrast, less than one percent of all establishments occurred in the extractive industries in the Rockies and the nation. Interestingly, recreation-related businesses represented an equal proportion of total number of establishments in the U.S. and the Rockies region, although recreation brings a higher portion of income in the Rockies than the nation. This implies that recreation businesses in the Rockies bring a higher proportion of total income than their counterparts across the nation. Thus, business establishment data confirm the importance of amenity-based economic activity in the Rockies. In all Rockies states, more than eight percent of business establishments were based on recreation and tourism services in 2007.

The concentration of businesses, jobs and income in the recreation and tourism industry provides evidence for its major economic significance. Leisure activities exclusively based on outdoor recreation and contact with nature are also an important contributor to the Rockies economy.

The Economic Impact of Nature-Based Recreation

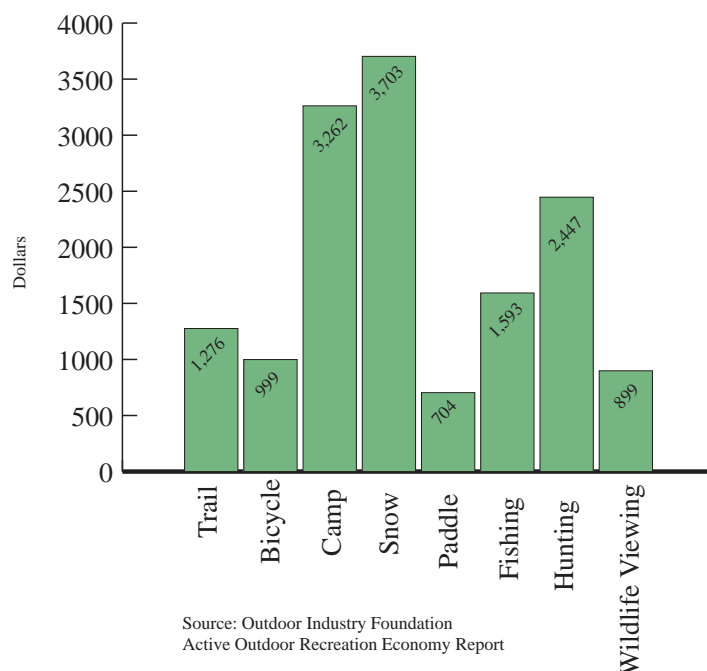
The outdoor recreation sector represents these particular activities within the broader recreation and tourism industry which are exclusively based on active outdoor recreation (the remainder being based roughly on indoors location and character). The Outdoor Industry Foundation defines active outdoor recreation as biking, paddling, camping, climbing, skiing (including downhill, cross country, and telemark), snowboarding, hunting, fishing, wildlife viewing, as well as the use of trails for hiking, backpacking, and trail running.³⁰ People spend money to engage in these outdoor activities, which circulates throughout the economy, creating a ripple of secondary and tertiary impacts of income and job-generating activity. Total spending by participants in active outdoor recreation in 2006 stood at \$352 billion in the nation.³¹ In the Rockies, these activities generated \$44 billion revenue in the same year.³² The amount of revenue these outdoor activities brought to the region outstripped revenue generated by oil and gas extraction in the Rockies, which stood at \$38.7 billion in 2007.³³

Some of the dollars that exchange hands between customers and retailers eventually make their way through

the retailer's suppliers, manufacturers, producers of raw materials, investors, financiers, landowners, and others. Accounting for these secondary effects, the total revenue generated by active outdoor recreation in the nation stood at \$590 billion, compared to \$50 billion in the Rockies.³⁴ The largest single spending category out of all outdoor activities was camping, partially due to the large number of campers. In 2006, total spending by campers, stood at \$14.8 billion.³⁵

These economic contributions comprise the spending of a diverse mix of recreationists, adrenaline junkies, and outdoor enthusiasts. **Figure 6** illustrates the way economic contribution varies by the type of outdoor activity. The average skier/snowboarder brought \$3,703 to the regional economy, more than the average camper, who generated \$3,262 in revenue. While campers spend money on campgrounds, lodging and RV maintenance, skiers and snowboarders purchase mountain passes, supporting mountain resort operations. They also often spend money in the surrounding developments, on food, lodging and souvenirs. Hunters represented the smallest category of outdoor participants according to the report by the Outdoor Industry Foundation.³⁶ However, by purchasing licenses, gear and transportation, every hunter generated the third highest amount of spending, at \$2,447, compared to other outdoor activity groups. This also does not take into account the beneficial effect that hunters have had on conservation.

Participation in outdoor recreation is also a prominent source of jobs in the Rockies. In 2006, outdoor enthusiasts supported 702,651 jobs in the region,³⁷ roughly 18 times more than total employment in oil and gas extraction during the same year.³⁸ Compared to the 1.4 million jobs supported by the recreation and tourism industry, this estimate only includes job generated by outdoor recreation activities and the spending associated with them. The largest supporters of employment in the region were campers, skiers and

Figure 6: Total Annual Spending per Participant by Outdoor Activity, 2006

Source: Outdoor Industry Foundation
Active Outdoor Recreation Economy Report

snowboarders, and hunters, as shown in **Figure 7**. The winter sport industry stands out as the highest source of revenue and employment among outdoor activities. Every thousand skiers and snowboarders generated 54 jobs in 2006. Hunting and camping activities were other major sources of employment in the region, generating 50 and 47 jobs for every thousand participants respectively. When the location of the various types of outdoors activities is considered, such job generation often is a major share of a county's total employment and economic activity.

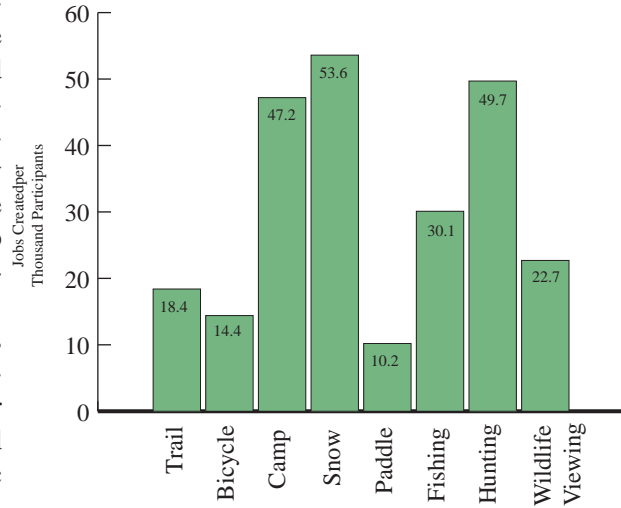
Economic impacts, measured by spending and jobs generation by outdoor enthusiasts even within a specific recreation sector varies considerably across the Rockies. For example, those who engage in trail, camp, snow, paddle, and bicycling activities, have significantly different economic impacts, as depicted in **Figure 8** and **Figure 9**. Across all Rockies states, every outdoor enthusiast generated \$1,897 in revenue on average in 2006. Every thousand participants in outdoor recreation created 26 jobs on average for all Rockies states. Wyoming stands out among other states, as outdoor enthusiasts there generate five times as much revenue and jobs compared to the rest of the Rockies. Visitors to Wyoming spent more on food, drinks, transportation, and lodging than the average camper tourist in the Rockies.

Teton County, home to the resort town Jackson Hole, Wyoming and a gateway to Grand Teton National Park and Yellowstone National Park, experienced the most spending and jobs generated by tourists out of all counties in Wyoming.³⁹ The majority of visitors to the state stayed for multiple nights, as the number of overnight trips in the state accounted for 54 percent of the total number of trips, compared to an average of 48 percent overnight stays for the rest of the Rockies. Visitors who stay longer spend proportionately more on local services. Of the many overnight visitors to the Yellowstone area, 26 percent, come from Colorado, Utah, and South Dakota.⁴⁰ These tourists are compelled to drive through the state, thus spending more on transportation. In addition, the abundance of public lands in the area and small number of second homes leads travelers to stay at local lodging businesses. It is unclear whether this is a positive trend for Teton County. Its epicenter, Jackson Hole, is heavily based on recreation and tourism. The town has long forgone other sectors of the economy and the vitality that usually comes with a diverse mix of business enterprises.

Willingness to Pay

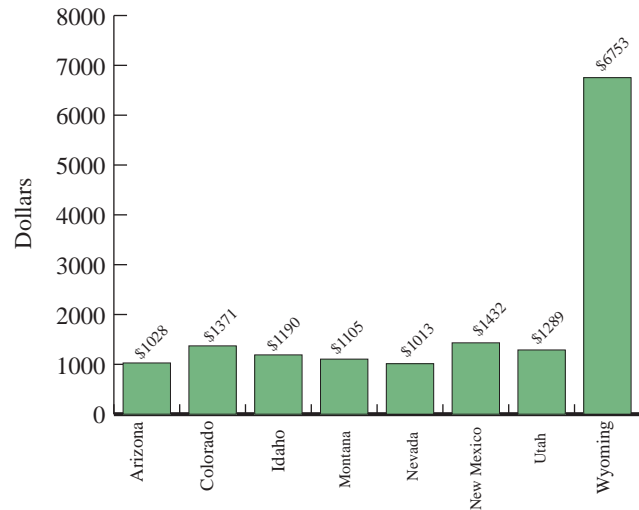
Skiers, hikers, and bird-watchers might be deriving more value from experiencing America's wild lands than the actual money they pay to be on public land. This raises questions about the appropriate price of access to public lands, as federal land agencies are strapped for cash. Time spent outdoors provides benefits such as exercise, spiritual rejuvenation, solace, inspiration, education of youth, etc., that are hard to measure. The value of recreation is an important indicator of social welfare and must be included in cost-benefit analyses regarding public lands and recreational opportunities in the Rockies. Surveys of visitors on public lands pro-

Figure 7: Jobs Created per Thousand Participants in the Rockies



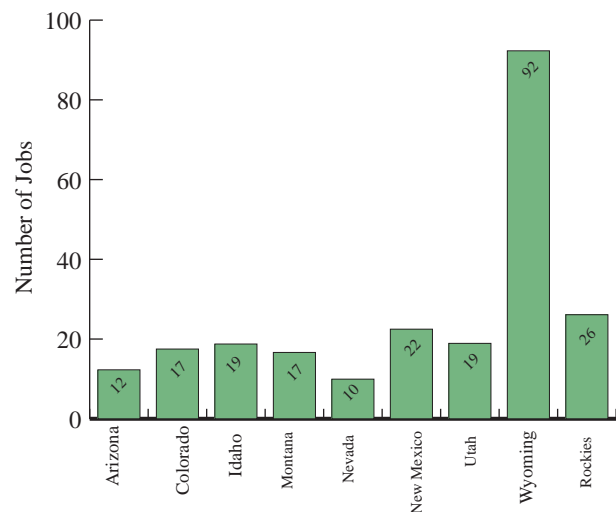
Source: Outdoor Industry Foundation, The Economic Contribution of Active Outdoor Recreation – Technical Report on Methods and Findings, 2006

Figure 8: Spending per Participant in Trail, Camp, Snow, Paddle and Bicycling in the Rockies, 2006



Source: Outdoor Industry Foundation, The Active Outdoor Recreation Economy, State Level Technical Report, 2006

Figure 9: Jobs Generated per Thousand Participants in Trail, Camp, Snow Paddle and Bicycling, 2006



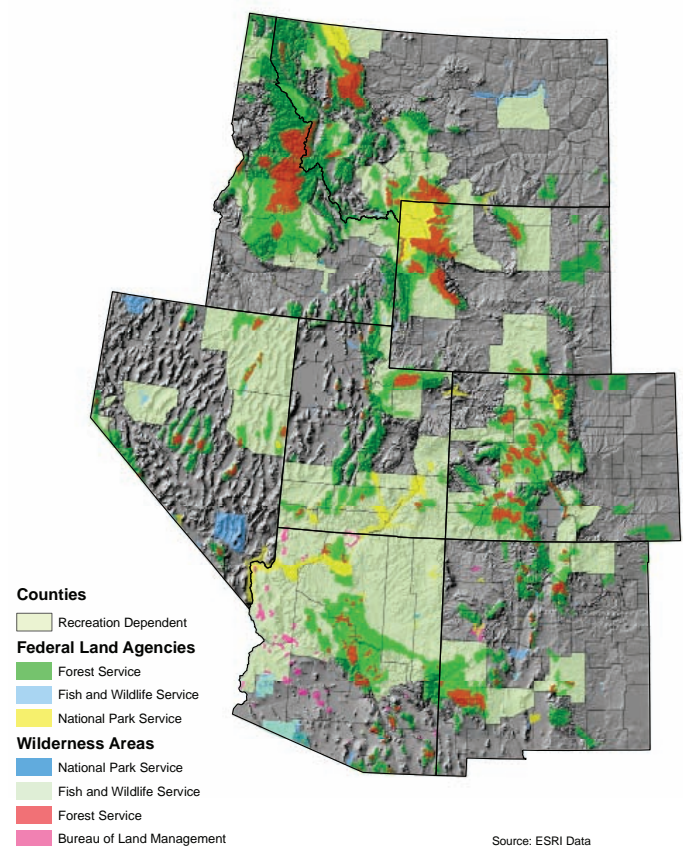
Source: Outdoor Industry Foundation, The Active Outdoor Recreation Economy, State Level Technical Report, 2006

vide an estimate for the total amount that people are willing to pay for recreation. A compilation of these data for National Parks shows that on average, each visitor is willing to pay \$57 per day (measured in 2008 dollars) for visiting park land in the Intermountain region (which along with the Rockies region included North Dakota, South Dakota, Nebraska, and Kansas).⁴¹ In 2009, almost 43 million people visited national parks in this region.⁴² This indicates that the approximate value of parks in the intermountain region is \$6.7 million per day. Similar surveys conducted on Forest Service lands indicate that visitors there are willing to pay the same amount as those in national parks. On average, each visitor to national forests in the Intermountain region is willing to pay \$57 per day⁴³ to do a myriad of activities including camping, downhill skiing, snowmobiling, and others. Surveys conducted for U.S. Forest Service land between 2005 and 2009 indicate that about 21 million tourists on average visit national forests in the Intermountain region every year.⁴⁴ Thus, the approximate total value of these areas is \$3.3 million per day.

The Impact of Nature-Based Recreation on Local Communities

The rich natural environment of the Rockies is an important economic asset not only to the region as a whole, but for individual communities within the region. The wide-stretching public lands that characterize the West hold in-

Figure 10: Recreation Counties



Case Study: The History of Railroads and National Parks

Opportunities for play, solitude and spiritual rejuvenation are important to the economic vitality of the region and the nation today, as well as in the past. Transcontinental railroads were the first to make wide-scale western travel possible, and the first to benefit from it. By the end of the 19th century tourism had become an important part of the railroad industry. Transcontinental rail companies began producing calendars, brochures, posters, and magazines, which emphasized the natural attractions of the West, in an effort to increase visitation. The economic interests of the railroads in Western tourism also played a role in the protection of Western public lands. With John Muir as a chief publicist to Southern Pacific, the transcontinental railroad used its political power to achieve the designation of Yosemite as a National Park.¹ The same railroad later helped create Sequoia National Park in 1890 and Crater Lake National Park in 1902.

Similarly, Northern Pacific's president Jay Cooke lobbied for the designation of Yellowstone National Park in 1872.² Northern Pacific later played a prominent role in the designation of Mount Rainier National Park in 1899. Glacier National Park, designated as national park in 1910, was the result of lobbying from the Great Northern Railway. Transcontinental railroads thus not only marked the beginnings of "western tourism" as we know it today. They also established the precedent that profits and the protection of western public lands could go hand in hand.

Railroads also benefited from National Parks by operating and supporting campgrounds and hotels. Northern Pacific loaned money for the construction of Old Faithful Inn in Yellowstone and operated concessions in Mount Rainier. Great Northern Railway brought in additional profits through the construction and operation of the Many Glaciers Hotel.³ Both as attractions and venues for hotel and campground businesses, the National Parks represented important economic resources, based upon their recreational, aesthetic, ethic and spiritual values. After the railroads, a myriad of private enterprises stood to profit from the recreation and tourism sector.



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¹Mark D. Barringer, *Selling Yellowstone*, (Lawrence, Kansas), 2002, p. 40

²Mark D. Barringer, *Selling Yellowstone*, (Lawrence, Kansas), 2002, p. 15

³Mark D. Barringer, *Selling Yellowstone*, (Lawrence, Kansas), 2002, p. 40



© Monica Mueller

trinsic values as well as various economic benefits to local communities that are often “gateways” to major public lands. Proximity to wilderness areas has been found to be an important driver of economic development in non-metropolitan communities, boosting income, employment, and population growth.⁴⁵ Similarly, Western counties close to national parks and other protected wild lands show healthy economies. These communities generated more income per capita in 2003 and more growth in income, employment, and population between 1970 and 2003 than counties farther away from such public lands.⁴⁶ They also outperformed the national average in these categories, indicating that protected public lands can lead to robust economies. During the 1990’s, nonmetropolitan areas rich in natural amenities experienced higher growth of in-migration compared to other regions in the nation. Particularly in recent years, quality of life has been a major factor for migration.⁴⁷ Revived interest and population influx in these areas indicate the prevalence of “amenity growth” in the rural West, founded on the region’s high environmental quality. Such growth is associated with a variety of economic and social factors, including in-migration, seasonal housing, employment in tourism, employment in finance, insurance, and real estate, high housing values, and high levels of education.⁴⁸

A large number of nonmetropolitan counties in the Rockies region are today economically dependent on the recreation and tourism sector. The major source of jobs and income for these communities are entertainment and recreation, accommodations, eating and drinking places, and real estate.⁴⁹ In addition, these counties had a higher percentage of seasonal housing and high receipts from hotels and motels. Such counties possess a variety of attractions that bring visitors, second home-owners, retirees, and new businesses. Major draws of recreation communities in the Rockies include ski resorts, other mountain-related recreation, national parks, reservoir lakes, and casinos. For the purposes of this analysis, recreation counties where casinos represented the major attraction were excluded as their economy does not depend on outdoor recreation and natural amenities. The counties selected for this analysis have, on average, 166 percent more acres in national parks and 68 percent more acres in forest service land than the average county in the Rockies.⁵⁰ Additionally, recreation dependent counties have an average natural amenity index of 5.3, compared to the average for the Rockies of 4.8⁵¹, further indicating that high environmental quality is an important characteristic for these communities and their recreation and tourism sector.

Counties economically dependent upon recreation

for their income and employment are largely distributed along the spine of the Rocky Mountains. The regions they encompass, illustrated in **Figure 10**, demonstrate the abundance and diversity of recreation opportunities in the Rockies. The communities in these recreation-dependent counties are situated near landmarks such as: Glacier National Park, which contains vast wilderness areas; the Greater Yellowstone region; the mountains of Colorado, well endowed with fourteen peaks and world class ski resorts; and the southern Rockies, home to the Grand Canyon and expansive desert ecosystems.

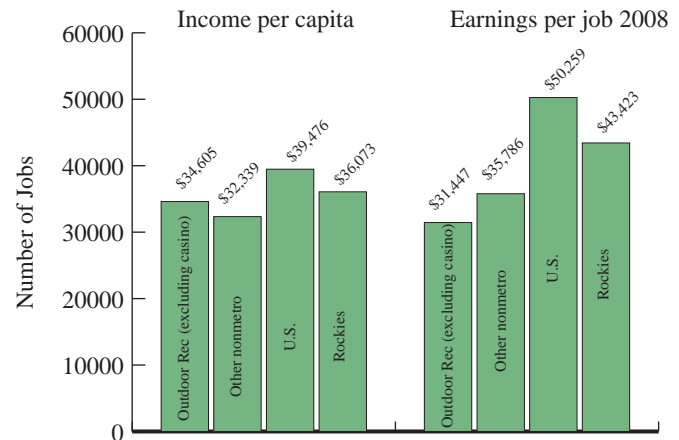
Recreation counties show strong growth between 1969 and 2008, illustrated in **Figure 4**, indicating that the amenity growth of the rural Rockies is in full swing in these counties. These communities experience an average annual population growth between 1969 and 2007 of nearly three percent, outstripping other nonmetropolitan regions in the region, where average population growth stood at one percent. Recreation counties also had a higher population growth than the Rockies and the U.S. average. The 1980's marked a period of net outmigration from nonmetropolitan counties due to the economic downturn.⁵² While Rockies counties with no recreational resources saw declines in population during that period, recreation counties continued to experience population growth.⁵³ Mining areas were the most severely affected by the poor economic conditions and outmigration in the 1980's; they lost three percent of their population in one year between 1986 and 1987.⁵⁴

Population increase is a troubling trend for the region's fragile environment. As the baby boomer generation looks for retirement destinations, Rockies' recreational areas will experience increased pressure. The common phrase, "we are loving our lands to death," sheds some light on the scope of the problem. This trend not only calls for careful management of recreation centers and public lands but also for their expansion where possible to house the in-migrants who create jobs and bring investment.

Employment growth in leisure-based communities, at an annual average of four percent from 1969-2008, outperformed other nonmetropolitan areas of the region, the region as a whole and the nation. Recreation-dependent counties also proved more resilient to recessions. During the prominent "recession periods" of 1974, 1980, 1982-1983, 1990-1991, 2001-2002, and 2008, these counties had higher annual employment than other rural areas, the region and the nation.⁵⁵

Communities which provide opportunities for recreation on the nearest public lands and ski resorts, as well as accommodation, food, and drinking services have been providing an influx of income into the Rockies region between 1969 and 2008. Average annual income growth in these counties stood at nine percent, higher than that in other nonmetropolitan regions as well as the Rockies. Thus, recreation has a central importance for the economic and cultural development of the Rockies. Recognizing these counties' place in the "new economy of the West" will be crucial to the way regional planners manage public land and opportu-

Figure 11: Income per Capita and Earnings per Job in Recreation Dependent Counties, 2008



Source: Regional Economic Information System,
Bureau of Economic Analysis, US Department of Commerce

nities for recreation.

Recreation counties attract not only seasonal employment and service workers, but also wealthy individuals including retirees and workers in the financial, insurance, and real estate sector. **Figure 11** indicates that income per capita in these communities, at \$34,605, was higher than for other nonmetropolitan parts of the Rockies in 2008. However, income per capita was lower than the average for the Rockies and the U.S., where a mix of industries and a large number of urban centers generate the bulk of the income. Retirees bring non-labor sources of income such as dividends, interest receipts, and rent. These sources represented a quarter of total personal income in recreation counties, compared to one fifth for the Rockies as a whole.⁵⁶ The presence of retirees brings more benefits as their higher level of affluence leads to more demand for local goods and services, higher local government tax collections, and contributions to local charities and social organizations.⁵⁷

Outdoor recreation workers were paid on average \$31,447 in 2008, lower than earnings per job in other nonmetropolitan regions and the nation. It is unclear, however, whether this fact supports the wide-spread belief that tourism brings low-paid employment to local communities. This is likely due to the seasonal flood of nonresidents to these



counties, who fill low paid service jobs, but are not representative of earnings by local residents. Earnings per employed resident are higher in recreation counties in the nation than other nonmetropolitan regions.⁵⁷ These workers earn more than ones in other rural parts of America, despite the fact that one of their jobs might be a lower paying part-time or seasonal job.

While all of these counties are gifted with public lands and natural environment, their economic landscapes are different. A cluster of counties near Yellowstone and Grand Teton National Parks, Sublette, Wyoming, Teton, Idaho, and Teton, Wyoming were among the five fastest growing recreation counties in the past decade. Duchesne, Utah, near Salt Lake City, which draws anglers to Starvation Reservoir, hikers to the High Uintah wilderness, ATV riders and hunters to its surrounding areas, is another one of the fastest growing recreation counties. Ouray, in the heart of Colorado's Rocky Mountains, is the fifth fastest growing recreation county. Growth in income from 2000 to 2008 in these communities ranged between 100-220 percent.⁵⁸

The service sector that characterizes communities with outstanding recreational opportunities does not solely consist of low-paid waiters and souvenir sellers. The high quality of life in these counties also attracts knowledge-based businesses that employ highly educated architects, designers, financiers, lawyers, real estate agents, and software publishers. Globalization of production has made it possible for these workers to locate where they choose and work out of their laptop, occasionally making trips to urban centers and markets. For them, recreational opportunities, environmental quality, and availability of public land have become major reasons for location of the business.⁵⁹

The percentage of jobs in knowledge-based sectors of total employment is higher in recreation counties than other nonmetropolitan counties, as evidenced in **Figure 12**. The information sector, consisting of publishers and

distributors of media, accounted for a small amount of employment. Finance and insurance played a larger role in the local economies, as well as real estate, rental and leasing services, consistent with the bulging demand from second homeowners and the seasonal influx of workers. Professional and scientific services, which include architects, engineers, designers, lawyers and other consultants, accounted for almost five percent of total employment. Combined, these four knowledge based industries supported 182,000 jobs in Rockies' recreation counties in 2008.

From the perspectives of employment, income, and population, the statistics confirm how robust recreation dependent counties are. Once supported largely by agriculture and resource extraction, these counties and their close proximity to high-amenity natural attractions now thrive from recreation uses of the land rather than extraction. There are profound implications for this new economic base; proper management of the land and environment to keep a healthy



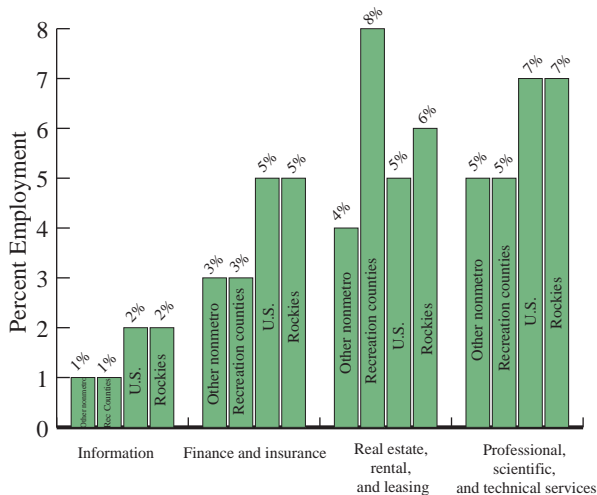
Case Study: Recreation and Legal Standing

Recreation brings other societal benefits, in addition to economic growth and individual health. Direct contact with the natural environment creates environmentally responsible constituents and provides support for environmental conservation. The act of recreating gives individuals and organization “standing” in legal proceedings. Such standing can allow parties to challenge the acts of others in court, especially in cases of environmental degradation.

Under the Administrative Procedure Act, a person has standing to seek judicial review if s/he has suffered or will suffer injury, whether economic or otherwise. The issue of standing as it relates to environmental conservation was decided in 1972 in the Supreme Court case *Sierra Club vs. Morton*. The suit arose when the U.S. Forest Service issued a permit for the development of Mineral King, near Sequoia National Park. The Supreme Court held that the Sierra Club, as an organization, lacked standing to challenge the development of Mineral King. The Court, however, asserted that any member of the Sierra Club, who holds aesthetic or recreational interests in the area under question, had legal standing. This case established that any environmental group can assert standing in a natural resource matter by finding among its members a single person with a particular aesthetic or recreational interest (e.g. one who camps, hikes, bikes, hunts, or fishes in or near the affected area). Thus, recreational values have emerged as an important public use of natural resources. They have allowed for society to challenge in court traditional extractive uses of the land.¹

¹ Percival, Schroeder, Miller, Leape. *Environmental Regulation: Law, Science and Policy*, 977-981, 2003

Figure 12: Percent Employment in Select Knowledge Based Industries, 2008



Source: Regional Economic Information System, Bureau of Economic Analysis, US Department of Commerce

balance and intact flora and fauna are essential. The foundation of this outdoor recreation economy is no less “nature based” than mining and forest products, but requires quite different conditions and constraints on the region’s public and private lands.

Other important factors for the location of these businesses are proximity to colleges and universities and transportation and communication infrastructure.⁶⁰ While colleges and universities supply a well-educated workforce, connectivity through major airports and interstates makes it possible for these businesses to stay in touch with urban markets. Building bridges between large cities and rural areas, thus, plays an instrumental role not only in developing recreation economies but also in attracting a diverse mix of professional services.

Ray Rasker, Ph.D., Executive Director of Headwaters Economics, noted that the existence of an established cluster of similar businesses is another important reason for business owners in their choice of location.⁶¹ Proximity to such “clusters” means that business owners can employ a worker who has had experience working for a similar firm. While these clusters often form at random, the increased employment in knowledge-based industries in recreation counties across the Rockies are likely to attract more of these businesses. Rasker is optimistic about the continued growth of these firms in amenity rich communities, observing that such businesses might be relocating from high-density urban centers.⁶¹

A recreation and tourism-based economy also brings negative changes for rural communities. A growing concern for housing affordability has emerged in mountain towns where people employed in the service industries cannot afford to live where they work and are forced to commute over large distances. Median monthly rent in recreation counties averaged 23 percent higher than those in other nonmetropolitan communities in the U.S.⁶² Among possible solutions are tax credits that could ease the burden of housing costs

as well as loan subsidies for new developments that include dedicated affordable housing.⁶³

Other issues of rural development in and near recreation communities include the location of many homes near fire-prone areas, in what is called the “wildland-urban interface” (WUI). Settling down in the pathway of possible future environmental disasters is costly to taxpayers as it increases the need for fire management. On average, more than \$1 billion per year is spent on fire-fighting costs, a large proportion of which are attributable to the defense of homes in the WUI areas.⁶⁴ Shifting the burden of these costs from federal tax money and federal land agencies to states, counties, cities, towns and homeowners provides one viable solution.⁶⁵

The growing number of in-migrants and seasonal visitors increases pressures on public lands. Loss of open space is another mounting concern, as community development gnaws at farms, ranches, and other land. Forces of amenity growth that increase sprawl over prime landscapes can be counteracted with careful planning. The Sonoran Institute, a nonprofit agency which works with local communities to inspire and enable conservation and resilient economies, strives to promote smart growth in the Rockies. A “smart city” is one that has a compact ground footprint and minimizes infringement on open space. Through a combination of development and protection of land, planners integrate housing with the natural environment. McCauley Butte in Missoula, Montana is one example. Less than nine percent of the owned land was used for a residential development, while the rest, wetland, riparian areas and a hayfield were protected under a conservation easement. In Valley West in Bozeman, Montana, housing units were integrated with wetlands, watercourses and trails. Denser towns can further enhance social networks, which benefit the local economy, and decrease the need for spending on infrastructure.⁶⁶ Planning for more walkable and bikeable communities and incorporating urban transit systems can improve connectivity and reduce classic automobile-driven sprawl.⁶⁷



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Participation Trends

The public lands of the Rockies and the region's recreational opportunities are not only an engine of economic growth. They are also valuable to the high numbers of people who continue to use them for leisure, medical, and spiritual rejuvenation. The popularity of nature-based recreation has changed over the years, varying by the types of outdoor activity and public lands and the demographic characteristics of the population. The Rockies Project finds that people continue to engage in nature-based recreation and these activities continue to enjoy strong popularity.

The History of Nature-based Recreation

During the late 19th century, the dream of a better life founded on economic industries such as agriculture, timber harvesting, and mining caused a vast population migration to the West. Between 1880 and 1910, the Rockies population increased by over 303 percent.⁶⁸ Although early settlers indeed spent time in the outdoors, such time was not seen as leisure and nature was largely viewed as wild, hostile, a force to be tamed. However, as America continued to develop into a major world power, citizens enjoyed greater disposable income and more leisure time. This is evidenced by the 6.8 hour decrease in average annual work in the late 20th century between 1965 and 2003.⁶⁹ As a result, people began pushing the boundaries of environmental exploration and enjoying nature in new ways. They were able to take advantage of “natural amenities” in a way that did not require the removal or intensive use of the natural resources for production or manufacturing.

Between the years of 1938 and 1965, there was a noticeable increase in visitation to national parks.⁷⁰ According to Clawson and Harrington, this trend was driven by four post-war “fueling factors”: increases in population, disposable income, leisure time, and mobility.⁷¹ The need to manage and plan for the growing demand for outdoor recreational opportunities forced Congress to establish the Outdoor Recreation Resources Review Commission (ORRRC) in 1958.⁷² The ORRRC conducted a national survey in an effort to answer these questions: “What are the recreation wants and needs now and what will they be in the years 1976 and 2000? What are the recreation resources of the Nation available to meet those needs? What policies and programs should be recommended to ensure that the needs of the present and future are adequately and efficiently met?”⁷³ The National Recreation Survey (NSR) has been conducted frequently between 1960 and 2008 and results highlight general participation trends in national outdoor recreation. In the 1990's, the survey was revamped and renamed the National Survey on Recreation and the Environment.

Today 49 percent of Americans participate in outdoor recreation, of which eight percent are in the Rockies region. Of the Rockies 2009 population 55 percent participate in outdoor recreation, up from 53 percent in 2008. This is the highest rate of any region in the United States, next followed by the West North Central census division with 53 percent of its population participating.⁷⁴ This high percent-

age of participants further evidences the importance of recreation in the Rockies and how the changing participation can have an effect for more than just those people recreating.

Long-term Trends

Over the years the most popular recreation activities have remained largely consistent. The top five activities that American were involved in during 1960 included driving for pleasure, swimming, walking, playing outdoor games or sports, and sightseeing. In the 1982-1983 survey, swimming and walking became the two most common activities, followed by visiting zoos and parks, picnicking, and driving for pleasure. A little more than ten years later, wildlife viewing and biking became increasingly dominant while swimming and walking remained in the top five. By 2000, walking, family gatherings, viewing natural scenery, visiting a nature center, nature trail, or zoo, and picnicking were the most widespread outdoor pastimes. It is important to note that the most prevalent activities over the years remain generally low cost, demand minimal physical exertion, and require no expensive special equipment or highly developed skills.⁷⁵ As **Table 4** depicts, bicycling, camping, and canoeing/kayaking had the greatest increase in participation numbers between 1960 and 2000. Simultaneously, horse riding, hunting, and fishing remained fairly consistent or show a slight decline during the same time period. The decline in hunting has also been observed in the U.S. Fish and Wildlife Surveys. In recent years, further research has been conducted in an effort to more effectively calculate participation trends in outdoor recreation.

Recent Trends in Selected Outdoor Activities: National Outdoor Participation

The National Survey on Recreation and the Environment and the Outdoor Industry Association's Outdoor Foundation Reports are the two most prominent studies on current national trends in outdoor recreation. The Outdoor Foundation's 2010 Report found that 48.9 percent of Americans (age six and older) participated in outdoor recreation in 2009, a small increase from 2008. While the number or overall participants increased, participation by activity varied greatly.

Table 4: National Long-term Participation Trends (Millions of Participants)

Year	Bicycling	Horseback riding	Camping	Hunting	Fishing	Canoe/ kayaking	Sailing	Swimming	U.S. population
1960	13%	9%	10%	16%	33%	2%	3%	47%	131
1965	18%	12%	13%	16%	34%	3%	4%	50%	144
1982-1983	32%	9%	21%	12%	34%	8%	6%	53%	188
1994-1995	32%	8%	29%	10%	30%	8%	5%	55%	216
2000-2001	41%	10%	37%	12%	35%	12%	5%	55%	229

Source: National Survey on Recreation and the Environment



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Case Study: Ethnic Minorities in Outdoor Recreation

As seen in the demographics section of the Recreation Overview in this report card, the breakdown of participation among ethnicities does not correspond to the diverse population of the Rockies and the greater United States.

In their article “Understanding the Role of Ethnicity in Outdoor Recreation Experiences,” Deborah Carr and Daniel Williams explain that the underrepresentation of ethnic groups is approached from two different perspectives: one of general marginality and another based on ethnic factors.¹ According to the marginality argument, “low socio-economic status, lack of access... (and) discrimination” results in under-participation.² Conversely, the other approach places a greater emphasis on cultural aspects such as historical involvement, and “difference in values and expectations.”³ Although there has been a dramatic increase in research regarding the demographic characteristics of outdoor enthusiasts, there is still a need for further studies to determine what the main factors are and how they can best be addressed.

From an economic standpoint, targeting underrepresented ethnic groups should be pursued as it could significantly impact participation numbers and therefore, presents an opportunity to the recreation industry. Currently the “outdoor recreation is marketed to a white, middle-class population,” according to Dave Secunda, the executive director of the Outdoor Recreation Coalition of America (ORCA).⁴ Ellen Wessel, president of Moving Comfort, Inc., points to the portrayal of outdoor activities via advertising and the media as “reinforcing the idea that these are all-white activities.”⁵

The efforts to encourage participation of people of different ethnicities should be multifaceted and multilateral. The change in policy from the supply side by outfitters and advertisers is one aspect. However, there must also be attempts made to increase the demand from minority groups. Through his work, Michael Brown, Ph.D. “has shown that if people aren’t exposed to an activity before the age of 16, they won’t do that activity later in life.”⁶ Thus, it is crucial to get minorities involved in outdoor activities at a young age. Groups, such as Denver’s Outdoor Recreation program, are crucial in increasing the accessibility of outdoor education and natural places to urban populations. Founded by an African-American woman, Outdoor Afro is an example of a grassroots, community focused attempt to encourage nature-based recreation.⁷ According to the website, “Outdoor Afro is a community that reconnects African-Americans with natural spaces and one another through recreational activities such as camping, hiking, biking, fishing, gardening, skiing – and more.”⁸ There have even been initiatives led by celebrities, such as Oprah Winfrey’s recent overnight camping trip in Yosemite National Park.⁹ While awareness is arising and can now be seen in federal bills, such as President Obama’s America’s Great Outdoor Initiative, there must continue to be a reform in all aspects of the outdoor recreation community.¹⁰

¹Carr, Deborah S., and Daniel R. Williams. 1993. Understanding the Role of Ethnicity in Outdoor Recreation Experiences. *Journal of Leisure Research* 25, no. 1, 22.

²Carr, Deborah S., and Daniel R. Williams. 1993. Understanding the Role of Ethnicity in Outdoor Recreation Experiences. *Journal of Leisure Research* 25, no. 1, 22.

³Carr, Deborah S., and Daniel R. Williams. 1993. Understanding the Role of Ethnicity in Outdoor Recreation Experiences. *Journal of Leisure Research* 25, no. 1, 23.

⁴ORCA is a non-profit industry group based in Boulder, Colorado. Eller, Daryn. “The Outsiders.” *Women’s Sports & Fitness* 16, no. 7 (1994): 19.

⁵Eller, Daryn. *The Outsiders*. *Women’s Sports & Fitness* 16, no. 7 (1994): 19.

⁶Eller, Daryn. *The Outsiders*. *Women’s Sports & Fitness* 16, no. 7 (1994): 19.

⁷Paige Ogburn, Stephanie. 2010. Into the wild: African American environmentalist Rue Mapp gets people of Colorado outside. *High Country News*. June 21.

⁸Mapp, Rue. Outdoor Afro. “About.” Accessed November 3, 2010. <http://outdoorafro.com/about>.

⁹Mapp, Rue. 2010. Outdoor Afro. “Oprah Goes Camping in Yosemite!,” October 22. <http://outdoorafro.com/2010/10/oprah-goes-camping-in-yosemite.html>

¹⁰America’s Great Outdoors. 2010. “President Obama Launches Initiative to Develop a 21st Century Strategy for America’s Great Outdoors.” April 16. <http://www.doi.gov/americas-greatoutdoors/Press-Release.cfm>.

According to **Table 5**, hiking has seen the greatest overall increase of participants, which witnessed an eight percent increase in participants between 2000 and 2009. This is no surprise, as hiking is a relatively cheap, low impact option. It is easily accessible for families during the economic recession when higher priced activities further from home often do not fit into the budget. Self powered activities with minimal gear requirements have seen the greatest increase in participation, while “destination” activities have not seen the same growth.⁷⁶ For a comparison, camping participation rates only increased by two percent and skiing by six percent, both of these are “destination” activities. Other activities with the exceptions of rafting and climbing have remained constant or shown a slight increase in participation. Kayaking has seen a 53 percent increase in participation between 2000 and 2009. Within the past year, adventure racing and snowshoeing have witnessed the greatest growth, with adventure racing growing 18 percent between 2008 and 2009, while snowshoeing has grown by 17 percent. Overall, the Outdoor Industry Foundation Report has found that participation in outdoor recreation is increasing on a national level, while certain activities such as hunting are experiencing noticeable decline.

Hunting, Fishing, and Wildlife Viewing

The U.S. Fish and Wildlife Service has conducted the National Survey on Fishing, Hunting, and Wildlife-Associated Recreation every five years since 1955. However, a change in methodology in 1985 caused discrepancies when attempting to compare data over time. Hunting has been declining in participation both on a national and regional level. As **Table 6** shows, in 1991, there were 14,063,000 national hunters and 1,069,000 in the Rockies (FWS Mountain Division is the eight-state mountain census division). By 2006, there were only 12,510,000 hunters nationwide and 868,000 in the Rockies region. While hunting has declined, wildlife viewing has shown an increase in participants between 1996 and 2006. Nationwide, wildlife viewing has grown by 13 percent from 62,868,000 participants to 71,132,000. The Rockies region experienced a 60 percent increase in wildlife viewers during the ten-year period between 1996 and 2006. The public choice has turned from hunting animals to viewing them, following a shift in public opinion on hunting.

Activity	2000	2006	2007	2008	2009
Number of Participants in Thousands					
Backpacking (more than 1/4 mile from home)		7,067	6,637	7,867	7,647
Canoeing	10,880	9,154	9,797	9,935	10,058
Climbing		6,314	6,576	7,057	6,148
Hiking	30,051	29,863	29,965	32,511	32,572
Kayaking		6,098	7,762	9,262	9,352
Rafting	5,259	3,609	4,340	4,651	4,318
Trail Running	4,167	4,558	4,216	4,857	4,833

Source: Outdoor Foundation 2009,2010 Report

This trend is not seen as prevalently in angling. Participation of anglers has only slightly declined at both the national and regional level. From 2008 to 2009 the Outdoor Foundation found that 17 percent of Americans participate in fishing (freshwater, saltwater, and/or fly fishing), the highest participation rate out of any activity, though still 200,000 participants lower than the year before.⁸⁰

Visitation to Public Lands

Visitation to protected public lands is a commonly used indicator of trends in recreation. The public’s interest in exploring wild and natural places can be evaluated partially based on the demands placed on public lands, especially those that are managed in a way that protect their natural amenities and recreational values. Calculating visitation numbers can often be challenging and the methods to do so are constantly evolving in an effort to increase accuracy. Although there have been noticeable improvements in standardizing data collection, agencies often struggle to obtain consistent information due to budget and resource constraints. As a result, discrepancies often arise when attempting to track visitation numbers over time.

National Parks

The National Park Service (NPS), established in 1916, is responsible for managing National Parks “to conserve the scenery and the natural and historic objects and

Year	Region	Anglers	Hunters	Wildlife Viewing
1991	U.S.	35,578,000	14,063,000	76,111,000
	Rockies	2,079,000	1,069,000	4,437,000
1996	U.S.	35,246,000	13,975,000	62,868,000
	Rockies	2,411,000	1,061,000	3,099,000
2001	U.S.	34,067,000	13,034,000	66,105,000
	Rockies	2,443,000	1,020,000	4,619,000
2006	U.S.	29,952,000	12,510,000	71,132,000
	Rockies	2,084,000	868,000	4,968,000

Source: U.S. Census Bureau: National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR)

Case Study: Pay-to-Play

Charging fees for use of public lands has been widely debated as a way to fill the gap in public funding. In May 2010, the U.S. Forest Service proposed charging fees in the South Colony Basin in the San Isabel National Forest, generating concern over restrictions of access to public areas. Under the proposal, day hikers would be charged \$10 and campers \$20 to access the wilderness area.

Home to the popular fourteeners, Mount Humboldt, Kit Carson, Crestone Needle, and Crestone Peak, this area is heavily trafficked, receiving between 5,000 and 7,000 visitors per day in high-season.¹ Visits to Colorado's fourteeners have increased by 300 percent in the past 10 years, resulting in soil erosion and vegetation loss and threatening rare plants species, not to mention the traffic jams on the trails.² Battling negative environmental and infrastructure impacts from the large number of visitors, The Colorado Fourteeners Initiative, Rocky Mountain Field Institute and the Forest Service have been cooperating on trail and campsite restoration in the South Colony Basin for the past 13 years. Collection of the fees would go towards upkeep of the restored sites and ranger patrol.³ The San Isabel National Forest faces many trail and road maintenance backlogs due to shortfalls in federal budgets, said Eric Billmeyer of the Rocky Mountain Field Institute.⁴ Thus, generating revenue from fees might be a way for the National Forest to continue providing recreational experiences.

Among opponents of fee proposals is the Western Slope No-Fee Coalition. The coalition is a proponent of a system of limited permits that are available on a fair and equal basis, instead of fees which restricts visitors who simply are not able to pay them.⁵ A survey of fourteener climbers showed that the average amount that they are willing to pay to visit fourteeners, beyond spending on gear and travelling, is \$70 per person per trip, indicating that many visitors will not be dissuaded.⁶ Some people will be discouraged from visiting however, raising concerns for the fairness of fees on public lands. Other opponents are concerned that implementing this charge might lead to similar charges on other fourteener peaks.

Discussion over visitor fees raises questions about other methods for filling the gap in public budgets. Proposals for taxes on outdoor gear have circulated in the outdoor industry, according to Eric Billmeyer of RMFI.⁷ Such taxes would increase the price of equipment and use the margin to fund public land restoration. Where the responsibility of public land restoration falls is a question that regional and national planners need to resolve and act upon to ensure sustainable funding for recreational areas.

According to proponents of free markets, the federal budget shortfalls must be resolved by turning the land over to private business that will bring in the needed funding to manage the land.⁸ Federal land managers are concerned with encroachment of the private sector. Federal ownership of the land might depend on the agencies' ability to collect the funds needed to maintain it. For them, fees represent an alternative to the unlikely scenario of raising funds through general taxes.⁹

¹Rocky Mountain Field Institute, Sangre de Cristo Area, <http://www.rmfi.org/current-work-areas/sangre-de-cristo-wilderness-area>, accessed August 11, 2010

²Mark Hesse, Mount Humboldt Climbing Route Improvement and Restoration Project: A case study in addressing recreational impacts on Colorado's Wilderness Peaks, 2000

³Jason Blevins, Forest Service weighing plan to require fees from peak hikers 05/16/2010 www.denverpost.com/hiking/ci_15095017, accessed August 10, 2010

⁴Eric Billmeyer, Executive Director of Rocky Mountain Field Institute, interview by author, 07-06-10

⁵Western Slope No-Fee Coalition, Save South Colony Basin, <http://westernslopenofee.org/index2.php?display=yes&pageid=32>, accessed August 10, 2010

⁶Mike Smith, Anticipated Questions and Responses to the South Colony Basin Fee Proposal http://www.westernslopenofee.org/pdfuploads/South_Colony_Q_and_A.pdf, accessed August 10, 2010

⁷Eric Billmeyer, Executive Director of Rocky Mountain Field Institute, interview by author, 07-06-10

⁸Terry L. Anderson, Vernon L. Smith, and Emily Simmons, How and Why to Privatize Federal Lands, 1999

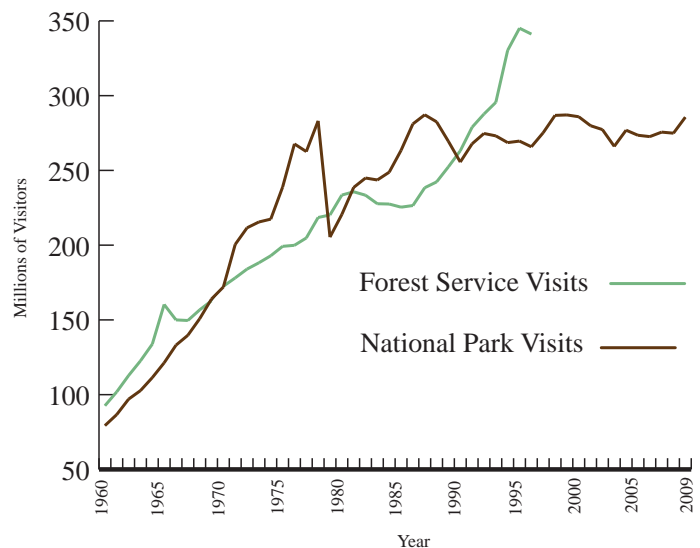
⁹Dave Iverson, To Fee or Not to Fee, August, 10, 1999, <http://www.fs.fed.us/eco/eco-watch/feemot99.html>, accessed August 10, 2010

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."⁷⁷ The NPS, through their Public Use Statistics Office, has the most comprehensive figures on user visitation, dating back to 1960. As **Figure 13** demonstrates, visitation increased dramatically from 79.3 million recreation visits in 1960 to 283.1 million recreation visits in 1978. Although there was a brief decline in the late 1970's, visitation rose again in the 1980's, hitting a peak number of 287.2 million visits in 1987. Although overall visitation was at its highest, per capita visitation was actually decreasing. Research by Pergams and Zaracic shows that per capita national park visits vastly declined between 1981 and 1991 and continue to decline (one to one point three percent a year).⁷⁸ This report has been criticized for concluding that outdoor recreation is decreasing because they only focused on two measures: statistics from national parks and the results of the Fish and Wildlife Survey, thereby largely ignoring many other forms and types of outdoor activities. Also, they ignored the fact that the dramatic initial increase was not a sustainable growth pattern. In recent years, leisure time, income, quality, and funding for the park and highway systems have all leveled off or slightly declined. The only factor that has continued to increase is car ownership.⁷⁹

Despite the recent decrease in per capita visitation, overall visitation has again shown an increase, reaching

285.6 million recreational visits in 2009. Despite some fluctuation over the years, visitation to the country's first national park, Yellowstone has shown an overall increase depicted in **Figure 14**. In 2009, there were 3,295,187 recreational visits to Yellowstone National Park; the highest number of visitors in the history of the park. This increase in visitation adds stress to an already underfunded public resource. This

Figure 13: Annual Visitation to National Parks and National Forests



Source: 1960-1979: U.S. Statistical Abstract 2000 section 7: parks recreation and travel
1979-2009 NPS stats

lack of necessary financing could have future effects on participation and visitation to these resources.

Bureau of Land Management

In 1946, the General Land Office and the U.S. Grazing Service combined to form the Bureau of Land Management (BLM).⁸⁰ The majority of the BLM's property is located in the Rockies region. The BLM manages 25 percent of the land in the eight-state Mountain region. As a result, the BLM's recreation management strategies greatly impact outdoor recreation in the American West. According to **Figure 15**, since 2002, there has been a steady annual four percent increase in recreational visits to BLM land. This increase is incredibly relevant to the Rockies region as the BLM primarily manages the land located in the "west and southern mountain amenity zone." The Bureau of Land Management's mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.⁸¹ This being said, there is often more energy development, associated roads, and hunting on BLM lands due to their less stringent regulations. A greater variety of activities is available and allowed on BLM lands which allows for a wider variation of participants.

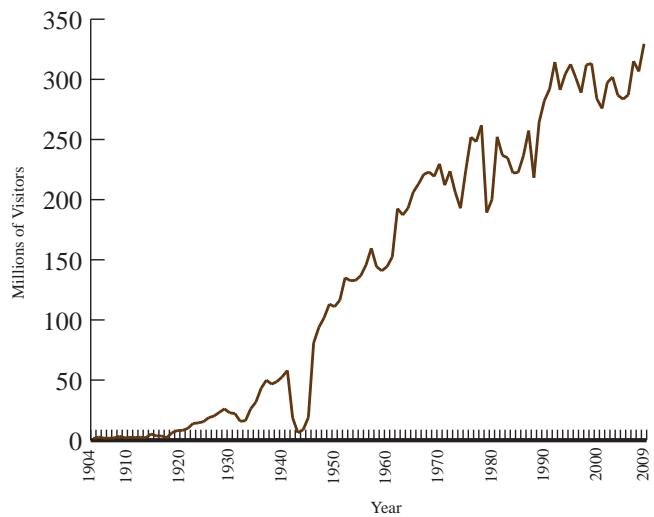
Demographics: Ethnicity

There is a disproportionate number of Caucasians that participate in nature-based recreation, especially when taking into account the national and regional demographic breakdown of ethnicity. As represented in **Figure 16**, the Outdoor Foundation found that nationwide in 2009, 80 percent of outdoor participants were Caucasian, while 82 percent of the total U.S. population is Caucasian.⁸² Hispanics were found to make up six percent of outdoor participants. This comparison does not adequately demonstrate the discrepancy as the U.S. Census defines Hispanics to be of any race. With an increasingly African-American and Hispanic population, the demographic breakdown of recreationists does not coincide with the ethnic diversity of the United States. African Americans made up seven percent of outdoor participants compared to 13 percent of the U.S. population in 2008. Asian/Pacific Islanders and Hispanics represent five percent and six percent of participants versus 0.18 percent and 15.1 percent of the total U.S. population.⁸² Explanations for this inconsistency range from lack of historical involvement by minority groups to issues of inaccessibility. As the Minorities in Recreation case study further discusses, there are numerous efforts underway to encourage members of underrepresented ethnic groups to recreate in the outdoors. This increased effort for accessibility can also be noticed in regard to youth participation

Youth Participation

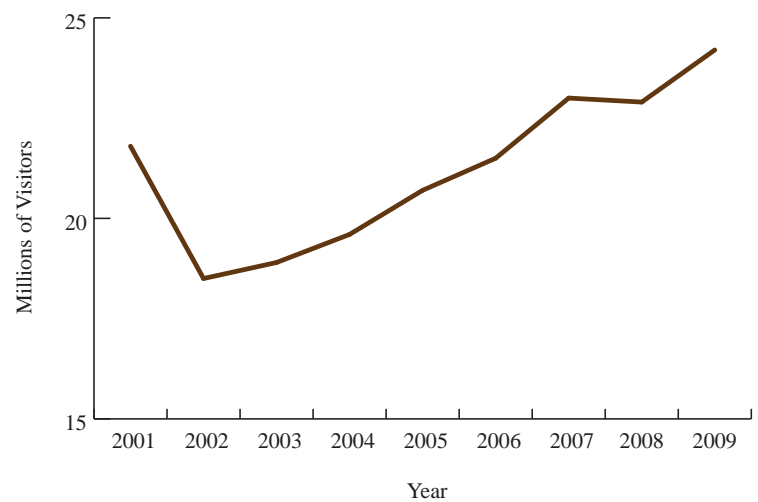
In 2005, author Richard Louv published a book titled *Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder*. He hypothesized that children are suffering from an influx of technology and are not spending enough time outdoors. He then concluded that the lack of

Figure 14: Annual Visits to Yellowstone National Park



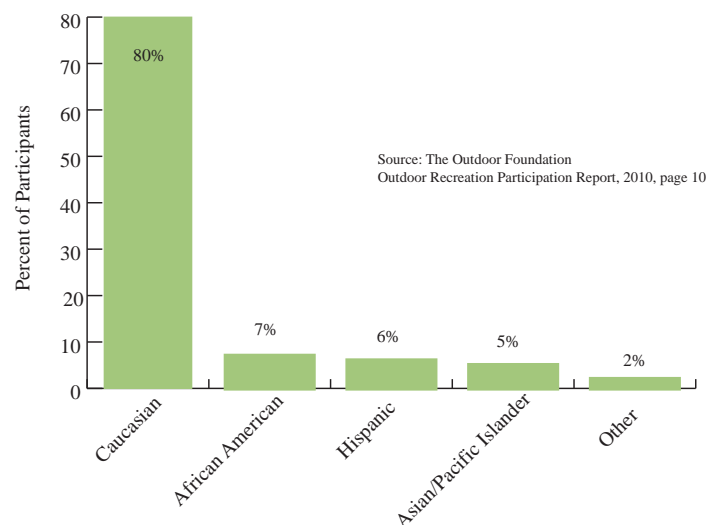
Source: <http://www.nature.nps.gov/stats/viewReport.cfm>

Figure 15: Annual Visits to BLM Land



Source: Bureau of Land Management Public Land Statistics

Figure 16: Ethnicity of Outdoor Participants, 2009



Source: The Outdoor Foundation
Outdoor Recreation Participation Report, 2010, page 10

time in nature is largely responsible for many of the rampant negative trends in children's health including obesity, attention-deficit disorder, and depression.⁸³ Within days of releasing his book, a term previously unknown "nature-deficit disorder" became the centerpiece of heated debates and numerous scholarly studies. The question then became, is youth participation in outdoor recreation significantly declining as Louv theorizes in his book?

Louv himself explains that when he wrote the book, his belief in a decline of youth participation was based on anecdotal evidence as there was a lack of longitudinal studies documenting youth outdoor recreational participation.⁸⁴ The recognition of the need for more studies led to reports such as that of the Outdoor Foundation, which largely agrees with the current trends in children's involvement in nature-based activities. The Outdoor Foundation survey seems to suggest that Louv was in fact correct. As shown in **Figure 17**, adults (18+) encompass the majority of outdoor participants, while youth aged 6 to 17 only represent 22 percent of recreationists while they make up less than 20 percent of the nation's population. Referring to **Figure 18** one can see that the greatest percentage decline in participation from 2006-2009 occurred in the younger generations. Participation by 6-12 year olds decreased 16 percent and 13-17 year olds by nine percent. These are large percentage decreases which cannot be attributed solely to the aging population of the U.S. Youth participation in the outdoors is finding itself competing with more and more indoor and electronically inclined activities, not only changing the nation's skill set but also the physical health of our youth.

Summary of Participation Trends

By evaluating a diverse range of activities and types of participation measurements, this study highlights the changing dynamic of outdoor recreation. Although there are some declines in particular activities, such as



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Case Study: The Health of Recreation

Living near natural areas and experiencing them through outdoor recreation brings a variety of health benefits. The sedentary environment of cities is often revived by the creation of urban parks, popularly called the "lungs of the city". Other urban manifestations of "nature" include community parks, walkways, even gardens and rooms with household plants. More physical activity and lower levels of stress are some of the positive benefits of outdoor recreation. Stress-related problems account for an estimated 75 percent of all visits to primary care physicians.¹ Stress is linked to a wide variety of physical disorders such as common cold, heart attack, cancer, obesity, high systolic blood pressure, elevated heart rates, migraine headaches, rheumatoid arthritis, chronic fatigue, receptiveness to allergies, and other maladies.² Rejuvenation and stress relief have been associated with natural areas away from the cities for many decades, including forests, rivers and lakes, wilderness and prairies.

An activity as simple as walking outside promotes a host of benefits such as weight management, blood pressure control, lower risks of heart attack, stroke, breast cancer, depression, and type two diabetes, stronger muscles, bones and joints, and generally longer lifespan.

According to surveys conducted between 1999 and 2002, only 25 percent of adults and 50 percent of young people, ages 12-21, engage in recommended physical activity in the U.S.,³ indicating the need to encourage more widespread participation in outdoor recreation. Obesity is another indicator of lack of physical activity; 27 percent of Americans today are obese. Physical activity is especially important for the younger generations. Childhood development lacking physical activity may result in obesity or attention deficit hyperactivity disorder (ADHD). Recently experts have identified an affliction known as "nature deficit disorder". While children are spending time in front of computer and television screens, they might be losing important benefits of outdoor recreation. Eight million children are reported to be overweight, with increased chances of cardiovascular diseases, cancer and adult-onset diabetes. Around 4.4 million youth, ages 4-17, have been professionally diagnosed with ADHD. Spending even little time outdoors has been reported to reduce the symptoms of ADHD.

¹Godbey, Geoffrey, *Outdoor Recreation, Health, and Wellness: Understanding and Enhancing the Relationship*. Resources for the Future, 2009, p. 3.

²Godbey, Geoffrey, *Outdoor Recreation, Health, and Wellness: Understanding and Enhancing the Relationship*. Resources for the Future, 2009, p. 3.

³Godbey, Geoffrey, *Outdoor Recreation, Health, and Wellness: Understanding and Enhancing the Relationship*. Resources for the Future, 2009, p. 7

hunting, there is an overall increase in participation. Part of the trend, such as national park visitation numbers, can be attributed to the economic downturn. Despite the fact that the economic downturn may have discouraged more expensive forms of outdoor recreation, the current economic situation has promoted more cost-effective means of spending one's leisure time. Instead of traveling out of the country or spending money in an urban setting, many Americans have opted to take "stay-cations." Traveling to nearby natural environments and camping, hiking, or fishing can provide a more affordable alternative to traditional vacations. The Rockies region is fortunate in that public and accessible land, available to recreate on, is much more plentiful and often aesthetically pleasing than in other parts of the nation.

Looking to the future, it is important for a healthy population that initiatives are developed to encourage people to spend time outdoors. Efforts should be particularly focused towards youth (particularly with current issues of obesity) and historically under participating ethnic and cultural groups. The continued decline in youth participation rates is troubling for our future and that of our region. The Rockies has a rich history of providing premier outdoor recreating opportunities to outdoor enthusiasts and it is in the region's best interest to continue to do so, building a strong foundation for future generations and Rockies' citizens.

Funding for Recreation and Parks

Case Study: Denver Parks and Recreation

While remote natural areas provide unparalleled opportunities for spiritual rejuvenation, solitude and recreation, distance from urban centers is an ever-existing challenge for efforts to connect people to the outdoors. Furthermore, the recent spike in gas prices and the economic recession have increased expenses for trips far from home. Data on participation in outdoor recreation show that people today choose to recreate closer to home and for a shorter amount of time. These trends stress the importance of urban recreation parks. Such parks can also reduce negative impacts on more remote natural areas from overuse, as they attract more visitors and outdoor enthusiasts.

Urban parks bring various economic benefits to communities. They increase property values and bring higher property taxes to the local government. Proximity to park settings also attracts retirees, who bring income in the community in the form of dividends, rent and interest and increase demand for services such as health care, finance, insurance, and real estate. Finally urban parks attract workers and businesses in knowledge-based industries.¹

The Denver Parks and Recreation department offers recreational opportunities closer to home in mountain parks surrounding Colorado's capital such as the Genesee Mountain Park. The Outdoor Recreation department leads youth groups and corporate teams into the park in an effort to connect them to the outdoors and to one another. A complex ropes course, hidden among ponderosa pines and firs is used for team building programs. The outdoor recreation department leads hikes, incorporating environmental ethics and naturalist education. The department employs three full time workers and 14 on-call staff, including old-time outdoor leaders from the nation's best outdoor schools. Demand for these services is growing. Every year between April and October, 4,500 to 5,000 participants take part in programs organized by the Outdoor Recreation Department.

Acquired in 1912 and then expanded in 1937 and 2007, Genesee Park is the city of Denver's first mountain park. Only a thirty-minute drive west of downtown Denver, the park provides an accessible option for those looking to escape from the urban environment to a more natural setting. The Denver mountain park system has a rich history. In 1914, the first reintroduction of buffalo and elk in Colorado took place at Genesee.² In 1918, volunteers from the Colorado Mountain Club developed the Beaver Brook Trail, which to this day offers a "rugged backcountry experience." In 1939, two Civilian Conservation Corps groups, funded under the New Deal, built stone shelters near Genesee Mountain, which are still in existence and are available for reservation. The Mountain Parks have a deep history of use including celebrations conducted by the Daughters of the American Revolution (an event which first started in 1911) and contain many historic structures such as the Chief Hosa Lodge (built in 1918) and the Patrick House (created as a toll station in 1860).³

Denver's Mountain Park system serves many purposes including, but not limited to, providing habitat for buffalo and elk herds, protecting key ecosystem services that the land offers, and making outdoor-recreation activities accessible to the urban and surrounding rural population of Denver. The Outdoor Recreation sector of the Denver Parks and Recreation Department relies heavily on the Genesee Mountain Park as an area to conduct their programs and further their mission. According to their website, the mission of the Outdoor Recreation Program is to "promote public awareness of the natural environment through interactive programs that combine opportunities for recreation and environmental education."⁴ Although they conduct courses in Denver as well, Julie Brown, the program's coordinator, discussed how she preferred teaching in Genesee as it provides a better "sense of place."⁵ The group is unique from traditional outdoor recreation groups in that it tends to target ethnic minorities and youth from income levels that are largely underrepresented in outdoor recreation (see demographics section for further information). In order to encourage involvement, the city helps subsidize fees and offers numerous programs via the Denver Public school system. When asked why more urban youth weren't involved in the program, Julie Brown cited transportation costs and "fear of the unknown" as two major obstacles. In her opinion, because parents of ethnic minorities historically did not spend leisure time in the outdoors, they have many concerns about the lack of safety and potential risk of being in the "unknown" outdoors.⁶

Besides the barriers discussed above, there are also limitations regarding land acquisition and maintenance of the parks. Urban parks across the U.S. face the problem of limited funding, which results in maintenance backlogs. Establishing new recreational areas is also a challenge. Private development of local land also decreases the amount of available land for new parks and also increases land prices, making it harder for urban park managers to bid for it.⁷ Despite these obstacles, urban recreational programs should seek to expand courses in and access to natural lands near cities as an opportunity to encourage nature-based recreation, particularly for those who historically do not participate or get the chance to spend time in the natural environment.

¹ <http://atfiles.org/files/pdf/citiesparksecon.pdf>

² Denver Parks and Recreation. "Outdoor Recreation." Accessed on November 6, 2010. <http://www.denvergov.org/recreation3/OutdoorRecreation/tabid/432114/Default.aspx>.

³ Denver Mountain Parks. "Genesee Park." Accessed on November 6, 2010. <http://mountainparkshistory.org/Parks/genesee.html>

⁴ Denver Mountain Parks. "Genesee Park." Accessed on November 6, 2010. <http://mountainparkshistory.org/Parks/genesee.html>

⁵ Brown, Julie. Interview by author. Golden, Colorado. July 29, 2010.

⁶ Brown, Julie. Interview by author. Golden, Colorado. July 29, 2010.

⁷ <http://www.rff.org/RFF/Documents/RFF-RPT-ORRG-State-of-Outdoors.pdf> page 25

Figure 17: Age of Recreation Participants, 2009

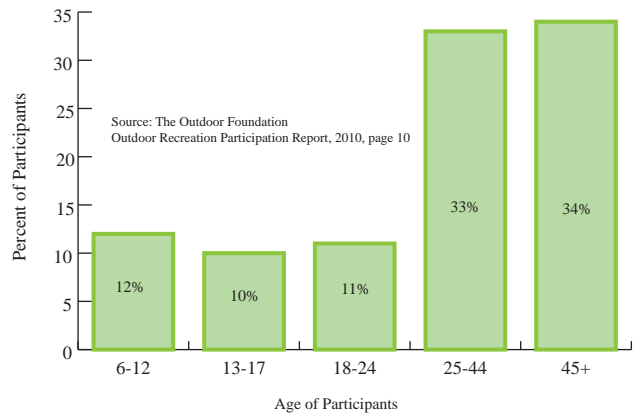
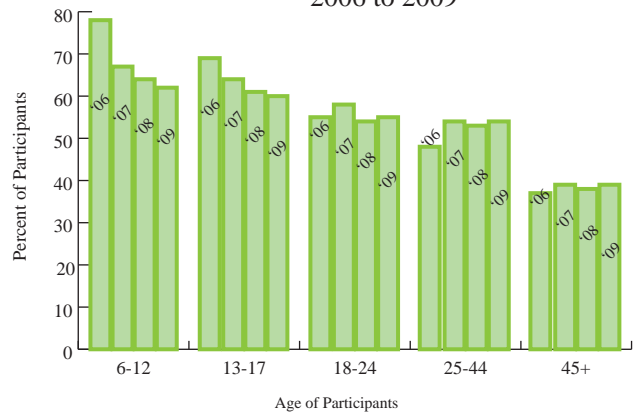


Figure 18: Participation in Outdoor Recreation 2006 to 2009



Case Study: The Rafting and Property Conflict

As discussed elsewhere in this report, a large portion of the Rockies region is public land. Nevertheless, the historic dispute between people asserting their private property rights and others hoping to recreate on or near private land continues to be a pertinent issue. This collision between conflicting values can be seen in the current debate occurring in Colorado as to whether white-water rafters are trespassing if any part of the raft or any member of the crew (accidentally or intentionally) touches the shoreline of adjacent private property. Adjacent land owners point to the 1979 Colorado Supreme Court ruling that “rafters need permission to float through private land or face criminal trespassing charges” while recreationalists emphasize other state statutes that permit “rafters to float through private property without the threat of criminal trespass charges.”¹ In an effort to reduce the ambiguity of the laws, Representative Kathleen Curry of Gunnison County recently introduced House Bill 1188. Under the bill, also known as the River Outfitter Viability Act, outfitters cannot be prosecuted for trespassing when “incidental contact” occurs on rivers that have historically been rafted.² HB-1188 did not pass and the ongoing conflict has yet to be decided and is currently deemed lost. Though this issue relates directly to rafting, the future outcome of similar debates could serve as a precedent for disputes over other types of recreation that occur in areas on or near private property.



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¹ Frosch, Dan. 2010. Dispute Revives Battle Between Rafters and Property Owners. The New York Times. April 16. <http://www.nytimes.com/2010/04/17/us/17colorado.html>

² Valentie, Jimmy. 2010. House committee approves rafting along private land. The Colorado Statesman. February 12. <http://www.coloradostatesman.com/content/991599-house-committee-approves-rafting-along-private-land>

The prosperity of the Rockies' economy is increasingly embedded in its opportunities for outdoor recreation. Sustaining this type of economic growth, however, hinges on maintaining the fragile natural environment of the region. The Rockies' recreation dependent counties are experiencing increased pressure from visitors, volatile and prolonged swings in precipitation patterns, sprawling community development, dwindling agricultural land going to community uses, and cyclic energy and minerals extraction. Protecting these natural resources for recreation requires funding from local sources both public and private and the federal government. **Figure 19** depicts the recent trend in three major sources of public funding. Inflation adjusted figures, represented by the darker lines, illustrate the decline or steady trends in public budgets. As a result, the maintenance of public lands increasingly calls for the participation of non-profit organizations, volunteer labor, and private source of funding. How reliable and sustainable these resources are is a question that will determine the future of public lands and recreational opportunities in the West.

The National Park Service (NPS), which operates more than 10 million acres in the Rockies,⁸⁵ struggles to protect the region's treasured landscapes and provide visitor services. Budget shortfalls have led to a lack of law enforcement in the parks. As a result, national parks have become homes to more than innocent visitors; in some areas marijuana plantations are growing alongside other flora. This has led to fertilizer pollution, irrigation tubing, and wildlife poaching by the plantations' guards. In addition, these national treasures are increasingly becoming “off-limits” to casual visitors due to the higher likelihood of violence for those stumbling into these illegal activities. Damage to cultural artifacts and wildlife have also been prevalent. The National Park Conservation Alliance estimates that the illegal removal of wildlife will lead to the extirpation of 19 species.

Lack of federal funding has resulted in the decrease of interpretive staff, educational brochures, and exhibits. Congested roads and infrastructure damaged by natural disasters are other issues that require more funding. Invasion of nonnative species is a major threat to native ones, second to habitat loss. Close to 2.6 million acres of national park land in the U.S. is today in need of management against nonnative species. Maintenance of trails and facilities has also been neglected. Responsibilities of National Park Service staff increasingly are focused on protecting vulnerable places, such as the Washington Mall, the Statue of Liberty, and Independence Hall, from terrorism; this responsibility comes under the jurisdiction of the National Park Service. These responsibilities erode NPS' budget and ability to effectively manage the remainder of the NPS system.⁸⁶ A study by the National Park Conservation Association reports that an additional \$800 million per year are needed to address these issues and maintain America's national parks.⁸⁷

Lack of law enforcement personnel and funding is a challenge to the U.S. Forest Service as well. Cultivation or use of illicit drugs, vandalism to facilities, recreational fee violations, unlawful trail creation, and illegal off-highway vehicle travel were among the main management issues faced by Forest Service officers.⁸⁸ Despite these issues, funding for the Forest Service Recreation, Wilderness and Heritage Program has stayed constant in inflation-adjusted terms since 2001 (see **Figure 19**). The Recreation, Wilderness and Heritage program is meant to provide a “wide range of recreation settings, services and infrastructure needed to support over 205 million visits each year to national forests.”⁸⁹ This includes management of wilderness areas and heritage sites on national forest lands. Pike-San Isabel National Forest in Colorado is one example of the inability of the Forest Service to handle restoration and conservation efforts. Despite efforts from several nonprofit organizations to restore

the forest's trails, lack of funding and personnel has resulted in trail and road maintenance backlogs.⁹⁰ Other public lands face similar problems. State parks have also reported budget shortfalls which provide challenges for operations, maintenance, new construction and land acquisition.⁹¹ Urban Park Directors reported similar issues; 65 percent of responses to a survey indicated insufficient funds for operation and maintenance as a major problem.⁹² National Wildlife Refuges similarly face shortfalls in staff and funding to maintain facilities and natural areas. They report a maintenance backlog of \$2.6 billion.

Another source of funding for recreation and conservation on public land is the Land and Water Conservation Fund (LWCF). Its purpose is the purchase and development of federal land under the Bureau of Land Management, Fish and Wildlife Service, Forest Service and National Park Service. The fund also assists states' efforts in maintaining parks and recreation lands, through a matching grant program.⁹³ Inflation-adjusted annual appropriations for this fund in **Figure 19** show a 79 percent decrease between 2000 and 2008. In 2008, states reported a \$27 billion shortfall in state matching funding.

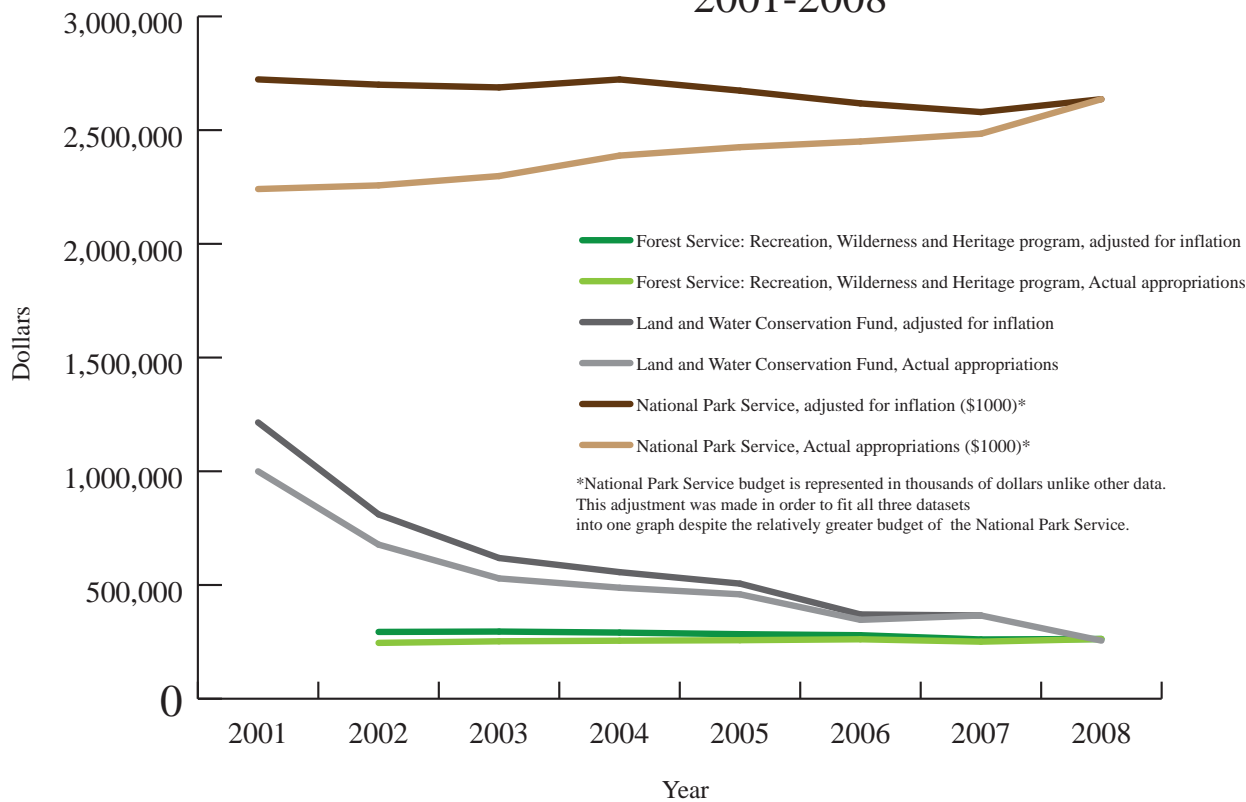
Lack of federal sources of funding is a challenge for communities to continue providing recreation resources for the American public.⁹⁴ As a result, communities have actively started to cast their vote towards conservation. According to the Trust for Public Lands, since 1996 more than 75 percent of around 1,500 proposed conservation funding measures have passed as ballot initiatives at the county, municipal, or district level. Other innovative local funding projects include GOCO, the Great Outdoors Colorado Trust

Fund, which directs proceeds from a state lottery towards outdoor recreation projects.

Eric Billmeyer, Executive Director of Rocky Mountain Field Institute (RMFI), addressed the issue of federal funding shortfalls, saying, "Recreational issues now are being taken care of by recreational enthusiasts, or environmental groups, who have that passion to focus in on a particular interest or their area of expertise."⁹⁵ A report by Resources for the Future also found that non-profit organizations or "friends groups" are becoming more involved with maintenance of American public lands. City and state parks, in particular, were reported to be increasingly dependent on limited funding from support groups.⁹⁶ National Forests are also being supported by nonprofits. Eric Billmeyer noted that not only funding but also responsibilities such as project planning, environmental compliance, implementation, and monitoring of national forests are being taken over by friends groups.⁹⁵ The Rocky Mountain Field Institute works on preservation and conservation of areas impacted by climbers, hikers, mountain bikers, and recently, motorized users. RMFI does receive funding from federal agencies. In 2009, government grants made up less than half of their annual budget. The bulk came from charitable organizations, while the rest was filled by corporate and individual contributions. This nonprofit is almost exclusively based on volunteer labor, using around 1,000 volunteers a year to restore and maintain the public recreation areas. Filling the gap in public funding with more nonprofits, however, could lead them to compete for the same limited sources of funding and volunteers, warned Billmeyer. Qualified crew leaders are also needed to lead volunteer groups on trail restoration



Figure 19: Federal Recreation and Conservation Funding
2001-2008



Source: Land and Water Conservation fund: Congressional Research Service, Land and Water Conservation Fund: Overview, Funding History, and Current Issues, July 10, 2006, available at: <http://www.nationalaglawcenter.org/assets/crs/RL33531.pdf>
 Congressional Research Service, Interior, Environment, and Related Agencies: FY2008 Appropriations, February 3, 2008, available at: <http://www.nationalaglawcenter.org/assets/crs/RL34011.pdf>
 Forest Service: USDA, Forest Service, Budget, <http://www.fs.fed.us/aboutus/budget/> National Park Service: U.S. National Park Service, National Park Statistical Abstract

projects. Due to these constraints, depending so heavily on the work of nonprofits might not be a sustainable future for Western public lands.

The private sector has also played a major role in the management of public lands. During the early years of the National Park Service, its first director, Stephen Mather, proclaimed, "Scenery is a hollow enjoyment to the tourist who sets out in the morning after an indigestible breakfast and a fitful night's sleep on an impossible bed."⁹⁷ His words echo the widespread notion that, for many, comfort is an integral part of recreation and tourism. By leasing land to concessionaire enterprises, the National Park Service has cooperated with the private sector on the development of the infrastructure and lodging needed to accommodate visitors. The Forest Service also encourages private enterprises. The construction of major ski resorts has been the result of cooperation between the Forest Service which owns the land and concessionaire businesses that brought the investment dollars. Today 2,000 national forest campgrounds are run under permit by concessionaires. Concessionaire management has started to play a more major role on national forests. Acceptance of private investment and concessionaire control has provided an alternative to closing facilities that cannot be maintained due to inadequate governmental funding.⁹⁸ While concessionaires provide crucial visitor services, scrutinizing their impact on the natural resources and the public interest continues to be a critical responsibility of public land agencies.

Despite cooperation with the private sector, fund-

ing shortfall issues in federal and state budgets remain. The influence of the public on Western lands depends on the ability of public agencies to provide sufficient funding for their maintenance. One way that federal land agencies can increase budgets for recreation management is through user fees as further discussed in a later case study.

Ecological Impact of nature-based recreation in the West

How can a single individual or a small group harm nature in the process of "recreating" outdoors? Many disregard the possible impact of recreationists scattered over vast areas and the harmful effects on the expansive public lands of the West. Others play a "shift the blame" game of arguing that certain forms of recreation are more harmful than others. For instance, some argue that horses do more damage to trails than backpackers, or better yet: motorized vehicles produce more damage than either horses or hikers. And so the arguments go. What is certain is the difference between impact of the "densely packed" vs. "dispersed" types of recreation in the Rockies. Similar to prior era resource extraction, such as mining and forest clearing that had intense impact on limited areas, today ski areas are often developed on leased public land by clear-cutting slopes. However, hikers, hunters, fishermen, even mountain bikers, spread their recreation over vast stretches of mostly public lands, which now show clear effects of repetitive use.

Increased visitation to Western public lands, made possible by the advent of the internal combustion vehicle



(cars, motor bikes, ATV's) and the economic prosperity following World War II, raises concerns about the negative impacts recreation has on the environment. Such effects vary in magnitude and gravity from soil compaction by a hiker to clear-cutting forests for ski resorts. These impacts of human activity support the widespread notion that Americans "love their public lands to death". Studies have reported on the resulting deterioration of natural resources in national parks and forest service land.⁹⁹ An analogy helps explain the problem. Consider the difference between tightly spaced houses in cities vs. the spread and "sprawl" of houses in the suburbs. Today, individual outdoor recreation, while sometimes densely packed into ski areas and built-up areas in national parks, often leads to the dispersed impact of millions of individuals, spread out across the vast public lands. The question then arises: when do dispersed recreationists start to harm the very lands they come to enjoy?

Among the most common environmental impacts is trampling, which damages vegetation and compacts the soil. This alters the organic content and microorganism composition in the soil, making it harder for plants to grow back, even in the absence of future disturbance.¹⁰⁰ The initial trampling has a greater environmental impact than stepping on an already disturbed area. Thus, conservation can better be achieved through efforts to concentrate visitors in a few designated areas rather than to disperse their impact. The high-elevation alpine ecosystems of the region are especially vulnerable. Recovery rates for some alpine flora in the Southern Rockies are ten to a thousand times longer than for lower elevation plants.¹⁰¹ In Glacier National Park, effects of trampling remain for 30 years after disturbance ceases.¹⁰² Trampling is often more severe in cases of off-highway-off-trail vehicle use (ATV), which cause erosion and sediment runoff as marshy areas and slopes lose their vegetative cover and inevitably erode. Campfires can lead to the loss of wood debris, which provides crucial food source and habitat for invertebrates, small mammals, and birds. Compared to usu-

al firewood collection practices, picking wood that can only be broken by hand has little impact.¹¹⁰

Harassment and disturbance of wildlife is another widespread human impact. Such occurrences can endanger animals by depleting their energy reserves. Disturbance of wildlife's habitat does not always occur due to heavy visitation. A single hunter or skier is often enough to cause elk or moose to flee. Some animals are more susceptible to disturbance such as wolves and bald eagles, which may not return to feeding sites for several hours after disturbance. Species that are usually not hunted and ones that are giving birth are more easily disturbed than others. Finally, cases of carelessness, such as escaped campfires and improper food storage which attracts bears and other animals, also result in widespread damage.

"Tread Lightly," a nonprofit, provides guidelines for responsible recreation for motorized users, urging visitors to minimize wheel spin, not widen the trail, and abide by existing regulations such as designated trails.¹⁰³ Similarly, the "Leave No Trace" guidelines, developed by the Leave No Trace Center for Outdoor Ethics, provide seven general rules for minimizing impact when camping.¹⁰⁴ A combination of education, management, maintenance of high-use trails and campsites, and restoration can minimize such negative impacts. Maintaining the high environmental quality of the region would sustain the recreational opportunities of the Rockies and their economic, health, and spiritual benefits.

Competing Uses of Public Land

Balancing diverse opinions on how public lands should be used is an issue at the forefront of public debate that has existed since the establishment of federal lands. Conflicts abound not only between preservationists and developers but also among those who feel that the land should be managed strictly for its economic value. Gifford Pinchot, one of the nation's first well known foresters and father of the USFS, played a key role in creating a bridge

between multiple conflicting land ethics. Pinchot recommended a more comprehensive management strategy that places some restrictions on the extractive industries rather than completely halting all timber operations. According to him, “conservation is the foresighted utilization, preservation and/or renewal of forests, waters, lands and minerals, for the greatest good of the greatest number for the longest time.”¹⁰⁵

Land Designation and Multiple-Use Mandates

The idea of managing public land to accommodate as many citizens’ needs and wants manifests itself in both the multiple designations of land and the multiple-use mandates of the Bureau of Land Management (BLM) and the Forest Service (FS). As already mentioned, federal land is managed by different agencies within the Department of the Interior and the Department of Agriculture. Each agency has unique goals and priorities they are required to meet. As another measure, land itself can be established with unique purpose, such as the federally designated Wilderness Areas. In order to provide guidance to the FS and BLM with respect to the issue of balancing the concerns of multiple stakeholders and interest groups, Congress passed the Multiple-Use Sustainable Yield Act in 1960 (MUSYA) and the Federal Land Policy and Management Act in 1976 (FLPMA). MUSYA, which applies to the Forest Service, mandates that

“national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes”.¹⁰⁶

FLPMA, which applies to BLM land, states that

“the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air, and atmospheric, water resource, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use”.¹⁰⁷

The Act does not rank the different uses but rather instructs the agency to consider each of these uses when developing land management plans. Furthermore, the legislation considers ecological limitations of the land by requiring agencies to achieve maximum public benefit within the constraints of sustainable-yields so that the resources will be available for future generations.

Criticism of the Multiple-Use, Sustained-Yield Mandates

The multiple-use mandates are often criticized for not placing adequate restriction on agency behavior resulting in decisions being made based on political and economic pressures rather than scientific and ecological factors. Michael Blumm highlights this challenge in his paper “Public Choice Theory and the Public Lands: Why ‘Multiple

Use’ Failed.”¹⁰⁸ According to Public Choice Theory, a small group of people with a large stake in the decision-making process tends to have a disproportionate affect on the outcome of the process. As a result, the common interest of the people is misrepresented and undervalued. In his words, “sustained yield means sustained production of all resources over the long term, and that multiple use means simultaneous resource management, not the landscape of segregated dominant uses we see today.”¹⁰⁹

As long ago as 1985, Bruce Babbitt, who was at the time governor of Arizona, recognized the need for a redefinition of multiple uses.

“The old concept of *multiple use* no longer fits the reality of the New West. It must be replaced by a concept of *public use*... the highest, best and most productive use of western public land will usually be for public purposes – watershed, wildlife and *recreation*. Mining entry must be regulated, timber cutting must be honestly subordinated to regeneration and restoration of grasslands.”¹¹⁷ (emphasis added)

Beyond placing a greater importance on public goods over private industry gains, management must also strive to use a more comprehensive and adaptive approach that stresses ecosystem science.

Conclusion

Recreation and tourism are traditionally regarded as a cleaner, more sustainable, source of income than the prior economic sectors of the “extractive” era in the Rockies. The economic value of natural areas and recreational opportunities provides a powerful argument for their protection. Thus, the shift away from extractive and manufacturing economies toward service economies is commonly identified as a potential solution to historic environmental issues. This notion relies on the presumption that service economies are less harmful to natural resources than are industrial economies.

In the Rockies, however, the large recreation and tourism industry is inextricably linked to the region’s public lands and opportunities for outdoor recreation. The growth of this industry naturally leads to increased pressures on the natural environment in the form of hikers’ impacts, growing population, and expanding second-home developments and resorts in the Wildland-Urban Interface. Degradation of the open space and natural environment that characterize the West’s recreational foundation can undermine the recreation driven economy. Thus, the classic mantra of balance between environmental and economic interests becomes balance in recreation for the benefit of both the economy and the environment.

Post World War II the Rockies region has experienced a sustained boom in population, economic activity, and recreation. It is complex to find ways to balance these often contradictory pressures; however numerous tools and strategies exist and are being tried throughout the Rockies and beyond. The economic boom and population rise can

harmonize with careful planning of Western development, through initiatives such as “smart cities”. In the realm of recreation, “multiple use” offers options to separate incompatible types of recreation, such as cross country skiers versus snowmobiles. The diversification of the Western economy away from heavy resource extraction of the early decades, results in a diverse array of high skilled workers in the professional, scientific and technical services. These immigrants are both attracted to the region for its recreational opportunities and are capable of agitating for protection of the same open spaces, wildlife and environment. The old adage, “If it pays, it stays”, suggests that the recreational activities and the economic activity they stimulate will play a major role in the future of the Rockies region. Recognition of their multiple benefits calls for a re-examination of how we view tourism. Federal and state agencies, nonprofits, and the private sector play important roles in the careful management of this industry.

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Brendan Boepple is a student researcher for the 2010/2011 State of the Rockies Project. Originally from Wilton, Connecticut, Brendan is a Political Science major and an Environmental Issues minor. While growing up Brendan developed a love for the outdoors and the environment as his family traveled to many National Parks and he later worked with environmental organizations like Trout Unlimited and his local conservation land trust. He spent the fall semester of 2009 studying International Relations in Geneva, Switzerland and hopes to pursue a career in foreign policy after he graduates in May of 2011. His interests include skiing and fly-fishing, two activities that drew him to the Rocky Mountain region.



Russell Clarke is the 2010/2011 program coordinator for the State of the Rockies Project. Last year he researched agricultural production in the Rockies as a student researcher for the 2009/10 State of the Rockies Project. A native of West Simsbury, Connecticut, Russell graduated in May 2010 with a major in Economics and a minor in Environmental Issues. His senior thesis focused on the effect of severance taxes in the state of Colorado. Russell is very interested in energy issues and hopes to eventually work in a related field.



Jeremiah Cox is a 2010/2011 student researcher from New York City and will graduate in 2011 with a degree in Environmental Science. As a native Manhattanite, his interest in environmental conservation and sustainable infrastructure began during his daily forty-five minute commute by subway to and from school. He came to Colorado College to experience something different. His hobbies include photography and he maintains a personal website, SubwayNut.com, of his work.

Emil Dimantchev is a project researcher for the 2010/2011 State of the Rockies Project. He worked as a student researcher for the Rockies Project in the summer of 2009, writing reports on the economic state of agriculture in the Rockies and federal agricultural subsidies. He is from Bulgaria and will graduate in 2011 with a major in mathematical economics and a minor in environmental issues. His academic interest lies in environmental economics and policy. His extracurricular activities, such as the Colorado College Environmental Action Group and the Colorado College Sustainability Council, nurture his passion for environmental stewardship. In his leisure time, he likes to hike, mountaineer, bike, swim and explore new places.



Matthew C. Gottfried is the GIS Technical Director at Colorado College and the 2010 technical liaison for the State of the Rockies Project, overseeing tasks including data assimilation, GIS analysis, and logistics management. He received his B.S. (1999) in Field Biology and Environmental Studies from Ohio Northern University and his M.A. (2005) in Geography and Planning from University of Toledo where his focus was on land use planning and GIS. Matt's regional research focus includes studying the biogeography of critical species, land use planning, and conservation management practices of local natural resources.



Walter E. Hecox is professor of economics and environmental science, director of the Slade sustainable Development Workshop, and project director for the State of the Rockies Project at Colorado College, Colorado Springs, Colorado. Walt received his B.A. degree from Colorado College in 1964 and an M.A. (1967) and Ph.D. (1970) from Syracuse University, Syracuse, New York. He teaches courses in ecological economics and sustainable development. He has conducted research and taken leave to work for the World Bank, U.S. Agency for International Development, U.S. Department of Energy, and Colorado Department of Natural Resources. He is author of Charting the Colorado Plateau: an Economic and Demographic Exploration (The Grand Canyon Trust, 1996), co-author of Beyond the Boundaries: the Human and Natural Communities of the Greater Grand Canyon (Grand Canyon Trust, 1997), and co-editor of the Colorado College *State of the Rockies Report Cards*.



Anna Johnson is student researcher for the 2010/2011 State of the Rockies project. From Evanston, Illinois, Anna will graduate in 2011 with a degree in Political Science and a minor in Environmental Issues. Anna's interest in the environment can be traced to the summers she spent going to camp in northern Ontario, where she both grew to love the outdoors and witnessed the devastating effects of logging. In her spare time, she enjoys frolicking outside, playing music, and rollerblading.



Zoe Osterman is a student researcher for the 2010/11 State of the Rockies Project. She will graduate in 2011 with an Environmental Policy major and Spanish minor. Born in Villanova, Pennsylvania, she attended high school at Choate Rosemary Hall in Wallingford, Connecticut. Having spent the past two years interning in Carbondale, Colorado, she looks forward to learning more about the interplay of policies, economy, and the environment in the Rockies region. Zoe is also the captain of the Colorado College club ice hockey team and extracurricular activities include snowboarding, exploring the Rockies' mountains, and traveling.



Rebecca Spira is a student researcher for the 2010/2011 State of the Rockies Project and native of Oak Park, Illinois. Becca will graduate in May 2011 with a major in Philosophy, and strong interests in legal and political thought. She is eager to explore the relationships between societies and their environment from the perspectives of eco-psychology and conservation psychology with connection to influences and impacts of infrastructural change. She is looking forward to engaging with the people and environment of the Rockies throughout the summer, and enjoys writing, yoga, running and hiking in beautiful places.



Stephen G. Weaver is an award-winning photographer with over 30 years experience making images of the natural world and serves as technical director for the Colorado College geology department. Educated as a geologist, Steve combines his scientific knowledge with his photographic abilities to produce stunning images that illustrate the structure and composition of the earth and its natural systems. As an undergraduate geology student, he first visited the Rocky Mountains where he fell in love with the mountain environment and the grand landscapes of the West. Steve currently photographs throughout North America with a major emphasis on mountain and desert environments. His use of a 3x5 large format view camera allows him to capture images with amazing clarity and depth.



Greg Zimmerman graduated from Colorado College in 2006 with a B.A. degree in Environmental Science, and was a student researcher for the 2005/2006 State of the Rockies Project. Since Colorado College, Greg has worked with the Colorado Watershed Assembly and was a guest contributor to the 2010 Report Card. In the fall of 2010 Greg is entering a Master of Environmental Management program at the Yale School of Forestry and Environmental Studies.





Students Researching, Reporting, and Engaging:

The Colorado College *State of the Rockies Report Card*, published annually since 2004, is the culmination of research and writing by a team of Colorado College student researchers. Each year a new team of students studies critical issues affecting the Rockies region of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

Colorado College, a liberal arts college of national distinction, is indelibly linked to the Rockies. Through its Block Plan, students take one course at a time, and explore the Rockies and Southwest as classes embark in extended field study. Their sense of “place” runs deep, as they ford streams and explore acequias to study the cultural, environmental, and economic issues of water; as they camp in the Rocky Mountains to understand its geology; as they visit the West’s oil fields to learn about energy concerns and hike through forests to experience the biology of pest-ridden trees and changing owl populations. CC encourages a spirit of intellectual adventure, critical thinking, and hands-on learning, where education and life intertwine.

The Colorado College State of the Rockies Project dovetails perfectly with that philosophy, providing research opportunities for CC students and a means for the college to “give back” to the region in a meaningful way. The *Report Card* fosters a sense of citizenship for Colorado College graduates and the broader regional community.

Research

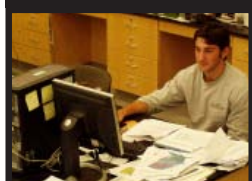
During summer field work, the student researchers pack into a van and cover thousands of miles of the Rocky Mountain West as they study the landscape, interview stakeholders, and challenge assumptions. Back on campus, they mine data, crunch numbers, and analyze information.

Report

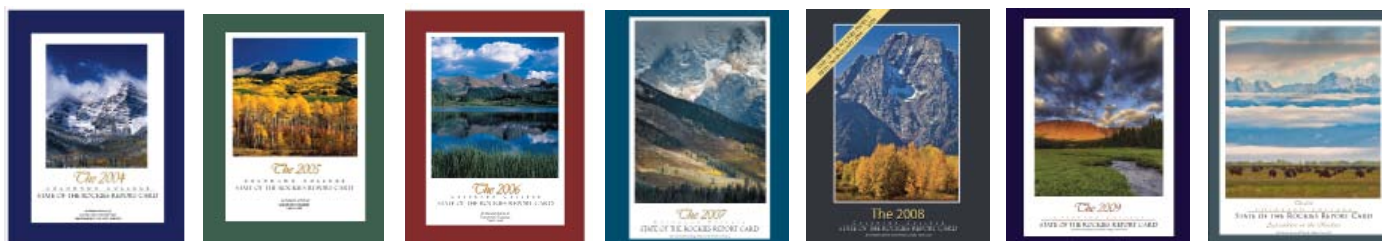
Working collaboratively with faculty, the student researchers write their reports, create charts and graphics, and work with editors to fine-tune each *Report Card* section. Their reports are subjected to external review before final publication.

Engage

Through a companion lecture series on campus, the naming of a Champion of the Rockies, and the annual State of the Rockies Conference, citizens and experts meet to discuss the future of our region.



Each *Report Card* has great impact: Media coverage of *Report Cards* has reached millions of readers, and the 2006 report section on climate change was included in a brief presented to the U.S. Supreme Court. Government leaders, scientists, ranchers, environmentalists, sociologists, journalists, and concerned citizens refer to the Colorado College *State of the Rockies Report Card* to understand the most pressing issues affecting the growing Rockies region.



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www.stateoftherockies.com

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